THE DESERT WORLD.

by Arthur Mangin.

Acc no 56
dt. 15/12/06

BOOK I.

THE DESERTS OF EUROPE AND ASIA: THE LANDES, THE DUNES, AND THE STEPPES.

TRANSFERRED FROM
Imperial Library 13 MAY 1903

CHAPTER I.

THE DESERT IN FRANCE:—THE LANDES OF BRITTANY.

TO those whose imaginations have been kindled by glowing pictures of the African Sahara and the Arabian wilderness, it will be, perhaps, a matter of surprise to learn that even fertile and civilized Europe includes within her boundaries regions which are scarcely less cheerless or desolate, though, happily, of far inferior extent.

Thus, it would be possible for a Frenchman whom the engagements of business, the pressure of limited means, or the ties of home, prevented from undertaking any distant voyages, to obtain a vivid conception of the great Deserts of the World without crossing the confines of his own country.

In France, so richly cultivated, so laborious, and so blessed by genial Nature, there are, nevertheless, a few districts where her sons may wholly forget—may almost disbelieve in the existence of—her

cities stirring with the "hum of men," her vineyards and her gardens, her grassy pastures, her prolific meadows, her well-ordered highways, and those "iron roads" which are the incessant channels of such restless energy, movement, and vigorous life.

Bare and desolate enough, and as yet unconquered by advancing civilization, are the mountains of France: among its gigantic ranges of the Jura, the Vosges, and the Cevennes,* the traveller may still ascend precipitous rocks, may hearken to the deafening roar of foamy torrents, may contemplate with astonished gaze the masses of stone upheaved in some convulsion of the ancient world, may listen to the hoarse cry of the eagle, as

> "Close to the sun in lonely lands,
> Ringed with the azure world he stands."

In the Alps, profaned as they now-a-days are by noisy tourists; in the Pyrenees, whither Alpine clubs have not yet extended their encroachments, he who ascends some 8000 or 9000 feet may still wander among ice and snow which the sun's rays never loosen, and gather in his mind's eye a picture of the colossal peaks of Asia and the New World, of the virgin summits of the Himalaya and the Cordilleras. There you may follow with entranced vision the swooping wing of the lammergeyer; or trace the nimble feet of the shy chamois; or, like Manfred, muse and wander, while

> "The sunbow's rays still arch
> The torrent with the many hues of heaven,
> And roll the sheeted silver's waving column
> O'er the crag's headlong perpendicular."

Mayhap, if favoured by Fortune, you may even find yourself face to face, in the abrupt bend of some obscure ravine, with a bear, which, calm and unsuspicious, looks on as you pass by, as if he were ignorant of men, and had never heard the ringing echoes of the hunter's rifle.

* The Jura chain is an offset of the great Alpine system, and situated on the border of Switzerland; the Vosges separate the valley of the Rhine from that of the Moselle (greatest elevation, 4669 feet); and the Cevennes that of the Loire from the basin of the Rhone (greatest elevation, 5794 feet).

A PYRENEAN

It is less easy—in France, at least—to discover the old shadowy, leafy, almost impervious forest. The most celebrated—that of Fontainebleau—despite its enormous trees, its rudely broken surface, its stags and roebucks reserved for imperial sport, despite its few adders and problematical vipers, is now little better than a rendezvous for amateur artists and listless idlers. Its well-kept avenues resound with rapid wheels, and you can scarcely stir a step without finding the associations of the place interrupted by the stalls of vendors of cakes or the apparatus of itinerant gamblers. This profanation is surely to be regretted, for the Forest exhibits many landscapes of surpassing interest, as the rocks of Franchart, the glens of Apremont, and, above all, that Sahara in miniature, the sands of Arbonne. Nor would one willingly forget the historical memories which immortalize the famous palace where Francis I. received his after-time conqueror, Charles V.; where the wayward and half-insane Christina of Sweden listened with cruel delight to the groans of the murdered Monaldeschi; where Madame Du Barry lavished her shameless graces; where Pope Pius VII. lingered through two years of gilded captivity; and where Napoleon bade farewell to his dreams of universal empire.*

Among the uncultivated regions of France we may mention the marshes of the Bresse, of Forez, of the Sologne, of Upper Brittany, and of Picardy. The greater portion of these marshes, owing to the peat which forms their bed, is vigorously and not unsuccessfully worked. They are traversed by trenches dug at right angles, and on whose border are placed the turf-cutter's little hut, and the furnace in which the peat is baked. Their lagoons, and the canals which connect them, swarm with flat-bottomed boats. Man, in a word, has taken possession of them; braving the unhealthy vapours which enfeeble his frame and shorten his life, he builds his squalid abode on the rising ground left uncovered by the waters. The largest of these peat-bogs are those of Montoir and the Grand Brière, near Savenay, in the department of the Loire Inférieure. They occupy a considerable area

* The forest covers an area of about sixty-four square miles. The château, originally founded by Robert the Pious in 975–990, was rebuilt in the twelfth century by Louis VII.

of a vast desolate plain, where a few lean sheep crop an insufficient food from the scanty herbage, and whose sole product is turf. "This country," says Jules Janin,* "has no other harvest, no other wealth than its peat; neither fruit, nor flowers, nor corn, nor pastures, nor repose, nor wellbeing; the earth is wild, the sky one of iron. It is a region of stagnant waters, pestiferous exhalations, decrepit men, famished animals."

The swampy levels of Montoir form the natural vestibule to the Armorican Peninsula, which of all the French provinces has the longest and the most vigorously withstood the advance of civilization, its ideas, and its modern institutions, and has the most rigidly preserved its primitive character. There are many nooks and corners in Brittany scarcely changed in outward aspect or inner life since the remote days when it was a valued appanage of the English crown. They seem to have been plunged in a sleep of centuries, from which the shrill whistle of the steam-engine is only just awakening them. The country is undulating and broken; in the central districts it assumes quite a mountainous character. It is true that its heights are only of moderate elevation, the loftiest not exceeding 2000 feet; but they are barren, rude, and sombre in appearance. The coast is picturesque enough to delight the most zealous artist, bordered with high and abrupt cliffs, and lined, as it were, with a beach where the waters of the Channel ever break in floods of spray and foam, and where masses of rock lie scattered of immense size and the most fantastic forms.

Geologically speaking, Brittany may be regarded as a prolongation of our English mountains, to which, like all the north-west coast of France, they were anciently united. In some remote era a vast convulsion opened in the solid land a chasm through which the oceans poured their meeting waters and separated our beloved island from the European continent; the sole condition under which, perhaps, it was possible for the English people to have accomplished their destiny. Anchored amid the protecting seas, we are able to regard from afar, like a watchman from a tower, the convulsions that

* Jules Janin, "La Bretagne" (ed. Paris, 1845), c. xvii.

sweep across the face of Europe. Like the watchman, we cannot refuse to be moved by the spectacle, by the stir and the tumult; but it is only considerations of duty that can induce us to descend from our security, and mingle in the fray.

Brittany belongs to what geologists call the primitive and intermediary formations. It is divided into three belts or longitudinal trenches: those of the north and south consist of primitive rocks, granite and porphyry; the central appertains to a more recent formation, to the group of intermediary or secondary rocks, composed in the main of schists and mica-schists, quartz, and gneiss. Schist prevails over a considerable area, and is prolonged to the very extremity of the peninsula. These hard, compact, impervious rocks, are entirely bare in many places; elsewhere, and over a great extent, they are covered but by a thin layer of clayey and sandy earth, where the sudden slopes of the soil do not allow the rains to settle.

Here are the plains, often of considerable dimensions, which, bristling with rocks, and broken up by ravines, water-courses, and marshes, constitute the Landes of Brittany. True deserts these, relieved at distant points by an isolated hut, or by a wandering herd of swine, lean cows, and meagre-looking horses, which obtain a scanty subsistence from the heathery soil, sown here and there with tufts of furze, broom, and fern.

Under a sky of almost continual sombreness, like that which impends over the pottery districts of England, these landes present a sufficiently sinister and uninviting aspect. The traveller, as he crosses their sepulchral wastes, will hardly marvel that they were anciently a chosen seat of Druidical worship. Like Dartmoor, they would seem to have offered a peculiarly fitting arena for the rites and ceremonies of a creed which we know to have been mysterious in character and sanguinary in spirit. They are covered with its gray memorials: the masses of granite of different shapes known as *Maen hirs*, or "long stones," and *peulvens*, which appear to have been employed as sepulchral monuments; *dolmens*, or "table-stones;" and *cromlechs* (*crom*, bowed or bending, and *lech*, a stone), which anti-

quaries are now agreed to regard as the remains of the ancient cemeteries or burial places. At Camac, near Quiberon Bay, may be seen a truly remarkable example of the *Parallelitha*, or avenues of upright stones, forming five parallel rows, which extend for miles over the dreary moorland. What were their uses it is impossible to determine, for there seems little ground to believe, as some writers would have us believe, that they were "serpent temples," where the old Ophite worship was celebrated. We can only gaze at them in wonder: mile upon mile of gray lichen-stained stones, some twenty feet high, laboriously fashioned and raised in their present places by the hand of man some twenty centuries agone.*

On these very *dolmens*, where the priests of the Tentates were wont to immolate their human victims to their unknown god, the mediæval sorcerers and sorceresses celebrated the Black Mass, or Mass of Satan, in terrible burlesque of the Roman Catholic sacrament, concocted their abominable philtres, and performed their dreary incantations. Alas for human nature! in every age it is a prey to the wildest credulity. Even in the present day more than one superstition hovers around the monuments of the Celtic epoch. The Bretons believe them haunted by demons called *poulpiquets*, who love to make sport of the passing stranger, but will sometimes give both counsel and encouragement to those who know how to address them in the prescribed formulas; who, like the Ladye in the "Lay of the Last Minstrel," at their bidding can bow

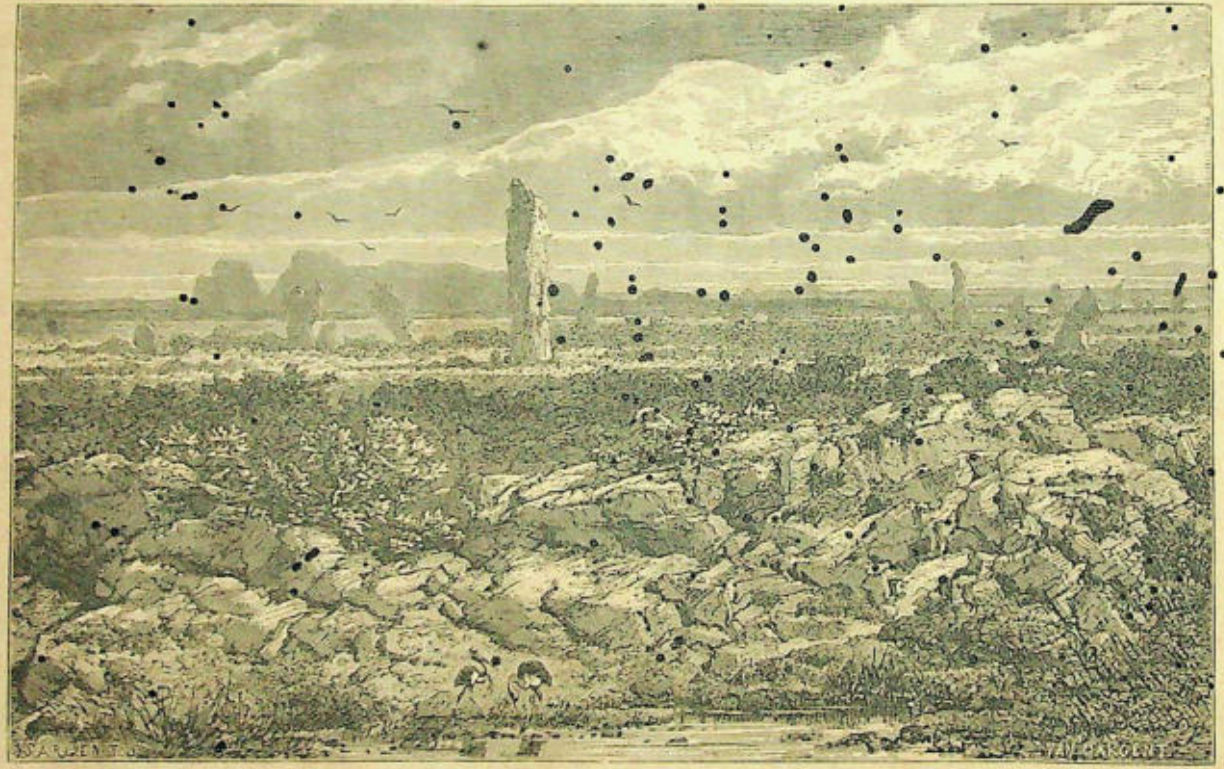
> "The viewless forms of air."

Eor, in the Breton mind, the superstitions of Druidism have not been wholly uprooted by the teachings of Christianity, still less by those of science and reason. Many a dark and dismal legend flourishes in the lonely recesses of the landes.†

Brittany, like England, has its *Cornouaille*, or Cornwall, and it

* Deane, "Archæologia," vol. xxv.

† See Mr. Jephson's "Walking-Tour in Brittany," and Tom Taylor's recent book of "Translations of Breton Songs and Ballads."



CELTIC MEMORIALS IN BRITTANY.

is here, particularly in North Cornwall, that we see it under its most desolate aspect, with its chains of black treeless hills covered with heath and furze; with its deserts of broom and fern, its ruins scattered along the winding roads, its attenuated herds wandering at their will across the moors, and its savage, ignorant, and scanty population. The Bretons of Cornwall, according to a French writer, are elevated but a little above the true savage life. Those who dwell upon the coast live on the products of their fishing, except when the fortunate occurrence of a wreck provides them with temporary abundance. At bottom, they possess the qualities and defects of characters strongly tempered, but absolutely uncultivated. They are as hard and bare as their own granite rocks. Persevering, courageous, resolute, they make excellent sailors, the best which France can find; the sea is for them a second country. Progress, which they do not understand, inspires them with a sort of terror, a gloomy mistrust. When the railway surveyors first intruded upon their solitudes, these rigid conservatives assailed them with volleys of stones, and when the railroads were laid down flung beams across the lines to overthrow the hissing, whirring trains which threatened to disturb their prescriptive barbarism. They asked but to be let alone—to be suffered to live as their forefathers lived—to be spared the ingenuities, successes, vices, and virtues of the New World. But modern civilization, like Thor's hammer, or Siegfried's magic sword Balmung, will break down the last barriers raised by ignorance and superstition. It will shed its light upon the wilds and wastes of Brittany, and compel their inhabitants in the course of years to acknowledge its value and accept its benefits.

CHAPTER II.

THE LANDES OF GASCONY.

THE Breton "Cornwall" has been called by a popular French writer, "the Arabia Petrea of Brittany." But we might, perhaps, with greater justice apply to this sombre region, peopled as it is with fantastic visions, the name of "Land of Fear," which the Arabs bestow on the Great Desert. Less vivid, it may be, but graver and more profound is the impression produced by the Landes and Dunes of Gascony. These deserts of the south, which Michelet terms "the vestibule and threshold of the Ocean," appeal less powerfully to the imagination. They are haunted by no historical memories, no traditions or marvellous legends in which man has rudely embodied his dim conceptions of the mysteries of nature; they are crowded with no monuments of antiquity to revive the shadows of the heroes and priests of ancient Gaul; and when these are wanting, what shall supply their place? But ample scope exists for the assiduous labours of the naturalist, who here may see at work those unresting forces which have inspired every revolution of the globe's surface; who may contemplate here the phenomena that occur with the same regularity as in the days when man had not been fashioned after his Maker's image—

> "Him framing like himself, all shining bright;
> A little living sun, son of the living light."*

These despoiled plains, these inhospitable wilds, alternately dry and marshy; these sullen pools, these mountains of shifting sand, speak forcibly to his mind of their past history, which is not one of the least curious episodes of the history of the physical world.

The department which borrows its name from the Landes of Gascony is divided by the Adour into two wholly dissimilar parts.

* F. Fletcher, "The Purple Island," canto i. 45.

THE SHEPHERDS OF THE LANDES

To the south of the river lies a rich, undulating, vine-bearing country, rich in pasturage and harvest, sown with pleasant villages and smiling country houses, and watered by full streams and little rivers. To the north, the appearance of the country changes abruptly. When the traveller has crossed the alluvial zone of the Adour he sees before him a thin, dry, sandy level of a comparatively recent marine formation. Its only products are rye, millet, and maize; its only vegetation, forests of pines and scattered coppices of oaks; beyond these, and they do not extend far, all cultivation ceases, and the soil is stripped of verdure; you enter upon the Landes—seemingly vast as a sea—occupied by permanent or periodical swamps; and where, over a space of several square leagues, in an horizon apparently boundless, you perceive nothing but heaths, sheepfolds or steadings for the flocks of sheep that traverse these deserts, and shepherds keeping mute watch over their animals, living wholly among them, and having no intercourse with the rest of humanity, except when once a week they seek their masters' houses to procure their supply of provisions. It is these shepherds only (*Landescots* and *Aouillys*), and not, as is generally supposed, all the peasants of the Landes, who are perched upon stilts, so as to survey from afar their wandering flocks, and to traverse more safely the marshes which frequently lie across their path.

Wild and uncouth are the figures which these stilt-walkers present, as they move rapidly over the country, often at the rate of six or seven miles an hour; occasionally indulging in an interval of rest, by the aid of a third wooden support at the back (curved at the top, so as to fit the hollow of the body), while they pursue their favourite pastime of knitting. The dress of the Landescot is singularly rude. His coat or paletot is a fleece; cuisses and greaves of the same material protect his legs and thighs; his feet are thrust into sabots and coarse woollen socks, which cover only the heels and instep. Over his shoulder hangs the gourd which contains his week's store of provisions: some mouldy rye-bread, a few sardines, some onions and cloves of garlic, and a flask of thin sour wine. From sunrise to sun-

set he lives upon the stilts, never touching the ground. Sometimes he drives his flock home at eventide; sometimes he bivouacs *sub jove frigido*, under the cold heaven of night. Unbuckling his stilts, and producing his flint and steel, he soon kindles a cheery fire of fir-branches, and gathering his sheepskins round him, composes himself to sleep; his only annoyances being the musquitoes, and his fears of the evil tricks of wizard or witch, who may peradventure catch a glimpse of him in the moonlight, as they ride past on their besom to some unholy gathering or demon-dance.

An English traveller has sketched in vivid colours the landscape of the Landes. Over all its gloom and barrenness, he remarks, over all its "blasted heaths," its monotonous pine-woods, its sudden morasses, its glaring sand-heaps, prevails a strong sense of loneliness, a grandeur and intensity of desolation, which invests the scene with a sad, solemn poetry peculiar to itself. Emerging from the black shadows of the forest, the pilgrim treads a plain, "flat as a billiard-table," apparently boundless as the ocean, clad in one unvaried, unbroken garb of dusky heath. Sometimes stripes and ridges, or great ragged patches of sand, glisten in the fervid sunshine; sometimes belts of scraggy young fir trees appear rising from the horizon on the right, and sinking into it again on the left. Occasionally a brighter shade of green, with jungles of willows and water weeds, giant rushes, and "clustered marish mosses," will tell of the "blackened waters" beneath—

> "Hard by a poplar shook alway,
> All silver-green with gnarled bark;
> For leagues no other tree doth mark
> The level waste, the rounding gray."*

The dwellings which stud this dreary, yet not wholly unpoetic landscape, are generally mere isolated huts, separated oftentimes by many miles. Round them spreads a miserable field or two, planted with such crops as might be expected on a poor soil and from deficient cultivation. The cottages are mouldering heaps of sod and

* Tennyson, Poems: "Mariana."

unhewn and unmortared stones, clustered round with ragged sheds composed of masses of tangled bushes, pine-stakes and broad-leaved reeds, beneath which the meagrest looking cattle conceivable find a precarious shelter.*

The Landes are divided into the Little Landes, near Mont-de-Marsan; and the Great Landes, stretching to the north and west of the department of which that town is the capital, and uniting uninterruptedly with those that occupy the vast country situated south of the Gironde. The total superficial area of these plains is estimated at upwards of 2,400,000 acres, of which two-thirds belong to the department of the Landes, and the remainder to that of the Gironde.

Yet the reader must not believe this country to be a desert in the popular acceptation of the word; it has its forests of pines, where the extraction and preparation of resinous matter are carried on with considerable activity. It has its small towns, its pretty villages, its factories, and even its handsome villas. Finally, modern industry has cut the Landes in two by the Bordeaux railway, which traverses them from north to south, and bifurcates at Morans to throw off a line to Bayonne, and another to Tarbes.

In shape, the Great Landes may be compared to an immense rectangular triangle, having for its base the coast, which, from the mouth of the Gironde to Bayonne, or for a length of more than sixty leagues, is almost rectilineal. But they are separated from the sea by a long parallel chain of lakes and water-courses—a waste of shallow pools—a labyrinth of gulfs and morasses, and then by the continuous chain of the Dunes, of which we shall speak in the following chapter.

That which is commonly called the Great Lande is bounded on the north by the *étang*, or lake, of Cazau. It is a sandy, treeless plain, and upon which, for a traject of several leagues from east to west, not one habitation worthy of the name is perceptible until the traveller arrives at Mimizan, near the southern point of the lake of Aureilhan. This lake on the south-west pours its waters into the sea. To the north it communicates, through the canal of St. Eulalie,

* Angus Reach, "Claret and Olives."

with the lake of Biscarosse, which is itself connected with that of Cazau. East of this chain of lakes lies the Lande; west of it stretches the range of *Dunes*, or sandhills.

The lake or pool of Cazau is a small sea of fresh water, perfectly clear, profoundly deep, and fourteen to fifteen thousand acres in extent. It has its whirlwinds and its tempests, so that in certain seasons it is perilous to embark on its surface. And were its banks clothed with rich woods, or raised aloft in irregular or precipitous cliffs, it would surely attract as great a throng of tourists as the mountain-tarns and lochs of Scotland or Cumberland, or the Arcadian waters of Northern Italy. The lake of Biscarosse, in form a triangle, with one side formed by the Dunes, covers about twelve thousand acres. It derives its name from a village situated at its northern angle, on the bank of the canal which connects it with the lake of Cazau. The lake of Aureilhan is the smallest of the three; the St. Eulalie canal, which links it to the preceding, traverses a series of peat-bogs bounded eastward by gloomy pine-forests, and westward by the interminable Dunes, which, by arresting the flow of the rain-waters, have really created these so-called lakes and extensive swamps. Enormous quantities of rain fall every year in the Landes,—which district the Romans would certainly have dedicated to Jupiter Pluvius,—and find beneath the thin superficial stratum or crust of sand and earth, a sub-soil of *tufa* and *allios*—in other words, of compact chalk and sand agglutinated by a ferruginous sediment. Frequently this *tufa* possesses all the hardness of stone, and its imperviousness is its fundamental property. Hence it follows, that a portion of the heavy annual rainfall remains in the receptacles provided by the hollows and depressions of the soil, and in due time accumulates into marshes and lagoons, until gradually evaporated by the heat of spring.

When of old the scared peasants beheld the irresistible advance of these strange ministers of destruction, they had no other resource than to fell their woods, abandon their dwellings, and surrender their "little all" to the pitiless sand and devouring sea. What could avail against such a scourge? Efforts were made to repel it. It is

said that Charlemagne, during a brief residence in the Landes, on his return from his expedition against the Saracens, employed his veterans, and expended large sums of money in preserving the cities of the coast from imminent ruin; but whether the means employed were insufficient, or whether the imperial resources failed, and other urgent needs diverted the population and their leaders from this struggle against nature, the works were wholly abandoned.

Of late years they have been resumed, and with greater success, by a skilful agriculturist, M. Desbiey, of Bordeaux, and an able engineer, M. Bremontier, who have called in nature herself to assist man in his war against nature. Their system consists of sowing in the driest sand the seeds of the sea-pine, mixed with those of the broom (*genista scoparia*), and the *psamma arenaria*. The spaces thus sown are then closely covered with branches to protect them from the action of the winds. These seeds germinate spontaneously. The brooms, which spring up rapidly, restrain the sand, while sheltering the young pines, and thenceforth the Dune ceases to move, because the wind can no longer unsettle its substance, and the grains are held together by the roots of the young plants. The work is always begun on the inland side, in order to protect the farmer and the peasant, and to withdraw the infant forest from the unwholesome influence of the ocean-winds. And, in order that the sown spaces shall not themselves be buried under the sands blown up from the shore, a palisade of wicker-work is raised at a suitable distance, which, reinforced by young plants of sandwort (*psamma arenaria*), check the moving sands for a sufficiently long time to favour the development of the seeds. Finally, the work is completed by the construction of a substantial wall, or rather an artificial cliff, which effectually prevents the further progress of the flood, or directs it seaward, to be arrested on its course by the barrier of the sand-hills. Unable to force a passage through these natural ramparts, they have excavated certain basins, more or less extensive, more or less deep, which have formed into inland seas, communicating with the Atlantic by one narrow issue.

It is a noteworthy fact that, owing to the encroachment of the Dunes, these lakes have been constantly forced back upon the inland country. Fortunately, this menacing invasion of the sands has been checked by the great engineering works executed a few years ago; which, on the one hand, have fixed, and, as it were, solidified the Dunes, and, on the other, have provided for the regular outflow of the waters. The Landes have thus been opened to the persevering labours of the cultivator. The culture of the pine, and the manufacture of resinous substances, have largely extended, and the time, perhaps, is not far distant when these deserts will almost completely disappear; when these desolate and unproductive plains will pleasantly bloom, transformed into shadowy woods or verdurous meadows.*

To so fortunate a result nothing will more powerfully contribute than the embankment of the Dunes. These have been, in reality, the true scourge of this country; these were the moving desert, the constantly ascending sea, which had already engulfed forests, villages, even towns, under its billows of sand, and driven before it the terrified inhabitants of the coast.

CHAPTER III.

THE DUNES, OR SAND-HILLS.

THE Dunes form the extreme line of the Brittany coast for nearly two hundred miles, from the Adour to the Garonne. They are hills of white sand, as fine and soft as if it had been sifted through an hour-glass. Their outline, therefore, changes every hour. When the wind blows from the land, millions of tons of sand are hourly driven into the sea, to be washed up again on the beach and blown inland by the first Biscay gale. A water hurricane from the west will fill

* The fir plantations, which are so numerous in the Landes, were first formed in 1789, under the direction of the minister, M. Necker (father of Madame de Staël). In 1862, the department had a population of 300,859. Acreage, 2,434,752.

A FLOOD IN BRITTANY.

up with sand square miles of shallow lake, driving the displaced waters into the interior, dispersing them in shining pools among the "murmurous pines," flooding and frequently destroying the scattered hamlets of the people, and inundating their fields of rye and millet.*

Their origin is due to the prevalence of the sea-winds on those points of the coast which are not protected by rock and cliff, and whose slopes of sand descend very gradually to the margin of the waves. Their formation is easily explained. The sand of which they are composed is a silicious material, reduced to minute grains, generally rounded, by trituration. These grains, nevertheless, are often too big and too heavy for the wind to take them up and scatter them afar, like the dust of the highways or the ashes of volcanoes. But at low tide the sand, dried by the sun's rays and the action of the wind, offers to the latter a sufficient *holdfast* to be dragged up the slopes which descend seaward, and deposited at a certain distance. This process being constantly repeated, the heaps are daily increasing in dimensions.

It will easily be understood that this accumulation along the shore cannot have taken place where the force and direction of the sands experience periodical or capricious changes; for then the sands cast upon the beach by the winds of the north and west would be driven back into the sea by the winds of the south and east. This is noticeable in many places where the nature of the coast is favourable for the production of such a phenomenon. But on other shores—as on the Atlantic littoral of France—the winds which blow most frequently and most violently are from the west and south-west. And it is there we encounter the Dunes. Those of Gascony are by far the most remarkable. Northward, they extend as far as the Point de Grave, which shuts in the mouth of the Gironde; southward, to the banks of the Adour, and even further, to the cliffs of Béarn. Here the basin of Arcachon constitutes one vast hollow; and some openings exist, moreover, in the department of Landes, between that basin and the Adour, for the overflow of the waters which descend from the interior. To the north and south of the

* Angus B. Reach, "Claret and Olives."

Teste de Buch the chain of sand-hills measures from 4400 to 6600 feet in width. At other points it is still wider; but it narrows towards its extremities, and both at the Point de Grave and near Bayonne does not exceed 450 yards.

Owing to their extreme shiftiness of soil, the Dunes can attain no considerable elevation. The sand deposited by the wind on the summit of the hill is always in a state of precarious equilibrium. It has a constant tendency to be precipitated down the other side; and the higher the summit the greater is this tendency, so that there comes at last a moment when no further accumulation in height is possible. The Dune may then extend its basis, may even increase twofold in dimensions, but it no longer rises.

Let us note, moreover, that owing to its density the sand cannot be carried even by the most violent winds into the higher regions of the atmosphere; and that the Dunes, when they have reached a certain elevation, oppose to them an insuperable obstacle. This circumstance would consequently have a salutary effect, and the accumulation of sand would be determined by a law of its own, if the Dunes, once formed, had time to cohere. But this is not the case. Incessantly does the wind undo or modify its work; and the loftiest hills being the most exposed to its violence, are quickly reduced to the common level. In general, the greatest elevation of the Dunes corresponds to their greatest breadth. Thus the culminating point of those of Gascony is found in the belt situated between the lakes of Cazau and Biscarosse, where the chain is from 7500 to 9000 yards across. Their average height is 180 feet to 200 feet above the sea-level; but some of the hills in the forest of Biscarosse attain an altitude of 320 feet. In the neighbourhood of the mouths of the Gironde and the Adour, where the chain is considerably narrowed, the height of the Dunes is only thirty to forty-five feet.

The reader must not suppose that the Dunes consist of a single series of sand-hills ranged along the shore. He will, however, have conjectured, from our statements respecting their width, that they really compose a chain of several more or less regular ridges. The

up with sand square miles of shallow lake, driving the displaced waters into the interior, dispersing them in shining pools among the "murmurous pines," flooding and frequently destroying the scattered hamlets of the people, and inundating their fields of rye and millet.*

Their origin is due to the prevalence of the sea-winds on those points of the coast which are not protected by rock and cliff, and whose slopes of sand descend very gradually to the margin of the waves. Their formation is easily explained. The sand of which they are composed is a silicious material, reduced to minute grains, generally rounded, by trituration. These grains, nevertheless, are often too big and too heavy for the wind to take them up and scatter them afar, like the dust of the highways or the ashes of volcanoes. But at low tide the sand, dried by the sun's rays and the action of the wind, offers to the latter a sufficient *holdfast* to be dragged up the slopes which descend seaward, and deposited at a certain distance. This process being constantly repeated, the heaps are daily increasing in dimensions.

It will easily be understood that this accumulation along the shore cannot have taken place where the force and direction of the sands experience periodical or capricious changes; for then the sands cast upon the beach by the winds of the north and west would be driven back into the sea by the winds of the south and east. This is noticeable in many places where the nature of the coast is favourable for the production of such a phenomenon. But on other shores—as on the Atlantic littoral of France—the winds which blow most frequently and most violently are from the west and south-west. And it is there we encounter the Dunes. Those of Gascony are by far the most remarkable. Northward, they extend as far as the Point de Grave, which shuts in the mouth of the Gironde; southward, to the bank of the Adour, and even farther, to the cliffs of Béarn. Here the basin of Arcachon constitutes one vast hollow; and some openings exist, moreover, in the department of Landes, between that basin and the Adour, for the overflow of the waters which descend from the interior. To the north and south of the

* Angus B. Reach, "Claret and Olives."

hills are separated from one another by valleys, locally named *laites* or *lettes*. These valleys, where the pluvial waters flow and accumulate, exhibit a striking contrast, in their freshly-blooming verdure, to the naked, barren Dunes. The general aspect of the landscape may, therefore, be compared to that of the ocean. There is the same broken surface, the same extent of undulation, the billows of sand being upheaved by the wind like the billows of the sea, and sharing in their mobility. You must see, says a writer, in order to form an idea of those colossal masses of fine sand, which the wind incessantly skims, and which travel in this way towards the inland country: you must see their contours so softened that they look like mountains of plaster of Paris polished by the workman's hand, and their surface so mobile that a little insect leaves upon it a conspicuous track; their slopes, at every degree of inclination; their everlasting sterility—not a blade of grass, not an atom of vegetation; their solitude, less imposing than that of the mountains, but still of a truly savage character. You must see, from the summit of one of these ridges, the ocean on your right hand, and on your left the extensive lakes which border the littoral; and, in the midst of this tumultuous sea of tawny sand, green grassy valleys, rich and fertile pastures, smiling oases of verdure, where herds of horses graze, and cows half-wild, guarded by shepherds scarcely less wild than they.*

The marked characteristic of the Dunes, as we have already said, is their mobility, which renders them a constant menace for the neighbouring populations. To the wind which creates them they owe their frequent changes and their inland movement. While the sea eats into the coast, assisted by the breezes which gradually sweep clear the ground before it, the Dunes extend, and drive before them the shallow lakes; these in their turn encroach upon the Landes, and until now man has been constrained to recoil, step by step, before his threefold enemy. It is in this phenomenon, rather than in the ungrateful soil of the Landes, that we must seek the cause of the curse which has seemed so long to rest upon this country-side. You

* M. Perris, in "Mémoires de l'Académie de Lyon."

must go back some twenty centuries to trace the origin of the Dunes of Gascony. Fourteen or fifteen hundred years ago the coast north of the Adour was inhabited, and comparatively flourishing. Mimizan was then a town and a sea-port, from which were exported the resinous products of the neighbouring forests. The Normans disembarked there on several occasions. Under its walls, in 506, was fought a great battle between the allied Goths and Ostrogoths on the one side, and the Béarnais, commanded by a bishop of Lescar, on the other. Both town and port to-day are buried under the sands. "Full fathom five" lie church and convent, and the busy street, the noisy mart, and the once peaceful home. The present village has nearly perished: the Dune was not three yards from the church when its progress was recently arrested. Other cities, laid down in old charts of the country, but of which not a trace remains, have in this manner disappeared, and entire forests have been ingulfed, now under the sands of the Dunes, now under the sands and waves of the sea.

Some parts of the chain have been rendered to a great extent immovable by the vegetation which has gradually covered them, and these have opposed a formidable obstacle to the encroachments of the sands. Yet here and there the barrier has been defied. For example, in the forest of Biscarrosse the movable Dunes, actually sweeping over the ancient hills, have not only filled up the valleys, but ingulfed a great number of pines, and raised themselves several yards above the crest of the oldest trees, planted on the summit of the highest hills.

In whose favour, in this struggle of science against the elements, will the victory eventually be decided? The question is one which the future alone can resolve.*

* "Dunes," from *dun*, a hill. These sand-mounds also extend along the coast of the Netherlands, where they serve to protect the low country from tidal inundation. "In some places," says a traveller, "they look like a series of irregular hills; and when seen from the top of the steeples, they are so huge as to shut out the view of the sea. The traveller, in visiting them from the fertile plains, all at once ascends into a region of desert barrenness. He walks on and on for miles in a wilderness such as might be expected to be seen in Africa, and at last emerges on the sea-shore, where the mode of creation of this singular kind of territory is at once conspicuous."—*W. Chambers, "Tour in Holland."*

CHAPTER IV.

WILD SCENES OF ENGLAND:—DARTMOOR AND THE FEN COUNTRY.

CROSSING the Channel, and surveying the limited expanse of our own "beloved England," we become aware of certain districts which belong to the Desert World. Through the ceaseless energy of our race, and the introduction of mechanical inventions which economize time and labour and treble the reproductive power of capital, almost all England has been transformed into a rich and radiant garden, where the waste places are "few and far between," where the solitude of desolation is scarcely known; yet, as already observed, there *are* districts which retain much of their ancient wildness of character.

Such a region is Dartmoor, the extensive and romantic table-land of granite which occupies the south-western part of the county of Devon. In its recesses still linger the eagle, the bustard, and the crane; its solitudes are broken by the hoarse cries of the sparrow-hawk, the hobby, and the goshawk; and the Cyclopean memorials of Druidism which cover its surface—cromlechs and kistvaens, tolmens and stone-avenues—invest it with a peculiar air of mysterious awe. It extends in length about twenty-two miles (from north to south), and in breadth twenty miles (from east to west). Its total area exceeds 130,000 acres. It rises above the surrounding country like "the long, rolling waves of a tempestuous ocean, fixed into solidity by some instantaneous and powerful impulse." A natural rampart is cast around it. Deep ravines, watered by murmuring streams, diversify its aspect, and lofty hills of granite, locally called *tors*, of which the principal, Yes Tor, has an elevation of 2050 feet above the sea. Its soil is composed of peat, in some places twenty-five feet

deep; underneath which lies a solid mass of granite, occasionally relieved by trap (a volcanic rock), and traversed by veins of tin, copper, and manganese.*

Nearly in the centre of this dismal wilderness lies an immense morass, whose surface is in many places incapable of supporting the lightest animal, and whose inexhaustible reservoirs supply the fountains of many a river and stream—the Dart, the Teign, the Taw, the Tavy—all clear as crystal in the summer months, but after heavy rains running redly through the "stony vales." The roaring of these torrents, when angry and swollen, is sublime to a degree inconceivable by those who have never heard the wild impressive music of untamed Nature.

The tors are remarkable for their quaint fantastic outlines, which, like the clouds, suggest all manner of strange similitudes—to dragons, and griffins, and hoary ruins and even to human forms of gigantic size, apparently confronting the traveller as the lords and natural denizens of the rugged waste. The principal summits are Yes Tor, Cawsand Beacon, Fur Tor, Lynx Tor, Rough Tor, Holne Ridge, Brent Tor, Rippen Tor, Hound Tor, Sheep's Tor, Crockern Tor, and Great Mis Tor. Not only must their variety of form delight the artist, but his eye rests well pleased on their manifold changes of colour; purple, and green, and gray, and blue—now softened by a delicate vaporous shadow, now glowing with intense fulness in the sun's unclouded light.

Dartmoor is traditionally reputed to have been anciently clothed with forest. The sole relic now existing is the lonely *Wistman's Wood*, which occupies a sombre valley, bounded on the one side by Crockern Tor, on the other by Little and Great Bairdown; the slopes being strewn with gray blocks of granite in "admired disorder," as if the Titans had been at their cumbrous play. Starting from this chaos of rocks, appears a wood or grove of dwarf weird-looking oaks, interspersed with the mountain-ash, and everywhere festooned about and garlanded with ferns and parasitical plants. None of these trees

* Rev. S. Rowe, "Perambulation of the Ancient Forest of Dartmoor" (ed. by Dr. E. Moore: London, 1856).

exceed twelve feet in height, but at the top they spread far and wide, and "branch and twist in so fantastic and tortuous a manner as to remind one of those strange things called mandrakes." Their branches are literally covered with ivy and creeping plants, and their trunks so thickly embedded in a coating of moss that at first sight, says Mrs. Bray, "you would imagine them to be of enormous thickness in proportion to their height. Their whole appearance conveys to you the idea of hoary age in the vegetable world of creation; and on visiting Wistman's Wood it is impossible to do other than think of those 'groves in stony places' so often mentioned in Scripture as being dedicated to Baal and Astaroth." *

That heathen rites were celebrated here in the pre-historic era seems very probable, the best etymologists agreeing that the name is a corruption of *Wisc-man*, or *Wish-man*; that is, of the old Norse god Woden, who is still supposed to drive his spectral hounds across the silent wastes of Dartmoor. Celtic or Cymric memorials, as we have previously hinted, are very abundant and very various. There are cromlechs, where the Britons buried their dead; stone pillars, with which they commemorated their priests and heroes; avenues of upright stones leading up to the circles, where, perhaps, their priests celebrated their religious rites; kistvaens, or stone-chests, containing the body unburned; tolmêns, or holed stones, whose meaning cannot be determined, but which may probably have had some astronomical uses; bridges, huts, and walled villages, all bearing traces of the handiwork of our "rude forefathers." There is no spot in England so thronged as this with the shadows of a remote, a mysterious, and an irrecoverable past.

From Dartmoor our wanderings take us to the eastern coast, and the district of THE FENS, now so rapidly yielding to the labour of the agriculturist as to exhibit but rare glimpses of their ancient "savagery." It extends inland, around an arm of the North Sea called the Wash, into the six counties of Cambridge, Huntingdon,

* Mrs. Bray, "The Borders of the Tamar and the Tavy."

Lincoln, Norfolk, Northampton, and Suffolk, with an area of upwards of 420,000 acres. Inland it is bounded by an amphitheatral barrier of high lands, and touches the towns of Bolingbroke, Brandon, Earith, Milton, and Peterborough. Into this great basin flow the waters of the greater part of the drainage of nine counties, which gather into the rivers Cam, Glen, Lark, Nene, Great and Little Ouse, Stoke, and Welland, these being linked together by a network of natural and artificial canals.

Anciently, the Fens were pleasant to the eye of the lover of the picturesque; for they contained shining meres and golden reed-beds, haunted by countless water-fowl, and strange, gaudy insects. "Dark-green alders," says Kingsley,* "and pale-green reeds stretched for miles round the broad lagoon, where the coot clanked and the bittern boomed, and the sedge-bird, not content with its own sweet song, mocked the notes of all the birds around; while high overhead hung hawk beyond hawk, buzzard beyond buzzard, kite beyond kite, as far as eye could see." What strange transformations must this wild region have undergone! There was a time, in all probability, when a great part of the German Ocean was dry land, through which, into a vast estuary between North Britain and Norway, flowed together all the rivers of North-eastern Europe—Elbe, Weser, Rhine, Scheldt, Seine, Thames, and all the rivers of east England, as far north as the Humber. Meanwhile, the valleys of the Cam, the Ouse, the Nene, the Welland, the Glen, and the Witham, were slowly "sawing themselves out" by the quiet action of rain and rivers. Then came an age when the lowland was swept away by the biting, corroding sea-wash still so powerfully destructive on the east coast of England, as far as Flamborough Head. "Wave and tide by sea, rain and river by land; these are God's mighty mills in which he makes the old world new. And as Longfellow says of moral things, so may ye of physical,—

"'Though the mills of God grind slowly, yet they grind exceeding small;
Though he sit and wait with patience, with exactness grinds he all.'"

* Rev. C. Kingsley, in *Good Words*, vol. for 1867, pp. 302-310.

se ever-active causes have converted the dry land into the fens. mud brought down by the rivers cannot get away to sea; and, h the *débris* of the coast, is constantly swept southward by tide nd current, and deposited within the great curving basin of the Wash, between Lincolnshire and Norfolk. There it is kept by the strong barrier of shifting sands coming inwards from the sea; a barrier which also confines the very water of the fens, and spreads it inland into a labyrinth of streams, shallow meres, and bogs. The rainfall, over the whole vast area of dull level, has found no adequate channels of escape for centuries; and hence we may understand how eat—the certain product of standing water—has slowly overwhelmed he rich alluvium, and swallowed up gradually the stately forests of r and oak, ash and poplar, hazel and yew, which once spread far and wide over the blooming country.

> "Many a green isle needs must be
> In the deep wide sea of misery,"

sings Shelley; and this dreary outcome of mudbank and bog and mere had its wooded isles, very fair and lovely to behold, redeeming the desolation of the landscape. Such were Ramsey, Lindsey, Whittlesea, whose names remind us of their wholesome characteristics (*ea, ey,* an island). In these green places the old monks loved to build their quiet abbeys, rearing their herds in rich pastures, feeding fat fish in their tranquil streams, and dreaming in the shadow of green alder and stately ash.

But these Eden-isles were few, and the surrounding marsh was black and dismal enough to scare the boldest spirit, and pestilential enough to sap and undermine the strongest frame. The Romans had attempted to drain and embank it, and their *vallum* may still be tracked along the surface of the marsh-lands, marked to this day by the names of Walsoken, Walton, and Walpoole. In the Middle Ages, however, it returned to its primeval desolateness—a waste and wilderness, haunted by the foul legends of an unwholesome superstition. In the immediate neighbourhood of the great monasteries of

Crowland and Ely, and of the thriving towns, the good work of drainage went on slowly; but elsewhere the land was given up to the bittern and the heron.

No comprehensive scheme was adopted, however, until Russell, Earl of Bedford, cut the great Bedford River, twenty-one miles long, and rescued from the desert the rich tract known by his name—the Bedford Level.

"Erst
A dreary pathless waste, the coughing flock
Was wont with hairy fleeces to deform;
And, smiling with its lure of summer flowers,
The heavy ox, vain struggling, to ingulf;
Till one, of that high-honoured patriot name,
Russel, arose, who drained the rushy fen,
Confined the waves, bade groves and gardens bloom,
And through his new creation led the Ouse
And gentle Camus, silver-winding streams."[2]

The work was continued by William Earl of Bedford, who added, in 1649, to his father's old "Bedford River" that noble parallel river the Hundred Foot, both rising high above the land to allow for flood water. It was carried on at a later period under the direction of Government surveyors. Then came Rennie, the great engineer, whose operations effectually shut out the desert, and handed over to the agriculturist nearly the whole level of the Fens, some seventy miles in length. Works are now in progress for rescuing a further portion of the basin of the Wash, to be formed into a new county, and named after the Queen. So that now, in tracts once covered by the sea, or knee-deep in reedy, slushy, pestilential slime, the grass grows luxuriantly, the crops wave in golden abundance, or the breeze takes up and carries afar—

"The livelong bleat
Of the thick-fleeced sheep from wattled folds."

But the dominion of labour has not yet been established over the whole Fen-district. There are still dreary nooks, and gloomy corners, and unproductive wastes, wild scenes there are, which few English-

[2] Dyer, "Poetical Works," *The Fleece*, book ii.

men have any conception of as contained within the boundaries of their own "inviolate isle." Romantic scenery, remarks Mr. Walter White, must not be looked for on the Lincolnshire coast. In all the journey from the Wash till you see the land of Yorkshire, beyond the Humber, not an inch of cliff will your eyes discover. Monotonous is the prospect of—

"A level waste, a rounding gray"

of sand-hills, which vary but slightly in height, and bristle with *marum*. "But tame though it be" continues our authority,* "the scene derives interest from its peculiarity. Strange perspective effects appear in those irregular hills: yonder they run out and form a low dark, purple headland, against which the pale green and yellow of a nearer tongue look bright by contrast. Here for a few furlongs the range rises gray, cold, and monotonous; there it has a warmth of colour relieved by deep shadows, that change their tint during the hours that accompany the sun while he begins and ends his day. Sitting on the summit of those dry hills, you will remark the contrasted landscape: on the one side, the level pasture land, league after league of grassy green, sprinkled with villages, farms, churches, and schools, where work and worship will find exercise through ages yet to come; on the other, league after league of tawny sand, sloping gently outwards to meet the great sea that ever foams or ripples thereupon. On the one hand, a living scene bounded by the distant wolds; on the other, a desert, sea and shore alike solitary, bounded only by the overarching sky. More thoughts come crowding into the mind in presence of such a scene than are easy to express."

* Walter White, "Eastern England," ii. 13, 14.

CHAPTER V.

THE STEPPES:—THE DESERT IN RUSSIA, SIBERIA, AND TARTARY.

HITHERTO we have only been speaking of miniature deserts, of the more limited of the world's wildernesses, where some degree of victory seems to reward man's arduous struggle with nature. Those which we have hitherto described are open to the "breath of civilization." The pilgrim who visits them incurs no danger; he has nothing to dread from beasts of prey; the men he meets with obey the same general laws as himself; he is carried into their furthest recesses by the all-embracing railroad. He sees on every hand the efforts of science to confine the desert within ever narrower boundaries; to reclaim the moor, and the fen, and the sandy waste; to reap from the once barren soil an abundant harvest. But, if he pass from England or France to Germany, and thence across the provinces of unhappy Poland, he will find himself daily advancing into a country of more and more savage aspect. He will observe that vegetation loses its happy variety; that the cultivated fields become scarcer; the morass and forest more frequent, and of greater extent; the population poorer, more squalid, and less numerous. Wide and dreary intervals separate the different towns; here and there, surrounded by gloomy woods, are scattered the melancholy-looking villages. Travelling becomes difficult, for the roads are ill-kept; he has left behind him the modern magician, the engineer; wild wolves haunt his path; and he has good cause to fear the robber's knife. Civilization here has left barbarism for centuries to itself; we are approaching the great Deserts, the Steppes of Northern Asia.

The Steppes commence near the thirty-fifth degree of longitude, east of the Dnieper, as soon as we quit the fertile plains of the Ukraine to enter the country of the Don Cossacks. They are the characteristic feature of the immense zone which starts from the

north-eastern shore of the Sea of Azov, stretches to the foot of Caucasus, between the Black and Caspian Seas, and is thence prolonged beyond the Ural range, to the north and south of the metaliferous Altaï; but mainly between the latter and the Thian-Shian mountains, to the seas of Okhotsk and Jesso.

The word *Steppe*, supposed to be of Tartar origin, primarily signifies an uncultivated plain, a prairie.

The Steppes, in short, are ordinarily plains of very considerable extent interrupted at intervals by chains of hills or mountains; but, on the whole, of a level, monotonous character, and with a considerable part below the level of the ocean. Their area may be roughly computed at 4,200,000 square miles.

Occasionally, in traversing them, we meet with lakes or brackish ponds, with forests of pines, even with patches of cultivated ground. Sometimes they form lofty and extensive plateaux, as in the case of the plateau of Gobi, also called, but most inappropriately, *Scha-mo*, or the Sandy Desert, and *Scha-ho*, or the Sandy River.

The Gobi begins upon the confines of Chinese Tartary, and thence extends over thousands of leagues in a vast expanse of sterile wilderness towards the coast of the Pacific. It chiefly consists of bare rock, shingle, and loose sand, alternating with firm sand, sparsely clothed with vegetation. But a large portion of the country, though not less leafless and monotonous, assumes in the spring season the appearance of an undulating ocean of grass, supplying pasturage to the flocks and herds of the Mongolian nomades, who wander at will over its vast prairie grounds, and encamp wherever they find a stream of water or sheltering crag. The general elevation above the sea is probably not less than 3500 feet. The Gobi was crossed by Mr. Grant, in 1863, and, soon afterwards, by Mr. Bishop, a correspondent of the *Times*.

Though their general aspect is chill and dreary, the Steppes are not without their romantic landscapes, and their vegetation is more varied as well as more abundant than is generally believed. You may find among them wide meads with a soil of sufficient fertility to

produce corn in great quantities, although too thin to permit the development of plants which have need of a certain depth. "The most agreeable portion of these plains," says Humboldt, "is adorned with small shrubs of the family *Rosaceæ*, tulips, and the *cypripedium*. Just as the Torrid Zone is distinguished by the tendency of all its plants to become trees, so some of the Asiatic Steppes in the Temperate Zones have the peculiar characteristic that all their flowering herbaceous plants attain to a remarkable height, such as the *Saussurea* and other synantheraceæ, the leguminous shrubs, and, above all, an infinite variety of astragals. If the traveller attempts to go forward, in the small Tartar chariots, across these pathless, trackless prairies, he must keep standing, to ascertain his direction, and he will see the plants, interlaced as in a dense forest, bend before his wheels. Some of these Steppes are grassy plains; others are covered with saline plants, fleshy, articulated, and always green. Often, too, one sees afar the glitter of saline efflorescence, like lichens, spreading unevenly over the glassy soil, like newly-fallen snow."*

Comparing the Asiatic Steppes with the Pampas of South America, Humboldt does not hesitate to declare that the former are far the richer. "In that part of the Steppes, inhabited by the Kirghiz and the Kalmucks, which I have traversed," he says, "that is to say, from the Don, the Caspian Sea, and the Oural (Jaïk), to the Obi and the Upper Irtysh, near Lake Dsaisang, over a space of forty degrees of longitude, one can never discover, even at the most distant limit, a phenomenon frequent in the Llanos, the Pampas, and the Prairies of America; that horizon vague and boundless as the sea, which seems to support the vault of heaven. Seldom in Asia was the spectacle offered me of even a single side of the horizon. The Steppes are traversed by numerous chains of hills, or covered with forests of conifers. The vegetation of Asia, even in the richest pasturage, is nowhere confined to the families of the *Cyperaceæ*. A great variety prevails there of herbaceous or frutescent plants. In the spring season, small rosaceæ and amygdalaceæ, with rosy or

* Humboldt, "Ansichten der Natur," vol. i., App.

snow-white blossoms—Spiræa, crataegus, prunus spinosa, amygdalus nana—present a graceful appearance. I have elsewhere spoken," he adds, "of the vigorous growth of Synanthers, such as *Suassurea amara* and *salsa*, the *artemisias* and blue *centaureas*, which grow profusely in these deserts, and the leguminosæ, which are there represented by different species of astragal, cytisus, and *caragana*. The fritillaria ruthenica, meleagroides, cypripedium, and tulip, delight the eye with the brilliance of their colours."*

This almost exclusively herbaceous, but abundant and various, vegetation of which Humboldt speaks, is conspicuous in the spring, in the least favoured Steppes, after the rainy season. But it is there of a brief life. In the month of June the heat grows intense, and the dryness excessive. Then every herb perishes, cut down by the sun's keen-smiting rays, like the Greeks before Troy by the arrows of Apollo.

"Bent was his bow the Grecian hearts to wound;
Fierce as he moved, his silver shafts resound."†

The dust is whirled off the ground by the wind, and swept about in revolving tornados. The Steppes situated in a comparatively low latitude thus alternately assume the most discordant aspects. In winter the heavy rains inundate them, and transform them into impracticable marshes; spring clothes them with a thick carpet of grasses and other herbaceous plants, so that they reveal to the eye leagues upon leagues of delightful sward cropped by numerous flocks. In summer they undergo a third metamorphosis, and are converted into parched and sun-scathed deserts like those of Nubia or Arabia.

These periodical transformations are especially remarkable in the Steppes of the Black Sea, the Sea of Azov, and the Caspian Sea; where winter comes attended with abundant snows and terrific tempests. No obstacle can arrest the fury of the gale, which accumulates the driven snow in fearful avalanches, and like the

* Humboldt, "Ansichten der Natur," vol. i. (Notes).
† Homer, "Iliad," book i.

demon in the old German legend, drives before it the wild horses in an access of violence. Half frozen by the cold, and exhausted with hunger, they fly in a complete panic. Oftentimes their giddy headlong course carries them forward upon the crust of ice which gathers over the waters close to the shore; it cracks, it breaks, and hundreds perish! The melting snow and heavy rains at the end of winter drown the plains under vast sheets of water, which, however, quickly evaporate in the first rays of the sun. Rain, in summer, is extremely rare, and as there are neither brooks nor springs to refresh the thin layer of earth in which the herbs and shrubs take root, all these plants enjoy only a butterfly existence; they bloom, they fade, they die, with startling rapidity.

The hurricanes are neither less numerous nor less furious in the hot than in the cold season; dust, however, takes the place of snow, when, as is sometimes the case, no tremendous deluge of rain follows in the track of the mighty wind. To sum up: the spring and summer of the Steppes are compressed (so to speak) into two months; all the rest of the year seems given over to desolation. Two months in the year of bloom, and sunshine, and colour, and beauty, are all that Nature grants the wandering Mongolian.

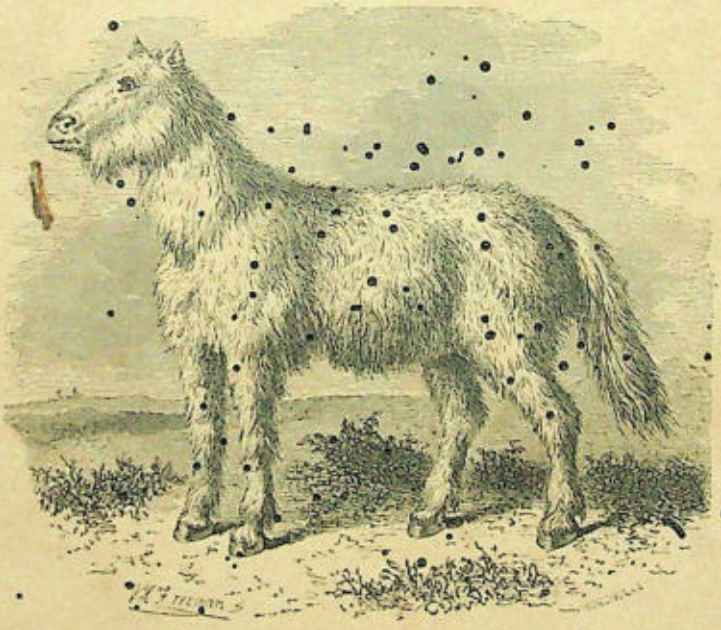
Such being the general configuration of the Steppes, one may easily imagine how stern and gloomy is the aspect of these immense plains, with no other interruptions of the soil than their tumuli, no other boundary than the sea. He who has not been habituated from youth to their monotony finds himself wholly unable to struggle against its depressing influence. Their dismal solitudes are in truth an immeasurable prison, where he wanders to and fro without hope of escape. In vain does he interrogate the north and south, the east and the west; in vain does he turn from one side to the other; it is always the same uniformity, the same immovability, the same solitude.*

* Madame Hommaire de Hell: "Voyage aux Steppes de la Mer Caspienne," tome 1er.

CHAPTER VI.

ANIMAL LIFE IN THE STEPPES:—THE WILD HORSE—THE CAMEL.

REFERENCE has been made to the numerous troops of wild horse which haunt the Steppes on this side of the Oural. Similar troops of these animals wander over the whole extent of the Steppes of Central Asia, which the most accredited modern naturalists repute to be the original cradle of their race.



THE TARPAN, OR WILD HORSE.

These horses are called *tarpans*, a word undoubtedly derived from the Tartar. Shall we look upon them as the representatives of the primitive breed, whence have sprung all the varieties known at the present day; or shall we see in them, as well as in the wandering horses of the prairies and pampas of the New World, the descendants

of individuals which had escaped from the thraldom of man? This latter hypothesis seems to be the most probable. But there is good ground for believing that, living a wild life, these animals are gradually returning to the primitive type. They have lost the harmonious graces of form, the beauty, and the vigour which we admire in the high-bred steed, perfected by the assiduous care of man. There seems as great a difference between the Arabian horse and the wild horse of the Steppes as between the accomplished European gentleman and a Malagasy savage. They are of small stature; their limbs are lank; their coat is coarse, woolly, rude, and rough. With the tarpans of the northern Steppes it is thick, flaky, and frizzled. Their mouth and nostrils are garnished with long hair, not unlike a goat. Their colour is generally brown, of the shade called *Isabelle*, after a certain Queen of France who, in fulfilment of a vow, wore her linen unchanged for a considerable period. A few are black or white. They have a large head, with the forehead projecting above the eyes; a straight chamfer; and long ears, customarily laid back close to the head.

The troops of the tarpans are subdivided into groups of twenty to thirty individuals, each group usually living apart, and only uniting in a compact phalanx when a common danger threatens, or a necessity arises of migrating from one region to another. The gaunt grim wolves, which hunger drives from their neighbouring forests; and man, who hunts them hotly, either to reduce them into subjection, or kill them for their flesh, are almost the only enemies they have any reason to dread. The warlike nomade tribes of the Black and Caspian coasts, and of Central Asia, have no other breeding-grounds than the steppe which they inhabit. Thither come Cossack, and Mongol, and Kirghis, and Kalmuck, to choose their chargers. They catch them by means of a lasso, which they throw with surprising dexterity, and in a few days train them into a suitable docility. When in want of their hide or flesh, the nomades hunt them with gun, arrow, or spear; for hippophagy, which a few zealous amateurs are now endeavouring to popularize in France and England, has been practised from time immemorial by the inhabitants of the Steppes.

WILD HORSES TERRIFIED BY A STORM.

These barbarians, however, respect the life of their domestic animals, or sacrifice them only in cases of pressing need. They treat them also with a gentleness unknown to our European grooms and horse-dealers. With them, as with the Arabs, the horse is a friend rather than a slave; he is, in truth, one of the family; and it is with great difficulty that his master consents to part with him. Our travellers describe the Tartar, Mongol, and Kirghiz horsemen as realizing the celebrated fable of the Centaurs,—as becoming, so to speak, one with their horses. The exigencies of their wandering life require that they should be constantly on horseback; it is almost their home, their abode, their dwelling-place; there they are mounted day and night; there they sleep, prepare their food, and take their repasts. True that their cooking is of the rudest and simplest, and their taste not so fastidious as that of an European epicure! If, for example, they would make ready a piece of meat, they insert it between the saddle and the horse's skin, and in this impromptu oven leave it for a few hours, while it undergoes the processes of heat, pressure, and frequent friction, serving in some degree to cook it; then a pinch of salt for seasoning; and lo! a dainty titbit which our cavalier devours with the best appetite in the world.

But it is to the inhabitants of the Steppes of the Black and Caspian Seas that the horse renders the most estimable services. To make use of a phrase of Buffon's, "He shares with them the fatigue of war and the glory of battle;" he provides them with the best and swiftest means of transit; he nourishes them with his flesh, and the mare quenches their thirst with her milk. In *their* dairies mares take the place of our European milch-cows, and are regularly milked once or twice a-day. The milk, warm, is employed as a medicine. It is thicker and more saccharine than that of ruminating animals, and this, undoubtedly, is the reason that the Cossacks, Tartars, and Kalmucks have succeeded, by fermentation, in distilling alcohol from it, and procuring vinegar by acetifying it. They prepare with it an intoxicating liquor (*koumis*), to which they are very partial, and with which the wealthiest among them consider it an honour to be largely provided.

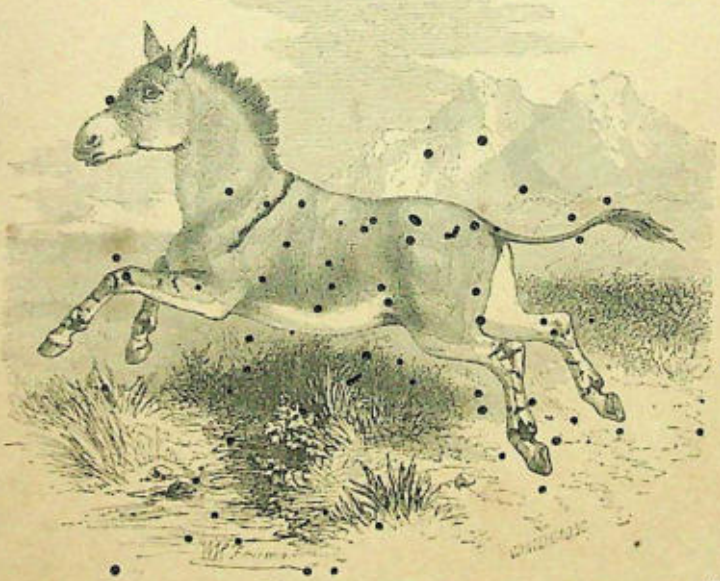
By the side of the horse, we naturally place his humble congener and compatriot, the *Ass*.

Nor need we be ashamed to devote a few lines to this useful animal, though civilization has appointed to it a very different lot from that of the horse.

While man has devoted his utmost efforts to ennoble, as it were, and aggrandize the latter, to perfect his capabilities, develop his qualities, embellish and vary his form, for the former he has had nothing but contempt and harsh treatment. He has made the horse the companion of his campaigns, the minister to his sumptuous pleasures, the instrument of his grandest labours. He has dismissed the poor ass to the fields to carry the heaviest burdens, to share in the toil and privation of the peasant. In these different conditions, who will wonder that while the horse has become a strong, graceful, and proud-spirited animal, the ass, on the other hand, remains bowed and bent, with a rough coarse hide, lanky limbs, a heavy head,—always drooping, as if under the weight of continual lassitude and unconquerable melancholy,—and long ungraceful ears, which give his physiognomy an air of ridicule. Everything in him bears the impress of degradation. How has he merited so obscure a destiny? Alas, he is the victim of an iniquitous caprice of man. For see him in his natural condition; contrast with the well-worn servant of civilization the *Onagra*,* the free wild ass of the Steppes, with the Tarpan, and the parallel will be wholly to the advantage of the former. The onagra is at least of the same size, his ears are short; he carries aloft a well-proportioned head; his skin, of a handsome gray or yellowish-brown, is sleek and shining; his limbs are long, delicate, and nervous. He lives in very numerous troops, and migrates from north to south, and south to north, according to the season. The Tartars employ him as a beast of transport and the saddle rather than as a beast of burden. They eat his flesh, preferring it to that of the wild horse. Even the domestic ass of the East differs notably

* The Onagra is identical with the Kouhan (*Equus hemionus*) of the Persian. It is described in the Book of Job, ch. xxxix. 5–8.

from the slow, dogged, ill-used animal of European notoriety. Under a more favourable climate, and in the free life of the desert, he has preserved his tall stature, his vigour, and the haughtiness of his bearing. The wealthiest and most distinguished personages do not disdain to mount him or harness him to their carriage. He has a keen eye, a quick scent, a sure foot, a mild and resolute aspect. He accomplishes with ease from six to eight miles an hour; and, lastly —a fact worthy of notice—his life, which with us seldom exceeds



ONAGRA, OR WILD ASS.

fifteen years, in Asia is frequently prolonged to thirty or thirty-five. He is less subject to sickness than the horse, and he almost equals the camel in sobriety, docility, and endurance of hunger and fatigue.

Whether the Tartars and Kalmucks, who use mares' milk as a medicine, attribute, as we do, certain therapeutical virtues to the milk of the ass, we are unable to say; but it is certain that this milk forms a portion of their daily food. On account of the strong proportion of saccharine *serum* which it contains, it is well adapted

for the preparation of the fermented drink already spoken of, known to the Tartars under the name of *Koumis* or *Kamuis*. Mr. Atkinson speaks of the large leathern *koumis* sack or bottle, as an important piece of Mongolian furniture. One which he saw was five feet eight inches long, and four feet five inches wide, with a leathern tube at the corner about four inches in diameter, through which the milk is poured into the bag, and the *koumis* drawn out. A wooden instrument is introduced into this bag, its handle passing through the tube, not unlike a churning staff; with this the *koumis* is frequently agitated. The Kirghiz begin making it in April, and its due agitation and fermentation occupy about fourteen days.*

The horse, and a few flocks of sheep and herds of horned cattle, amply suffice for the wants of the warlike tribes in the south of Asiatic Russia. These tribes have almost entirely abandoned the use of the camel. But as we advance eastward, we find these gigantic and mis-shapen ruminants in great numbers, the faithful companions and indispensable auxiliaries of the nomades of the East. They wander freely about the Steppes, in troops of several hundreds, browzing indifferently on the grass of the wide pastures or the foliage of the bushes. They are without fierceness, and the traveller who intrudes upon their immense domains seems only to inspire in them a benevolent curiosity. "It is impossible to describe," says Madame Hommaire de Hell, "the astonishment they exhibited as we passed them. As soon as they caught sight of us, they ran with all speed towards us, and then stood motionless, with heads turned towards our cavalcade, until we had got to such a distance as to be no longer distinguishable."

"Gold and silk," says Buffon, "are not the true wealth of Asia. The *camel* is the treasure of the East." It is a fact that this animal is wonderfully adapted to supply the wants of the desert races. It may be said to supply them with every object of primary necessity: food, clothing, and even habitation, fire, and the means of transport.

* T. W. Atkinson, "Oriental and Western Siberia," pp. 286, 287.

The flesh of the young camel, though inferior to beef or mutton, is savoury and easy of digestion; the she-camel yields an abundance of milk as substantial and agreeable to the taste as that of the cow. The camel's skin is, it is true, a coarse wool, but long, tenacious, and readily wrought. The Mongols make it into tissues and cord. Out of the tissues they weave their clothing, coverings, and tents; with the cord, which is of various thicknesses, they fabricate the harness of their horses and other objects of equipment. Camel-leather is not inferior in suppleness and solidity to that which we make use of in Europe. The dung of these animals, dried in the sun, serves as fuel not only for cooking food, but even for working metals. Finally, as a beast of burden, the camel surpasses every other in strength, swiftness, endurance of fatigue, and, above all, in that proverbial sobriety which enables him to accomplish a journey of several successive days without taking either food or drink. From nature he has received a special organization, which well justifies his Arab name of "the ship of the desert." It consists essentially in the structure of his feet, in that of his stomach, and in the species of hunch or hump which he carries on his back.

We know, in the first place, that the camel's foot does not resemble that of other ruminants; it is bifurcated, but the two toes, very strong and much elongated, are furnished, not with a hoof, but with a short nail, adhering only to the final phalange; they are, moreover, *palmated*; that is to say, reunited near the extremity by a carneous membrane, which is supplied underneath with a veritable thick and horny *sole*. The foot can thus plant itself on a wide surface, and seems expressly adapted to the shifting sandy soil which the camel usually traverses.

As for the stomach, beside the four compartments into which the stomach of all ruminants is divided, we notice, on the sides of the paunch, a mass of cubic cells, or partitions, always containing a quantity of tolerably pure water, very drinkable, and kept as a kind of reserve supply; so that more than one traveller, when crossing the desert, and perceiving neither fountain, well, nor stream in which to

quench his devouring thirst, has preserved his life at the expense of that of his camel, by killing the poor animal, and opening his reservoir to drink its contents.

The hump, of which the Arabian camel, or dromedary, has but one, while the Bactrian, or camel properly so called, has two, is, in truth, "a storehouse of solid nutriment, on which he can draw for supplies long after every digestible part has been extracted from the contents of the stomach: this storehouse consists of one or two large collections of fat

Bactrian Camel.

stored up in ligamentous cells supported by the spines of the dorsal vertebræ. When the camel is in a region of fertility, the hump becomes plump and expanded; but after a protracted journey in the wilderness it becomes shrivelled and reduced to its ligamentous constituent, in consequence of the absorption of the fat."*

To be deprived of drink for from eight to ten days is no hardship to the camel. Accredited authorities testify that without any serious

* Brande, "Dictionary of Art and Science," art. *Camel*.

inconvenience he can go without drink for twenty-three and even twenty-five days. In the way of solid food, a ball of cake weighing from a pound to a pound and a quarter, will suffice him for a whole day. Often when he has set out on his journey fasting, he contents himself with browsing on the way a few green or dry bushes, and in the evening sups on a handful of dried beans. But this singular abstemiousness is not his sole good quality; his vigour, his docility, his swiftness render him equally valuable.

The ordinary burden of a small camel is from 600 to 800 lbs.; a large camel will carry 1000 lbs. or upwards, from thirty to thirty-five miles a-day; but the *maharis*, or those which are used for speed alone, will travel daily from twenty to thirty leagues.

The camel of the Steppes, in Eastern Europe and Central Asia, is, as I have already hinted, the Bactrian or camel strictly so called. This animal differs from his African congener in several very important physical characteristics, and perhaps also in some moral peculiarities. His two humps are smaller than the one hump of the dromedary. He is a little larger than the latter; his average stature is from six feet and a half to seven feet. His hair, of a deep chestnut brown, almost woolly on the humps, the head, and the upper part of the neck, is short and smooth on the body, and hangs in long fringes below the neck and around the fore-legs. He endures without inconvenience the most opposite temperatures, great heat and extreme cold, so that his habitat naturally ranges over an immense extent of country. He is found throughout the zone of the Steppes, even to the confines of Siberia, on the borders of Lake Baïkal; he was formerly still more common in Hindostan, but has now almost disappeared, owing to the great consumption entailed by the military expeditions of our East Indian Government.

The camel is an excellent traveller, but his gait is rough and awkward, and almost insupportable by those who have not been long habituated to it. In this relation we may borrow an anecdote from Madame Hommaire de Hell:* Her dragoman, a Frenchman, named

* Madame de Hell, "Voyage aux Steppes de la Mer Caspienne," tome I.

Antoine, curious to essay this new species of equestrian practice, begged a Kalmuck in the escort to lend him his camel. The request being readily granted, he perched himself on the extremity of the saddle, in "measureless contentment" with his lofty post, and by no means mindful of the malicious smiles exchanged between the Cossacks and the camel-drivers. Scarcely had the beast advanced four paces, however, before his face turned pale, and he clung to the saddle, with a most pitiful countenance, and imploring help in the most agonizing tones. "One need be a Kalmuck," says Madame de Hell, "to be capable of enduring the trot of a camel. His jerky gait shakes the body so severely, that a long journey is a positive punishment, even for the Cossacks. The unfortunate Antonio, left some distance behind by the escort, made a vain effort to overtake us; he was compelled, willy-nilly, to retain his steed as far as the Caspian Sea, where he arrived about two hours after ourselves. I have never seen a man more *demoralized*. His groans, when he was lifted off the camel, were so lamentable, that we really hardly knew what to think of his condition."

As for the camel's moral qualities, the same lively writer furnishes a very different estimate to what we gather from the majority of travellers. She represents him as idle, pettish, and very vindictive.

"All that we had read," says she, "of the rapidity of these ships of the desert; their insensibility to fatigue, to hunger, to thirst; their tractability to the will of man exceeding the obedience of the leaf to the wind, was completely contradicted by the conduct of these quadrupeds, little careful to maintain their reputation for agility. Despite of a stout cord passed through one of the nostrils, and which caused them a sharp pain every time they became refractory, they would not march more than two successive hours without flinging themselves on the ground. We had to battle with them incessantly to rouse them from their torpor, and prevent them from biting one another. Whenever a camel-driver pulled a little roughly his animal's guiding-string, we heard a succession of cries, all the more frightful from their resemblance to the human voice. In a word, these camels behaved so ill

during their short journey, that we entirely lost the good opinion our great naturalist (Buffon) had given us of their species, in descriptions more poetical than true."

Notwithstanding Antoine's discouraging experience of camel-riding, Madame de Hell, a few days afterwards, essayed the same experiment, with the result that, like her poor dragoman, she made a vow never to repeat it. Somewhat later, she had an opportunity of witnessing a very curious illustration—and one very amusing to the lookers-on—of the natural vindictiveness of these rough steeds. We give the adventure in her own words:—

"Everybody knows that the camel possesses the faculty of ruminating the food already stored in one of his stomachs, and that he willingly enough grants himself this pleasure when he has nothing to eat; but it is not generally known, perhaps, that he possesses sufficient malice to make, when an opportunity arises, this prerogative a means of vengeance.

"I had noticed in the morning that one of our camel-drivers appeared on bad terms with his beast. He vainly tried to master him by punishment, pulling with all his might the cord which passed through the animal's nostril; the latter was obstinate, and threw himself every moment on the ground, a proof of rebellion. The Kalmuck, irritated by the struggle, profited by a halt to dismount, and inflict severe chastisement on the recalcitrant; but the camel, disdainfully raising his long neck, followed with so malicious an eye all his tyrant's movements, that without doubt he was revolving some project of revenge in his head. And so it happened that he quietly waited until the Kalmuck stood opposite to him; then, opening his great mouth, he ejected full in the camel-driver's face a double volley of masticated herbs, mixed with slaver and all sorts of filthiness. It would be impossible to describe the air of satisfied vengeance with which the camel raised his neck, and moved his head from one side to another, as if in quest of applause. What astonished me most in this affair was his master's moderation after undergoing such an outrage. He wiped himself coolly, remounted his saddle, and caressed

the neck of the ill-bred animal, as if he had received the most flattering compliment. A good understanding being thus strangely re-established, they went on their way peaceably, without giving another thought to what had taken place."

CHAPTER VII.

THE ANIMAL LIFE OF THE STEPPES:—WILD RUMINATING ANIMALS—RODENTS—CARNIVORA—BIRDS.

BESIDES those species of which we have just spoken, and which man has subjugated to his service, the Steppes nourish a host of other animals which seem for ever destined to a savage life. Some are spread through the entire zone of the Steppes, and include representatives of the genera or species belonging to the temperate latitudes of Europe. But most of them are circumscribed in more or less limited habitats, out of which they would not meet with the conditions of climate or provision that are essential to their existence.

The mammalia which are found in the plains of Eastern Europe and Central Asia belong principally to the orders of *Ruminants*,* *Rodents*, and *Carnaria*.

Cuvier divides the ruminants into two great sections: one comprising the ruminants without horns (genera, *camel*, *lama*, and *chevrotain*); and the other, those *with* horns. The latter he again divides into ruminants with deciduous or wooden horns (these are the *cervidæ* of the new nomenclature), ruminants with membranous horns (as the giraffes), and ruminants with hollow horns (oxen, goats, antelopes, sheep).

The section of Ruminants without horns is represented in the Steppes by the camel. Of the three groups of horned ruminants, one

* Class I., Mammalia; Order II., Carnaria; Order V., Rodentia; Order IX., Ruminantia.

only is wanting in this region of the Old Continent—namely, that of the ruminants with membranous horns; but we meet there with varieties of all the species included among the cervidæ, except the reindeer, which is confined to the glacial countries of both continents. The common European stag is found on this side of the Oural, in the Steppes bordering on the forests, where he prefers to seek an asylum.

THE ELAND (*Antilope oreas*).

The *aku*, or roebuck of Tartary, inhabits the valleys and plains which stretch to the north of the Himalaya and along the chain of the Thian-Chan. Deer wander in troops, or in isolated couples, in all the temperate and fertile portions of the zone of the Steppes, and the eland is spread over all Asia between the 45th and 41st degree of latitude. The latter is the largest of all the cervidæ. It ordinarily attains, and sometimes exceeds, the stature of the horse. His antlers,

spread out perpendicularly to the axis of his head, take at first a nearly horizontal direction, then spring upwards in an abrupt curve. At their extremity they terminate in a broad palm, set with sharp snags around its outer edge. Their weight, for adults, averages from fifty-five to sixty-five pounds. The eland has a short robust neck, which is necessary to enable him to support the burden of his branching honours; but which, joined to the projection of his shoulders, and the disproportionate length of his fore-legs, gives him a very ungraceful aspect. Nor can he browse the herbage without making a great digression or falling on his knees. The male, moreover, under the throat has a sort of goitre, or swelling, garnished with a rude pointed beard. The female wears a beard, but has no goitre. The neck is surmounted with a short, stiff, blackish mane. The rest of the hair is of a pronounced gray.

The eland inhabits the marshy plains and banks of rivers; he dreads the heat, and to escape it will often remain during the long summer days plunged up to his neck in the cool waters. He lives with his comrades in tolerably numerous herds. The first birth of the female is only one; afterwards she produces two at a time. Frequently the eland attains a prodigious stature. An individual killed in the Altaï measured four feet and a half in height to the shoulder, and four feet and a third in length. His flesh is said to be light and nourishing; his hide excellent for making shoulder-belts; and his antlers are converted to the same uses as the horns of the stag.

Among the hollow-horned ruminants I may mention the *Saiga*, a kind of antelope which inhabits the Asiatic Steppes, and is met with even in Poland. In figure he takes the poetical elegance of the gazelle; his horns are of a clear yellow colour, and of a transparency which rivals that of tortoise-shell. His forehead is covered with transversal folds; he has no muzzle, properly speaking, but a kind of snout like that of a hog. It is said that he drinks through his nostrils. The saigas travel in herds of about two thousand each, of whom a certain number keep always some distance in advance, in

the rear, and on the flanks of the main host, so as to watch over their security.

Another kind of gazelle, the *Dscren*, is peculiar to the Mongolian Deserts, and named by the inhabitants the *yellow stag*. His stature is little inferior to that of the deer. The female is without horns.

The *Mouflon*,* the original of our domestic sheep, sometimes strays into the plains of Central Asia, but prefers the solitude of the mountains. His general size is that of a small fallow deer, but though clothed with hair instead of wool, he bears a closer resemblance to the ram than to any other animal. In summer his hair is close, but in winter it becomes rough, wavy, and slightly curled. On the upper part of the body it is brown, but the under part and insides of the limbs are whitish. The hair is considerably longer under the throat, and about the neck and shoulders, than elsewhere.

We may refer, in this connection, to the *Egagre*, or wild goat, which Cuvier considers to have been the original stock of the numerous races of goats spread over various regions of the globe.

The Steppes nourish two species of *Rodents*: the Varying Hare (*Lepus variabilis*), so called because he changes from tawny gray in summer to white in winter; and a gray squirrel, which is probably only a variety of our common European squirrel. He is not a climber and a "haunter of the woods," like his congener. He abounds in the Mongolian Steppes, where he lives in holes excavated under the earth, like the rats and rabbits. He is, however, much more ingenious than the other troglodyte-rodents; he shelters the entrance to his abode under a domed roof, skilfully constructed of dry herbs woven together, and covered with clay. These works closely resemble the mounds upheaved by moles.

The Carnaria of the *Felida*, or feline family, are wanting, or

* Also called the Musmon (*Ovis Musmon*).

nearly so, in the immense zone which we are considering. Except a species of lynx, the *Chilason* or *Chalon*, whose existence has been recognized in the north of Tartary; and a few tigers which adventure into Mongolia, we may say that the Asiatic Steppes, and, therefore, also those of Europe, are exempt from these inconvenient guests. The most dangerous, and almost the only enemy which man and the herbivora have reason to dread, is the *Wolf*. This animal, now very rare in Western Europe, where his race will soon disappear, is still found in great numbers in the wild Lithuanian forests, in Russia, and all Northern and Central Asia. To him, as to other animals of the *Canidæ*, cold appears more favourable than heat, and it is in countries where the average temperature seldom rises high he attains his greatest dimensions. In Lithuania wolves are often met with which measure three feet and a half in length, without the tail. Those of Northern Asia are also of a great size and nerve, of terrible strength and audacity; they have been seen to pounce on a sheep, and carry it off at full speed. They intrude in quest of victims into the towns, the villages, and the encampments; combat to the last with their enemies; and when vanquished die without a groan. Generally they lurk in the woods and forests; but, hunger, according to the proverb, drives them forth from their lairs. Then they assemble in vast hordes; they pursue, they assail, they defend, with ingenious tactic, skilfully availing themselves of the disposition and accidents of the ground. Their manœuvres vary according to the nature of the game or the enemy. In general, if a man preserve an upright bearing and a bold countenance, they will not attack him; they follow him stealthily, however, prepared to pounce upon him if, unhappily, he should stumble or falter. But the wolves of Tartary, far from sharing in this deference towards the lord of creation, display a singular bitterness against him. "It is remarked," says the Jesuit missionary Huc, "that the Mongolian wolves attack man more willingly than any animals; one sees them sometimes galloping through innumerable flocks of sheep, without inflicting any injury, in order to dash upon the shepherd. In the neighbourhood of the Great Wall they

frequently descend upon the Tartar-Chinese villages, enter the farms, turn aside with contempt from the domestic animals which they encounter, and penetrate even into the interior of the houses to select their victims, seizing them invariably by the throat and strangling them. Not a village in Tartary but has every year to deplore some calamity of this kind. One might say that the wolves of this

Capture of a Wolf by a Kirghiz Horseman.

country sought specially to avenge themselves on men for the blood-thirsty war the Tartars wage against them." And it is true that in their pursuit of these animals the inhabitants of the Steppes display not only an ardour which would be legitimate, but a fierce and uncontrollable cruelty.

"They pursue them everywhere *à outrance*," remarks M. Huc; "they regard them as their chief enemy, on account of the terrible

losses they inflict upon their flocks. The news that a wolf has made his appearance in the neighbourhood is for everybody a signal to 'mount and ride away.' And as each cavalier has always two or three saddled horses in waiting near his tent, the plain is speedily covered, as if by enchantment, with a cloud of eager horsemen. Their weapon is a long rod.* Thus, in whatever direction the wolf may seek to escape, he encounters a band of determined adversaries, whose cry, as they precipitate themselves upon their traditional foe, is 'No quarter!' There are no mountain-sides so rugged or so difficult, that the nimble horses of the Tartars cannot pursue him thither. The cavalier who finally overtakes the beast, flings a lasso round his neck as he passes at full gallop, and drags him in his rapid track to the nearest tent. There they firmly bind up his muzzle, that they may proceed to torture him with impunity, closing up the tragic scene by flaying him alive, and then setting him free. In the summer the miserable animal will live in this condition for several days; but in winter, exposed without his furry coat to the rigour of the season, he dies almost immediately, frozen to death." †

It is generally considered that the wolf is an animal as cowardly as he is fierce, because he flies before man when man does not retreat before him, and because he kills unoffending animals. But we forget that man acts in a precisely similar manner. Numerous experiments, and especially those of Cuvier, have clearly proved that the wolf is fully capable of being domesticated, is very sensible of kindly treatment, and will as readily grow familiar with, and attached to, his master, as the best of dogs. We must, therefore, refer his ferocity to the instinct of self-preservation and of a vengeance too frequently excited; just as at the Cape of Good Hope, the unfortunate Bosjesmen, formerly treated like beasts by the Dutch colonists, though naturally of a peaceable disposition, became active

* This rod, or whip, is furnished with a long cord terminating in a slip-knot, something like a lasso. With this instrument the Tartars seize and carry away the horses and wild asses, and, as we see in the Engraving, capture wolves alive, and satisfy their hatred against these unfortunate beasts, less ferocious, assuredly, than the Tartars themselves.

† Huc, "Souvenirs d'un Voyage dans la Tartarie, la Thibet, et la Chine," tome 1er.

and cruel aggressors, and daring assailants, against the enemies who had exhausted their patience.

Two other wild beasts of the dog genus, the *Korsak* and the *Karogun*, are eagerly hunted by the Tartars, especially by the Kirghiz. But the chase, in this instance, is carried on for industrial purposes. The fur of these animals is very valuable, and the Kirghiz hunters carry thousands every year to the great market of Orenburg. The Korsak is a species of fox. In colour he closely resembles the jackal; but he has a long tail, with a black tuft at the tip, and on each side of the head a brown stripe extends from the eye to the muzzle. He ranges over all the Steppes of Tartary, and lives in burrows like the foxes. The natives pretend that he never drinks. He is a very handsome animal, and when, towards the close of the sixteenth century, several individuals were brought to Europe, he became quite the fashion. All the great ladies of the court were desirous of possessing one, which they tended in their chambers, and when promenading in the parks, often led about like a spaniel. The mania was of brief duration, but it clearly showed how easily the animal could be tamed and reared.

Buffon has confounded the karogun with the isatis or polar fox, and other animals with the korsak. He is equally distinct from the one as from the other, and the Kirghiz never make a mistake, though they hunt for both in the same districts. His skin is of an ashen gray on the back, and a pale yellow under the belly. His fur is not less precious than that of the korsak.

The wild Ornithology of the Steppes comprises some migratory palmipedes, a few gallinaceæ, and some predatory birds of the falcon family. Gulls, wild ducks, herons, curlews, and especially pelicans, people the shores of the Black Sea, the Sea of Azov, and the Caspian, with the banks of the rivers that flow into them, and the neighbouring pools. The Cossack and Kalmük chiefs, who now ardently cherish the love of falconry that was so marked a trait

in the character of the mediæval nobles, hunt these birds with much enthusiasm, save, indeed, the pelican, whose flesh is not edible.

The *herons* form, in the order *Grallatores* and the tribe *Cultirostres* (knife-like beak), a family (*Ardeidæ*) composed of numerous species, several of which inhabit or frequent the marshes, lakes, and streams of the region of the Steppes.

> "O'er yonder lake the while,
> What bird about that wooded isle,
> With pendant feet and pinions slow,
> Is seen his ponderous length to row?
> 'Tis the tall heron's awkward flight,
> His crest of black, and neck of white,
> Far sunk his gray-blue wings between,
> And giant legs of murky green."*

The most remarkable species is the great white heron (*Ardea alba*), or yellow-billed white egret, clothed in plumage of snowy white, with a long yellow bill, long lank limbs, and black feet; length about forty inches. On the nape and the croup his feathers are long and flexible, wavy, and with tapering ends; they are eagerly sought after for purposes of adornment. We may also mention the great bittern, the "bird of desolation" (*Botaurus stellaris*)—which the French expressively name *eau-mère*, or "water-mother," and which derives its zoological appellation from the Latin words *bos* and *taureau*, in allusion to the booming, bellowing sound of his hoarse voice. His plumage is of a pale yellow, marked with brown and nest-coloured zig-zag patches and shades. From the fulness of the feathers about his neck, he presents a very quaint, and even ridiculous appearance; but he is a bird of courage, and even of ferocity, striking with keen bill at the eyes of his antagonist. When attacked by dogs or other carnivora, he will throw himself upon the ground, and fight with both claws and bill unto the very last.

The *curlew* is allied to the ibis, differing from it only in secondary particulars, and notably in the form of his bill, which is thinner, and rounded in its whole length. His tail resembles the hen's; the

* Bishop Mant, "British Months."

plumage of the head, neck, and fore part of the back, is light reddish-gray, streaked with dark-brown; the hind part of the back is white, with dark narrow longitudinal markings; the tail, breast, and abdomen are white, the former crossed with black bars, and the latter with dark marks and spots of a similar shape to those on the back.

1. Great Bittern. 2. White Heron or Egret. 3. Curlew.

The female lays four excessively large pyriform eggs, about three inches long. The cry of the curlew is loud, wild, and plaintive. These birds assemble in numerous flocks, and live on the sea-coast and the marsh-border, feeding on worms and molluscs. At breeding-time they separate into pairs, and haunt the wild hills and dreary moorlands,—

"Remote from human sight,
In lonely pairs their vernal flight

They speed o'er heathy mountain rude,
On some waste marsh's solitude,
To the tall grass or bristling reed
Their wild unnestled young to breed."

The species of *Pelican* which inhabits the shores of the Black and Caspian Seas is the Common (*Pelicanus Onocrotalus*). We must not pass unnoticed this well-known wader, which has for ages been invested with an atmosphere of song and fable, and which is specially remarkable for the bright yellow membranous pouch attached to the lower mandible of his long robust bill. This pouch, says Broderip, will hold a considerable number of fish, and thus enables the bird to dispose of the superfluous quantity which may be taken during fishing excursions, either for his own consumption or for the nourishment of his young. "In feeding the nestlings—and the male is said to supply the wants of the female, when sitting, in the same manner—the under mandible is pressed against the neck and breast, to assist the bird in disgorging the contents of the capacious pouch; and during this action the red nail of the upper mandible would appear to come in contact with the breast, thus laying the foundation, in all probability, for the *fable* that the pelican nourishes her young with her blood, and for the attitude in which the imagination of painters has placed the bird in books of emblems, with the blood spirting from the wounds made by the terminating nail of the upper mandible into the gaping mouths of her offspring."

It is usually in the evening or the morning that these birds gather about the lonely shores to fish in company, like a party of sociable Izaak Waltons, and proceeding, as Nordmann remarks, upon a systematic plan, which is apparently the result of a kind of concerted agreement. They select a suitable station—a shallow bay with a smooth bottom. There they arrange themselves in a half-circle, the bill turned towards the ground, and keeping at a distance of from ten to twelve feet. With their wings they beat the water hurriedly, and sometimes plunge in up to their middle, gradually wading towards the beach, and driving the fish before them into a very narrow channel. Now the feast commences, and other birds

never fail to profit by the ingenious labours of the pelican. Nordmann counted, on one occasion, forty-nine pelicans fishing together in this fashion on the shores of the Black Sea.

"Besides these forty-nine," he adds, "there were assembled on the heaps of algæ, confervæ, and shells cast ashore by the sea, hundreds of sea-mews, sea-swallows, sea-daws, preparing to snatch the fish out of the water, and to divide amongst themselves the remains of the banquet. Finally, several grebes swimming in the area circumscribed by the semicircle of fishers, while this space was still sufficiently broad, played their part at the welcome feast, frequently plunging after the scared and terrified fish."

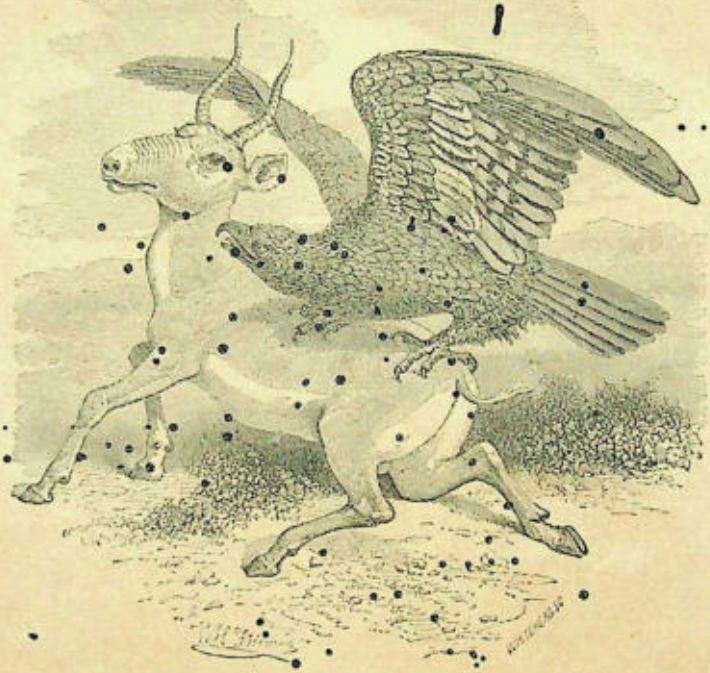
The *bustard* and the *grouse*, or heather-cock, are common enough in the prairies of Central Asia. Crows and numerous birds of prey also flock thither in search of their dead or living prey. Travellers speak of a *black eagle* of Mongolia which the Mongols and Kalkas train to hunt the *moufflon*, the yellow goat, and the saïga. We cannot find the bird described under this name by any naturalist, nor can we determine whether he is an eagle properly so called, or whether he is not rather the cosmopolitan black kite (*milvus ater*), which rises so fiercely on his plumed wings,

"And hunts the air for plunder."

We may mention, as also proper to Central Asia, the *Aquila bifasciata* of Dr. Gray, and several species of buzzards, hawks, and falcons. These *Raptores* live very peacefully in the desert solitudes, where none disturb them; and so little do they fear man, that they venture into the Mongol encampments and carry off the provisions destined for the travellers' refreshment. An incident of this nature is recorded by the Abbé Huc, who, with his companions, was at the time preparing to sup on a quarter of a kid skilfully "dished up" by their Tartar neophyte, Samdadchiemba.

"We had just seated ourselves," says M. Huc, "in a triangle on the grassy sward, having in our midst the lid of the pot which served instead of a dish, when suddenly a noise like thunder broke over our

heads. A great eagle fell like an arrow on our supper, and rose again with the same rapidity, carrying off in his claws some slices of kid. When we had recovered from our surprise, we had nothing better to do than laugh at the adventure. However, Samdadchiemba could not laugh, not he; he was exceedingly wroth, not on account of the stolen



THE EAGLE OF THE STEPPES, AND THE ANTELOPE SAIGA.

kid, but because the eagle, in flying off, had insolently buffeted him with the tip of his wing. . . . .

"The eagle," adds our author, "is found almost everywhere in the deserts of Tartary. You see him sometimes hovering and wheeling round and round in the air; sometimes, perched upon a hillock in the middle of the plain, he remains there for a long time as motionless

as a sentinel. Often we encounter him on the ground, apparently larger than an ordinary sheep; when we draw near, he is compelled, before he can rise into the air, to make a long detour, agitating his heavy wings; after which, succeeding in lifting himself a little above the ground, he soars aloft at pleasure."

The Erpetological fauna of the Steppes is little known, and is probably very scanty. Unfortunately, this region has not been explored by scientific naturalists, and the unprofessional travellers who have visited it do not appear to have met with any reptiles which seemed to them worthy of detailed notice. Atkinson, however, speaks of the stony ridges of the plain as "swarming with *serpents*."—"I observed," he says,* "four varieties: A black one, three feet eight inches long, and about one inch and an eighth in diameter. Another was of slaty-gray colour, from two to three feet long, and smaller in diameter than the black snake. This breed was numerous, and often difficult to see, they so nearly resembled the colour of some of the rocks. We also found some of an ashy-green and black, with deep crimson specks on the sides; as they moved along in the sun the colours were most brilliant." Another, which Mr. Atkinson's companions killed, was of a dark-brown, with greenish and red marks on the sides, and evidently very venomous. He measured five feet two inches and a half without his head, and four inches and a quarter round his body.

* Atkinson, "Oriental and Western Siberia," pp. 463–465.

CHAPTER VIII.

THE INHABITANTS OF THE STEPPES:—TARTARS, COSSACKS, KALMUKS, KIRGHIZ, MONGOLS.

THE Steppes of Tartary and Mongolia, interrupted, says Humboldt,* by chains of mountains of various aspects, separate the ruder peoples of Northern Asia from the primitive races, which have been for ages civilized, of Hindostan and Thibet. Their existence has influenced the destinies of mankind in various important ways. They have rolled back the populations towards the south, and more than the Himálaya, more than the snow-crowned peaks of Serinagur and Goorkha, have raised an obstacle to the alliances of peoples, while opposing, in the north of Asia, insuperable barriers to the refinement of manners and the genius of the arts.

But it is not only as barriers that History should regard the plains of Central Asia; they have several times let loose on earth a torrent of calamity and devastation. The pastoral races of the Steppes—Mongols, Getæ, Alans, and Huns—have convulsed the world. If, in the course of ages, intellectual culture has directed its course from east to west, like the vivifying light of the sun, Barbarism at a later period has followed in the same track, when threatening to plunge all Europe into darkness. A people of tawny shepherds, Tou-Kin (that is to say, Turkish) in origin, the Hioung-Nou, inhabited, under tents of skin, the elevated Steppe of the Gobi. Long formidable to the Chinese power, a horde of the Hioung-Nou was driven back towards the south into Central Asia. The impulse which they gave spread uninterruptedly even into the native country of the Fins, on the borders of the Ourel, and thence the Huns, the Avars, the Chasurs, and various mixtures of Asiatic races, poured forth in furious violence. The Hunnish hosts first appeared on the

* Humboldt, "Ansichten der Natur," vol. i.

banks of the Volga, then in Pannonia, and finally on the banks of the Marne, and on those of the Po, ravaging the beautiful fields where, from the days of Antenor, the genius of man had accumulated its glorious monuments. Thus from the Mongolian deserts blew a pestiferous wind, which choked even in the Cisalpine plains the delicate blossom of art, the object of such tender and continual cares.

Our English traveller, Atkinson, has called the Steppes "the cradle of invasions;" and this not only because from their solitudes issued the hordes which devastated Europe in the first centuries of the Middle Ages, but because Russia and Austria have found therein those truculent soldiers of repulsive aspect who, in their hands, have become, even in our own day, the scourge of the free and civilized nations they would fain have subjugated.

In the present day the Steppes of Eastern Europe and of Asia are still the asylum of savagery, if not of barbarism. The tribes scattered over them are more or less closely allied to that fraction of the human family which ethnographists designate under the name of the "Turanian." Those of the East belong exclusively to the Mongolian branch, and those of the West partly to the Mongolian and partly to the Turkish, more or less modified by their mixture with the Slave branch of the great Caucasian family. To all these peoples we commonly apply the term Tartaro, or Tartars, which originally "was a name of the Mongolic races, but through their political ascendancy in Asia after Chingis-Khan (A.D. 1227), it became usual to call all the tribes which were under Mongolian sway by the name of Tartar." * It now really belongs to the small tribe of Turkic origin which, after occupying Turkistan, has spread even into the Crimea. We must distinguish from it, however, the Cossacks, or Kosaks, who inhabit the Ukraine, the banks of the Don and the Dnieper, and who are more closely related to the Slave family than the Mongolian race.

We shall pass in rapid review the principal hordes which inhabit the Steppes, from the western border to the eastern extremity of these deserts.

* Prof. Max Müller, "Lectures on the Science of Language," 2nd Series, p. 399.

The first tribe which we encounter on the shores of the Sea of Azov and the Black Sea is that of the Tartar-Nogáis, who formerly lived north-east of the Caspian. "Pressed by the Kalmüks, a Mongolic tribe, the Nogáis advanced westward as far as Astrachan. Peter I. transferred them thence to the north of the Caucasian mountains, where they still graze their flocks on the shores of the Kuban and the Kuma." Of late years, however, they have begun to settle themselves in permanent habitations, owing to the exertions of a French emigré, Count Maison, who was appointed their governor in 1808.

They now occupy (according to Madame Hommaire de Hell) all the territory comprised between the Sea of Azov and the river of Malochnia-Vodi. They number about 32,000 souls, spread over seventy villages. Their huts are small, with a roof constructed of beams of timber, covered with reeds, which are afterwards loaded with clay and ashes. They occupy themselves wholly in rearing horses and cattle. The horses of the Kalmük-Kirghiz breed are of moderate stature, but nimble and robust. All the year round they roam across the plains, and in winter seek their provender beneath the snow. The horned cattle are small and puny, the cows yield but a poor supply of milk, and are of scarcely any value.

The aged Nogáis shave the hair entirely off; the young people preserve a single tuft on the top of the head. This custom compels them to wear constantly a bonnet of wool or lamb's skin. A short caftan over a shirt of cotton or woollen, bound round the waist by a leather belt; loose, wide trousers; in winter a pelisse of sheep's skin and a kind of hood enveloping the head and shoulders, compose the dress of the males. As for the women, they wear above the chemise a caftan of cloth, girded about the form by a large belt ornamented with great metal buckles; they likewise figure in Turkish trousers and slippers, with a long white veil fastened round the head, and allowed to fall upon the shoulders; small silver rings adorn the fingers and the nose; heavy ear-drops hang from their ears, the two being frequently linked together by a chain passing under the chin.

The young girls dress their hair in a multiplicity of curls, and instead of the veil wear a small red fez, garnished with pieces of metal and all kinds of trinkets.

The Nogáis are Mohammedans, of the sect called Sunnites (or believers in the "Sunna," the sayings and aphorisms traditionally attributed to the Prophet). Their name is derived from that of their first chief, the grandson of Chingis-Khán, who, about 1260, declared himself independent of the Kapchakian empire, and established himself with his warriors on the borders of the Black Sea.

The Kosaks (or Cossacks) are, as we have said, Slaves rather than Tartars. They have blue eyes, red hair, thick lips, a flat nose. Nimble, robust, indefatigable, skilful horsemen, they furnish the Russian army with a formidable host of irregulars. Some have fixed their homes in the towns, but the majority inhabit the villages or *stanitzas* scattered over the Steppes. Very few are agriculturists. Either they devote themselves to breeding horses and cattle, or live on the small pension allowed them for their military services. Nearly all the young and hardy of the males have no other trade but that of arms. The Cossack chieftains, their Hetmans, or Attamans, derive their authority directly from the Czar. Their religion is that of the Russian Greek Church; and they are, we believe, the only Christians in the entire zone of the Steppes.

Bold and resolute robbers in time of war, the Cossacks "at home" are peaceable, kindly-natured, and more honest than the Russian Mongiks. The erroneous ideas which still prevail respecting their character are mainly due to French prejudices, excited by the disastrous events of 1814 and 1815, when the jingle of their arms resounded in the streets of Paris. But they are not really so black as they have been painted. The traveller passes through the country which they inhabit with the utmost security, and is received in their stanitzas with a hospitable welcome.

These stanitzas, if we may credit Madame Hommaire de Hell, present a far more agreeable appearance than the Russian villages.

They consist of small wooden houses, gaily painted. There is but one story, which is surrounded by a miniature gallery, and seems expressly constructed to please the eye. The interior is exceedingly neat and pretty, indicating an intelligence and an idea of comfort which the Russians never exhibit. You will find it enriched with towels, dishes of delft ware, forks, and all the most necessary utensils. Usually two huts are built in one block; the first, which we have just described, is occupied for a summer residence; it contains, generally, one room hung with paper of a lively design, and adorned with images, flowers, and trophies of arms, which is reserved for state occasions and the entertainment of strangers. The second hut, built of dried clay, resembles the Russian *kates*, consisting of a single chamber, where all the household huddle together during the winter to shelter themselves from the cold.

The traveller seldom sees in these stanitzas any but women and children. With the exception of a few gray veterans, who have purchased by forty years of service the right of dying under the home-roof, the entire male population is under arms. Thus all the work falls upon the shoulders of the women, who must repair the houses, cleanse and dry the furs, take care of the children, and watch the cattle.

The Cossack soldiers, regulars and irregulars, are the guardians of the Steppes. To them is intrusted the security of the traveller, who is much exposed to the attacks of nomadic Turkomen, whose only occupation is robbery. The surveillance of these immense plains is not so difficult, however, nor does it necessitate so large a force as you might suppose. Small watch-posts, or platforms, of extreme simplicity of design, are raised at intervals on the higher grounds; they consist of four long stout poles planted in the earth, and supporting a timber floor, which is sometimes sheltered by a roof of timber. These are the observatories, the prospect-towers of the Cossacks, who can thus obtain a survey over an immense sweep of country, and exchange signals with one another. The horsemen always remain stationed under the platform, ready to leap

into the saddle and to gallop wherever their presence may be required.

In the Steppes of the Caspian Sea the Cossacks give place to the Kalmüks, or Olöts, a people of the Mongolic race, who originally inhabited Turkistan, but abandoned that country, in 1778, for the

COSSACK HORSEMEN IN THE STEPPES.

banks of the Volga. Their life is wholly nomadic. They encamp under tents called *kibitkas*, formed of a trellis-work of wood covered with thick felt. In stature they do not often exceed the middle height; they are thin and ugly, with a swarthy skin, a large flat countenance, little eyes, broad nose, thick lips, and frizzled beard. They are inoffensive, hospitable like all Eastern people, but idle and cunning. Their costume differs but little from that of the Tartars.

Nogáis. They profess the Lamaii religion, and obey the chiefs, whom they themselves elect, and who bear the title of khans. The Russian Government levies among the Kalmük tribes encamped on its territory a body of irregular troops, whom it employs in the defence of its eastern and southern frontiers.

According to Madame de Hell, the Kalmüks are as friendly as the Cossacks in their reception of a stranger. "The last encampment," she says, "where we passed the night, appeared to us one of the most considerable which we had hitherto met with. The country, almost transformed, was no longer saddened by the great sandy plains of the Caspian Sea and the Manitch. . . . . Herds of horses, camels, and oxen furrowed the surface of the Steppe, announcing the wealth of the hordes to which they belonged. No hostile manifestation on the part of the latter occurred to disturb our security. Happy in receiving us in the very midst of their tents, these good Kalmüks never attempted to rob us even of the most trifling article. Their desires and their wants are so limited! To tame a wild horse, to roam from one Steppe to another on their camels, to smoke, and to drink *kouniis*, to shut out the cold airs of winter with smoke and ashes, and to observe devoutly the superstitious practices of a religion which they cannot understand—such is their whole life."

At intervals, the traveller who crosses the Steppes of the Caspian encounters with astonishment, in the most dreary localities, far from every Cossack village and Kalmük kibitka, a group of men, women, and children with bronzed complexions, with features strongly defined, covered with squalid and grotesque rags, dragging their naked feet over the damp and burning soil, and leading small vehicles loaded with implements and utensils of every kind. He easily recognizes in these beings of sinister mien, audacious mendicants, skilful thieves, musicians, blacksmiths, conjurers—what shall I say?—the *débris*, in a word, of that once great, and perhaps powerful race, now so degraded and corrupt, whose problematical history is the despair of the scholar. The scorn and mistrust of every nation—impatient of all discipline, all education—without law, without religion, without country—these

men speak a language which none can understand. Of their real name they are themselves ignorant, and they accept with indifference that which is imposed upon them in different countries: in the East, *Romany;* in Moldavia, *Tsiganes;* in Italy, *Zingari;* in Spain, *Gitanos;* in France, *Bohemians;* in England, *Gipsies.** The Germans call them *Zigeuner;* the Dutch, expressively but intolerantly, *Heathens;* the Persians, *Sisech;* the Hindus, *Kavachee;* the Danes and Swedes, *Tatars;* and the Arabs, *Haramé.* Their origin has been a theme of speculation for centuries, and all that seems certain, after a vast amount of research and discussion, is, that the cradle of the race was India. To what Indian people they should be affiliated is still doubtful; whether to the Zuts or Djalts of the north; the Tshingani, who dwelt near the mouth of the Indus; or the Tshandalas, chronicled by name in the laws of Menou.

We know that their first immigration into Europe occurred about the close of the tenth century, for we find them referred to in a paraphrase of the book of Genesis, written by an Austrian monk, about 1122. They are there spoken of as "Ishmaelites and braziers, who go peddling through the wide world, having neither house nor home, cheating the people with their tricks, and secretly deceiving mankind." In the fourteenth century a considerable body settled in Wallachia, Hungary, and the island of Cyprus. Next, they invaded Germany, broke into Switzerland, and appeared in Bologna and other Italian cities. Like a besieging army they set down before Paris in 1427, but were not suffered to enter its precincts. A few years later they crossed into England, and gradually they overspread the whole of Europe. Their own account of themselves represented that they came from "Little Egypt;" that about four thousand of their number had been compulsorily baptized by the king, and condemned to seven years' wanderings, while the remainder had been slain. At first, their wealth, their pomp, and their supposed penitence secured

* The Spanish gipsies call themselves *Calés* (black). Many interesting details of this curious people are embodied in George Borrow's "Zincali; or, An Account of the Gipsies in Spain."

them a favourable reception; but when their wealth was dissipated, their pomp decayed, and their penitence discovered to be a sham, a storm of obloquy broke over their heads. Every European government levelled the most arbitrary decrees against them, which continued in force down to the middle of the eighteenth century. Various attempts have since been made to civilize and incorporate them with the general body of the population, but these have obtained a very limited success. They still remain a race apart, with their own language (Romany Tschib), their own traditions, their own customs, their distinct personal characteristics. They still remain a race cursed with the curse of perpetual restlessness; a mysterious impulse constrains them to wander; they live secluded from all other peoples; an atmosphere of secrecy enshrouds their inner life, their language, and their creed. They are gifted with a remarkable love of and capacity for music, and a strange wild charm invests their own gipsy-melodies. Their character is a grotesque combination of the most opposite qualities; for they are brave and yet cowardly; revengeful, yet loyal; treacherous, yet capable of the most passionate attachment; indolent, yet energetic; chaste, yet fond of licentious songs and dances. In a word, they are a problem to the ethnologist, the moralist, and the historical student; and fence themselves about with so impenetrable a reserve, that we may well doubt whether the full truth respecting them will ever be ascertained.*

The Tsiganes or Romany are very numerous in Southern Russia. They pass from town to town, from village to village, sometimes begging or stealing, sometimes exercising their peculiar trades and industries, and providing for their wants more honestly. They never establish themselves permanently in any place. They halt wherever the evening shades may chance to overtake them, stretch a few fragments of woollen stuff across the poles of their vehicles to serve for tents, kindle a fire with herbs, twigs, and dry branches, partly to cook their food, and partly to scare away the wild beasts, and fling themselves

* All that is really known about them will be found in Professor Pott's "Zigeunersprache" (Halle, 1844).

down pell-mell to sleep on mats or the naked earth. When morning dawns, they resume their life-long march—giving no thought to the future, no dream to the past—without object, hope, or purpose.

The Steppes of the interior of Asia, from the Aral river to the Ala-Tau mountains, are occupied by the great nation of the Kirghiz,

NIGHT ENCAMPMENT OF GIPSIES IN THE STEPPE.

who have, from time immemorial, been divided into the Great, Middle, and Little Hordes. To the former belongs the territory north of the Ala-Tau, with portions of China and Tartary. They are subject to the sovereigns of the countries in which they dwell. The Middle Horde inhabits the district between the Ishim, Irtish, Lake Balkhash, and Khokan. The Little (and far most numerous) Horde

wanders over the grassy plains bounded by the Yamba and the Ural, Turkistan (now a Russian province), and the country of the Middle Horde (or Siberian Kirghizes). Altogether, the Kirghizes number upwards of one and a quarter million of souls. They are of Turco-Tartaric origin, and Southern Siberia is their mother country.*

Though owing a nominal allegiance to the Russian Czar and the Chinese Emperor, they are virtually independent, and obey only their sultans or chiefs. They are frequently at war. Many live wholly by brigandage; suddenly descending, under cover of night, upon the richest *auls*, or villages, slaying all who resist, and carrying off horses, cattle, and all objects of value, and men, women and children, whom they sell as slaves. These nocturnal razzias are designated, in the Kirghiz language, *barantas*.

The *yourt*, or tent of these nomades, resembles the kibitka of the Kalmüks. We borrow a description of one belonging to a Kirghiz chief from Mr. Atkinson's entertaining pages.

"It was formed," he says,† "of willow trellis-work, put together with untanned strips of skin, made into compartments which fold up. It was a circle of thirty-four feet in diameter, five feet high to the springing of the dome, and twelve feet in the centre. This dome is formed of bent rods of willow, one and a quarter inch diameter, put into the mortice-hole of a ring about four feet across, which secures the top of the dome, admits light, and lets out the smoke. The lower ends of the willow-rods are tied with leathern thongs to the top of the trellis-work at the sides, which renders it quite strong and secure. The whole is then covered with large sheets of *voilock*, made of wool and camel's hair, fitting close, making it water-tight and warm. A small aperture in the trellis-work forms a doorway, over which a piece of *voilock* hangs down, and closes it; but in the daytime this is rolled up and secured on the top of the *yourt*.

* Max Müller, "On the Origin of Language," 2nd series, p. 317.

† T. W. Atkinson, "Oriental and Western Siberia," pp. 284–286.

"The furniture and fittings of these dwellings are exceedingly simple; the fire being made on the ground in the centre of the *yourt*, directly opposite to the door *voilocks* are spread: on these stand sundry boxes, which contain the different articles of clothing, pieces of Chinese silk, tea, dried fruits, *ambas* of silver (small squares, about two and a half inches long, one inch and a half wide, and about three-tenths of an inch thick). Some of the Kirghiz possess large quantities of these *ambas*, which are carefully hoarded up. Above these boxes are bales of Bokharian and Persian carpets, some of great beauty and value. In another part of the *yourt* is the large *koumis* sack, completely covered up with *voilock* to keep it warm and aid the fermentation. In another part of the *yourt* is the large leathern *koumis* sack, completely covered up with *voilock* to keep it warm and aid the fermentation.

"And near this bag stands a large leathern bottle, sometimes holding four gallons, often much ornamented; so are the small bottles made to carry on the saddle. In another place stands the large iron caldron, and the trivet on which it is placed when used for cooking in the *yourt*. These are usually half-a-dozen Chinese wooden bowls, often beautifully painted and japanned. These are used to drink the *koumis* from; some of them hold three pints, others more. On entering a Kirghiz *yourt* in summer, one of the Chinese bowls full of *koumis* is presented to each guest. It is considered impolite to return the vessel before emptying it, and a good Kirghiz is never guilty of this impropriety.

"The saddles are placed on the bales of carpets. Rich horse-trappings being highly prized by the wealthy Kirghiz, many of their saddles are beautiful and costly. If of Kirghiz workmanship, they are decorated with silver inlaid on iron, in chaste ornamental designs, and have velvet cushions; the bridles and other trappings covered with small iron plates inlaid in the same manner.

"Leathern thongs and ropes made of camel's hair are hung up on the trellis-work, common saddles, saddle-cloths, and leathern *khimbar*. This part of a Kirghiz costume is frequently made of black

velvet, splendidly embroidered with silk, more especially the back elevation."

Such is the dwelling of a Kirghiz chief in the Steppe.

The national garment of the Kirghiz is the *khalat*, a kind of pelisse, very long and very full, with large sleeves, in silk or cashmere, and of the most dazzling colours; but the poorer warriors sub-

KIRGHIZ AOUL OR VILLAGE.

stitute for this state dress a horse-skin jacket. Breeches fastened below the hips by a girdle of wool or cashmere, high-heeled madder-coloured boots, and a fox-skin cap, rising into a cone on the top, and lined inside with crimson cloth, complete his costume. His weapons are the spear, the gun, the axe, and the cutlass. The women wear a long and copious robe, and a veil of numerous folds, surmounted by a

lofty calico head-dress, a part of which falls over the shoulders and covers up the neck.

The Kirghiz are fierce, cunning, and often cruel, but the life of a guest is esteemed sacred. They have not so much respect, however, for his property, and do not always resist the temptation of plundering him of any article which suits their fancy. Equestrian exercises and falconry are their favourite amusements. They love the chase, indeed, with a true sportsman's passion; they love it for itself rather than for the game it secures, for they have no greater dainty than a dish of mutton. Their mode of preparing this viand is exquisitely simple. They content themselves with skinning the animal, cutting it into quarters, and plunging it into a pot, where they keep it boiling in a great quantity of water for a couple of hours. Generally, to prevent the loss of any portion, they cook with the meat the animal's intestines, without even taking the trouble of cleaning them. The guests arrange themselves in a circle on carpets of felt; the men in the foremost rank, the women and children behind them. The smoking quarters of mutton are removed from the pot; each man draws his knife, slashes off a slice, eats a portion, and passes the remainder to his wife and children, who speedily finish it. The dogs come in for the bones. Afterwards, bowls of the liquor in which the meat has been boiled are handed round, and not a Kirghiz but swallows the greasy broth with delight. This broth, koumis, and tea are his customary drink; the tea is not made in the European fashion, but becomes a veritable soup, prepared with milk, flour, butter, and salt. In every well-to-do aoul the women keep constantly upon the fire a vessel full of this beverage, which they offer to visitors, just as the Turks serve up coffee, the Spaniards, chocolate, and the French, wine.

To the north of the Great Horde, in the government of Irkutsk (Siberia), we meet with the Agro-Mongolian people of the Buriäts, numbering about 35,000 families. They are given to Chamanism, an idolatrous worship widely spread through Eastern Siberia. Their

supreme divinity inhabits the sun, and reigns over a host of lesser gods.

Finally, between Lake Baïkal and the Altaï Mountains to the north, the Ala-Tau mountains west, the Great Wall of China south, and the sea east, stretches the immense territory commonly known as Mongolia, and inhabited in part by the tribes which represent the Mongol type in all its primitive purity. This great desert, where grassy lands alternate with dry and sandy or saline plains, was formerly the seat of a flourishing empire, established by Chingis-Khán in 1227, which gave birth to the three Mongol kingdoms of Krim, Kasan, and Astrachan. Mongolic empires, at a later period, arose in China, Turkistan, Siberia, Southern Russia, and Persia. The Mongolian dynasty lost its hold on China in 1360, and a century later was driven out of Russia. In Central Asia it was rehabilitated in 1369, by the illustrious Timur; but a hundred years afterwards the empire was again crushed by its own weight. Baber, a descendant of Timur, conquered India, and erected there a Mongolian throne, which endured until the soldiers of Great Britain defeated Tippoo Saib and captured Delhi. Most Mongolic tribes are now under the rule of the nations whom they once had conquered, the Tungusic sovereigns of China, the Russian Czars, and the Turkish Sultans.*

The ruins of Mongolian grandeur are still visible in those solitary cities, which the traveller in the desert discovers half overwhelmed in sand. "We met," says the Abbé Huc, "with an imposing and majestic memorial of antiquity. It was a great city, desolate and abandoned. The crenellated ramparts, the watch-towers, the four great gates, situated at the four cardinal points, were all in perfect preservation; but all was buried three-fourths deep in the ground, and covered with a thick sward. We entered its vast precinct with a profound emotion of awe and melancholy. We saw neither *débris* nor ruins, but only the outline of a beautiful and spacious city,

* Max Müller, "Origin of Language," pp. 311, 312.

wrapped in grass and weeds as in a funeral shroud." Similar relics of the past are scattered over the deserts of Mongolia, but everything connected with their origin is enveloped in shadow.

The Mongolian family includes several branches, each subdivided into tribes, obeying chiefs of unequal rank. The most numerous people are the Kalkas, who occupy all the northern districts. The Mongols of the south, dwelling near the Great Wall, have been affected in their habits and manners by the neighbourhood of the Chinese; they have become industrious, and engage eagerly in commercial affairs. But the Kalkas, and the other tribes of the Great Gobi, are still nomadic, reckless, and indolent. Their religion is Buddhism; they profess for its head, the living Buddha or Great Lama (Dalai-lama, or Ocean-priest—*i.e.*, wide as the ocean), a reverence and a blind obedience, which they also pay to the inferior lamas. "Under an external aspect of savagery," says Huc, "the Mongol hides a character full of mildness and kindly feeling; he passes suddenly from the wildest and most extravagant gaiety to a sadness which has nothing forbidding. Timid to excess in his ordinary life, when impelled by fanaticism or revenge, he displays an irresistible impetuosity of courage. He is simple and credulous as a child, and passionately loves stories and legends of the marvellous."

The Mongols are ugly in feature, of the middle height, agile and robust; their sight is wonderfully keen, their hearing of an extraordinary acuteness.* Their wants are restricted to the indispensable necessities of life; of luxury they have no conception; their few pleasures are easily enjoyed; their instincts lead them rather in the

* Dr. Latham thus describes their physical characteristics:—"The face is broad and flat, because the cheek-bones stand out laterally, and the nasal bones are depressed. The cheek-bones stand out *laterally*, are not merely projecting, for this they might be without giving much breadth to the face, inasmuch as they might stand forward. The distance between the eyes is great, the eyes themselves being oblique, and their caruncule concealed. The eyebrows form a low and imperfect arch, black and scanty. The iris is dark, the cornea yellow. The complexion is scanty, the stature low. The ears are large, standing out from the head; the lips thick and fleshy rather than thin; the teeth somewhat oblique in their insertion, the forehead low and flat, and the hair lank and thin."—*Descriptive Ethnology.*

path of good than of evil, and their defects, to use an expression of M. Huc's, are those of ill-trained children. They need, perhaps, but a well-directed impulse to develop their intellect, and guide them onward to a far higher civilization. In the great human family, it is true that as yet they do but fill the children's place, and it is impossible to say whether their national genius is capable of any great or lasting work.

BOOK II.

THE DESERTS OF SAND:—THE DESERTS OF EUROPE AND AFRICA.

CHAPTER I.

THE RAINLESS DESERT—THE BED OF A SEA—THE DEAD SEA.

THE Sandy Deserts may with equal, nay, with greater accuracy, be entitled Salt Deserts, Rainless Deserts, Seas of Sand; for they present at one and the same time all these characters, and the three last, though less generally known than the first, are the most essential.

The soil is generally covered with a thick stratum of sand; but in several places it also exhibits great walls of rock, and in others masses of rolled or shattered pebbles. The subsoil is nearly always of a gypseous or calcareous nature, rarely clayey; wherever it is porous and permeable, it is impregnated with salt, which rises to the surface, or is held in solution in the subterranean basins of water, the thermal springs, the ponds, and the lakes. The saline efflorescences of the deserts of Persia and Oriental Asia not only suffice for the wants of the inhabitants, but supply the great Asiatic caravans with their principal article of exportation.

The atmosphere of the Deserts is not less dry than their sands and rocks. The sky wears a perennial azure, more or less veiled in haze, or rather spotted with a few clouds. Johnstone represents them, in his admirable "Physical Atlas," by two white unequal

bands, characterised as "Rainless Districts." Of these the larger occupies all the northern region of Africa, and the greater portion of Arabia, Syria, Persia, and Beloochistan, embracing an area of 80° of longitude over 17° of latitude. The other extends over the table-lands of Thibet and the Gobi. It is in form an irregular ellipsis, obliquely inclined from south-west to north-east. Its length is about 1100 leagues; its width, 450. From the former it is only separated by a narrow belt. In the region marked by these two species rain is an extraordinary phenomenon; several years will pass without the clouds shedding a single drop of water. This permanent, and nearly absolute, aridity, establishes a very marked difference between the Deserts properly so called, and the Landes, Steppes, and Prairies, condemned as these are during the hot season to a deadly dryness, but in winter inundated with rain or covered with snow; and in spring converted into immense marshes, where an exuberant vegetation makes its appearance, frequently capable of resisting the action of the summer sun and the withering winds.

In the Rainless Districts vegetation is a nullity; it becomes reduced to a very small number of saline plants and dwarf bushes, nourished by the brackish waters which the soil conceals. Finally, the desert region may not only be compared to a sea in its aspect and immensity, but it is a true sea, or at least the bed of an ancient sea, which formerly communicated, and, perhaps, was confounded with the Mediterranean, and whose drying up, though still incomplete, took place at a recent geological epoch. We may reasonably conclude that, owing to a series of gradual upheavals, this sea was at first broken up into vast lagoons; that most of these successively disappeared, but not without leaving some certain evidences of the primitive submersion of the continent. "If we might hazard a conjecture," says a recent writer,* "it would be that the same convulsions and upheavals which at the close of the tertiary epoch indented the southern coasts of Europe, at the same time drained the ocean which hitherto had rolled over the plains of the Sahara, and

* Rev. H. B. Tristram, "The Great Sahara," p. 360.

submerged the low-lying lands, which probably united the Canaries and Madeira to the mainland." To a similar cause must be attributed the existence of the subterranean waters, springs, ponds, and salt lakes, of which I have already spoken, and of the inland seas—the Caspian, the Sea of Aral, and the Dead Sea; while the Black Sea and its offshoots, the Sea of Azov and the Sea of Marmora, must have had the same origin. I shall discuss this subject further when describing the Great Sahara.

In Eastern and Central Asia, the Sandy or Salt Deserts alternate with the Steppes, and with lands susceptible of a certain amount of cultivation. The vast region which geographers designate the Great Gobi, or the Shamo, is intersected by many grassy Steppes and even by fertile fields, where the sedentary Mongols, and especially the Artons, yearly sow and gather hemp, millet, and buckwheat. The sombre picture of "a barren plain of shifting sand blown into high ridges where the summer sun is scorching, no rain falls, and when thick fog occurs it is only the precursor of fierce winds," * is true only of special districts, such as the Han-hai, or "Dry Sea," or the Desert of Sarkha. There, for instance, we meet with no other vegetable than the salsolæ, or salt-worts, which flourish around the small saline pools. Of these pools, when seen from a distance, Mr. Atkinson notices a remarkable characteristic: the salt crystals which accrete upon their banks frequently reflect the orange or crimson hues of flowers, and resemble glowing rubies set in a rich mounting.

As we advance in a south-easterly direction, we find the features of the desert region more prominently marked.

Immense plains of sand, with a bare and brackish surface, called *Kevir*, traverse the whole of Persia, from the Caspian Sea to the Indus. They comprise the Deserts of Kerusan, Seistan, Beloochistan, and Mekran, rich in salts with a basis of soda. "The shores of the Persian Gulf," as Mrs. Somerville remarks, "are [illegible] hot, sandy solitudes, so completely barren, that the country [illegible]ssora to the Indus, a distance of 1200 miles, is nearly a waste. Three-tenths of Persia is a desert, and the table-

* Mrs. Somerville, "Physical Geography," vol. i., p. 105.

land is nearly a wide scene of desolation. A great salt-desert occupies 27,000 square miles between Irak and Khorasan, of which the soil is a stiff clay, covered with efflorescence of common salt and nitre, often an inch thick, varied only by a few saline plants and patches of verdure in the hollows. This dreary waste joins the large sandy and equally dreary desert of Kerman. Khelat, the capital of Beloochistan, is 7000 feet above the level of the sea; round it there is cultivation, but the greater part of that country is a lifeless plain, over which the brick-red sand is drifted by the north wind into ridges like the waves of the sea, often twelve feet high, without a vestige of vegetation. The blast of the desert, whose hot and pestilential breath is fatal to man and animals, renders these dismal sands impassable at certain seasons."

The Desert of Mekran is separated from that of Moultan by the Indus. That which lies to the east of Kom, in the centre of Persia, is more than sixty leagues in extent. Of Persia, M. Forgues observes that the actual reality differs strangely from those glowing eastern landscapes which poets and romancists love to paint. Even in those provinces where the winter rains encourage the growth of vegetation, the scene would hardly remind the traveller of

> "That delightful province of the Sun,
> The first of Persian lands he shines upon,
> Where all the loveliest children of his beam,
> Flowerets and fruits, blush over every stream."*

"To bare, dry mountain-ridges," says M. Forgues, "succe plains, sometimes incrusted with hard clay, sometimes clothed v thick sand. At the outset of spring, in the months of Apri May, the country is coloured with some softer tints, the grass here and there through the granite and the gravel; but in summer heats everything grows dry, and the soil resumes its nously brown or gray livery. Water fails for cultivation, the best districts is confined to a few scattered oases. In spaces, when the eye surveys them from some mountain-crest,

* Moore, "Lalla Rookh"—*Veiled Prophet of Khorassan.*

occurs nothing to arrest the gaze; and when once the spring has past, the cultured fields become blended with those which the plough has suffered to lie fallow, the clay-built villages with the earth of which their walls are constructed. In these confused landscapes even a considerable town scarcely traces its blurred outline among the accumulated ruins in whose centre it persists in living, and whose extent attests its decadence. It is a marvel if, on arriving at the limit of these monotonous plains, the traveller distinguishes them from the deserts to whose threshold they have generally conducted him. He only recognizes the latter by the dazzling gleam of their saline efflorescence, which stretches far out of sight, and where at intervals abruptly projects some mass of ebon-black rock, transformed by the solar refraction, and assuming in quick succession the most fantastic aspects."

I have spoken of the inland seas and salt lakes which testify to the primitive submersion of the whole region of the Great Deserts. Let us pursue our route towards the west, and we shall encounter the most remarkable of these vestiges of a remote past.

First, I shall speak of the Dead Sea, the Lake Asphaltes, which Dean Stanley justly designates "one of the most remarkable spots in the world," and which, as the reader knows, is situated in the south of Palestine, at a short distance from Jerusalem. It is true that "a great mass of legend and exaggeration, partly the effect, partly the cause of the old belief that the cities of Sodom and Gomorrah were buried under the Dead Sea, has been gradually removed in recent years. The glittering surface of the lake, with the thin mist of its own evaporations floating over its surface, will now no more be taken for a gloomy sea, sending forth sulphurous exhalations. The birds which pass over it without injury have long ago destroyed the belief that no living creature could survive the baneful atmosphere which hung upon its waters." But still, for the scientific no less than for the historical student, it possesses an absorbing interest. It is the most depressed sheet of water in the world,

lying fully thirteen hundred feet below the level of the Mediterranean: as the Lake Sir-i-Kol, where the Oxus rises

"In his high mountain-cradle in Pamere,"

is the most elevated.* "Its basin," to quote Dean Stanley's graphic description, "is a steaming caldron—a bowl which, from the peculiar temperature and deep cavity in which it is situated, can never be filled to overflowing. The river Jordan, itself exposed to the same withering influences, is not copious enough to furnish a supply equal to the demand made by the rapid evaporation. Its excessive saltness is even more remarkable than its deep depression. This peculiarity is, it is believed, mainly occasioned by the huge barrier of fossil-salt at its south-west corner, and heightened by the rapid evaporation of the fresh water poured into it. Other like phenomena, though in a less striking form, exist elsewhere. But, without entering into its wider relations, this aspect is important, as that which most forcibly impressed the sacred writers. To them it was 'the salt sea,' and nothing more. They exhibit hardly a trace of the exaggerations of later times. And so it is in fact. It is not gloom, but desolation, which is the prevailing characteristic of the Sea of Death. Follow the course of the Jordan to its end. How different from the first burst of its waters in Mount Hermon, amongst the groves of Dan and Paneas! How different from the 'riotous prodigality of life' which has marked its downward course, almost to the very termination of its existence! Gradually, within the last mile from the Dead Sea, its verdure dies away, and the river melts into its grave in a tame and sluggish stream; still, however, of sufficient force to carry its brown waters far into the bright green sea. Along the desert shore the white crust of salt indicates the cause of sterility. Thus the few living creatures which the Jordan washes down into the waters of the sea are destroyed. Hence arises the unnatural buoyancy and the intolerable nausea to taste and touch,

* Lake Sir-i-Kol is 15,600 feet above the sea-level; that is, nearly as high as Mont Blanc. It is fourteen miles long and one mile broad.

which raise to the highest pitch the contrast between its clear, bitter waves, and the soft, fresh, turbid stream of its parent river. Strewn along its desolate margin lie the most striking memorials of this last conflict of life and death: trunks and branches of trees, torn down from the thickets of the river-jungle by the violence of the Jordan, thrust out into the sea, and thrown up again by its waves, dead and barren as itself. The dead beach shelves gradually into the calm waters. A deep haze—that which to earlier ages gave the appearance of the 'smoke going up for ever and ever'—veils its southern extremity, and almost gives it the dim horizon of a real sea. In the nearer view rises the low island close to its northern end, and the long promontory projecting from the eastern side, which divides it into its two unequal parts. This is all that I saw, and all that most pilgrims and travellers have seen, of the Dead Sea." *

The sinister aspect of the valley of the Jordan, especially at the embouchure of the river, impresses itself on the mind of every spectator. There the traveller finds the path narrowed between two abrupt gigantic walls. On the right rises the Arabian chain, black and perpendicular; on the left, the Judæan range, less elevated, more irregular, and resembling a dismantled ruin. "The valley comprised between these two chains," says the Père Lagty-Hadji, "exhibits a soil closely resembling the bed of a sea which has long been dry. You can discern but a few stunted trees. Ruined towns and castles appear in the distance. At the moment of flinging itself into the Dead Sea, the Jordan itself, traversing a muddy soil, changes its physiognomy and colour. It seems to drag reluctantly, towards the motionless lake, a burden of slow and tawny waters. The shores of the Dead Sea are low on the east and west; to the north and south high mountains enclose it." "These mountains, separated by a formidable cleft, exhibit their beds of red sandstone, overlain by a thick stratum of compact chalk, interrupted by silicious fragments. One is surprised not to see a volcanic crater, when all about, in this convulsed site, the action of fire is visible—the violent, bitter struggle

* Dean Stanley, "Syria and Palestine," pp. 290–294.

of the two Neptunian and Plutonian principles, which, during the geological eras, contended for the empire of the world. One might say that here the two antagonistic forces exhausted themselves, that they have equally lost their potency; so much so, that at the close of the combat all has sunk into the silence and immobility of death. And who knows if the volcanic crater, whose absence at first astonishes the observer, is not the Dead Sea itself? Is it unreasonable to admit that after the upheaval of the mountains which inclose it, and which a terrible explosion of subterranean fire will have separated, the neighbouring waters were precipitated into and swallowed up in the yawning gulf which they still fill to-day? . . . This hypothesis is so much the more probable, because in this fire-scathed region the lake affords manifest indications of an igneous travail even now accomplishing itself sullenly in the bowels of the globe. We know that its name of Lake Asphaltites is due to the semi-fluid bituminous matter which constantly rises to its surface and accumulates on its shores. With the vapours exhaled by this bitumen under the influence of heat, mingle sulphurous and ammoniacal exhalations which render the atmosphere of the Dead Sea dangerous to breathe."*

Before 1835 no one had ventured upon its waters. An Irish traveller, named Gottingham, was their first navigator; but after a five days' voyage he returned to Jerusalem, and died of exhaustion. Two years later Messrs. Moore and Beke made a new attempt. For several days they withstood the pestilential exhalations of the lake, and succeeded in proving the deep depression of its basin; but at length, both of them being taken ill, they were compelled to cut short their explorations. In 1847 the enterprise was undertaken by a Frenchman—Lieutenant Molyneux—who sounded it in many places, but was speedily carried off by fever. The following year Lieutenant Lynch, of the American navy, embarked on the lake in iron boats, with competent crews. He navigated its waters for three weeks; but all who composed the expedition were more or less severely attacked, and one of them, Lieutenant Aeane, succumbed.

* Chorty-Hadji, "La Syrie, la Palestine, et la Judée."

THE DEAD SEA.

Though, as we have said, geographical research has dissipated most of the wild stories formerly accepted in reference to the peculiarly fatal concomitants of the Dead Sea, it well deserves its expressive name. It *is* a *dead* sea: it has neither the ocean's living movement nor deep-sounding roar; the surf and the spray never sparkle on its rocks; that "multitudinous laughter" which Homer ascribes to the sea is wholly wanting; the wind never wakes a smile on its passive and sombre countenance. By its shores one might realize Shelley's mournful wish, and feel

> "In the warm air
> His cheek grow cold, and hear the sea
> Breathe o'er his dying brain its last monotony."*

It is lifeless, untenanted; the fish found there, and brought down by the Jordan, are dead. Unlike the Caspian, it is never stirred by the whirr of wings—by the flight of gulls, or pelicans, or sea-mews. The migratory birds sweep across it without even a pause, without seeking the prey which they could not find. Its waters are denser than those of other seas: their constituents are different, and mingled in different proportions.

Laorty-Hadji is mistaken in his idea that they repose on a bed of rock salt. Rock salt is the chloride of sodium in a nearly pure condition. But the Dead Sea holds in solution a comparatively small portion of this salt, mixed with large proportions of other salts. Its water was analyzed for the first time in 1778 by Lavoiser, Macquer, and Sage. Experiments have also been made by Arcet, Klaproth, Gmelin, Gay-Lussac, and, more recently, by Boussingault. According to the latter, it contains :—

Chloride of magnesium,	10.7288
Chloride of sodium,	6.4964
Chloride of calcium,	3.5592
Chloride of potassium,	1.6110
Bromide of magnesium,	0.3306
Sulphate of lime,	0.0424
Sal-ammoniac,	.0013
Water,	77.2303
	100.0000

* Shelley, "Poetical Works"—*Stanzas Written in Dejection, &c.*

It will be seen that it possesses neither chloride of manganese nor chloride of aluminium, no nitrates, and no iodines; that it is, therefore, not *sea water*, properly so called, but a mineral water *sui generis*.

The enormous proportion of saline matter accounts for its exceptional density, and justifies the assertion of travellers that a man floats upon its surface like a log of wood; though we can hardly credit the statement of Pococke that it is impossible to sink to the bottom. Its gravity undoubtedly endows it with extraordinary buoyancy, and to dive to any considerable depth is a matter of difficulty; but in the Dead Sea, as in other seas, man must employ his strength and skill to keep his body afloat.

CHAPTER II.

ARABIA DESERTA AND ARABIA PETRÆA.

THE traveller who starts from the southern extremity of the Dead Sea encounters a succession of deserts. To the east extend wide plains, covered with ruins, where upwards of thirty cities are to be traced in their decay, like Palmyra, by the trunks of shattered columns and the wrecks of desecrated temples. This is the once flourishing country of the Nabatheans, now haunted by some tribes of Idumean Arabs. One might not inappropriately call it the vestibule of Arabia Deserta, a name applicable to all the central and southern districts—that is to say, to nearly three-fourths of the Arabian peninsula. There the sea of sand reveals itself in all its nakedness, in all its horrors; with its implacable sky and fiery atmosphere, its sandy billows, its masses of salt, and in certain places, with its hidden quicksands capable of devouring entire armies. The Desert of Akhaf, situated towards the extremity of the peninsula, conceals, it is said, several of these abysses, where the hapless

CARAVAN IN THE DESERT.

traveller, if he set his foot upon them, would be instantly swallowed up. Thus even the Arabs regard it with an unconquerable dread. It owes its name to a Saffite king who would fain have traversed it with his troops, and who saw them perish therein even to the last man. The tradition does not inform us how he himself escaped this immense disaster.

A European traveller, Baron de Wrede, undertook nevertheless, some twenty-five years ago, to penetrate into this soul-appalling desert, and attempted to measure the extent and depth of one of these abysses. Starting in the morning from Saba, under the guidance of a few Bedouins, he reached, after six hours' marching, the threshold of the desert of Akhaf.

"A sandy plain, extending as far as the eye could reach," he says, "and upon which arose innumerable hills in the semblance of waves, —such was the scene presented to my gaze. Not the least trace of vegetation was perceptible; not a bird interrupted with its song the tomb-like silence which prevailed around the graves of the Sabean army. I remarked three tracts distinguished by a dazzling whiteness. 'Yonder are the abysses,' said the Bedouins; 'they are inhabited by the spirits who have covered with this deceitful sand the treasures intrusted to their charge. He who dares approach them will assuredly be dragged down under the sand! Do not venture there!'

"Naturally, I paid no attention to this counsel; on the contrary, I demanded to be guided towards them, according to agreement. Two hours were consumed by our camels in reaching the bottom of the plateau, where we arrived at sunset, taking up our quarters for the night on the lee side of two enormous rocks. On the following day I insisted that the Bedouins should guide me over these tracts. My trouble was in vain; fear rendered them unable to utter a word. Furnished with a plumb-lead weighing about a pound and a quarter, to which was attached a rope nearly 350 yards in length, I accomplished this dangerous enterprise. I occupied thirty-six minutes in reaching the first abyss; it was thirty-six feet long by twenty-six feet broad,

and formed an inclined plain towards the centre, about six feet deep, which I attributed to the action of the wind. I approached at first with the utmost precaution, in order to examine the sand, and found it to be almost impalpable. I cast my plumb-lead as far as I could; it disappeared immediately; however, the rapidity with which the rope shortened gradually diminished; in five minutes, it had wholly disappeared."

Baron de Wrede has made no attempt to account for this strange phenomenon, which is not, I may add, peculiar to Arabia. The late Doctor Cloquet, who for many years acted as chief physician to the Shah of Persia, relates that he had seen similar gulfs in the great Salt Desert, which he considered to occupy the place of lakes suddenly vanished. This hypothesis is certainly admissible, and perhaps very probable; but while in some degree explaining the existence of these abysses of sand, it raises fresh questions which are by no means easily answered; for instance, why have these lakes disappeared, and why have they been replaced by this impalpable and incoherent dust in which heavy bodies sink as in a void?

Consider, moreover, the remarks made by Doctor Cloquet in a letter addressed in 1851 to the Academy of Medicine at Paris:—

"At fifteen parasangs from Teheran,* commences the *Salt Desert*, which, from east to west, extends to the very frontiers of India. This immense basin, eastward, has no other limits than the horizon; to the west, to the north, to the south, it is bounded by hills of sand which completely represent the Dunes of France. The soil, of a fawn-coloured yellow, is composed of clay and sand, exactly resembling the mud which occupies the bottom of a dried-up basin. It is said that at many points a man on horseback will disappear without his body being ever again discovered.† I have seen one of these places, near Sivas; the soil is everywhere impregnated with salt mingled

* A parasang varies in length; in some parts of Persia it measures thirty, in others fifty furlongs.

† Such quicksands are found at some parts of the British coast, and the reader will remember that in one of them occurs the catastrophe of Scott's romance, "The Bride of Lammermoor."

with nitre, which crystallizes on the surface. For the rest, if you dig two or three inches deep, you find water, though very brackish in quality. The general opinion is that the desert was once occupied by a sea, which suddenly disappeared on the night that Mohammed was born. And it seems to me that there is no reason to doubt this sudden disappearance, since even in our own days, and only a few years ago, the salt lake of Ourmiah (Urumiyeh), in the province of Azerbaïdjan, vanished completely for twenty-four hours; it is true that the waters emerged again from their subterranean basin. I think it almost absolutely demonstrated, from inspection of these localities, that at a remote epoch this sea communicated with the Caspian, and formed one united basin of water. I am not sure but that in the south it also communicated with the Indian Sea, for I have not travelled in that direction. The apparition of the Elburz chain has cloven the two basins, and the sea, receiving only inconsiderable streams, insensibly receded, until the day when it was wholly dried up, leaving only two lakes: one, the lake of Sivas, which disappeared in the seventh century; the other, the lake of Seistan, which is still extant, and receives several of the important rivers of Afghanistan. At all events, the great sea itself had disappeared some generations prior to the epoch of Alexander.

"The great humidity of the soil," adds Doctor Eloquet, "struck me vividly. Does not this humidity appear to indicate the presence of vast subterranean sheets of water, which sweat, so to speak (*transsuderaient*), through the porosities of the earth?"

The desert table-land of Nadjed, which fills all the central part of Asia, is bounded on the west and south by the more fertile and fortunate countries of the Hedjaz and the Hadramant, which skirt the Indian Ocean. To the north-east lies the desert of the Tih, whose deep sand-drifts lie between Palestine and the Isthmus of Suez, and which the Mediterranean washes on the north, on the south-west the Gulf of Suez, and on the south-east the Gulf of Akaba. This is the small triangular peninsula which was known to ancient geographers as Arabia the Stony. A group of ever-famous mountains,

hallowed by the sublimest associations, Sinaï, Horeb, Jebel Mûsa, Jebel Bestîn (St. Epistème), raise their granitic summits on the southern point of this peninsula. "They are 'the Alps' of Arabia; but the Alps planted in the desert, and therefore stripped of all the clothing which goes to make up our notions of Swiss or English mountains; stripped of the variegated drapery of oak, and birch, and pine and fir, of moss, and grass, and fern; which to landscapes of European hills are almost as essential as the rocks and peaks themselves." Sinaï, or St. Catherine, the loftiest peak in the range, reaches an elevation of 8160 feet. It is so closely connected with Mount Horeb, to the north, that the two mountains really seem but one. Ravines, and narrow valleys planted with palm-trees, thorny acacias, tamarisks, and some other shrubs, wind between the abrupt trunks of this grand chain. In one of these valleys stands the Monastery of the Transfiguration, and on Mount Horeb rises the Church of St. Catherine, a shrine held in great esteem by devout Greeks. The pilgrims ascend on their knees a large staircase laboriously constructed by the monks.

I have no space to recapitulate the sublime historic memories which invest these solemn heights with an interest of their own. The presence of the Almighty has clothed their summits with a glory that might not be borne; the thunders of the Most High have echoed through their deep dark valleys. At their base the people of Israel watched and waited while Moses received from Heaven the code which thenceforth determined their religious and civil polity. Down the side of yonder mighty peak came their Prophet and Leader, his face bright with a radiance such as was never before on the face of mortal man. They were the scene of a singularly unique history; by which, as Dean Stanley remarks, "the fate of the three surrounding nations—Egypt, Arabia, Palestine—and through them the fate of the whole world, has been determined."

The locality, consecrated by such glorious associations, is also rich in geological interest. It exhibits indubitable traces of the great volcanic convulsions which have so profoundly shaken the

shores of the Dead Sea, and which still growl sullenly under the accumulated rocks. In the time of Procopius, the legend runs that men fled from Sinaï on account of the gruesome noises which haunted it; and modern travellers, notably Stutzen and Gray, declare that they have heard at intervals a sound comparable to the dull heavy

Mount Sinai.

throbbing of a Cyclops' pulse. It might be said that one of the vast arteries which provide for the circulation of the ever boiling and seething flood of lava of our globe passes in this direction at an insignificant depth below the surface. The springs of thermal waters which well out at the mountain-base, the masses of bitumen and lava scattered over the soil, the gigantic rocks which bristle over the

whole desert of El-Tih, and whose hue, to adopt the expression of a modern traveller, is that of calcined and fire-scathed matter, are sufficient evidence that this country has been the theatre of dreadful volcanic phenomena.

Messrs. Bida and Hachette describe a place named *Wâdy-Nassoub*, situated a short distance from Sarabit-el-Kadim, on the road from Sinaï to Suez. It is gained after traversing Ramleh ("the sandy"), a sandy ravine which serves as a retreat for horrible black serpents, both big and little, and for enormous lizards, and which is followed by a narrow valley. "Wâdy-Nassoub," according to these travellers, "is one of the most magnificent spectacles we have ever seen. It is a circus of twenty to twenty-five leagues in extent, surrounded by huge rocks arranged in successive terraces, and of incomparable beauty of form and colour. Its arena is an immense sheet of black basalt, furrowed here and there by torrents of yellow sand. A dazzling sun kindles up this landscape, which is one of incredible splendour."

As you approach the Isthmus of Suez—which will soon be annihilated, so to speak, by M. de Lesseps' great ship-canal—the desert resumes the character which we have seen it bear in Persia and Central Arabia. The rocks, much rarer and less lofty, gradually give place to mountains of sand. Salt lakes and fields of salt re-appear. Near the shores of the Mediterranean lies a pool of salt, still known by that name of Lake Baudouin (Baldwin), which the Crusaders imposed upon it. There the salt forms a firm and tenacious crust, on which the camel safely plants its foot. Sometimes the iron hoof of a horse breaks through, but beneath this first frail stratum it meets with another of astonishing hardness. "You might think yourself," says a traveller, "on the Mer de Glace of Mont Blanc. Our camel-drivers collected some large pieces from the surface. Nothing can be more brilliant or more transparent than these crystals. It is by tasting them only that you can distinguish them from rock crystal. As we advance, the impression grows overpowering. A plain of dazzling whiteness surrounds us, and is

LAKE BAUDOUIN (A SALT LAKE).

prolonged far beyond our ken. Dimly on the left may be perceived, like an indigo-coloured ribbon, the line of the distant sea. The sky itself appears jet black. The reverberation of sound is unendurable." Still further, between Suez and Cairo, the same traveller speaks admiringly of a natural amphitheatre, enclosed between two mountain-spurs, and strewn with *débris* of rock, and especially with petrified wood. It might be compared to a forest-clearing which the woodmen had just quitted. The splinters are quite fresh, the cloven fragments still expose the notches made by the axe. Great trees, divided into beams, resemble long serpents which have been slain by blows from a hatchet. The division is so clear that each gash reveals the concentric tissues perfectly preserved by this mineral embalming, this natural silification. Similar petrifactions may be seen in abundance on the plateaux of the Makattam, and the amphitheatre now described is not far from the hill, visited by every tourist, which has received the name of the Petrified Forest.

Thus it appears that the Land Deserts, despite the proverbial monotony of their aspect, do not fail to offer to the artist as well as the savant, the philosopher no less than the historian, objects worthy of patient study. Everywhere the handiwork of God and the evidences of Almighty design awaken the admiration of the thoughtful. Whether the picture be sombre or beautiful, grand or appalling, we see that it was conceived and filled up by superhuman power. But we are now in Egypt, on the threshold of the world's vast deserts. Egypt, kept alive by the fertilizing and genial Nile, is but an island in the great ocean of sand which encircles it, and which, far more truly than the Red Sea or the Mediterranean, isolates it from the rest of the globe.

CHAPTER III.

THE NUBIAN DESERT—THE GREAT SAHARA—DESERTS OF AFRICA.

As soon as we pass beyond the narrow borders of the Nile valley we encounter the Desert. Egypt *is*, in fact, the Nile; the Nile makes, recreates, preserves, fecundates Egypt, which, without this grand and ever-famous river, would immediately cease to be.

"Everything in Egypt," says Miss Martineau,* with equal truth and eloquence, "life itself, and all that it includes, depends on the state of the unintermitting conflict between the Nile and the Desert. The world has seen many struggles; but no other so pertinacious, so perdurable, and so sublime as the conflict of these two great powers. The Nile, ever young, because perpetually renewing its youth, appears to the inexperienced eye to have no chance, with its stripling force, against the great old Goliath the Desert, whose might has never relaxed from the earliest days till now; but the giant has not conquered it. Now and then he has prevailed for a season, and the tremblers whose destiny hung on the event have cried out that all was over; but he has once more been driven back, and Nilus has risen up again to do what we see him doing in the sculptures—bind up his water-plants about the throne of Egypt."

The traveller, ascending the famous river which has so long been mixed up with an apparently insoluble geographical problem, sees the Desert everywhere present; its yellow boundary-line is vividly traced against the rich emerald-green of the fertile valley, and, as he advances, that line seems to draw nearer and nearer, until the cultivated soil appears reduced to a narrow strip on the river-bank. It has encroached upon many once prosperous and busy sites, and buried deeply the memorials of the old Egyptian civilization.

* Miss Martineau, "Eastern Life: Past and Present."

"Round the decay
Of that colossal wreck, boundless and bare,
The lone and level sands stretch far away."

Everywhere outside the valley of the Nile, I repeat, lies the Desert. West of the Arabian chain of heights stretch the vast sandy plains frequented by the Arab tribes of the Beni-Wassel and the Arabdé. Beyond the eastern chain spread the Libyan Deserts, which, in the remote distance, merge into the Great Sahara, and those of the Thebaïd, where the early Christian anchorites found a dismal asylum. Lower, to the south of Egypt, extend the Deserts of Lower Nubia.

Let us ascend the Nile as far as Korosko, on the right bank of the river, and cross the huge chain of rocky hills which separates the cultivated zone from the Desert to which the village just spoken of gives name. These hills, all of equal elevation, assume the form of truncated cones. They are layers of granite superimposed horizontally, and with a depth of colour which makes them resemble at the first glance masses of basalt. They are absolutely bare, and separated from each other by abrupt sinuous gorges, whose bottom is covered deep in sand of golden lights, brought from the desert on the wings of the south-west. Long streams of the same brilliant sand descend the slopes opposed to the direction of the wind with graceful undulations, which subside imperceptibly in the blown sand that carpets the floor of these mysterious valleys. The crests of the hills can only be distinguished by their different colours; some are lightly shaded with gray, others with blue or green, and others again with rose or crimson. The reflets of the setting sun on these uniform and many-coloured summits have a marvellous splendour, lighting up the scene until it assumes a fairy aspect,

"And all puts on a gentle hue,
Hanging in the shadowy air,
Like a picture rich and rare."

At certain times it would rather remind the spectator of another of Coleridge's conceptions:

"A savage place! as holy and enchanted
As e'er beneath a waning moon was haunted
By woman wailing for her demon-lover!"*

Yet the spectacle is generally one of a rare and peculiar loveliness. "If nature," says M. Trémaux,† "had invested with this kind of beauty our verdurous fields of the West, they would have been veritable Edens; but to produce, blend, and harmonize these inimitable hues, it requires, under the last beams of the sun, the emanations from the heated sands and those which the day has called into existence from the burning surfaces of the denuded rocks. It is by the side of her greatest horrors nature places her grandest beauties."

The horror of the Desert does not lie only in its aridity, in its vacuity—this vacuity is not absolute; in default of life, Death peoples its solitudes. The glens or gorges frequented by the caravans are lined with stones, symmetrically disposed at certain intervals. These stones mark the places where rest the remains of the hapless pilgrims who have attempted to cross the wilderness, and perished in the attempt. Round and about each rugged tomb lie the skeletons of animals which none have troubled themselves to bury in the sand. Frequently you may see, on the sandy wastes of Africa, or the desolate plains of Asia and the New World, these carcasses laid out in two interminable rows; indicating the gloomy track which should be followed by the traveller, and never failing to remind him of the tribute Death levies upon mankind in these accursed regions. Thus does the Desert show itself more relentless than even the hungry ocean, which at least devours its victims whole, and affronts the eye with no traces of its murders. But the Moloch of the Desert has no shame; it cynically exposes the hideous remains of those whom it has killed; it strews the earth with their bones; it has its museums of skeletons, or rather of preserved animals.

M. Trémaux observed this curious phenomenon in the ravines of Korosko, but it probably occurs elsewhere under similar conditions.

* Coleridge, "Poetical Works"—*Kubla Khan*.

† Trémaux, "Egypte et Ethiopie," 1re partie, c. vi.

On closely examining the carcasses which he met at every step, he was astonished to find them covered with their skin, and presenting still their natural forms, as if the animals had been stuffed or embalmed. He readily distinguished horses, oxen, asses, camels. He observed with no less surprise that these corpses exhaled no odour. They had been dried by the heat before decomposition could commence its frightful work. The skin had hardened; the muscles and internal organs had been reduced into dust and gradually blown away by the wind through the yawning apertures at the two extremities of the body. There remained nothing more, literally, but skin and bone.

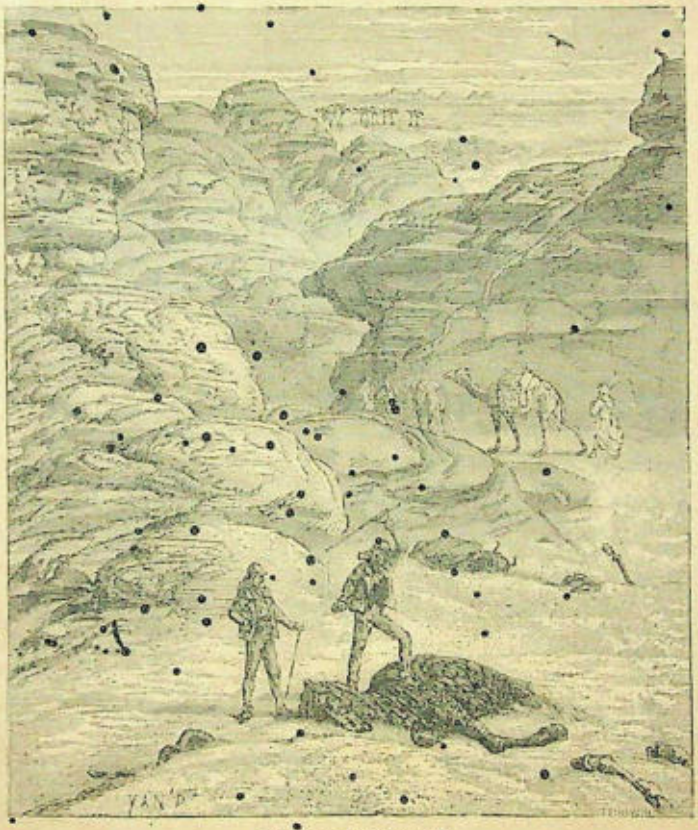
"This skin had such a consistency," says our author, "such a degree of solidity, that all my efforts to split it were without result. The heaviest stones which I could raise rebounded upon their carcasses with a loud noise, but did not pierce them. If a man dies while a caravan is on its march, he is buried in the sand. I have had no opportunity of examining whether the desert-heat produces the same effect upon his body as upon the corpses of the animals just mentioned; but it ought not to be so, since the human skin has not the same consistency."

On issuing from these gorges, we enter upon the Desert proper by a sandy plain which the Djellahs have named the "River without Water," and which, very low at first, slowly rises into a plateau of very slight elevation, intersected by some veins of a sandstone similar to that of the conical mountains. Then the plain declines anew, and we emerge upon the Sea of Sand, where the pulverized sandstone alternates with fields of rotted or broken pebbles, and mounds of porphyry and granite. At the foot of one of these mounds, the *Tallat-el-Guindé*, flourish a few wretched vegetables, among others some gum-trees and doum-palms. The latter trees are also found in solitary mournfulness scattered about the plain. Otherwise the *Desert of Korosko* is wholly deprived of vegetable life, of

"The glory in the grass, and the splendour in the flower."

As for water, it must needs be content with that of a few brackish

wells, grouped, about twelve in number, at a spot called *El-Mourâth*. It is there only that the caravans can fill their ill-tanned leather-bottles, in which the already nauseating liquid grows hot, and quickly becomes putrid. Its stench and its taste are then so disgustful that



Ravines of Korosko.

the very camels reject it several times before they can constrain themselves to drink of it.

The *Desert of Bahiouda*, situated in about the same latitude as that of Korosko, but on the other bank of the Nile, is of a less absolute aridity and nakedness. Water is more abundant and less brackish; vegetation is less scanty; and one meets on every side

with giraffes, gazelles, wild cattle, and even, it is said, with lions and elephants. Great numbers of reptiles, lizards, serpents, and tortoises inhabit the sand and the crevices of the rocks.

South of the above-named Deserts, towards 17° N. lat., is placed the limit of the Rainless District. Under the 18th parallel the rains do not last above one or two months in the year, and in some years are absolutely wanting; but when they *do* fall, it is generally in impetuous torrents. As we advance towards the Equator they become more regular, and last for longer periods. According to Humboldt, the average yearly rainfall in 19° N. lat. measures 80 inches; under the equator, 96 inches. In these tropical climes the [illegible]s divided into two seasons—one of excessive drought, and one of [illegible]xcessive rain. During the former, the sky is ever cloudless; during the latter, completely overcast.

There are, in fact, two rainless belts or districts, one on each side of the Equator. In the old world, the northern belt commences on the west side of Africa; includes the Sahara between 16° and 28° of latitude; and narrowing as it extends easterly, comprises on the banks of the Nile from 19° to 27°. It also embraces the low coast; and portions of the interior of Arabia; passes through Beloochistan to the base of the Himalayas, and terminates with the rainless table-land of Thibet. The southern district occurs north of the Gareep or Orange River in South Africa, and includes wide tracts in Australia, and a narrow belt in South America.

Where the earth is blessed with copious showers, vegetation will abound; grass, and herb, flower, bush, and tree;

"Fields of grain
Will bend their tops
To the numberless beating drops."

To meet with the true Desert we must, therefore, direct our steps in a north-westerly course, and penetrate into *The Sahara*.

M. Charles Martins, in his elaborate monograph on this re-

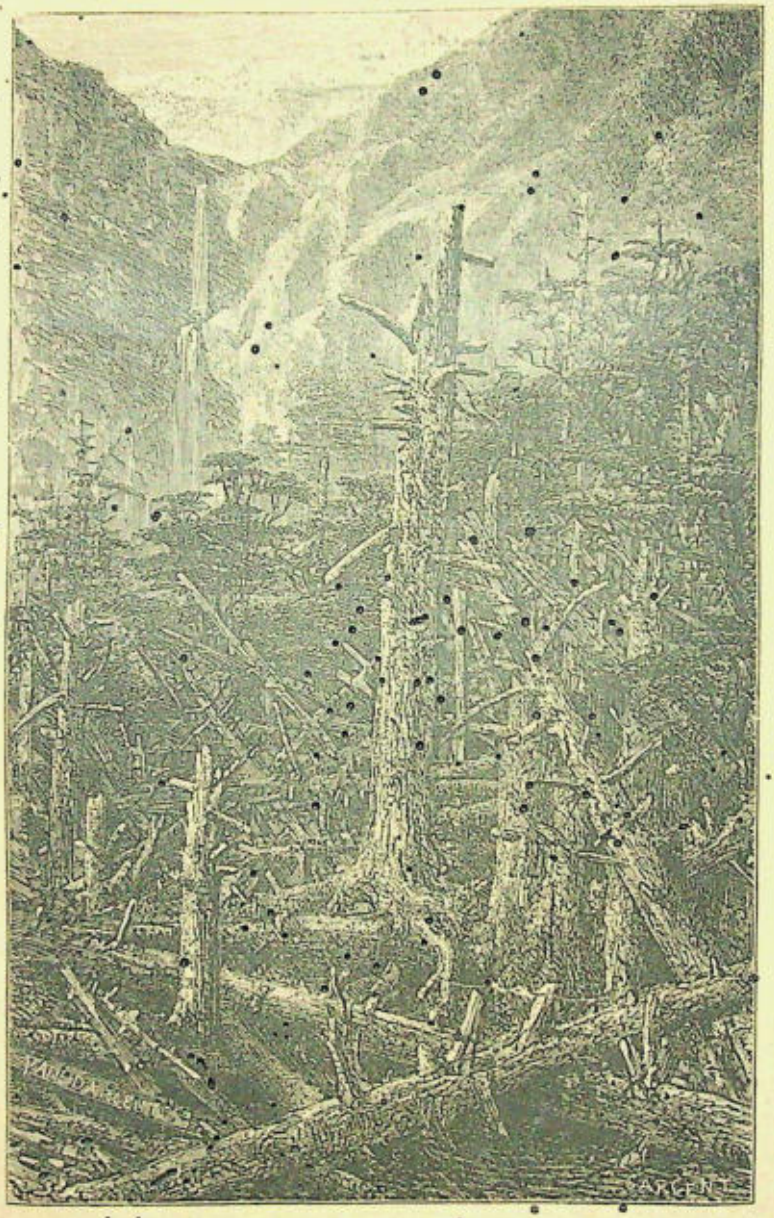
markable region, divides it into three distinct sub-regions: the *Desert of the Table-lands*, the *Desert of Erosion*, and the *Sandy Desert*.*

In Algeria, and in Barbary generally, the Mediterranean littoral does not come into immediate contact with the Sahara; but is separated from it by the Atlas chain. But the Atlas does not rise abruptly from the plain: on either side it ascends by a succession of rocky steps or terraces, which form the sub-region of the elevated Table-lands. Vast denuded surfaces, sprinkled with *chotts*, or salt lakes, deprived of all arborescent vegetation, traversed in summer by immense herds which feed on the plants even to their very roots, bare mountains starting abruptly from these horizontal surfaces; such is the general aspect of the landscape. The richly-varied culture of Mediterranean littoral has disappeared, and barley is the only cereal which the husbandman relies upon for his harvest. At many points, however, the "purple vine" and "golden olive" succeed admirably, and are destined one day to clothe the nakedness of these plateaux which the free-pasturing herds and the careless Arab have stripped of their blooming verdure.

Descending these rocky terraces of gray old Atlas, we enter the desert region in its first phase: the Desert of the Table-lands, or Saharan Steppe.

Here, horizontal strata of mud and gypsum, or sulphate of lime, are deposited upon the shores, as it were, of the great Sandy Sea. The gypsum reposing on the mud is composed of plates in such close juxtaposition as to resemble an artificial pavement. "It covers the surface of vast plateaux which have not been encroached upon by the waters; whether those waters were marine currents at the epoch when the Sahara was a vast sea, or diluvian torrents which descended from the mountains after their elevation, little matters; the gypsum, produced by the violent evaporation of the Saharan sea, has withstood their operation, and composes the plateaux of which we are speaking. Their surface is so smooth, that vehicles might roll for leagues upon this natural

* M. Charles Martins, "Du Spitzberg au Sahara" (Paris, 1866), pp. 555, *et seq.*



LANDSCAPE IN THE ATLAS (REGION OF TABLE-LANDS).

pavement, which echoes like a vault under the horses' hoofs. A plateau of this kind, the small Desert of Mouràd, extends from Biskra to the banks of the great salt lake called *Chott Mehrir* by the Arabs. The gypseous surface is not everywhere exposed: most frequently it is covered by a layer of small rounded pebbles, nearly all quartzose, exhibiting the greatest variety of tints, from the purest white to the most vivid red; they are mixed with black calcareous stones split on the surface. Whence came these pebbles, which have evidently been 'rolled' by the waters? We know not. They are the mysterious witnesses of those grand diluvian torrents which have left the traces of their passage over the surface of the whole earth, though the geologist cannot always discover the mountains or rocks that furnished the materials of this diluvium."*

From the Desert of the Table-lands we must needs make another descent. The town of Batna is situated at the extremity of the lowest of the Atlantean terraces, whose elevation is still some 3300 feet above the level of the sea. To the north-west rise the lofty spires of the colossal chain, with their diadems of cedars sharply defined in black upon the azure of the sky. Loftiest of all soars the *Jebel-Tougour*, or "Peak of Cedars," reminding the spectator of the Pyrenean crests. Towards the south-east stretch the rounded shoulders of the mountains of the Aurès, clad with dense dark forest of oak and pine. In a fold of the mountains lurk the ancient Lambessa and the mouldering ruins of a Roman camp. Four miles to the south of Batna is a large depressed hill, whose base mingles with the table-land, above which it rises only three hundred and thirty feet. This ridge marks the watershed; all the streams on the north flowing towards the Mediterranean, and, on the south, gradually disappearing in the arid bed of the ancient Saharan sea. On the frontier line, like a Cyclopean landmark, is planted the Peak of Cedars, while from its loins a torrent issues, and through a deep ravine whirls and leaps and flows towards the desert. Springs, abundant and warm, bubble up through the chalky marls, and take the same direction. Beyond the French mili-

* Martins "Im Spitzberg an Sahara," p. 556.

tary post, called *Les Tamarins*, the road descends the ravine-cloven mountain-slopes, and passes over the torrent which bifurcates at the foot of the majestic Metlili. On the left is seen a steep wall of rock, the Jebel-Gaouss, cleft midway by a chasm, or breach, which the Arabs expressively designate "The Mouth of the Desert," and which, gradually enlarging, opens upon the first oasis of the Sahara, *El Kantara* ("the bridge," from a Roman arch which spans the torrent), the most northerly limit of the palm-tree. "A magnificent, semi-alpine, semi-tropical scene. Below, a tumultuous foaming stream, its banks on either side clad with palms bending their feathery foliage towards the river, and sheltering fig, apricot, peach, almond, and pomegranate trees."* Above, a range of snowy heights, wreathed in ever ascending and descending clouds.

We now enter the Desert of Erosion, a mass of mountainous highlands; of ridges, peaks, and *cols*, intersected and, as it were, gashed by ravines where roll the winter torrents and the rivers which the heats of summer dry up, and which, hollowing and gnawing into the stony soil, spread themselves over the valleys and awake a transitory vegetation. The erosive action of the waters is, then, the special characteristic of this part of the desert, which the Arabs call *Kifar*, or "the abandoned country." Most of the streams which water it have their sources in Mounts Aurès and Zibans, which form its northern boundary. They have excavated wide intermingling furrows, whose intervening spaces are occupied by gypseous plateaux. The formations of less resisting power, the marls, clays, and sands, have been washed away.

The waters, whether proceeding from rain, or the melting of the snows on the loftiest peaks, are very pure at first, and roll in deep beds with vertical sides; when they reach the plains, their channels grow wider and shallower. In the wet season, the floods burst the banks, and overflowing, carry down immense quantities of rolled pebbles, which are distributed over an extensive area; in ordinary weather they are reduced to thin threads of silver, which, on arriving

* Tristram, "The Great Sahara," p. 354.

SARGENT. SC

in the desert, vanish completely. You must excavate the soil to obtain a supply of water, and when found, it is brackish. Frequently the beds unite, forming basins of greater or less extent and depth, which fill themselves at the close of the winter floods, and a few of which preserve, even in the winter season, a certain quantity of water. Elsewhere, the soil is only humid, thanks to the abundance of salt, which retains the moisture. In such places numerous slimy marshes occur, where the traveller may not adventure without peril. But in general the surface is dry, cracked, cloven, and completely parched.

The Desert of Erosion is not completely inhabited. At intervals you meet with a few squalid villages, and a multitude of camel's-skin tents are scattered like black spots over the yellow or grayish plains, on the borders of the *chotts* or scanty water-courses. Herds of goats and flocks of sheep wander in the valleys, feeding on the rare short grass. Columns of smoke arise from [illegible] bivouacs, and the women of the Sahara group themselves [illegible] wells and springs to fill the water-bags with which [illegible] asses.

[illegible] the summit of the rocks which fence round and bristle [illegible] f Erosion, we perceive for the first time the *Desert of* [illegible] sion is very similar to that which we derive from [illegible] an. M. Martins had already become sensible of this [illegible] when, from the Col de Sfa, he had gazed down upon the Desert of the Plateaux. "A grand circular arch," he says, extended before us, bounding a violet surface, smooth as the sea, and blending at the horizon with the azure of heaven; it was the Sahara. The arc eastward rested against the chain of the Aurès; westward, against that of the Zibans, some of whose offshoots, in the neighbourhood of Biskra, arose like reefs upon that sea which seemed to have been frozen suddenly into immobility. The actual sea ever trembles and shivers on the surface; a light wavering, imperceptible to the eye, propels towards the shore the expiring wave, fringed with a border of foam. Here, nothing like this may be seen; it is a

motionless, a congealed sea, or, rather, it is the smooth bed of a sea whose waters have disappeared. Science teaches us that such is the fact; and now as ever the expression of the reality is more picturesque, more eloquent than all the comparisons created by the imagination."*

An eminent French artist, M. Fromentin, whose skill with the pen equals his talent with the brush, has also painted this "congealed sea" in grand and poetic language. "The first impression," he says, "produced by this glowing lifeless picture, composed of the sun, space, and solitude, is keen, and cannot be compared to any other. Little by little, however, the eye grows accustomed to the grandeur of the lines, to the emptiness of space, to the denudation of the earth; and if anything can still astonish, it is that one becomes sensible to effects which change so little, and is so powerfully affected by spectacles in reality of the simplest character."†

I must also enumerate among the "artists in words" who painted the wonders of the Sahara, General Daumas, not [illegible] least distinguished of the Franco-Algerine warriors. He [illegible] the following language:—"It is a naked and barr[illegible] this sea of sand, whose eternal waves, agitated to-da[illegible] will to-morrow be heaped up immovable, and, whic[illegible] rowed by three fleets called caravans."

General Daumas, it is evident, confines himself [illegible] realism, which M. Martins prefers to the glowing and in[illegible] of the poets, and conveys in a few words an accurate yet very picturesque idea of that arid sea, where the wind stirs up rolling waves of sand instead of foaming billows, and which the Arabs call *Falat*. I shall place before the reader, however, the description given by M. Martins himself, for it represents both the *ensemble* and the details of the picture.

"If the Desert of the Plateaux," he says, "be the image of a sea suddenly fixed during a level calm, the Desert of Sand represents to

* Martins, "Du Spitzberg au Sahara," *in loco*.

† Fromentin, "Une Eté dans le Sahara."

us a sea which may have been solidified during a violent tempest. The Dunes, or sand-hills, like waves, rise one behind another even to the limits of the horizon, separated by narrow valleys which represent the depressions of the great billows of the ocean, all whose various aspects they simulate. Sometimes they narrow themselves into keen-edged crests, or shoot upwards in pyramids, or swell into cylindrical domes. Seen from a distance, these Dunes also remind us at times of the appearances of the *névé* (or granulated snow) in the amphitheatres and on the ridges which lie contiguous to the loftiest Alpine summits. Their colours still further enhance the illusion. Moulded by the winds, the burning sands of the desert assume the same forms as the *névés* of the glaciers."

Whoever has seen the Dunes on the coast of Norfolk, or more particularly in Gascony, may gain a very accurate conception of the Desert. The only notable differences are in the extent, which here s infinite, like that of ocean; the purity of the heaven, which is d by a cloud; and the colour, which is of a soft, intense ure of the soil is the same; it is a very fine, shifting, white sometimes, like that of Fontainebleau, and ed by the presence of oxide of iron. In the Sahara veritable Dunes, hillocks which the wind upheaves, sforms from one day to another. Only the *lettes*, in our Dunes receive the pluvial waters and preserve sufficient amount of fertility, are here just moistened by rare saline infiltrations, and almost always remain in a condition of absolute sterility. Nevertheless, in some localities, the presence of gypsum gives the sand a certain fixity, which permits a small number of plants to germinate and develop themselves. This gypsum is never found but in the valleys, and never in tabular masses, as on the plateaux, but only in crystals of various forms, penetrated by silica. "You pick up a pebble," says M. Martins, "and find it to be a crystal." The villages are surrounded by crenellated ramparts built of crystals; the houses which compose these villages are constructed of the same materials; and very weird and splendid is the scene pre-

sented by these edifices with their sun-illuminated walls. Notwithstanding their small dimensions and mean architecture, when thus lit up in glorious radiance, they seem to realize the wonders told in fairy tales of the enchanted palaces of the genii!

CHAPTER IV.

PHENOMENA OF THE DESERT.

THE desert has its own meteorology; it is the theatre of peculiar phenomena, which one observes in no other part of the globe. Its climate, at least in the sandy region, is remarkably uniform; it varies only, according to latitude, in a greater or less elevated thermometrical mean. Hippocrates, the ancient philosopher, rightly called "the Father of Medicine," states the three elements of climate to be, the atmosphere, the soil, and the waters. In the desert these are identically similar, and consequently identically similar phenomena.

The atmosphere, in fact, is everywhere of an absolute purity. It is only in the neighbourhood of mountains that it accumulates, to spend themselves at periodical seasons in abundant rains. In the plains it never rains, and during the day no veil is interposed between the earth and the sun's burning glare, nor during the night do any refreshing dews weaken the force of the terrestrial radiation. There result constant alternations of devouring heat while the sun is above the horizon, and of rapid and frequently intense cooling when he has disappeared.

The soil is everywhere as smooth as "the liquid main." This uniformity contributes, in addition to its silicious, argillaceous, or calcareous character, to render more abrupt the changes of temperature which occur from morning to evening and from evening to morning. In truth, the earth reflects the sun's heat in proportion as it

receives it; it absorbs but insignificant quantities, which it loses in a few minutes when the calorific source begins to fail. On the other hand, in these immense plains where no inequality of surface can oppose the atmospheric movements, the wind acquires an increasing force and swiftness, *vires acquirit eundo*, and soon assumes all the characteristics of a tempest. Hence arise these terrible typhoons, those appalling hurricanes, of whose destructive effects history records so many instances, and of which I shall presently be called upon to speak. As for water, we have seen that its entire absence is a characteristic feature of the Sandy Desert.

To sum up, an overpowering degree of heat during the day,—a freshness, often even an excessive cold, during the night (in the Sahara the thermometer frequently rises above 120° F. at noon, and not infrequently sinks below 32° about two or three o'clock A.M.); an ever transparent and azure sky,

"Darkly, deeply, beautifully blue;"

rains and dews, of gales and thunder; but a frequent rrible hurricanes: such is the meteorological constitu- zone, which embraces all the northern districts of he Mediterranean region—that is, from the snowy to the fertile pastures of Soudan—and which extends he west to the north-east, for all but one narrow belt, s far as the 119th meridian of longitude.

Foremost among the phenomena peculiar to this zone we must place those famous tempests which, in default of humid clouds, traverse with startling swiftness the changing surface of the Desert, driving before them whirlwinds of burning sand, and striking the traveller's heart with a sense of unconquerable awe. The wind of the Desert is called by the Arabs the *choum* or *khamsin*; but is more generally known in European books as the *Simoon*, *Simoom*, or *Samoun*. It is the *Sahiel* of the Turks; and, under a somewhat milder form, the *Scirocco* of the Mediterranean. Wherever, or how-

ever it blows, it is a pernicious and hateful wind; the blast, in all probability, which destroyed the hosts of Sennacherib at the bidding of the Divine Word.

"The angel of Death spread his wings on the blast,
And breathed in the face of the foe as he passed,
And the eyes of the sleepers waxed deadly and chill,
And their hearts but once heaved, and for ever grew still."

Torrents of burning sand sweep before it, a thick veil of darkness envelopes the firmament, and the sun assumes a blood-red hue.

"That crimson haze
By which the prostrate caravan is awed
In the red desert when the wind's abroad."*

When the Simoom rises, says M. Martins,† the air is filled with dust of such extreme fineness that it makes its way through obj... hermetically sealed, penetrates into the eyes, the ears, and th... of respiration. A burning heat, like that which brea... mouth of a furnace, possesses the air, and paralyzes t... men and animals. Seated on the sand, with their ... windward, the Arabs, wrapped in their burnous, wa... resignation the end of the torment; their c... exhausted, panting, stretch their long necks upon the ... Seen through this powdery haze, the sun's disc, shorn ... shows pale and ghastly as that of the moon.

Fortunately, the phenomenon never prevails over any very considerable area, and beyond its limits the atmosphere remains serene and calm; so that travellers who have watched it approaching in the form of a reddish cloud, without being able to calculate on its direction, have often escaped with no worse result than a panic, and have only witnessed its terrible effects at a distance.

It must not, however, be confounded with the sand-storms which

* Moore's "Poetical Works."—*Veiled Prophet of Khorassan.*

† Martins, "Du Spitzberg au Sahara," p. 562.

the pilgrim encounters in the Arabian Desert, and which seem confined to that region. Dean Stanley, on his route from Suez to Sinai, met with one which prevailed the whole day. "Imagine," he says, "the caravan toiling against this,—the Bedouins each with his shawl thrown completely over his head, half of the riders sitting backwards,—the camels, meantime thus virtually left without guidance, though from time to time throwing their long necks sideways to avoid the blast, yet moving straight onwards with a painful sense of duty truly edifying to behold. Through the tempest, this roaring and driving tempest, which sometimes made me think that this must be the real meaning of 'a *howling* wilderness,' we rode on the whole day."*

A French cavalier, M. Trémaux, while crossing the Desert of Korosko, had the good fortune to witness the course of a Simoom, while himself in a position of safety.

[illegible] was the 8th of February 1848. The horizon in the south- [illegible] a hue of the evillest augury. Gusts of wind, which [illegible] issued from some red-hot brazier, beat in the face [illegible]. The camel-drivers, accustomed to interpret these [illegible]d assured that a tempest was at hand, felt them- [illegible]n to give M. Trémaux a few counsels, which were [illegible]suring.

"[illegible] the storm darkens the air," said one of them, "by [illegible]rounding us with a cloud of sand, we must throw ourselves prone on the ground, wrap our heads in our finest stuffs, to protect our respiration from this sand, which burns the throat. It will be useless to trouble ourselves about the camels; they will lie down of their own accord, bend their head against their burden, and never stir so long as the tempest lasts. If the sand accumulates by our side, we must move in such a manner as to prevent it from covering us, making it roll under itself, but without exposing our heads. Remember these things carefully, and the will of God be done!"

* Dean Stanley, "Sinai and Palestine," pp. 68, 69.

"That is not all," added another; "when the water-bags are partly shrunken, as are ours at this moment, and the Khamsin blows for some time, it finishes by completely drying them up."

Thus warned, M. Trémaux was compelled to face, with all the resignation he was capable of, the melancholy alternative of perishing suffocated by the sand, or, a little later, of succumbing to the tortures of thirst. He continued to journey, or rather to drag himself towards the centre of the choking atmosphere, and to watch the scourge which rapidly drew near. This lasted a couple of hours, after which the travellers had the satisfaction of seeing the Simoom glide by on their right, and depart with the same rapidity.

A column of the French army, commanded by the Dukes of Aumale and of Montpensier, had met with a less happy chance on the 7th of March 1844, in the Souf, or Algerine Sahara; it was attacked by a Simoom, which prolonged its furious assaults during fourteen hours. On the day following, M. Fournel, a [illegible] engineer who accompanied the expedition, ascertained [illegible] meteor had swept but a narrow zone parallel to the A[illegible] that at the mountain base the tranquillity of the atm[illegible] undisturbed.

The Simoom, or Khamsin, is, however, more [illegible] painful than really dangerous. M. Martins speaks [illegible] army of Cambyses, the Persian king, which perish[illegible] Desert (B.C. 524),* and of whole caravans engulfed in the sepulchral sands. "The numerous skeletons of camels," he adds, "which we met with on our way prove that these catastrophes are still of frequent occurrence." It is more probable, however, that they died from dearth of water and want of food. As for the Persian host, it was probably swallowed up in one of those quicksands, those hidden treacherous gulfs, which are found in the deserts of Libya, as well as in those of Persia and Arabia. The evil effects of the Simoom have, in fact, been exaggerated by the Arabs, whose highly-coloured narratives have been too easily adopted by credulous travellers. It

* Philip Smith, "History of the World," i. 286.

A FRENCH COLUMN IN A [illegible] THE SIMOOM.

heats the blood, it dries the skin, it renders respiration troublesome; but it does not kill.

It is not always a single wind which blows in the Deserts; but sometimes two or three currents, from opposite directions, cross and clash and drive against one another with increasing fury. Then

Whirlwinds of Sand (Sand-Spouts).

is produced the singular phenomenon of the sand-spout; often witnessed on a magnificent scale in the sandy plains of Eastern Asia and Southern America. The sand is not now driven in voluminous masses in a rectilineal direction; but raised aloft in the form of long tortuous columns, which whirl to and fro like gigantic spectres in the mazes of a wild demon-dance. At the same time, the azure of the sky grows

pale and troubled, the sun's light obscured, the boundaries of the horizon seem to meet together; the burning dust held in suspension in the air renders it irrespirable, and if one of these whirlwinds encounters any object which offers a resistance, it carries it upward and hurls it a considerable distance. Fortunately the phenomenon is one of brief duration. The atmospheric equilibrium is speedily restored; the heavens recover their serenity; the atmosphere grows clear, and the sand columns, falling in upon themselves, form a number of little hills or cones, apparently constructed with great care, like those mimic edifices of sand or snow built up by children in their pastimes.

It is said that these furious whirlwinds have occasionally engulfed whole caravans in their tremendous vortex,—

> "Man mounts on man, on camels camels rush,
> Hosts march on hosts, and nations nations crush;
> Wheeling in air the winged islands fall,
> And one great *sandy* ocean covers all."

Whether this be true or not, there can be no doubt tha
is one of great magnificence, and calculated to ins
with emotions of awe and dread. Mr. Atkinson
by him, on one occasion, when traversing the Mong

"As we passed," he says,* "in the middle of a with innumerable hillocks of sands, we saw about thirty o idenly raise themselves around us, lengthen into long elliptical columns, and glide with many a whirl and sweep over the surface of the Desert with the hissings and contortions of gigantic serpents which had awakened at our approach. These spouts, for the phenomenon was no other, varied in diameter; the smallest measured between twenty and thirty feet; a few attained to a hundred; and one, which absorbed in its vortex all that it approached, rose to nearly two hundred. One might have said, on seeing them bending, rising again and crossing one another in space amidst an atmosphere of dust, that they were antediluvian monsters emerging from their geological bed

* T. W. Atkinson, "Travels on the Russo-Chinese Frontiers."

and returning into th. feverish activity of existence. But soon, the atmospheric forces which had raised them beginning to fail, we saw these sand-spouts fall away one after another, and form on the surface of the Desert a number of moving hillocks similar to those from which we had just emerged."

The poet, invoking the judgment of Heaven on the traitor, would fain doom him to the misery of cherishing hopes that shall never be realized. "May he," cries the minstrel—

> "May he, at last, with lips of flame,
> On the parched desert thirsting die,
> While lakes that shone in mockery nigh
> Are fading off, untouched, untasted."*

The image here is borrowed from that most singular phenomenon of the Desert, the *Mirage;* an atmospheric illusion due to the refraction of the sun's rays upon the sand, and the intense expansion of the strata of the air,—in other words, it arises from the total ...e rays of light from the lower surface of a stratum of ...urs when, from any cause, such a stratum of air possesses ... refractive power than the one immediately below it. ... condition of the atmosphere causes remote objects to be seen ... reflected in a mirror, or to appear as if suspended in the air. ... effect is confined to apparent elevation, the English sailors call it *looming;* when inverted images are formed, the Italians give it the name of *Fata Morgana*. The Arabs call it *Serab*, or *Suhrab*, the 'Water of the Desert;' and the Hindus, *Tchittram*, or 'the Picture.'"

The effects of the illusion are extraordinary, but undoubtedly they are heightened by the imagination of observers, generally over-excited by fatigue, by privations, or sometimes by fever. These causes contribute to vary the nature of the phenomenon as seen by different eyes. Thus some gaze enraptured on verdurous islands bright as Armida's enchanted garden, with feathery palms and bloom-

* Moore, "Lalla Rookh."—*The Fire-Worshippers.*

ing flowers, and delicious spark
off which is never reached, th
resting calmly at anchor, or

" Veering up and

and camels browsing quietly u
them the rolling river, its ba
and all this, while there is n
whose presence might serve in
visions. It is the very phant
wayward, and most fantastic
fied by the inequalities of t
the air, can alone account for
shows its victim, in the reflect
of water, which is variously
invests the slightest objects on
and dimensions, which are ea
men, animals; and it seems
fancy converts into camels wo
elephants, and at Venice into
ships, and gives to airy nothi

" A local h

It becomes absolutely n
wholly personal illusions born
are really due to a definite
suppose the existence of *actua*
horizon. Under such conditi
which shows the sky or rocks
superincumbent on the earth's
alone resembles water. It is
traveller, overwhelmed with f
his eager steps to reach more
hopes to refresh and revigor

ling lakes; others see, in that dim far-
laughing waves of ocean, with ships

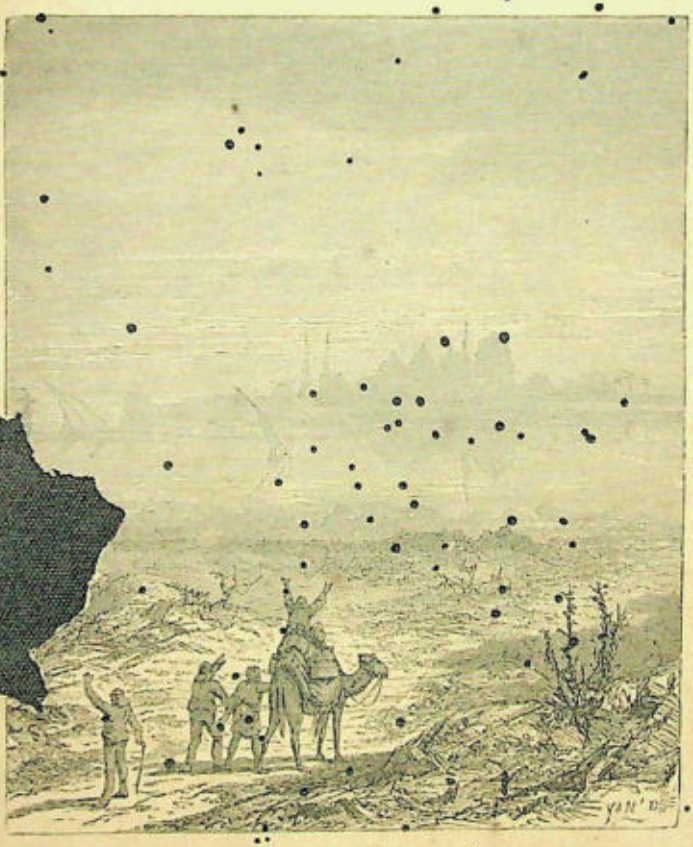
down, they know not why,"

pon its shores; others, again, see before
nks studded with groves and palaces;
t a solitary real object on the horizon
some degree as a foundation for their
smagoria of nature; her wildest, most
port. The reflection of the sky, modi-
e soil and the vibratory movements of
the singular deception. Imagination
ed image of the cloudless sky, a sheet
aken for a sea, a lake, or a river; it
the earth's surface with forms, colou
ily metamorphosed into house
ertain that those which
uld, in the Soudan, be t
gondolas. Imagination
gs

abitation and a name."

essary, therefore, to distinguish these
of a heated brain, fr e which
hysical cause. The latter necessarily
objects, below or very little above the
ns, the most frequent illusion is that
reflected in the expanse of rarified air
surface, and which through this cause
hen that the ignorant or inexperienced
atigue and devoured by thirst, hastens
quickly that limpid water, where he
te himself, but which flies before his

advance, and speedily vanishes altogether. Sometimes it is an inverted representation of terrestrial objects which appears in the air; or rather, these same objects, several times reflected, appear to multiply themselves. M. Trémaux relates that he saw the latter form of mirage in Nubia. He observed a row of doum-palms, which were



A Mirage in the Desert.

about two thousand yards distant, repeated in several similar rows, each with a like number of trees, so as to produce the effect of a quincunx; among these trees floated several seeming sheets of water.

We must remember, moreover, that the immensity, uniformity, and vacuity of the Desert singularly contribute to render optical illusions frequent. The very serenity of the air assists in destroying

the perspective to which we are accustomed in temperate climates, which are always more or less misty. Objects appear much nearer than they are in reality, because they are more distinctly visible, and also because nothing intervenes between them and the observer. Their dimensions, too, become arbitrary, for want of standards of comparison by which to measure them. So the trees and the mountains where the weary traveller hopes to obtain a temporary repose and a passing shelter from the Pythian's fiery arrows, seem constantly to recede before him, like the rainbow when pursued by the ignorant peasant; and, until experience has taught him to rectify the apparent testimony of his senses, he is doomed, like Tantalus, to be the victim of continual deceptions,—

> "Ev'n in the circling floods refreshment craves,
> And pines with thirst amidst a sea of waves;
> When to the water he his lip applies,
> Back from his lip the treacherous water flies."*

Nor is this all; hunger, thirst, weariness, and especi... action of the solar heat upon the brain, determine a p... logical condition, a species of mental intoxication o... powerfully predisposes the victim to hallucinations, an... mind of that self-control which would enable it to ch... phantoms that haunt it. To this affection, whose sym... frequently but erroneously confounded with those of the r... Arabs have given a specific name. They call it *Ragle*. A distinguished French traveller has described it with exhaustive fulness,† and he attributes it to fatigue, excessive heat, and want of sleep.

It shows itself most commonly at night, and in dreams, attacks of nightmare, and a somnambulism of which the sufferer is perfectly conscious, without being able to throw it off. By day strange hallucinations affect the sight, the hearing, and even, though less powerfully, the senses of taste and smell. The aberration extends, as far as the sight is concerned, to the objects which we are in the habit of

* Homer, "Odyssey," book xi.; Pope's Translation.

† M. le Comte d'Escayrac de Lauture, "Le Désert et le Soudan" (Paris, 1853).

seeing; a small stone, for instance, expands into a rock; the rut of a carriage-wheel enlarges into the furrow of a freshly ploughed field; a tuft of grass or a bush will assume the grand proportions of a forest; and, what is remarkable, these objects seem always close at hand. Another frequent error is the elevation of horizontal surfaces; the horizon becomes a wall or a mountain. "It has happened to myself," says M. d'Escayrac, "to meet with walls constantly reappearing before me. My extended arm has plunged into the masonry, but my body never encountered any obstacle; the rampart opened to give me a free passage."

Hearing is, in its turn, affected. Then, any sound whatsoever, such as a footfall, the blow of a stone, the whisper of the wind, is changed into melodious sounds, keen cries of distress, the murmur of woods, the harmony of familiar songs.

One day, says M. d'Escayrac, I heard the click-clack of a village mill. Endeavouring to collect my senses, and to obtain an explanation of the sound, I perceived that it arose from the clink of my [illegible]inst the pommel of my saddle, to which I had buckled

[illegible] the savant, who experienced the effects of the *rayle* [illegible] his travels in Egypt, confirms in every respect the foregoing [illegible]ion. On his way from Rosetta to Alexandria, he kept along the border of the sea, and found his feet painfully staggering in the thick fine sand. Such a journey is necessarily one of extreme fatigue. After the first night, this fatigue grew overwhelming; the traveller lost all accurate perception of objects, or of the form of places. The surface of the lake Medeah appeared not so much a sheet of water as a monotonous plain. Constantly pressing forward, he maintained a hard fight against the overpowering sense of slumber. Half-asleep, half-awake, his brain was dazzled with the most fantastic phantoms, and the hallucination was so great that he plunged into the lake before him, without perceiving it, though the water was very deep. But the freshness caused by the evaporation of the water warned him of his error, and the vision suddenly passed away.

Such being the phenomena of the Desert, one can understand the dreary picture which Dante paints in his "Inferno," of—

> "The plain
> Which from its bed rejecteth every plant;"

whose soil is—

> "Of an arid and thick sand;"

and where—

> "With a gradual fall
> Are raining down dilated flakes of fire,
> As of the snow on Alp, without a wind."*

CHAPTER V.

VEGETABLE LIFE IN THE DESERT:—THE OASES.

THE *Flora* of a region where nature provides no genial [illegible] rains, and whose soil is simply a shifting sand, m[illegible] certain places by a brackish water, must necessarily be [illegible] poverty.

It is reduced very nearly, as we have seen, to a few plant[illegible] genus *Salsola* (salt-wort), flourishing on the borders of the [illegible] and lakes. Nevertheless, at a few points where a certain degree of fixity obtains in the sand, we meet with the thornless bushes or shrubs, the *Ephedra alata* and the *retama Duriæi;* some pistachios (*pistacia lentiscus* and *p. terebinthus*); the "drin" (*aristida pungens*), a tall grass, with linear leaves, some seven feet high, to which the camel is very partial; and the "'ezel," a member of the family of Polygonaceæ, which botanists class with the allied buckwheat and knot-grasses, and which attains the stature of three to four feet. The latter plant throws out roots, which are generally uncovered, to a distance of twenty to twenty-five feet; its woody stem spreads in its

* Dante, "Inferno," c. xiv., Longfellow's Translation.

upper portion into gnarled branches, terminated each by a cluster of green, cylindrical and leafless twigs, which fall during winter. Elsewhere rise the tall trunks of the doum-palms, either isolated or assembled in scanty clumps, under which the traveller obtains with difficulty a modicum of shade, but which are otherwise of no value to him.

In districts where the surface is more broken up, notably in Palestine, on the banks of the Jordan and the Dead Sea; in the Sinaitic Peninsula of Arabia; in the Nubian deserts of Naga, Aredah, and Bahiouda; finally, even in the Sahara, in the "Desert of Erosion," and the table-land region, vegetable life becomes more abundant and more varied, though still but of mediocre interest. However, a curious arbustus, the *Limioniastrum Guyonianum*, shows itself very frequently in these damp localities, where it attains sometimes the dimensions of a tree. Its attenuated leaves are covered with saline efflorescence, and its particles of rosy flowers relieve the ...y of the wilderness. In the permanent salt marshes, or ...f the plants are analagous to those formed in the ...doc.

...he plants of the Desert I must not forget the rose of ...o (*Anastatica hierochuntica*),* an annual which contracts ...nto a ball, and, blown about by the breeze, seems a dead and ... mass of twigs. But plunge it into water, and it expands, regains the bloom of life, affording a remarkable example of what is called "revivification." The fable respecting it is, that the first time it ever bloomed was on the eve of the Nativity, and that its flower remained open until Easter.

Several other vegetable species grow on the table-lands of the Algerine Sahara, which are found elsewhere under similar conditions of soil and climate. They are thorny shrubs and underwood, almost wholly belonging to the family of Salsolaceæ, or littoral plants, which only thrive on ground impregnated with salt; there are also sub-frutescent plants, partly dried up by the sun. In some places the

* Order, *Cruciferæ*.

nakedness of the earth is concealed by the bloom of geraniums and heliotropes. Further, you may notice in the region of the table-lands, the *Melantha punctuata*, a member of the Colchicum tribe, which bears a bouquet of very white flowers grown upon the sand, and surrounded by a crown of ensheathed leaves. Not unworthy of rejoic-

VEGETABLE LIFE IN THE DESERT.

1. Jujube Tree. 2. Lentiscus. 3. Tamarisk.

ing the eyes of the most fastidious connoisseurs, it lives and dies unknown in the solitudes of the Sahara.

In the hollows, where the earth preserves some degree of humidity, a fine soft sward prevails, of the most delicious emerald green; two herbs, the Alfa (*stipa tenacissima*) and the White Wormwood

(*artemisia alba*),* often cover extended areas; the jujube trees clothe themselves in profuse foliage; the coloquinta stretches over the ground its branches loaded with spherical fruit; and the tamarisk, developed into a tree, waves in the wind its tufts of snowy and rose-hued flowers. It is in these meadows that the Arab rears his tent and pastures his flocks under a winter sky. The industrious and sedentary tribes seek in the oases a more benignant nature,—

"The yellow down
Bordered with palm, and many a winding vale
And meadow;"

soil which will repay their toil with liberal harvests. And it re only, in truth, that vegetation presents a development, a continuity, and sometimes even a variety, which recalls the fortunate countries of the Mediterranean region.

The old geographer, Ptolemæus, compared the Sahara to a panskin, sprinkled with black spots on a tawny ground. These hich, by an effect of contrast, are set off in black on the of the desert, are the far-famed oases, which have r poets and romancists with so many an appropriate Ptolemy's comparison is the more accurate because these of verdure scattered over the sandy ocean,

"Like precious stones set in a silver sea,"

have, in general, a circular form. We must except, however, the grandest and most beautiful of all, Egypt. That immemorial land of mystery and power is enchased in the Desert region like any other oasis, and only differs in its greater extent and more elongated figure. It stretches along the Nile like a ribbon—

"And Egypt joys beneath the spreading wave."

Its length, from Cairo to Assouan, is 450 miles. Its breadth does not exceed nine to twelve miles, except at Cairo, where it

* Sub-order, *Tubulifloræ*.

measures about eighty miles along the sea-coast, which forms the base of a triangular district known as the Delta (Δ) of the Nile. The two other angles are marked by the cities of Pelusium and Alexandria. This long strip of fertility is narrowly shut in between deserts of almost incredible sterility.

A peculiarity worthy of attention, because it is the unique cause of the fertility of Egypt, is, that the valley of the Nile, instead of sloping down on either side to the river-bank, assumes a gently convex form. It is owing to this slight convexity that, at the epoch of the inundation—beginning in June and ending in October—the Nile waters overflow to the right and to the left, rest upon the soil, and there deposit their precious mud. How different the aspects of the country at different seasons of the year! First, the bright sparkling sheets of far-spreading and fertilising water; then the emerald green of the growing crops; lastly, the ripe warm yellow hues of the full harvest. Well might Amrou, the Arab conqueror of Egypt, remark to the Caliph Omar, that, "according to the vicissitudes of the seasons, the face of the country is adorned with a *silver* ... verdant *emerald*, and the deep *gold* of an abundant h...

The soil of Egypt is, then, simply an alluvium mixed with sand which the winds bring from the Desert. Its aspect is that of rich, well-cultivated land, but bears the impress of a wearisome monotony. You see there neither the dark dense forest, the rolling prairie, nor the undulating woodland; from the shore of the Mediterranean to the tropics you meet everywhere with the same cultivation; the same mud-built villages, with their dirty and winding streets; and ever the same clumps of palms, which would end by becoming tedious if it were not that their elegance of form invests them with an eternal beauty—if a glorious radiance did not gild with "refined gold" everything it touches—if, finally, an after-glow of wondrous loveliness, of which the eye and soul can never weary, which whenever seen suggests some new and subtle emotions, did not terminate every day by a crepuscular pomp of indescribable magnificence.

The Palm-tree is, in Egypt, as in all the oases, the principal

element of the arborescent vegetation. But you also meet there with the banana, the gum-tree, the orange, the jujube, the mulberry, the sycamore, and other tall trees, which were planted by command of Mehemet Ali, and have perfectly succeeded. The green banks of the river are diversified by coppices of acacias and tamarisks. In the

VEGETABLE LIFE IN THE DESERT.
1. Doum-Palm. 2. Date-Palm. 3. Alfa (*Stipa tenacissima*).

Fayoum district bloom impervious hedges of cactus, and plantations of roses for the production of rosewater. Cereals yield four crops a-year; flax, hemp, indigo, cotton, the sugar-cane, prosper admirably; and under a climate where ice, snow, and hail are unknown, not a month but has its burden of flowers and fruits. Abundant crops of vegetables are raised, even as in those days when the Israelites

in the wilderness bewailed "the cucumbers and the melons, the leeks, the onions, and the garlics" of Egypt.

M. Charles Martins classes the Oases of the Sahara under three heads, corresponding to his three sub-regions.*

The oasis of the Table Lands is watered by a stream or a copious spring. That of the valleys of Erosion, by natural or artificial Artesian wells. That of the Sandy Desert wants water. In the latter the palm-trees are planted in conical cavities hollowed by the hand of man, that their roots may strike down to the subterranean reservoir which is to nourish them.

Every oasis is composed, in the main, of date-palms, which [illegible] to form a continuous forest; but in reality they are planted in [illegible], and in gardens separated from one another by walls of earth, which are pierced with an aperture to admit of the entrance of the irrigating rill into the enclosed square. The soil employed in the construction of the walls is removed from the paths, which are consequently [illegible] the surface, and can be employed for a double purpose; the [illegible] tate circulation in the oases, and the waters, after [illegible] the gardens and revived the soil, discharge themselves [illegible] hollow ways, whence they flow towards the chotts, or [illegible] swamps, which the lethargic Moslem never thinks of drain[illegible] such hotbeds of infection issues the monster Fever every year, [illegible] slays its hundreds.

In case of need, every oasis becomes a fortress. Each "square of flowery ground" is a redoubt; the assailant's bullet lodges in the earth wall or if it pierces through, forms a new loophole in which the Arab plants his gun to aim at his enemy. The villages themselves are encircled with walls, flanked by towers, which remind the spectator of the picturesque fortifications of mediæval times.

The Date-Palm (*Phœnix dactylifera*) is *the* tree of the Desert; there only will its fruits ripen; without it, the Desert would be

* Martins, "Du Spitzberg au Sahara," pp. 565, *et seq.*

uninhabitable and uninhabited. Arab poesy represents it as a living being, created by God on the sixth day, at the same time as man. To express under what conditions it prospers, the imagination of the Saharan exaggerates the true, to render it the more palpable. "This king of the oasis," he says, "must plunge his feet in the water and raise his head in the fire of heaven." Science, to a certain extent, confirms this seeming hyperbole; for it needs 5100° of heat accumulated during eight months for the date to ripen its fruit perfectly. If the sum of heat be less, the fruits set, but they do not grow to their full dimensions, remain bitter to the taste, and fail in the sugar and farina, which form their nutritive properties.

These conditions are realized in the climate of the Sahara. The mean temperature of the year averages from sixty-eight to seventy-six degrees, according to the locality. The heat commences in April, and does not cease until October. The thermometer seldom sinks in the cold season more than two degrees below zero, and the date [illegible]dure six degrees below zero.

[illegible] as already stated, is rare in the Sahara; it falls in winter, [illegible]nto a newly awakened life the vegetation which has [illegible] of vigour by a summer sun. Sometimes they descend [illegible]nts, but these torrents, like our summer showers, are of briefest [illegible]. At Tongourt and Ouraegla whole years pass by without a [illegible] of rain. Does not the reader understand, then, the gratefulness of the Arabs towards a tree which can derive its nourishment from the burning sand, the scarcely less burning airs of heaven, and the brackish waters beneath the soil which are fatal to all other kinds of vegetation—which retains its verdure fresh in the glare of a pitiless sun—which resists successfully the winds that bow to the ground its flexible stem—which provides him with beams and coverings for his tent, cordage for the harness of his horses and camels, fruit to satisfy his hunger and wine to quench his thirst—which is, moreover, "a thing of beauty," and gladsome to the eye?

"Those groups of lovely date-trees bending
Languidly their leaf-crowned heads,

Like youthful maids, when sleep descending,
Warns them to their silken beds."*

What the vine is to the Italian, the oak to the Englishman, the cocoa-nut tree to the Polynesian, is the date-palm to the Arab. And more—far more. This single tree has peopled the Desert. A civilization, rudimentary compared with that of the West, sufficiently advanced if you contrast it with that of the Malay or the South Sea Islander, finds in it its standing-point, its centre, its support. And without it the tribes of the Sahara would cease to be.†

The wealth of an oasis is computed by the number of its palm trees. All of them, however, are not fruitful; for the date is diœcious. It has its males and its females. The males have flowers furnished with stamens only, and form a closed-up, folded, grape-like ball, previous to the ripening of the pollen in an envelope called the spathe. The females, on the contrary, bear clusters of fruit also wrapped up in a spathe, but incapable of development until fecundated by the pollen or dust of the stamens. To multiply the trees, the Arabs do not sow the kernels of the fruits, though they germinate with extreme facility, for it is impossible to [illegible] of what sex the tree will be; they prefer, therefore, to [illegible] from the trunk of a female tree, and this becomes fruitful [illegible] expiry of eight years.

The male trees blossom, says Mr. Tristram,‡ in the month of March, and about the same time the case containing the female buds begins to open. To impregnate these, a bunch of male flowers is carefully inserted and fastened in the calyx. Towards the beginning of July, when the fruit begins to swell, the bunches are tied to the neighbouring branches.

The dates are ripe in October, at which time any premature rain is fatal to the crop, though the *roots* require a daily watering. Not less injurious are east winds in March and April. The tree when it

* Moore, "Lalla Rookh"—*The Fire Worshippers.*
† Martins, "Du Spitzberg au Sahara," p. 507.
‡ Tristram, "The Great Sahara," pp. 95-98.

begins to bear is about seven feet high. Each year the lowest ring of leaves falls off, so that the age of a palm may be roughly computed from the notches on its stem. Its fruit begins to decline after a century, and the tree is then cut down for building purposes; but it will live for at least a couple of hundred years. Some trees produce as many as twenty bunches, but the average in a favourable season is from eight to ten bunches, each weighing from twelve to twenty pounds. Before the dates ripen, each proprietor is bound to set apart one tree in his garden, whose fruit is consecrated for the service of the mosque and the use of the poor.

From the juice of the date the Arab obtains a sweet fermented liquor, called "laguni," of which he is inordinately fond. He makes an incision in the top of the tree, taking care to strike home to the centre. A funnel is attached, by which the sap flows into a vessel at the rate of about three quarts every morning for ten to sixteen days. The incision requires to be opened afresh daily.

cabbage, or soft pith and young unfolded leaves at the summe stem, in taste approaching the chestnut, is also eaten, but the tree has fallen or been felled, as the loss of its crown destroys it.

re are fifteen varieties of dates, of which the *dghetnour* is red the best for keeping, and three other kinds are preferred fresh.

The crest of the full-grown trees rises about fifty feet above the ground. The air circulates freely under the leafy canopy formed by their interlacing branches, but the sun's rays do not penetrate. Shade, air, and water—these three elements permit the most varied cultivation in the palm-gardens, despite the scorching heats of summer. The fruit trees which flourish are the fig, the pomegranate, the apricot; less frequently, the vine and the olive; still more rarely, the peach, the pear, and the orange. Vegetables are commonly cultivated during winter; such as turnips, cabbages, onions, carrots, beans, and pimento (*Capsicum annuum*), an indispensable condiment for those Arab sauces (*mergu*) destined to stimulate the digestive

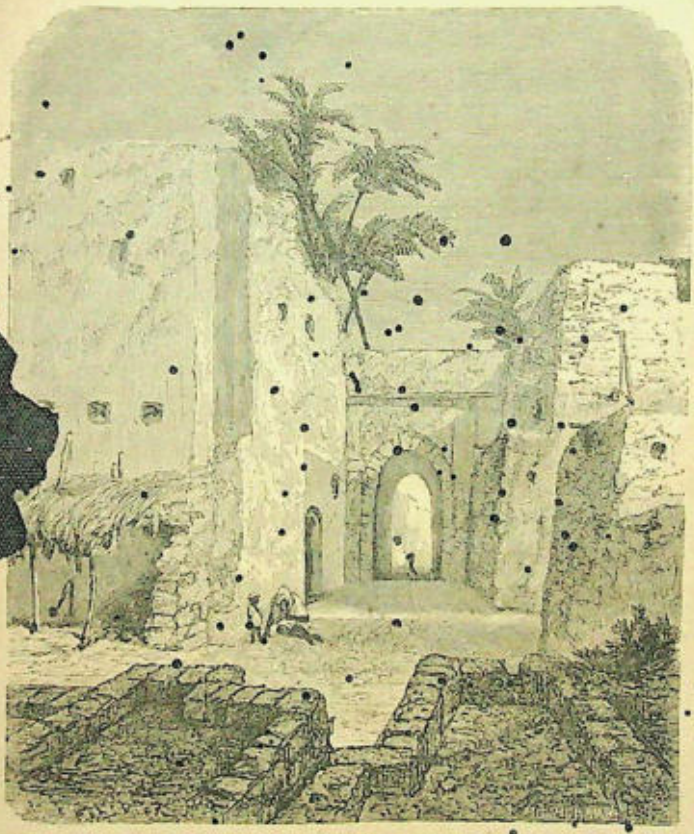
energies of a people who abstain from alcoholic liquors. You may also remark pumpkins, gourds, and water-melons; small squares of lucerne, which yield as many as eight crops yearly; the henna (*Lawsonia inermis*), which tints with yellow the nails of the Arab women; and tobacco (*Nicotiana rustica*), cultivated most largely in the Souf. In winter you may refresh your eyes in the clearings of the oasis with verdurous fields, green with barleys and early wheats, springing vigorously from the earth. The cultivation of cotton, though considerably stimulated by the failure of the usual supply from the Southern States of America, is still in its infancy. There can be little doubt, however, that with improved methods of irrigation it will be considerably and successfully developed.

The oases of the table-land region, fertilized, as we have already seen, by the streams of fresh water which flow down from the mountains and spread abroad in natural or artificial channels, are much the most fertile, and also the most healthy. They possess, moreover, the inestimable advantage of being but a short distance from the Mediterranean region, in a country less arid and less desolate than the remainder of the Desert. I may name, among these oases, those of El-Kantara, Biskra, and El-Outaïa, which form a sort of group, and are watered by the same river.

The oasis of El-Kantara is the first we encounter on quitting the Mediterranean region to penetrate into the Sahara through the gloomy and precipitous ravine entitled "The Mouth of the Desert." It is situated 1800 feet above the sea-level. Its length is 5000 yards. Fournel, the first geologist who examined it (in 1864), christened it the Hyères of the Sahara. Its temperature is cool and equable, and does but just suffice to enable the dates to ripen. It possesses upwards of 76,000 palm-trees, sheltering under their leafy shadow legions of apricots, pomegranates, and fig-trees. In the centre of this pleasant and fruitful shade houses of brick, with flat roofs and narrow loop-holed windows, surround a square tower. The ancient watch-towers have fallen into decay. Before France took

under its "protection" the peaceful Berbers who cultivate the oasis, these towers were useful as posts of observation whence to descry the approach of the wandering Arabs, who resort in summer to the pastures of the mountains, and in winter to those of the Sahara.

As a type of the oasis of the Desert of Erosion, let us take that Ouargla, the last which submitted to the French in South Algeria.



A Street in Ouargla.

It is situated in a profound hollow. In form it is elliptical, with its major axis measuring about five thousand yards, and its minor about three thousand. The palms are planted at the rate of ten to eleven hundred a hectare (two acres); they attain to extraordinary

dimensions, and their dense foliage over-arches a small world of fruit trees. Outside the gardens grow some wild date-palms, which yield a smaller crop, but whose fruit is much more savoury. Two avenues, or clearings, bisecting the forest from north to south, lead to the *q'sour*, or village, of Ouargla. This *q'sour*, like every other, is built of sun-dried earth, and surrounded by a circular rampart in very bad condition, six to thirteen feet in height, and four and a-half feet thick at the base. It is flanked with loop-holed towers, and encircled externally by a muddy moat, crossed by six causeways leading to the many gates.

Before some of these gates are planted the small entrenched camps, wherein the Arab shepherds of the neighbourhood take refuge with their flocks what time the oasis is menaced by an enemy.

The *q'sour* of Ouargla is divided into three quarters, inhabited by three tribes, who do not live always on the most friendly terms. In appearance it resembles the Saharan *q'sours*, which have all a strong family likeness; there are the mosque, and the governor's residence, and the open market-place, and the narrow squalid streets often obstructed by heaps of unclean and unsavoury rubbish, and low dull houses, pierced with holes instead of windows, which seldom any shutters; so that the traveller, when he penetrates these dismal quarters, is startled by the contrast which they present to the picture of enchanted palaces full of shade, perfume, and freshness, drawn by his eager imagination. Our poets and romancists have much to answer for. Their ideal East is very different from that actual East, in all its heat, and noisomeness, and glare, which the voyager finds around him, and which seems to have lost much of its beauty along with its grandeur and its power. Pleasant to the fancy is the palm-grove, pleasant the garden with its golden and purple fruitage, but the warm (and often mineral) waters which irrigate, or rather inundate the soil, exhale the most deleterious emanations, so that the unfortunate inhabitants are constantly decimated by fever, blinded by ophthalmic disease, and devoured by insects!

We have already seen that the Desert of Erosion is watered by means of artesian wells, natural or artificial. The latter have been known to the peoples of the Sahara from the remotest antiquity; but the implements and the methods employed to bore or preserve them were, as the reader will suppose, very rude and unsatisfactory. The sides of the well are only supported by a framework of palm-wood, which decays very quickly; the well gets choked; divers descend with baskets to clear away the sand; but after awhile the evil exceeds their power of remedying it. "Then, for want of water," says M. Martins, "the palms grow sick and perish; the villages are emptied of their population; the oasis contracts its limits, and gradually disappears. The Desert resumes possession of the demesne which the labour of man had temporarily won for it." Fortunately, in the track of the French army have trodden the English engineers, with all the wonderful apparatus that Science has at their disposal, and in numerous places they have excavated artesian wells, similar to those which supply some of our great towns. And thus many oases which were on the point of perishing have been saved, others have been created, and the conquest of the Desert by modern industry is henceforth no more than a question

The oases of the Sandy Desert, as I have said, are not watered. They only possess such wells as suffice, more or less, for the needs of the poor cultivators. As for the palms, and other nutritive vegetables, they are planted at the bottom of conical excavations some eighteen, twenty-five, or thirty feet in depth; so that at a short distance you only see their crests rising above the sandy soil like large tufts of herbage. The slopes around these hollow gardens are stayed indifferently well by a matting of palm leaves. The well itself is placed in the centre, and its depth does not exceed five-and-twenty feet. Nothing can be more precarious than these oases, which a gust of wind may bury under an avalanche of sand. Yet the men are cleaner in their person, neater in attire, and livelier in spirit—

the women are less wretched and less oppressed—and the houses better built and better provided than in the great *q'sours* of the upper regions. In the Souf, the sandy region of the Eastern Sahara, the industrious inhabitants of these oases remain at peace in the midst of the tumults and insurrections of their turbulent neighbours, and appear fully sensible of the advantages they undoubtedly derive from the firm and impartial rule of the French Government.

CHAPTER VI.

ANIMAL LIFE IN THE DESERT.

THE artist who wishes to represent the broad expanse of O "liquid plain," does not fail to animate it with the white ca the labouring ships. If he paints the Desert, his picture w divided by a horizontal line into two parts—the blue he yellow sand; the latter, an undulating sea, with a fe palms in the background, and in the foreground, to enli monotonous scene, a group or so of camels. The camel is, in indispensable accessory of every view of the Desert, as th every marine painting; which justifies once more the Arab des tion of "ship of the Desert" or "terrestrial ship" (*gouareb el beurr*).

In Book the First I have spoken of the Camel properly so-called, or camel with two humps, which is peculiar to Central and Eastern Asia. The camel of Arabia and Africa is the dromedary. The latter is employed conjointly with the two-humped camel in the westernmost countries of Asia: in Egypt, and in Nubia, he is much more widely spread than his congener, which is nearly unknown in the rest of Africa. The dromedary has but one hump. His hair is soft, woolly, moderately long about the body, longer and much thicker on the hump, the head, the neck, and the shoulders. Its colour varies from a reddish-brown to a clear yellow. Zoologists recognize three

varieties of this species:—The *Brown dromedary*, also called, but improperly, the Caucasian dromedary—he is brown, like the Bactrian camel, and his short squat limbs indicate strength rather than agility; the *White dromedary*, of a very transparent colour, and of slender figure; and the *Egyptian dromedary*, larger than either of the preceding, and with body and limbs uniformly clothed in short gray hair. But the Arabs distinguish only two races: the *Djemel*, or camel of

1. The Mahari. 2. The Djemel.

burden, which is no other, probably, than the Caucasian dromedary; and the *Mahari*, or camel for the saddle and war, whose name seems to apply equally to the two other varieties.

The mahari is to the djemel what our chargers are to our cart-horses, or, as the Arabs say, what the *djend* (noble) is to the *kheddim* (the servant). He has a very sure foot, a free, sustained, and rapid

trot; he is sober, enduring, and courageous; a true courser, and the nomade's inseparable friend and companion. His training is a matter of the highest importance, and skilfully adapted to develop all his best qualities and highest faculties.

The Arabs of the Tell assert that the maharis accomplish in o day ten times the march of a caravan, or a hundred leagues; but th best in blood and breeding do not generally exceed a daily journey from thirty-five to forty leagues.

The young mahari has his place in the Arab's tent. The childr play with him; he is a recognized member of the family; custo and gratitude attach him to his masters, whom he divines to b his friends.

If the djemel be not as noble as the mahari, he is not less use Without him, all relations would be suspended between the peopl the Sahara; the Soudan, wide, populous, and fertile as it is, woul a *terra incognita;* he is the sole means of intercommunication pos in the arid wastes of the Desert.

Alike living and dead, he is the fortune of his master.

Living, he carries the tents and the provisions; he mak carries on commerce; that he might be patient, God (say created him without gall; he fears neither hunger nor th nor heat; his hair is woven into the burnous and the tent milk of the female nourishes rich and poor, and fattens the horse is "a spring which does not dry up."*

Dead, all his flesh is excellent eating; his hump (*deroua*) forms the daintiest dish at the banquet; in the bottles made of his skin, the water is neither consumed by wind nor sun; the shoes fashioned from it may tread unhurt upon the viper, and will save the traveller's feet from burning wounds (*haffa*); denuded of its hair, afterwards soaked in water, and simply applied to a wooden saddle, without nails or pegs, it adheres to it, like the bark to the tree, and communicates to the whole a solidity which will defy war, the chase, and the foray.

* Général Daumas, "Le Grand Desert," pp. 160–162.

The superiority of the mahari consists in this, that to all his own peculiar qualities he adds those of the djemel. His inferiority arises from the difficulty of his training, which consumes for more than a year all his master's time without compensation, and from the fact that animals of his race are few in number.

If we turn to the poet or the artist for a picture of the Desert,

STRIPED HYÆNAS OF THE SAHARA.

we find it peopled with animals of a very unsatisfactory character: the lion, the leopard, the panther, in quest of prey, seeking whom they may devour, or troops of hyænas and jackals, tearing with keen teeth the corpses of men and animals.

"With these, lean dogs in herds obscene repair,
And every kind that snuffs the tainted air."—(*Lucan.*)

Others diversify the scene with the graceful form of the gazelle, with

the ungainly body, immensely long neck, and spotted hide of the giraffe; or with the ostrich, the camel of the bird-world, spreading his plumes to the wind, and flying with swift feet from the hunter or the wild beast that pursues him. But, in truth, these are bold fancies, artistic or poetic licenses, rather than exact representations of what o really sees in the Desert; and most of the animals with which v people, at our pleasure, the immense solitudes of Africa and A actually belong to neighbouring regions of a less arid character. A

JACKALS DISINTERRING DEAD BODIES.

in the first place, the lion of the Desert is a myth, or nearly so. "When you speak," says Carrette, "to the inhabitants of the Des of these ferocious beasts which Europeans give them as compani they reply with imperturbable coolness, 'You have, then, in your own country, lions which drink air and browse on leaves?' But, among us, lions must have running water and live flesh. Therefore they only appear in those parts of the Sahara where are wooded hills and an abundance of water. We dread nothing but the viper (*lefa*) and the

numerable swarms of mosquitoes; the latter being found wherever humidity prevails.'"*

What Carrette relates of the lion is also true of the other ...ra, of the panther and the leopard, as well as of the hyæna and the ...ckal. It is surely easy to understand that these animals greatly

1. Gypaëtos, or Bearded Vulture. 2. Sociable Vulture. 3. Catharles Percnopterus.

prefer to sojourn in fertile and well-watered countries, where they enjoy freshness, shelter, copious supplies of water, and abundant prey, than in hot glaring plains of sand, which offer them no asylum, and where they run the risk of perishing of hunger and thirst. It is, then, only on exceptional occasions that the lions and other large

* Carrette, "Exploration de l'Algérie," tome ii.

fe'des of Africa issue from their caverns or their lairs, and wander i the Desert (properly so called) in pursuit of prey. The hyæna and the jackal venture there more willingly. We know that these carnivora only attack living animals at the last extremity; their food is the dead and even putrid flesh; it is a nutriment which costs the less trouble to obtain, and probably, also, most pleases their tast Thus, it is by no means an uncommon occurrence to see them in th towns and *q'sours*, devouring the carrion, or in the cemeteries disinte ring the corpses; they follow also in the Desert the caravans a detachments of troops on the march, and at night prowl around the encampments, in the hope of some windfall, which they seldom expe in vain, but which the dogs, the vultures (*Cathartes percnopter* and *vultur fulvus*), the *gypaëtos*, and the crows rarely fail to dispu with them.

The region of the table-lands, or Saharan Steppes, the valleys Erosion, and certain parts of the Gobi—Persia, Syria, and Arabia which are not absolutely deprived of rain, or which are refreshed mountain-streams, nourish several species of mammifers: gazel hedgehogs, porcupines, hares, offering both to man and the carniv an abundant variety of game. Of all these animals, the most int ing are the gazelles, several species of which inhabit the desert I shall refer in the first place to the gazelle properly so call *Antilope dorcas*, so remarkable for the grace of his movements, slender limbs, and the expressive gentleness of his eyes. This bea ful species is common in Central Sahara, Nubia, and Asia. He li in numerous troops, is of small stature, with a yellowish or yell brown skin on the back, and a white belly, a brown or blackish l marking the sides. The horns, larger and stronger in the male than in the female, have a double curve, are lyrated, and without projections. The Ariel Gazelle is about twenty inches high at the shoulder. The *Gazella Sæmmeringii* belongs to Abyssinia and Sennaar. The gazelle *nanguer* is found as far as Morocco, Nubia, and in the Cordofou; some varieties occur at the Sénegal. Finally, the oryx-leucoryx inhabits Tropical Africa, and rarely makes his appearance in

Deserts; he differs from the gazelle in his arched horns, but his is nearly the same. Although the gazelles are generally considered extremely timid animals, which, moreover, their weakness would fully justify, they display on emergency a surprising courage. When they cannot escape from danger through agility, they bravely confront the enemy which attacks them. Menaced by a panther

1. Gazelle. 2. Antelope (*Oryx-leucoryx*).
3. Gazelle (*of Sœmmering*). 4. Nanguer.

leopard, they form themselves into a circle, which, bristling everywhere with keen-pointed horns, compels the antagonist to retreat.

In the deserts of Africa and Arabia the traveller frequently meets with small rodents, which excavate their burrows in the sandy soil, and only issue from them at night in quest of food. These are the

jerboas and jerbilles. The jerboas are easily recognized by the leng of their hind-legs and the disposition of their toes—three to e hind-foot, the middle larger than the rest; five to each fore-foot; a all furnished with sharp, strong, crooked claws; their structu resembling that of the *raptores* among birds. These anima ls le with great celerity, and to an extraordinary distance. The t which is a fifth longer than the body, and termin ated by a tuft black hair, forms at one and the same time a sort of balance,

Gazelles of Arabia opposing a Panther.

rudder, and a lever. It enables the jerboa to preserve his equilibri and to direct himself when he has taken his spring; or, in a s of repose, furnishes him with a substantial support.

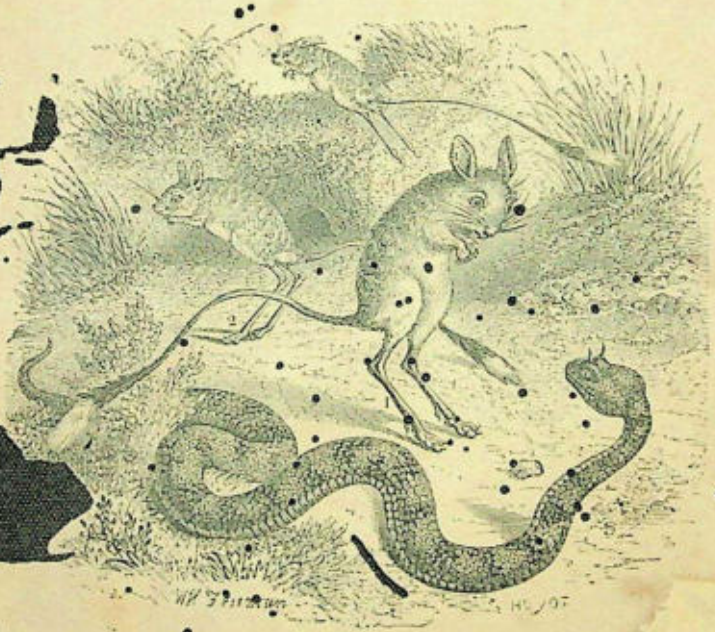
The jerboas constitute, in the family of *dipodidæ*, a tribe c posed of several species, which are found in eastern and cen Europe, Asia, and Africa.

The jerbilles, owing to the similarity of name, are often c founded with the jerboas; but the only things they have in comm

a certain conformity of habits, and a nearly equal aptitude for ping.

Otherwise, their organization rather resembles that of the rat, ng with which it is classed by zoologists. Their hind-legs are ich shorter than those of the jerboa, and their tail is garnished th but a few short, stiff hairs. Like the jerboas, they inhabit the dy wilderness of Africa, Asia, and eastern Europe.

These small animals, exclusively frugivorous and graminivorous,



Jerboas attacked by a Horned Viper.

em able, in the solitary places where they make their retreats, to ltiply themselves *ad infinitum;* but, while a great number perish ough famine, they are also decimated by a host of enemies in the tiles of the Desert, and especially by the terrible horned viper, or *astes*, and a great saurian, intermediate between the lizard and dile—the "varan of the Desert."

The horned viper (*vipera cerastes*) is thus named on account of two horns or protuberances on its forehead, which give it a

physiognomy more hideous, perhaps, than that of any of its c
genera. It attains the length of two to three feet. Its head
depress[illegible], very obtuse, swollen behind the eyes, and, so to spe
truncated in front. Its body, cased in shells of a tawny-like yello
marked with brown spots, blends curiously with the sand, hal[illegible] bur
in which it lurks to surprise its prey or escape from its enemi
The cerastes frequents the deserts of Lybia, Arabi[illegible], the Sahara, a
the valley of the Nile. Its bite is exceedingly dangerous.

1 Varan of the Nile. 2 Varan of the Desert.

The *varans*, or *monitors*, called also *tupinambis* by the anci
naturalists, form a genus represented in tropical climes by seve
species of great size. English writers commonly designate th
monitors, the French sauvegardes, because they frequent the hau
of crocodiles and alligators, and give warning of their approach by
whistling sound. Two species belong to Africa: one, aquati
varan of the Nile (*varanus dracœna*); the other, sand-burrowi
the varan of the Desert (*varanus sunius*, or *arenarius*), called

Arabs *onaran-el-ard*. Their usual size is from three feet to
e feet four inches. The varan of the Nile wears an armour of
rnately green and black scales. Its congener exhibits a mixture
brown and yellow, more suitable to its sandy lairs. It is rare in
Sahara, but common enough in the deserts of Egypt, Syria, and
ia.

Poor as may be the Fauna of the Desert, there is yet cause
ugh for astonishment that the species which compose it, especially
herbivora, should be able to find subsistence in these seas of
d, where they can find but a few saline plants scattered at rare
rvals, and where fresh water is almost wholly wanting. It is,
wever, well known now-a-days that the wilderness provides its
ens with an aliment, which is sometimes very abundant, suitable
man, the camel, and the beasts, and is considered identical by
y authorities with the *manna* of the Bible.* This substance is
ryptogamous vegetable, variously christened *lichen esculentus*
harius), *lecanora esculenta* (Pallas), *lutterut* (by the Arabs), and
sch-el-ard, or "earth-dung" (by the Algerines). It sometimes
ms on the sand, in the morning, a layer one or two inches in
kness, and appears to have dropped from heaven, or to have
aneously from the soil, during the night. It is probable
es, transported by the wind, are developed by the humi-
which is condensed through the nocturnal coldness.

A shower of this lichen was observed, in April 1846, in the
ssian government of Wilna. It covered the soil for three or four
hes in depth, and the inhabitants lived upon it for several days.
form is that of a small, anfractuous, rounded grain, about the
of a pea, externally of a gray colour, but white and farinaceous
hin. Its taste is weak, amygdalaceous, with a faint, mushroom-
aroma. Boiled in water, it swells, becomes gelatinous, and may
served up in various ways. In the Sahara, as well as in Arabia,

* This substance, according to other authorities, was more probably the saccharine
lation, *Mount Sinai manna*, which forms on the branches of the tamarix mannifera,
thence falls to the ground.

it adheres to any foreign body. Cattle feed upon it eagerly. It certainly facilitates digestion, and contains all the assimilating principles which form the constituents of the wholesomest vegetable food. Such as it is, the *lichen esculentus* is an inestimable boon to the wandering tribes of the Desert, who would perish of hunger in years of famine but for its heaven-sent nutriment.

CHAPTER VII.

THE MEN OF THE DESERT.

When I use the terms "Men of the Desert," "Populations of the Desert," evidently I must not be understood to employ them in an absolute sense. Man, no more than that other so-called "lord of animals"—the lion, makes a voluntary sojourn in countries where game, verdure, and fresh water are wanting. The peoples whom I entitle "Inhabitants of the Desert" are then, in reality, those who dwell upon its borders or in its oases, but whom the necessity of traversing and frequently abiding in it has familiarized with the gloom and its peril, as a similar necessity has familiarized mariners with the ocean. We have seen, however, that some pastoral tribes pitch their tents and pasture their flocks in those districts where vegetation is favoured and cherished by a supply of rain or subterranean waters, and which should more accurately be designated as Steppes than Deserts. Some authorities have, indeed, affixed the name of "the Saharan Steppe" to the region of high table-land which lies at the base of the Atlas range.

Other groups, who are partly shepherds and partly hunters, inhabit, in the Southern and Western Sahara, those plateaux where ostriches, gazelles, and hares abound. The more peaceful and industrious tribes occupy the oases. As for those who encamp or habitually wander in the Sandy Desert—where all cultivation is impossible,

here the herds can obtain but an insufficient pasture, where game ly seldom shows itself—the reader will suppose that they can only bsist by plundering or ransoming the caravans. These are the vers, the pirates of the Sea of Sand. There are "land-rats," akspeare tells us, as well as "water-rats." Others, again, there who seem convinced that "honesty is the best policy," who give nselves up exclusively to commercial transactions, and act as nts and intermediaries between nations separated from one ther by leagues of rock and sand, for the exchange of their respec- e products. It might be said of these that they discharged a ful and honourable function, if the purchase and sale of slaves e not the most ordinary, and unfortunately the most lucrative, of r operations.

In our previous examination of the peoples of the Steppes, we covered that all were more or less directly sprung from the same ces;—the yellow or Mongolian race, which blends in the north h the Hyperborean race, and in the west with the Japhetic or o-Germanic. We have now to note a not less remarkable fact—t the whole Desert zone is likewise occupied by one family, the itic, modified in certain parts of Africa by commixture with the gro race. Soon we shall see the latter peopling of itself the plains Central and Southern Africa; the Malayo-Polynesian and Papuan, singularly distinguished from the preceding, in possession of the nds of the Indian Ocean, those of Oceania, and the Australian tinent; the Hyperborean race, scattered through the Arctic soli- es; and, finally, the "Red Man," gradually dying away among prairies and forests of the two Americas: so that, to each of great divisions of the Savage or Desert World corresponds one of great fractions of the human species.

The Shemites—so named because the Bible attributes their origin them, the eldest son of Noah—are now-a-days represented only by Jews and the Arabs, though they formerly included also the yrians, the Chaldeans or Babylonians, the Syrians, Phœnicians, Ethiopians. Of their modern representatives, the Jews alone

have displayed any real aptitude for civilization. The Arabs, whc name is derived from the word *Arâba*, which signifies "desert seem almost exclusively adapted for a nomadic life; and it is them can most correctly be applied the characteristics which Ren too broadly attributes to the entire Shemitic race.

"As far as concerns the civil and political life," says that dist guished orientalist, "the Shemites are distinguished by the sa character of simplicity. They have never understood civilization the sense which we apply to the word. We do not find among th any great organized empires, or commerce, or public spirit—noth which recalls the absolute monarchy of Egypt and Persia. The t Shemitic society is that of the tent and the tribe: it owns no po cal or judiciary institution; its principle is, man free, without controlling authority, and without any other security than tha the family tie. The questions of aristocracy, democracy, feuda which sum up all the history of the Aryan peoples, have no mean for the Shemites. Aristocracy, not having among them a milit origin, is accepted without protest and without repugnance. Shemitic nobility is purely patriarchal: it owes nothing to conqu it has its origin in blood."

As far as their physique is concerned, the Arabs are in gen tall, thin, nimble, not very strong. Their face is pale and long, t forehead low, their nose aquiline, their mouth large, their chin rece The complexion is brown, as becomes those who live for months u a glaring sun; the eyes are keen and glowing; the port is free even haughty. They have black hair and beard.

Of their history, prior to the day when Mohammed's genius them into a great proselytizing military people, little certai known. A Shemitic tribe, descended from Joktan, grandson of S settled in Arabia at a remote period of antiquity, and Joktan's g grandson, Himzar or Homin, founded a dynasty which rule Yemen for upwards of two thousand years. Even the R could not utterly subdue them, but gradually the different tribes apart from one another, and for centuries waged against each o

most desperate wars, until Mohammed supplied them with a ing-point in the creed of Islam. Thenceforth their mission was ropagate the new faith by fire and sword, and bursting from their y highlands like a torrent, they poured along the shores of the diterranean to Gibraltar on the north, and Tangier on the south. Northern Africa they gradually mingled with the Berbers, the midians, and the Getulians, and from the fusion sprang the yles, the Tibbous, and the Touaregs, while the Shemites themselves a portion of their original character.

All the tribes of the desert are Moslems. The precepts of the n, and certain traditional usages, are almost the only laws which ze.

The Koran authorizes polygamy, and the Arab women, therefore, s the wives than the slaves of their husbands, who enforce upon the strictest seclusion, and impose upon them the most arduous rs. The tyranny which weighs upon the women is, however, in e proportion to the degree of welfare and civilization of the us tribes. Among the poor and almost barbarous peoples of the t, these unfortunate creatures are reduced to a condition of dation and brutishness which inspires in the European almost uch disgust as pity.

The instinct of rapine which most writers have signalized as one leading features of the Arab character, appears to have been ly exaggerated, or, at least, too much generalized. This vice is cial result of their position, and, we must own, of the very uated views they hold upon the "rights of man," which, indeed, sum up in much the same manner as Wordsworth's *Rob Roy*:—*

"The creatures see of flood and field,
And those that travel on the wind!
With them no strife can last; they live
In peace, and peace of mind.

"For why?—because the good old rule
Sufficeth them, the simple plan,
That they should take who have the power,
And they should keep who can."

* Wordsworth, "Poetical Works"—*Rob Roy's Grave*, vol. iii., p. 21.

We must also take into account the spirit of hostility which religion fosters against the infidel—against, that is, all who do accept the laws of the Prophet. "The sword," says Mohammed, the key of heaven and of hell; a drop of blood shed in the cause God, a night spent in arms, is of more avail than two months fasting or prayer: whosoever falls in battle, his sins are forgiven: the day of judgment his wounds shall be resplendent as vermilion, odoriferous as musk; and the loss of his limbs shall be supplied the wings of angels and cherubim." Such a declaration could but fire the enthusiasm of the Arab, and whet their swords against the enemies of Islam.

The leading features of his character have been discerned Gibbon with his usual sagacity, and described with his wonted stateliness of language.

"In private life," he says,* "every man, at least every family the judge and avenger of his own cause. The nice sensibility honour, which weighs the insult rather than the injury, sheds its deadly venom on the quarrels of the Arabs; the honour of their women their *beards*, is most easily wounded; an indecent action, a temptuous word, can be expiated only by the blood of the offender and such is their patient inveteracy, that they expect whole months and years the opportunity of revenge. A fine or compensation murder is familiar to the barbarians of every age; but with Arabs the kinsmen of the dead are at liberty to accept the atonement or to exercise with their own hands the law of retaliation. refined malice refuses even the head of the murderer, substitutes innocent for the guilty person, and transfers the penalty to the and most considerable of the race by whom they have been injured. If he falls by their hands, they are exposed in their turn to danger of reprisals, the interest and principal of the bloody debt accumulated; the individuals of either family lead a life of fear and suspicion, and fifty years may sometimes elapse before the account of vengeance be finally settled. This sanguinary spirit, ignorant

* Gibbon, "Decline and Fall of the Roman Empire," v., p. 451.

or forgiveness, has been moderated, however, by the maxims of our, which require in every private encounter some decent equality age and strength, of numbers and weapons. . . . .

"According to the remark of Pliny, the Arabian tribes are equally dicted to theft and merchandize; the caravans that traverse the sert are ransomed or pillaged; and their neighbours, since the most times of Job and Sesostris, have been the victims of their acious spirit. If a Bedouin discovers from afar a solitary traveller, rides furiously against him, crying, with a loud voice, 'Undress self, thy aunt (my wife) is without a garment.' A ready submis- entitles him to mercy; resistance will provoke the aggressor, n blood must expiate the blood which he presumes to shed legitimate defence. A single robber, or a few associates, are rded with their genuine name; but the exploits of a numerous l assume the character of lawful and honourable war. The temper people thus armed against mankind, was doubly inflamed by the estic license of rapine, murder, and revenge."

The name of "Bedouins" (from *bedaoui*, "man of the Desert") been bestowed on the nomades of Arabia, Egypt, and the Northern ara. The majority of them are shepherds; a few add to this ustry the much less honourable occupation of plundering trade- avans; some prefer to devote themselves wholly to this pursuit. The Bedouins are children of the sword. They exult in strife the clash of arms. It is their *acmé* of happiness to mount the ster and ride against the foe. The theme of the Arab and his se, of the attachment which subsists between them, of the services ch the latter renders to his master, of his physical and moral lities, his courage, his swiftness, his fidelity, has been worn so adbare that I need not here insist upon it.

I must state, however, that as there are two varieties of Arab els, so are there of Arab horses: the noble and the common, the st of blood and the beast of burden. The former seem to be wing scarcer every year. He is named *koleil*. The nobility a horse depends entirely upon that of his mother, so that an

authentic certificate of birth is always delivered to the purchaser
"high-bred steed." This certificate is enclosed in a small bag, wh
also contains a mysterious writing, and suspended to the anim
neck will be an omen of good fortune, it is hoped, to him and
owner.

The arms of the Bedouins are the curved sword, the yataghan, a
the long musket. Pistols are sometimes added, and the lance. El

BEDOUIN SHEPHERDS AND BEDOUIN NOMADES.

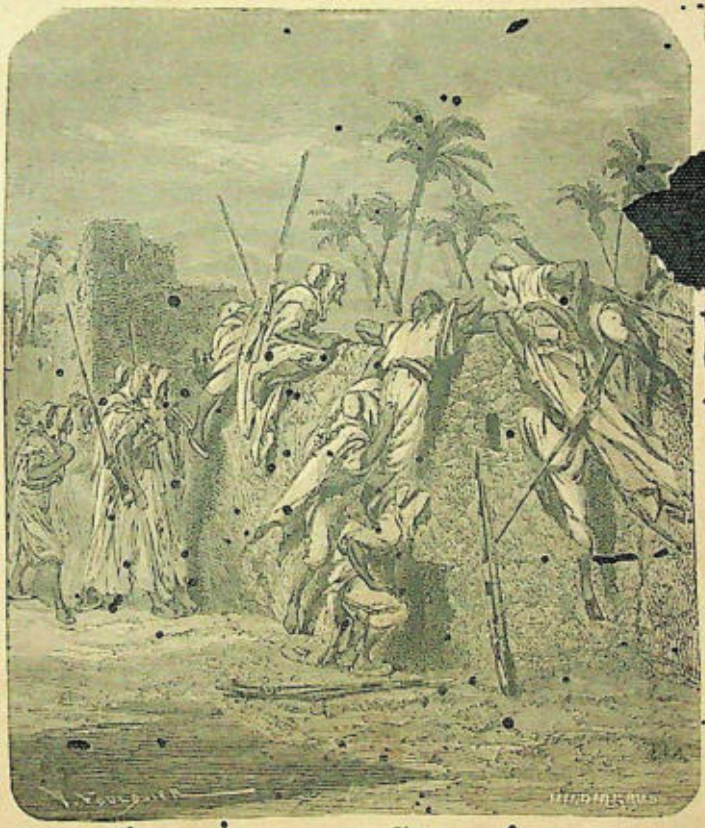
fight hand to hand, and without any strategical method. They n
venture upon night attacks. They seek to surprise the enemy
rapid marches and unexpected diversions, by ensnaring him
ambuscades, and harassing him when he is the strongest in numb
The most trifling fortification, however, arrests them—a wall of b
a simple ditch, a hedge of the fig-tree, will suffice to protect a vil
from their depredations.

The nomades of the Southern Sahara have not, like the Bedouins, erved in its purity the Shemitic type, but they have fostered and eloped the spirit of adventure and rapine which characterizes the ab of the desert, and they have added something of the ferocity of stiff barbarous tribes of Ham, with whom they have intermarried. ese nomades form two principal groups—the Tibboos on the east,

TOUAREGS.

Touaregs (Touarick, Touereug, or Tawarik) on the west. The er, according to Humboldt, are called "birds," on account of r agility; they are still imperfectly known to Europeans, despite e labours of Richardson, Clapperton, and Barth. The second are ded into the Touaregs of Aghadez and the Touaregs of Tagazi. was not until 1862 that the French army, crossing the Sahara north to south, entered into direct relations with these fierce

children of the desert. In the same year their ambassadors attra
the curiosity of ever-curious Paris. They are the despots, the tyra
of the southern Sahara. The charge of their lean flocks is their le
occupation. They are, it is true, skilful and enthusiastic hunte
but their veritable industry is the exploration of the desert:
exploration which changes in form according to circumstances.



ATTACK UPON A Q'SOUR.

a proper remuneration they undertake the guidance and protecti
the caravans; but whoever has not purchased their safeguard
treat as an enemy, and if not adequately ransomed sell into sla
The Berbers of the oasis not unjustly regard these marauders
alarm. For they pitilessly exact from the peaceful cultivator a s
of his harvest, which is always the lion's share; the right of

...ist, being the only right they recognize, and each man for ...self the only principle they respect. A troop of Touaregs, for ...tance, descends upon an oasis, and summons its inhabitants to ...liver up immediately a certain number of bags of dates. In case ...refusal they withdraw, but the people of the oasis may prepare to ...fend themselves with arms, for the dreaded blow will very shortly ...delivered. The Touaregs, leaving their maharis and their baggage ...a convenient distance, penetrate at night into the palm-gardens, ...le the walls, and, unless very energetically repelled, seize upon the ...bute they had demanded.

...ng is there to be remarked in the Arabs of the *q'sours* but ...y and degradation. A French officer, M. Tremblet, has ... with exactness and force their physiognomy, manners, ...acter, ideas, and history.* One rises from the perusal of his ... with a painful impression. In the narrow and pestilential ...ts of the *q'sours*, where vermin are as numerous as men and ...nen, in those mud palaces where the sultans are enthroned in ... the same passions, the same ambitions, the same all-potent ...petites, the same struggles, intrigues, and crimes prevail, as occupy ...large a place in the history of the great states of Europe and ...ia.

Among the inhabitants of the Desert I would include the posses-...rs of the great Egyptian oasis,—that ancient cradle of civilization ...that strange and mysterious land which, after throbbing with so ...l and brilliant a life in the days of the Pharaohs and the Ptolemies, ...mbered for centuries under the leaden domination of the Moslem. ...t us note only that the Egyptian people have undergone no special ...odification; the features of the fellahs of to-day are exactly those ...ich we trace in the pictures that cover the walls of palace and ...mb, the monuments that carry us back in imagination to the ...ction of the Pyramids or the glories of hundred-gated Thebes. It is ...l Egypto-Berber race, wherein we recognize the mixture of the ... and Shemitic blood, or perhaps the still incomplete result of the

* Tremblet, "Les Français dans le Desert" (Paris, 1863).

influences which have transformed into negroes the whites emigrated, some thousands of years ago, from Western Asia Africa.

The Egyptians establish, very clearly, the transition between t Shemites and the population of Nubia and Ethiopia. With the lat

Nubian Women.

the skin is black or of a deep bronze ; but the form, the features, hair, approach much more nearly the Caucasian than the Negro ty The Nubian women especially exhibit a grace and dignity of mo ment which reveal the nobleness of their origin. "It is in the lands," says Prémaux, "we meet with the modern Rebecca, with the antique Biblical simplicity, and carrying the water v

[illegible] Their air, at once easy and reserved, their black modest [illegible], recall those images of the holy history which every one has [illegible]; only, instead of a cotton stuff gaily coloured, imagine a piece [illegible]y dirty and often in tatters, and you will have the portrait the Nubian woman; this garment is otherwise so naturally [illegible]ped and so proudly worn, that it yields in nothing to the ancient [illegible]els."

BOOK III.

PRAIRIES, SAVANNAHS, PAMPAS, AND LLANOS.

CHAPTER I.

THE WILD PLAINS OF THE OLD WORLD :—THE AFRICAN INTERI

WHEN we have crossed the 18th parallel (or nearly s north latitude in Africa and the 30th in Asia southern boundary of the Rainless District—count extreme fertility and exuberant product succeed to the drear tudes we have hitherto traversed.

At intervals, indeed, the traveller encounters some vast blig and accursed area, where, for a part of each year, a deadly ar prevails; but ever there comes a happy moment, even in t desolate wastes, when genial Nature resumes her rights, abun rains nourish vegetable and animal life, and the glowing scene strains us to exclaim with thankful heart, "The earth is the Lo and the fulness thereof."

The Asiatic plains in the south, are, however, preserved such abrupt alternations; numerous water-courses, leaping down from the showy fountains of the Himalayan chain, refresh and fert these countries, which are almost everywhere subject to the domi of man. Analagous causes, in the grand rich islands of the w Indian seas produce similar effects; there, also, the very deserts humid regions, and tall grasses, bushes, shrubs, reeds, and clim

s grow in a rank and luxuriant chaos which we designate by the e of jungles, in whose dense obscurity the tiger makes his lair, t the serpent conceals his deadly venom!

'In the immense triangle defined by that portion of the African tinent which extends from the Mountains of the Moon to the e of Good Hope, nature has maintained almost intact her savage pendence; but she displays there her most varied forms, from snow-crested ice-bound mountain to the lowest and most mono- ous plain, from the impenetrable forest to the nakedest and renest steppe.

ble the reader to comprehend these widely different aspects, escribe the peculiar characteristics of each region of this continent, it will be necessary for us to recapitulate its most tant geographical features.

vast plateau, of comparatively slight elevation, occupies all ern Africa, extending eastward as far as the fifth or sixth degree of the equator. To the north-west, it is bounded by the ains of Senegambia; to the north-east, by those of Abyssinia. he east and west, the mountains descend to the very shore i dary chains; to the south the table-land is brought down to th a series of terraces which separate the mountain-ranges.

At its southern extremity, the African continent is from 550 to miles broad. It is occupied by the British colony of the Cape, h is bounded on the north by the Orange River. The most ing features of the physical geography of this part of Africa, and h determine in the main its climate and natural productions, are chains of mountains disposed parallel to one another and to the ern coast. These are separated by terraces or upland plains, range forming the boundary of the lower and the abutment of igher terrace. The communication is maintained by transverse ys, which are often of a highly romantic character. The loftiest most inland chain is christened in different parts of its course the geveld Bergen, the Nieuveld Bergen, and the Sneeu Bergen, or

"Snowy Mountains." Of these the loftiest summit is the Co
Berg, 10,000 feet in altitude. The second chain, the Black M
tains, though not so lofty are more massive, and, in truth, compo
of two or three chains in close juxtaposition. The third, or
chain, in proceeding from south to north, varies from eighteen
fifty-four miles, enlarging towards the west.

The plain or terrace between the Black and the Snowy Mount
is much loftier than the two other steps by which we descend to
southern extremity of the continent. The lowest terrace, border
on the sea, is well-watered and fertile. The second, or cen
terrace, consists of fertile districts, equally well watered
sected by vast dry deserts, called (from a Hottentot word
The third terrace, commonly designated the Great Karroo, a
of the Roggeveld and Nieuveld chain, is 300 miles in length, 8
in breadth, and 2000 feet above the sea-level. Its soil, says a
in the *Quarterly Review*, presents throughout its whole exte
the greater portion of the year, not a trace of vegetation.
gloomy solitudes assume a character of picturesque grandeur t
their very wildness of desolation. The scene might conve
fanciful mind the dreary image of a ruined world, where the wi
and demons of Goethe's Walpurgis-Night might fitly celebrate
revels.

> "And through the cliffs with ruin strewn,
> The wild winds whizz, and howl, and moan."*

During the long dry summer months, the smallest birds would
find wherewithal to sustain their existence in these sombre de
whose solemn silence not even the murmur of an insect interrup

Yet these regions, deprived of springs and running waters
not always sterile deserts, are not always desolate plains. I
dry season, the soil, a yellow ferruginous clay, acquires the har
of brick, just as if it had been exposed to the fire of a furnace
the roots and bulbs, protected by a ligneous covering, resist
devouring heat. The first rains revive them; they put forth t

* Goethe's "Faust," translated by Theodore Martin, p. 202.

NIGHT-SCENE IN THE

ent and branches; a myriad flowers reveal their sparkling colours; nd the country which, a day or two before, had shown to the eye a are and dreary surface, shines out in a panoply of splendour, as if a agician's spell had suddenly transformed it into a terrestrial para- ise! But as the days lengthen, and the sun's power increases, the oom and the beauty vanish, and the curse of fire once more escends upon the gloomy scene.

In several districts north of the Cape Colony whole years pass by without the sight or sound of running water rejoicing the wistful wanderer. Dr. Livingstone, while residing among the Bakouans, in the Bechuana country, saw the natives excavating the bed of the Kolobeng to extract a few drops of water. A centigrade thermometer, sunk two and a half inches in the earth, at noon, marked 56°. Insects placed on the surface of the ground died in a few seconds. The grass was so dry that it crumbled into powder when plucked.

The coast of Natal is rich in trees and herbage. The Zambesi, d other rivers which descend from the central plateau, refresh the of Mozambique and Zanzibar. But from the 4th parallel of latitude to Cape Guardafui extends an almost continuous The southern extremity of the Lupata chain also presents a naked country, where the presence of gold has encouraged the uguese to found some establishments.

The neighbouring zone of Kaffraria consists of great far-spreading, ly-undulating plains, characterized by extreme aridity. The districts are much less broken than the central, and exhibit lations except in the vicinity of the ocean. There an level territory exists under the name of the Kalihari Desert, outhern boundary is marked by the Gariep or Orange River, rains rather than waters it. To the north this awful wilder- etches as far as the Lake Ngami, thus covering the area com- tween the 29th and 30th parallels of south latitude. The untry of Namaqua and Damaras bounds it on the west. t extends to the 24th meridian of west longitude.

ure is not wholly wanting in this vast region. The Kali-

hari has been called a desert, says Livingstone,* because it contain no running water, and very little in wells. Far from being destitut of vegetation, it is covered with grass and creeping plants, and ther are large patches of bushes, and even trees. It is remarkably flat and prodigious herds of antelopes roam over its trackless plains The soil is composed in general of a fine soft sand, lightly coloured— that is, of a nearly pure silica. In the ancient beds of dried-u rivers lie immense patches of alluvial soil, which, hardened by th sun, form great reservoirs, retaining the rain-water for several month of the year. The quantity of grass flourishing in this region is remark able. It grows generally in thick tufts, occasionally intermingled wit spaces where the earth is naked or closely overgrown with creeping plants. These, deeply rooted in the soil, suffer but little from the effects of the excessive heat. Most of them have tubercular roots, and are so organized as to furnish both food and liquid during the long droughts—an epoch when one vainly seeks elsewhere anything which can appease one's hunger or one's thirst.

The rich vegetation of the Kalihari is due to its geological c tution. It consists of a great valley, or rather of a vast basin, bottom is formed of a diluvial earth, and which is encircled by of rocks, cloven at several places. It follows that where the ra abundant, the slope of the hills directs it towards the centre of basin, and this rain filters and deposits itself beneath the surfac the soil. And it appears to be a proof of this statement, that on ging in the sand cisterns are formed, or "sucking-places," whi filled with water supplied by subterraneous conduits.

This so-called Desert is not without its utility. Not only nourish innumerable multitudes of animals of every kind, but become the asylum of fugitive tribes. Here at first the Bak found a refuge; and then, in their turn, other peoples of the Be whose territories had been invaded by the Kaffirs.

The Kalihari has its mirage and its sirocco. During th drought which precedes the rainy season, a burning wind

* Dr. Livingstone, "Missionary Researches in South Africa."

is desert from north to south, and during its three or four days' uration it withers and dries up everything in its path. It is so aded with electricity that a bundle of ostrich feathers, which mained exposed to it for a few seconds, was itself charged as if it ad been in contact with a powerful electrical machine, and produced lively disturbance, accompanied by cracking noises, when taken in he hand. As often as this wind prevails, the electricity of the tmosphere is so abundant that every movement of the natives causes parks to be given off their *karosses*, or cloaks made of the skin of easts.

The contrast is striking between the well-watered east coast of outh Africa and the arid western coast. After the scarped moun- ains of the Cape, which ascend northward to the ocean, come the ess lofty chains—the hills of sand which separate the interior sandy esert from the equally sandy district of the littoral. With the ception of the Walvish Bay, the coast for eight hundred miles— the great Orange River to Cape Negro—has not a stream of ter.

At Cape Negro commences a series of terraces, separated from one other by long bands of sunken ground. This *ensemble* describes a rve towards the interior, and leaves on the coast a level plain of out 110 miles in breadth.

In Benguela the plains are healthy and cultivated. More to the one encounters nothing but monotonous savannahs and forests igantic trees. The soil, at a great number of points, is satu- ith water, and, so to speak, enveloped in a shroud of pestilen- ur, which the breeze never scatters.

ow plains of Biafra and Benin, and especially the Delta of r, are unwholesome, rank, and foul-smelling marshes. In grove swamps lurks fever, and a legion of deadly diseases.

"Macies et nova febrium
Terris incubuit cohors."—(*Horace.*)

the early years of the present century very little was the interior of Southern Africa. At this epoch some

native merchants traversed the country from one sea to another—from St. Paul de Loanda to the coast of Mozambique and Zanziba This exploit was repeated and outstripped by Dr. Livingstone, wh from 1850 to 1856, accomplished a marvellous journey of si thousand miles, through regions never before trodden by the whit man's foot.

Setting out from Kolobeng, the most advanced of the Englis missionary stations, he arrived, after having crossed some three hun dred miles of a region without water, at the beautiful river Zouga which issues from the western extremity of Lake Ngami.

> "A region of drought, where no river glides,
> Nor rippling brook with osiered sides,
> Nor sedgy pool, nor bubbling fount,
> Nor tree, nor cloud, nor misty mount
> Appears, to refresh the aching eye;
> But barren earth, and the burning sky,
> And the blank horizon round and round." *

Lake Ngami is from 45 to 60 miles long, and from 56 to 1 circumference. Its direction is N.N.E. to S.S.W. Its southern p tion curves westward, and it receives from the north-west the Teoug The water, very fresh when the lake is full, grows brackish duri the dry season. At the latter period it is very shallow, and eighteen or twenty miles from the shore canoes can be manœuvr with the help of a pole. The banks are everywhere low. At t west a considerable space, utterly bare of trees, proves that th was formerly larger. During the months which precede the of the northern waters, cattle, to quench their thirst, make th with difficulty through the belt of reeds dried up by the s natives, says Livingstone, who reside on the shores of the us that trees and antelopes are carried down by the wate the annual inundation.

The same traveller informs us that the vast region the north of the lake at such great distances—region watered, and deluged every year by the heavy tropical r

* Thomas Pringle, "South African Sketches."

wards the south the excess of the waters which saturate their soil; nd a certain quantity of these waters, encountering the lake on heir way, flow into it. It is in March and April that the inundaion begins. The waters, on descending, find the rivers dried up, nd the lake itself exceedingly shallow. The rivers in this part of frica flow in channels capable of containing a far greater volume of ater than they generally hold. When looking at them, you might elieve yourself in some desolated Oriental garden where all the irriating canals still exist, but where the dams permit only a mere hread of water to take its course.

"The water," adds Livingstone,* "is less absorbed by the earth han lost between banks too wide apart, where the air and the sun vaporate them. I am persuaded that there is not in the whole of his country a river which loses itself amid the sands."

The country situated to the north is exceedingly level for some ndreds of miles, and abundantly provided with lakes and rivers, hich the slightest undulations of the soil divert into innumerable adings. The plain is alternately covered with sombre thickets, forests, and dense herbage. On the banks of some rivers this ge assumes gigantic proportions, and by its tenacity opposes an tual barrier to animals. In many places the wide green pastures nlivened by large herds of cattle, which the natives breed. The of the Barotses possess immense prairies of this description, the f numerous herds of elephants. But this richness of the soil terbalanced by the insalubrity of the climate. These vast, ally flooded surfaces become, when the waters recede, the of deadly fevers, and other formidable maladies, whose e influence extends to a great distance.

agnificent river Zambesi, known in its upper course by the llation of Leambye—both words having the same significanative tongue, "the River"—fertilizes and brightens these egions. Flowing at first from north to south, it makes a westward, to march with stately step from south to north,

* Livingstone, "Missionary Travels and Researches."

and from west to east, until, with a south-eastern inclination, moves onward to the Indian Ocean.

It was at a point nearly midway between the two oceans—the Indian and the Atlantic—that the intrepid Livingstone first descried the Zambesi, regarding its fertile banks and noble stream with much the same emotions of delight and surprise as thrilled to the heart of Balboa, when

> "With eagle eyes
> He stared at the Pacific—and all his men
> Looked at each other with a wild surmise—
> Silent, upon a peak in Darien."*

He arrived there near the close of the dry season, and yet a grand volume of water still sparkled in the river's bed, which varied from 950 to 1900 feet in breadth. At the epoch of the great floods, the Zambesi rises perpendicularly more than eighteen feet, and at certain points extends more than forty miles from its bank. From the borders of the Chobé to those of the Zambesi spreads a low, level country, whose uniform expanse is only broken by the gigantic hillocks of the termites. At intervals the traveller lights upon spots where the waters have formerly settled, then on great morasses, deep rivers, winding their slow way through an almost impervious jungle. There is a certain fatal beauty about the whole region, like that of a Circe or a Lucrezia Borgia; but its atmosphere breeds disease and death.

A general depression and flatness of surface seems to be the principal characteristic of this part of Central Africa. Thus, on the route followed by Livingstone, in a N.N.E. direction, from the chain of Barotse to the Zambesi, all is level. Mount N'goua, an isolated mass in 18° 27′ 20″ south latitude, and 24° 13′ 63″ east longitude, is a wholly exceptional accident. The Kandehy Valley, which cuts the northern slope of this narrow colossus, is one of the most picturesque scenes that greeted the eyes of Livingstone during his adventurous pilgrimage. Fruit trees, loaded with emerald

* Keat's "Poetical Works," sonnet ix.

orn its sides; a crystal brook ripples in the centre. Under the ade of an enormous baobab the graceful antelopes browse undis-rbed, until alarmed by the footfall of the approaching traveller. ius and zebras contemplate the strange intruder with an air of rprise. A few continue to crop the grass indifferent; others pause the banquet, uncertain whether to stay or take to flight. The ge bulk of a white rhinoceros drags labouring up the shady valley. affaloes, and condors, and giraffes stray far into its pleasant depths peaceful and almost as trustful as those of their race which, in ys remote, wandered among the beauties of Eden, in

> "That delicious grove,
> That garden, planted with the trees of God."

Further to the north, even to the river Sanshureh, the country reases in richness and beauty, the water-courses multiply, and the rbage aspires to such a height that vehicles and animals are lost ongst it.

An exceeding gentleness, an almost Arcadian calm, characterizes ndscape on the banks of the Leeba, a great affluent of the bye. This river drags its slow and ever-winding waters through ightful meadow-land, which is probably flooded every year, for is no wood except where the ground rises four or five feet the general level of the plain. The soil of these tree-crowned x, or knolls, is sandy, while that of the prairies consists of an l earth, gray and black, and mixed with numerous river-

ding the Leeba, we enter on a plain more than eighteen readth, where the water rises to the traveller's ankles. r, says Livingstone, does not proceed from the overflow of but the level of the ground is so horizontal that the rain-not pass away, and abides there for months. Still more the adjacent plains of Lobala. This vast submerged area tershed between the rivers of the north and those of the to this point all the rivers wend their way southward;

but from this point they adopt a northerly course, to empty the tribute into the Kasaï or Loké.

The interior table-land, especially towards the mid-course of t Zambesi, is intersected by lofty mountain-chains. It is in this regio and at the southernmost point of the river's great Delta, which 270 miles in length, that the famous Falls occur, named by th natives "Mosioatounya," or "Smoke-resounding," re-christened Livingstone, the Victoria. Their vast columns of vapour are visil at a distance of five or six miles, and might suggest to an Americ traveller the rolling clouds that ascend from a burning prairie. T banks and islands of the river are here enriched with sylvan vege tion of every variety of form and colour: the mighty baobab, each whose enormous arms would form the trunk of a large tree; the gra ful palm, with its crest of plume-like foliage; the silvery mohonar whose leaves sparkle in the sunshine like Achilles' shield; and t nutsouri, abounding in clusters of pleasant scarlet fruit.

The Falls are bounded on three sides by densely-wooded rid 300 or 400 feet in height, and may be likened to a flood of a thousand yards broad, suddenly hurled over a basaltic pre 100 feet in depth, and then as suddenly compressed into a r gully not more than fifteen or twenty yards across.

"If one imagines," says Dr. Livingstone,* "the Thames filled low tree-covered hills immediately below the Tunnel, extendi far as Gravesend, the bed of black basaltic rock instead of l mud, and a fissure made therein from one end of the Tunnel other, down through the keystones of the arch, and prolong the left end of the Tunnel through thirty miles of hills; t the Thames leaping bodily into the gulf, and forced there its direction and flow from the right to the left bank, and boiling and roaring through the hills, he may have some id takes place at this the most wonderful sight I have w Africa."

In descending into the narrow abyss already spok

* Livingstone, "Missionary Travels and Researches."

taract breaks into five separate streams, which send up, to an ele-
tion of 200 or 300 feet, as many columns of luminous vapour—
llars of shivering spray, and foam, and diamond sparkle, which in
e sunlight are gloriously wreathed with the rare hues of Iris.

"How profound
The gulf! and how the giant element
From rock to rock leaps with delirious bound,
Crushing the cliffs, which, downward worn and rent
With his fierce footsteps, yield in chasms a vent
To the broad column which rolls on."—(*Byron.*)

In descending the Zambesi, we encounter the great river Kafue,
hich flows from the north. Beyond the point of confluence the
untry becomes opener, freer, and healthier, and we arrive at the
rtuguese town of Tété.

About 200 miles to the north-west of Tété lies the great lake of
sh water, Niyanyizi-Nyassa, or "Lake of Stars," which stretches
away to the north-west across Unyamuezi, or "The Land of the
n." It is rather shallow, sprinkled with numerous fairy islands,
seems to be the remains of an ancient lake of much greater
. To the south-west a belt of fertile country separates it from
er lake called Shirwa, whence issues a beautiful river, tributary
e Zambesi, impeded in its course by numerous rapids, but tra-
a level and unwholesome country.

t the same time (1856–58) that Livingstone accomplished these
iscoveries, Equatorial Africa was penetrated from the coast of
by Captains Burton and Speke. These undaunted and in-
travellers, after having ascended the river Pangany for
and thirty miles, through a rich and cultivated but pesti-
n, arrived in February 1858 at Lake Tanganyika, of which
had spoken to Livingstone, describing the country lying
ward of that mass of water as bare of wood, and solely
th marshy plains.

anganyika lies 200 miles S.W. of the Victoria N'yanza,
. 3° and 7° 45′ S., at an elevation of 1844 feet above the

sea. The 30th meridian of east longitude strikes it in the centr
Its length is 320 miles; but its breadth seldom exceeds 15 or 20
and never 60 miles, so that it has been compared to a beach inclini
its head towards the north. To the north-east its shores are bo
and elevated; the water is fresh and deep. The country around it
rich in pasture, where a thriving population breed numerous flock
and herds.

About two hundred miles to the north-east of this lake, and 374
feet above the sea-level, lies the vast basin of the Victoria N'yanz
discovered by Captain Speke in 1859, and more fully explored
Speke and Grant in 1862. Its northern shore runs nearly paral
to the Equator, at a distance of about twenty miles from it; i
southern is in lat. 2° 46′ S., and long. 33° E. It would seem
some remote period to have occupied a much larger area than it do
at present, though even now it is supposed to measure 220 miles
length and fully as much in breadth. Speke describes it as ve
shallow. Fleets of canoes cover its surface; but the natives on
one shore never venture across to the other, and no intercommun
tion has ever existed between them. The surrounding lands
are of a pastoral character, genial and fertile, with quiet bread
rich meadow land, dotted by hundreds of white hornless cattle
scarcely distinguishable from our midland English scenery, were
not interspersed with groves of the banana, the coffee-tree, a
date-palm. At its north-eastern extremity, and probably con
with it, lies a long narrow basin which the natives call Lake
On the west it receives the tributary waters of the Kitan
from the north throws off the various streams which un
channel to form the famous Nile.

North-west from the N'yanza lies the little Lúta N'zig
Lake, discovered by Sir Samuel Baker in 1864; a long,
shallow basin, surrounded by mountains 7000 feet high,
miles in length, and 2488 feet above the sea-level, which
serves as the great reservoir of the Nile.*

* Baker, "Basin of the Nile and Equatorial Africa," ii. 101-10

. The discoveries of Livingstone, Burton, Speke, Grant, and Baker, em to confirm the theory put forward by Sir Roderick Murchison, at the central portion of South Africa is a large and elevated basin, bounding in immense plains, in fertile lands, besprinkled with merous lakes fed by a thousand currents descending from the lofty ountains that surrounded it. The rains, says Morin, cause these kes to overflow, and their waters, prevailing over every obstacle, eak through the barrier of the high lands, and descend into the wer levels in a series of cataracts, to make their way eventually wards the ocean. Livingstone has proved the truth of this felici- us induction as far as the Zambesi is concerned. The Nile also sues from the lofty table-lands through deep and rocky ravines. he great reservoir of the mysterious Egyptian river, the *N'yanza i*, may be accepted as the final confirmation of Sir Roderick's y, and the conspicuous feature of the African people. The rn extremity of this lake stretches as far as the watershed n North and South Africa. Starting from the same view- Speke concludes that another great lake will be found under ator, to the west of the Tanganyika and the N'yanza Victoria. ill be the reservoir of the Congo. To establish this fact will olve the last problem of the hydrographic system of Africa.*

he western region of the African equatorial zone has been but icially explored, and in this direction numerous hypotheses to be verified. Lake Tchad, situated in Central Nigritia, Bornou on the west and the south-west, and the Kanem to and east, was discovered in 1823 by Major Denham, and Dr. Barth in 1852. The latter traveller grows eloquent ription of the delicious perspective which he had supposed ffer to the gaze. He met with numerous slaves on their grass for the horses. But instead of a lake, an immense n stretched as far as the eye could reach. The herbage sher and greener, thicker and taller; a marshy bottom, a curve which projected here and receded there, embar-

* Morin, "Sources du Nil," in *Annuaire Scientifique* for 1864.

rassed his progress more and more; and after a useless and pr
longed struggle to escape from the quagmire, seeking in vain on th
horizon some mirror-like surface, he retraced his steps, dabbling
the slimy water, and consoling himself with the reflection that
least he had seen some traces of the "liquid element." But t
scene was strangely different when, in the winter of 1854–55, mo
than one-half of the Ngornou was destroyed by the inundation; a
to the south of that town lay a deep sea, swallowing up the whol
plain even to the village of Koukiya! The lower stratum of th
soil, composed of limestone, appeared to have given way in th
preceding year, and had lowered the shore of the lake several yard
hence the inundation. But apart from this evidently exception
geological catastrophe, the character of the Tchad is clearly that of
immense lagoon whose borders change every month, and of whi
is consequently impossible to lay down any strictly accurate ma

Lake Tchad lies between lat. 12° 30′ and 14° 30′ N., lon
and 15° 30′ S. Its length varies from two hundred to three hu
miles, according to the amount of rainfall and similar circumst
At its broadest it measures one hundred and seventy miles;
has an elevation of eight hundred feet above the sea-level
actual margin of its waters is lined by a deep fence of papyr
tall reeds, from ten to fourteen feet high. Its islands are de
peopled. Fish and water-fowl abound, and not less do crocodile
hippopotami. The lake has no outlet, but receives several riv
which the Waube and the Shari are the most notable.

The country watered by the Niger is also broken up
plains which, fertile and glowing in the rainy season, ar
and withered by the summer heats. The famous port o
not far from Timbuktû, is several miles from the river,
accessible for five months in the year at the epoch of the g

Beyond this belt of vegetation, this girdle of fertili
wears a sombre aspect—the stony look of a corpse; for th
Desert of the Sahara begins. The transition from the one

Dr. Barth, "Travels and Discoveries in Central Africa" (London,

e other, from the land of plenty to the land of want and famine, m the land of bright lakes, and copious streams, and green pastures, the land of rocky heights and barren sandy wastes, is as startling the change which sometimes occurs in human life—the change of moment, from bustling and exuberant happiness to profound sorrow. is such contrasts, however, that enable us fully to appreciate the auty and wealth of Nature.

"The scorching winds from arid deserts borne,"

ach us to prize the balmy breath of the "sweet south" that anders "o'er a bank of violets." Fresh from the dreary Sahara ain, burnt and scathed by a Tropic sun, we can feel all the loveli- ss of the woodland and the leafy vale, of each

"Melodious plot
Of beechen green, and shadows numberless."

the material world as in the moral and intellectual, the law isation prevails, and the wayfarer in the Desert of Life may nself with the recollection that in due time the silence succeeded by music, the desolation by beauty, and the ss by

"Verdurous glooms, and winding mossy ways."

CHAPTER II.

RTS OF THE NEW WORLD :—PRAIRIES, PAMPAS, LLANOS.

o study the philosophy of history, of which men talk so know so little; they who seek in the general laws of the physical economy of the globe an explanation of its l phenomena, may find, it seems to me, a curious subject ation in the singular destiny of the New World. They o ascertain by what concurrence of circumstances the two

Americas, separated from us by an immensity of waters, and revealed to the world of the East but some four centuries ago, shall have traversed in so brief a period the successive phases of conquest, colonization, and emancipation; why European emigration was directed thitherward at the very beginning, and thitherward continues still to flow from every quarter; finally, by what tacit and unanimous agreement this New World has become the adopted country of all the proscribed and disinherited of the Old; while almost the entire area of the African continent, which is so much more readily accessible, is scarcely less favoured in its climatic conditions, and upon which the white race has rested, from the remotest antiquity, its political institutions, its arts, and its industry, has remained uninfluenced by the advancing tide of civilization.

I limit myself to indicating this problem, which, however, it is not within my present province to examine, but which naturally suggests itself when we think of the swift development under the European societies planted on the American continent—when we remember how rapidly they are narrowing the area of the domain of the wilderness. At the epoch of the discovery of the New World it was one vast desolation, with the exception of Mexico and Peru; and these were but the seats of a civilization which seemed to have grown without transition from infancy to old age, from vigour to decrepitude, and which crumbled into dust under the pitiless blows of the Spanish conquerors. Neither Cortez nor Pizarro would have overthrown a great empire with a handful of foot-soldiers and a few arms, a squadron or two of horse, and a few unwieldy guns, if the Colossus already nodded to its fall, had not the Colossus been hollow at the base. But soon the European nations shall have divided themselves this immense country and the neighbouring islands. The Slave race, whose destiny it seemed to be to reign under the polar ice and snow, long contented itself with the sterile and inhospitable region of the extreme north-west, which was but recently surrendered to the United States Government. The Anglo-Saxon race, in the northern continent, has seized upon

here. It now holds between the two oceans, from the fifty-fifth to
he thirtieth parallels of north latitude, a fertile and life-breathing
ritory, well fitted to be the cradle of great empires; the flourish-
g Confederation of Canada, the colony of British Columbia, and the
ighty republic of the United States. Virgin forests have fallen
fore the restless axe of the hardy pioneer; hundreds of populous
ties have risen as if by enchantment in districts haunted within the
emory of men by the bear and the wild buffalo; a network of
ilways spreads from the Atlantic almost to the base of the Rocky
ountains; crops of waving corn bloom over wide prairies that a
w years ago yielded only the tall grass and waving reed; the
original tribes of the Red Indians have melted away before the
petuous tide of an ever-advancing civilization; and the exhaustless
ies of our race have already raised in less than a century two
empires on the Mississippi and the St. Lawrence, destined to
llous, a changeful, and doubtlessly a glorious history. And
se empires have sprung from the loins of England, are
n the main by the same laws, hold the same religion, are
by the same aspiring and unwearied genius, and

"Speak the tongue
That Shakspeare spoke; the faith and morals hold
Which Milton held;"

ything, as we believe,

"Are sprung
Of Earth's first blood, have titles manifold." *

ward from the thirtieth parallel stretches the domain of the
s, already mingled with and being absorbed by the Anglo-
anada, California, and the Southern States of the Union.
s region is, for it comprehends all Central America and all
n Continent, it is infinitely less prosperous, less powerful,
l, than what we may call Saxon America. Mexico is a by-
reproach for savage anarchy and murderous license.
i, nor Peru, nor even Brazil approaches Canada in solid
e auspicious promise of future greatness. The Latin race

* Wordsworth, "Poetical Works;" sonnet xvi., vol. iii., p. 61.

seems dwarfed and cowed by the neighbourhood of the energetic Anglo-Saxon, is swiftly retiring before it in North America, and in the course of centuries will probably be subjugated by it, even in the southern division of the great Continent.

A considerable portion of South America, however, is uncultivated, unpeopled, and but imperfectly explored. There the Desert re-appears with—

"The pale, cold aspect of a wearied friend," *

under its most sharply defined forms and most impressive conditions. The supremacy of the whites over the indigenous tribes is almost nominal; and if the latter are gradually dying out, the catastrophe in this instance, is due rather to their own lack of vigour, energy, and capacity, than to the pressure of civilization.

However rapid may be the growth of population in North America, however great the rapidity—shall we say the avidity?—of the American *squatters* in their conquest and appropriation of the soil, the Desert still occupies, principally in "the far West" and the north, that is to say, in the angle comprised between the line of the great lakes and the Rocky Mountains—an area almost equal to the whole of Continental Europe. There we find, as Mr. Johnstone points out, the largest plains in the world. One such, for example, is the immense basin which extends from the mouths of the Mackenzie to the icy Arctic Sea, even to the remote Delta of the Mississippi, from the huge chain of the Rocky Mountains, with their pinnacles and snowy peaks, to the less rugged and more pastoral range of the Alleghanies; a total area of 4,400,000,000 square yards (2,000,000 square miles). A table-land of gentle elevation, nowhere above 1,000 feet, and rarely more than 700 feet high, separates this tract into two secondary basins.

The *north-east*, which pours its waters into the Arctic, Hudson's Bay, and through the Canadian lakes and Rivers of St. Lawrence, into the Atlantic; and,

* Taylor, "Isaac Comnenus," Poetical Works, ii. 216.

The *south* basin, of the Missouri-Mississippi, whose mighty waters low into the Gulf of Mexico.

It is in the latter that the traveller encounters the great grassy lains of the *Prairies* or *Savannahs* which are so remarkable a feature f North America, and which chiefly lie along the western bank of he Mississippi. "There are no prairies," says Sir J. Richardson, "to he north of Peace River, and the level lands which border the Rocky ountains do not extend beyond the Great Salt Lake."

Under so wide a range of latitude the plain necessarily embraces a great variety of soil, climate, and productions; but being almost in a tate of nature, it is characterized in its central and southern parts by nterminable grassy savannahs and enormous forests, and in the far orth by deserts not less dreary than those of Siberia.*

Southward, a bare sandy waste, 400 or 500 miles wide, skirts se of the Rocky Mountains to the forty-first parallel of north The dry plains of Texas and the upper region of the have all the features of Asiatic table-lands; further to the lifeless, treeless steppes on the high grounds of the far e burnt up in summer, and frozen in winter by biting blasts e Rocky Mountains. Towards the Mississippi the soil improves, delta is a labyrinth of streams, and lakes, and dense brushwood, e rank marshes at its mouth cover an area of 35,000 square "There are also," says Mrs. Somerville, "large tracts of and saline ground, especially the Grand Saline between the Arkansas and Neseikelongo, which is often covered two or three ep with salt, like a fall of snow. All the cultivation on the k of the river is along the Gulf of Mexico and in the adjacent and is entirely tropical, consisting of sugar-cane, cotton, and The prairies, so characteristic of North America, then

hat are these prairies?

s upon leagues of rolling meadow-land, sometimes as level as asture, always as boundless, apparently, as the sea; richly

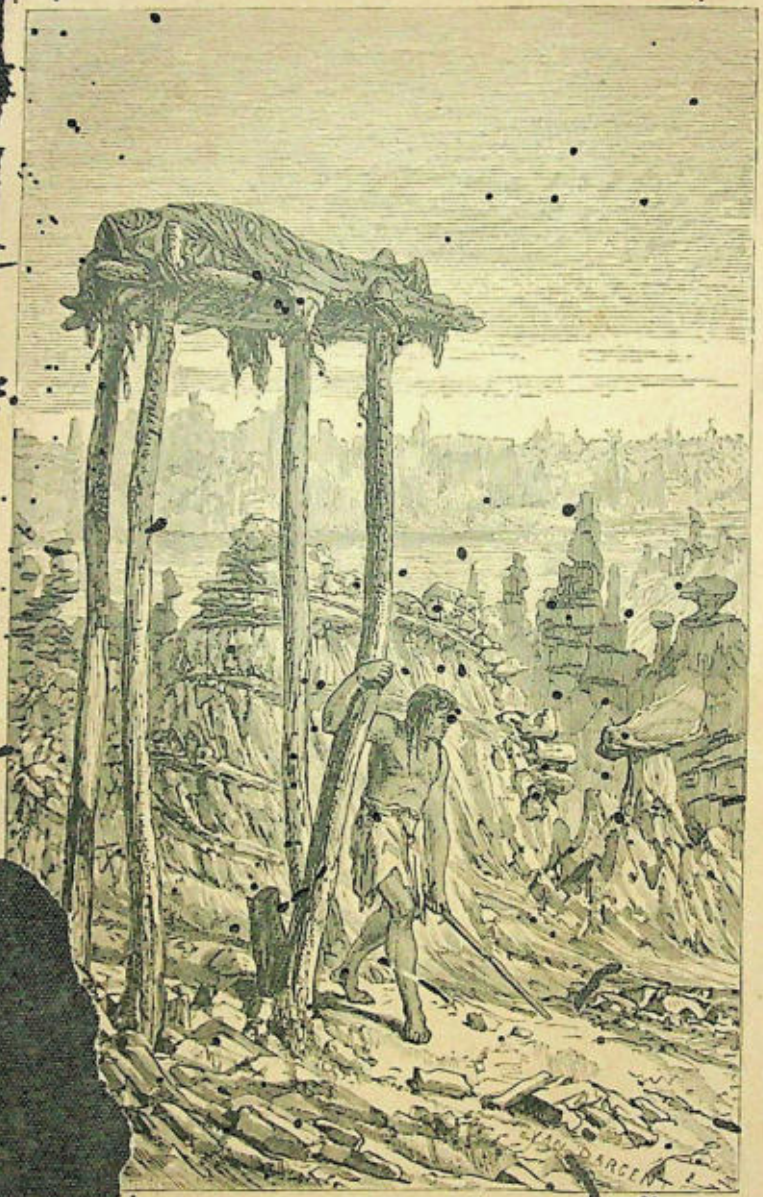
* Mrs. Somerville, "Physical Geography," p. 259, *et seq.*

covered with long rank grass of tender green, and lighted up b flowers of the liliaceous kind which scent the air with fragrance Here and there, in the north, occur clumps of oak and black walnu in the south, groups of tulip, and cotton, and magnolia trees. Occ sionally the monotonous scene is relieved by a lazy brook, who banks bloom with a brilliant mass of azaleas, kalmias, rhododendron and andromedas; the low howl of the cayeute, or prairie dog, break the silence; and life is given to the landscape by the frequent appea ance of herds of bison, deer, and wild horses. At times, in th remote districts, the prairie wolves will be seen in some leafy cove awaiting the approach of a victim; or flights of birds darken the a and tempt the traveller with the promise of an abundant provision.

On the right bank of the Missouri, and on the borders of the Whi River, in the territory of Nebraska, lies a dreary desert valley, 30 feet deep, which the French expressively designate les *Mau Terres*. It may be doubted whether the whole world offers a or a more impressive landscape. Here geology recognizes the an astonishing diluvian labour, and it is impossible to vent without striking one's foot against the fossil relics of vanished

It is a kind of world apart, says an American writer; valley which seems to have been excavated, in the first place immense vertical out-throw, and then modelled by the prolong incessant action of denudating agents. With a mean breadth and a total length of 90 miles, it develops itself in a westerly dir at the foot of the sombre mountain-chain known as the *Blac* On issuing from the immense uniform, and monotonous p traveller finds himself suddenly transported, after a descent 200 feet, into a depression of the soil where rise a myriad rocks, irregular or prismatic, or like columns dressed wit pyramids, and from 110 to 220 feet in height.

These natural towers are so multiplied over the surfa extraordinary region, that the roads wind through them passages, and the labyrinth may be likened to the irre and narrow alleys of some mediæval European city. Seen



VIEW OF THE "MAUVAISES-TERRES," NEBRASKA, U.S.

interminable succession of rocks resembles the massive monuments
antiquity; nor are turrets wanting, nor flying buttresses, nor grace-
arches, nor vaulted portals, groups of columns, façades, and taper
es. If at one place the eye lights upon the ruins of a feudal for-
s, at another it surveys the graceful ensemble of a Saracenic
sque. Or you might almost say, in the distance, that it is a fan-
ic "city of the dead" which looms before you; or the gigantic
ace of a race of unseen beings, fashioned by the power of spell
enchantment. And the illusion vanishes when, descending
m the heights, you penetrate into the mazes of this Dœdalian
el, the reality is not less calculated to inspire you with astonish-
nt, and the imagination remains confused before this wild, this
nd, yet ominous freak of Nature—ominous, for the place seems
a colossal Golgotha, and the rocks may be the monuments conse-
ted by invisible hands to the things and creatures, the life and
jesty, of a forgotten Past!

A spectacle unexpected by the European traveller comes at intervals
heighten and confirm the illusion. Here and there are reared con-
uctions of manifest human work, but of a truly primitive character.
consist of four poles, supporting a rude platform of wicker.
unt any adjacent hillock, and you will see corpses and human
letons outstretched upon the platform. These constructions are,
th, the burial-places of the Sioux Indians, who wander still in
bouring districts.

hole coast of the Mexican Gulf, from the Pearl River east-
igh Alabama and a great part of Florida, is occupied by
"pine barrens," which extend far into the interior.
monotonous tracts of sand, covered with forests of
rees," are not less a characteristic feature of North
he "rolling prairies." They are not limited to this
nited States, but occur to a great extent in Virginia,
a, and elsewhere. Tennessee and Kentucky, though the
ssed over extensive areas, still possess large forests, and
s for hundreds of miles among patriarchal trees, with a

rich undergrowth of azaleas, rhododendrons, and other beautiful shru bound together in chains of flowers by creeping plants. Wh America was discovered, one mass of unbroken forest spread over mainland from the Gulf of St. Lawrence and the Canadian Lakes the Gulf of Mexico, and from the Atlantic Ocean it crossed the Al ghany Mountains, and spread in gloom and grandeur over the vall of the Mississippi—an ocean of vegetation swelling and sinking upwards of one million of square miles.

"Then all the broad and boundless mainland lay,
Cooled by the interminable wood, that frowned
O'er mound and vale, where never summer ray
Glanced, till the strong tornado broke his way
Through the gray giants of the sylvan wild;
Yet many a sheltered glade, with blossoms gay,
Beneath the showery sky and sunshine mild,
Within the shaggy arms of that dark forest smiled."

Prairies which, in their general aspect, resemble those of t Missouri and the Mississippi, are found to the east and west of t American Desert, in Arrisons, in Texas, in California, and various p vinces of Mexico. Vegetation, however, nevertheless differs accordi to the conditions of each region, and the alternatives of deluging and extreme dryness become more and more conspicuous as we proach the Equator. Nevertheless—and this, perhaps, is the featu most distinctive of the Prairies, or Savannahs, from the Pampas Llanos—the dryness is never sufficiently severe in the f destroy vegetation, as is the case in the latter. But the grasses often grow so dry in summer that the most trivial such as a lighted match flung carelessly away, or the ash from a hunter's pipe—will kindle the most awful conflag the flames will spread devouringly over leagues of ope suming trees and shrubs, and burning to death the animals which happy fall within their range. With hissing, seething noises of the fire mingle the groans of beasts, while huge clouds of smoke roll before the w

W. C. Bryant, "Poetical Works."

M. DARGENT

illows of a wind-swept ocean, and live tongues of flame ever and noon light up the terrible scene with lurid splendour. These "Prairie-fires" are sometimes kindled in revenge by the Indians, nd occasionally the settlers resort to this dangerous but summary ethod of clearing the encumbered ground. However caused, the pectacle is one of infinite grandeur, which might have furnished ante with a fresh image of horror for his "Inferno."

From the fortieth to the thirty-fifth parallels of north latitude the esert appears in North America under a form more like the "seas f sand" of Africa and Arabia; the vast areas of the *Llanos* and the *mpas*. These two words are nearly synonymous. They are used o designate wide level plains, inundated and fertile in the rainy n, but in the hot season stripped by the sun's rays of every rent trace of vegetation. Between the Californian Alps and the o-Colorado withers a grand, sandy, and utterly barren plain, which ouches the northern borders of La Sonora. Somewhat further to the ast extends the Llano-Estacado, which eventually merges into the merican Desert. But the most considerable Pampas and Llanos elong to South America. Of these, the most arid and the most le—which most vividly recall the rainless deserts of the Ol World—are the Pampa of Atacama, between the Andes and the acific, with Taracapa on the north, and Copiapo on the south; that chura, which forms a great portion of the littoral of the Peruvian ent of Truxillo; and that of Pernambuco, which forms the t of the plateau north-east of Brazil.

Deserts, no less than those of Africa and Arabia, merit the he "Land of Fear."

urface is as smooth as that of the calm sea, and bounded circular line of the horizon; the eye frequently ranges of twenty-five square miles without meeting a clump of h to rest; nor is the monotony relieved by the slightest of the soil. Everywhere is nothingness, silence, desolation, e than one wayfarer has never escaped from their mazy Fatigue, hunger, thirst, decimate the caravans which under-

take to traverse them, and the track is marked by whitened skelpton
whose flesh has been devoured by vultures, and which unknow
hands have piled up and arranged with a ghastly symmetry of ord

However, since the discovery of America, certain portions of th
Llanos have become habitable. Towns have risen at intervals o
the banks of the rivers which water them. These centres of popul
tion are connected with each other by huts of reeds, covered wit
ox-hides, and separated by about a day's march. Here reside th
Llaneros, to whose charge are intrusted the innumerable herds of cattl
horses, and mules, which subsist on the pasturage of the Steppes.

The inhabitants of the Llanos possess characteristics as marked
those of their plains. The *hatos* wherein they assemble are situate
at long distances apart; but the true home of the llanero, c
and skilful horseman, is his saddle. Firmly seated on his
steed, he gallops at will across the trackless plain, and combining
two extremes of solitude and activity, confines his half-savage exist
ence to the custody or the ownership of his herds of horses an
cattle. Thus, born in the Llanos like his father, a descendant of th
first Spanish settlers, he has no idea of any other country than hi
southern pastures, of any other career than his dreamy pastoral lif
Clothed in a picturesque costume, half Spanish, half Indian; h
machete (or cutlass) thrust through a belt of leather, his *poncho*
chequered mantle) over his shoulder, and the redoubtable
suspended in a coil to his saddle-bow; armed with the clum
which serves to drive his herd before him, and, at need, to
its owner's courage in some partisan affray; the llanero, nev
ing of the past, never dreaming of the future, on the alert
danger, and accustomed to the severest privations, enjoys
cation the rude happiness of his wild freedom.

The Llanos of Venezuela occupy a superficial area,
cording to Humboldt, at 153,000 square miles, between
the Orinoco and the river Coquéta. They are as flat as
of the sea, and covered with long rank grass. You might
the dreary level for 1100 miles from the delta of the O

t of the Andes of Pasto, and frequently not encounter an eminence
foot high in 270 square miles. Their length is twice that of their
dth; and as the wind blows constantly from the east, the climate
the more ardent the further west. "These Steppes, for the most
rt," says Mrs. Somerville,* "are destitute of trees or bushes, yet
some places they are dotted with the mauritia and other palms."
at as they are, two kinds of inequalities will sometimes occur: one
nsists of banks or shoals of grit or compact limestone, five or six
t high, perfectly level for several leagues, and imperceptible except
their edges; the other inequality can only be detected by the
ometer or levelling instruments; it is called a *Mesa*, and is a
tle knoll swelling very gradually to an elevation of a few fathoms.
slight as is this altitude, a Mesa forms the watershed from south-
st to north-east, between the affluents of the Orinoco and the
rents flowing to the northern coast of Terra Firma. In the wet
ason, from April to the end of October, the tropical rains pour down
torrents, and hundreds of square miles of the Llanos are inundated
the overflow of the rivers. In the hollows the water is sometimes
velve feet deep, and such numbers of horses and other animals
rish, that the ground smells strongly of musk, an odour peculiar to
any quadrupeds. "From the flatness of the country, too, the
aters of some affluents of the Orinoco are driven backwards by the
that river, especially when aided by the wind, and form
lakes. When the waters subside, these Steppes, manured by
ent, are mantled with verdure, and produce ananas, while
groups of fan palm-trees and mimosas skirt the rivers.
y weather returns, the grass is burnt to powder; the air
dust raised by currents occasioned by difference of tem-
when there is no wind. If by any accident a spark of fire
corched plains, a conflagration spreads from river to river,
very animal, and leaves the clayey soil sterile for years,
les of weather crumble the brick-like surface into earth."
s takes place, the rending of the indurated soil is sudden

* Mrs. Somerville, "Physical Geography," i. 79.

and violent, as if from the shock of an earthquake. If at such a ti two opposing currents of air, whose conflict produces a rotatory motio come in contact with the surface of the earth, the Llanos assum strange and singular aspect. Like cone-shaped clouds, whose e tremities seem to touch the ground, the sand rises through t rarefied air in the electrically-charged centre of the whirling curren like the sand-spouts of the Saharan Desert, or the waterspouts whi formerly were the awe and dread of the mariner. Then does t lowering sky cast a "dim uncertain light," like a November fog London, on the desolate plain. The horizon draws suddenly neare the Steppe seems to contract, and a nameless terror seizes the he of the wanderer. The hot dusty air increases in suffocating-he and the east wind, blowing over the long-heated soil, yield no freshment, but rather oppresses with its burning glow. The poo hitherto protected from evaporation by the yellow fading branches the fan palm, begin to disappear. As in the north the animals gro torpid with the mortal cold, so under the influence of the parchin drought the boa and the crocodile fall asleep, buried deeply in the d mud. Everywhere the drought prevails, and yet everywhere th refracted rays of light delude the traveller with the image of gleamin lakes and rushing rivers. The distant palm bush hovers above t ground like a spectre, apparently raised by the influence of the co tact of unequally heated, and, therefore, unequally dense strat Half hidden by the rolling clouds of dust, restless with the thirst and hunger, the horses and cattle roam around, the c mally lowing, and the horses stretching out their long snuffing the wind, in the hope some moister current ma neighbourhood of a not wholly failing pool. More sa astute, the wary mule seeks a different mode of alleviat Under its prickly envelope the melon-cactus conceals a The mule first strikes the prickles aside with his fore-f cautiously approaches his lips to the plant and drinks th But the experiment is not always without danger, and m are lamed by the spines of the cactus.

When the overpowering heat of the day is followed by the cooler
perature of the night, which is always of the same length in these
tudes, even then the cattle can obtain no repose. Enormous bats
k their blood like the fabled vampires during their sleep, or attach
nselves to their backs, causing festering wounds in which mos-
toes, horse-flies, and a host of stinging insects, niche themselves.
s the animals lead a weary life during the hot season. But at
gth, after the long drought and the parching glow, comes the
come rain! Then takes place a transformation such as the fancy
he poet never surpassed or equalled. The deep blue of the hitherto
louded sky grows lighter; the dark space in the constellation of
Southern Cross is hardly distinguishable at night; the soft phos-
escent lustre of the so-called Magellanic clouds "fades, fades, and
way;" even the stars in Aquila and Ophiuchus in the zenith
n with a tremulous and less planetary radiance. And lo, yonder
the south, a single cloud, like the peak of some remote mountain,
rs perpendicularly from the horizon. Gradually the gathering
ours fold over the sky. Hark! The thunder is pealing in the
ance, and louder and nearer come its awful reverberation. It
ks the life-restoring rain! Scarcely has the genial moisture
ened earth, before a blessed fragrance breathes from the pre-
arren Steppe, and its nakedness is clothed upon with the
beauty of a thousand grasses. The herbaceous mimosas,
ed sensibility to the influence of light, open their drooping
et the rising sun; and the rosy-fingered morn is saluted
horus of birds, and by the opening blossoms of the water-
the horse bounds over the plain in keen ecstasy of
cattle grazes plentifully on the fresh green herbage.
e is not without its peril. *Angvis latet in herbâ.*
thick grass lurks the spotted jaguar, the tiger of the
measures carefully the distance that separates him
specting victim.

(so say the natives) the moistened clay on the margin
will blister and swell slowly into a kind of mound.

until, with a violent noise, like the outbreak of a small mud volc the accumulated earth is cast high into the air. The spectator comprehends the purport of this strange scene immediately retre for he knows that the birth of the portentous travail will b gigantic water-snake or huge crocodile roused from its torpidity.

The rivers which bound the plain to the south—the Arauca, Apure, and the Pajara—gradually swell, and now Nature compels same animals, which in the first half of the year panted with th on the dry and dusty soil, to adopt an amphibious life. A port of the Steppe now assumes the aspect of a vast inland sea.* brood mares retire with their foals to the more elevated banks, w rise like islands above the watery expanse. Every day the space grows smaller. It is a miniature reproduction of the Noa Deluge. The animals, crowded together, swim about for ho quest of other pasture, and feed sparingly on the tops of the fl grasses that spring above the seething surface of the turbid wat Many foals are drowned, and many are surprised by the crocod killed by a blow from their powerful tails, and devoured. It i uncommon thing to see the marks of these monsters' cruel teeth the legs of horses and cattle which have narrowly escaped from t blood-thirsty jaws. Such a sight reminds the thoughtful obse that capability of adaptation to the most varied circumsta which the all-powerful Creator has endowed certain a plants.†

The Pampas of Pernambuco and Buenos Ayres have the superficial area of the Llanos of Venezuela. So g extent, that while forests of palms border them on the covered with snow in the south, during a great part o the northern Steppes of Tartary. According to the generally adopted, these regions belong to the Temp in truth they comprehend a great variety of climat

* These inundations are nowhere more extensive than in the netwo by the Apure, the Arachuna, the Pajara, the Arauca, and the Cabuli sail across the country over the Steppe for forty or fifty miles.

† Humboldt, "Ansichten der Natur," i., Steppes and Deserts.

is not less grand or original than that of the Llanos which ecede them. "The Pampas," says an American writer, "surpass majesty all the marvels of the new continent, and yet they astonish traveller by the air of abandonment and sadness which is pressed upon them, especially in the low country watered by the ata. Traces of life are there infrequent; still rarer are the objects hich attract attention. Here, at the bottom of a crevasse, a cactus eveals its head bristling with spines; there, a solitary tree rises ajestically toward heaven. Sometimes, upon the plain, the eye scovers the monstrous skeleton of an animal which flourished in ose remote times when the Alps still slept in the depths of ocean, dreamed not of blending their snow-burdened peaks with the ds. The Pampas serve as the burial-place for races of gigantic now extinct, who seem to issue from their ancient graves in ony to the former being of vanished generations, and to bear ness to the Creator of all things. Above your head, and far away the azure of heaven, you perceive a black point; it is a condor scribing slowly its sinister circles. In the distance passes and isappears the ungainly figure of an ostrich. The inexpressible harm of these solitudes is their absolute freedom. And while rsing them the wayfarer comprehends the love with which nspire the Indian, whose hope it is to meet beyond this th yet vaster horizons for the indulgence of his wandering

southern extremity of South America spreads a sterile with pebbles and blocks of porphyry: it is Patagonia. e our steps towards the north, the soil rises before us in errace, till it reaches the base of the Cordilleras. In the ricts the pebbly soil gives place to verdant meadows, agonians breed numerous herds of horses and cattle. ing in this country. The rains are rare, and the dry prolonged. The summer heat is overwhelming; in winds sweep the Savannahs, which are covered with sts. Under such climatic influences the soil produces

only a dry coarse grass. In the interior a few beeches and ca
met with, and then broad swamps, fringed with reeds and rush
In the spring a mantle of clover spreads over the earth, but only
be withered up by the first heats of summer.

Along the banks of the Rio Negro the Pampas of Buenos Ay
stretch from the coast of the Atlantic to the foot of the Andes.
a considerable portion of this vast area marshes of salt water encro
—a phenomenon all the more curious because the salt lies only
the surface, and all the wells artificially excavated yield fresh wat
During the rains the low grounds are flooded; but as soon as the s
has dried up the plain, it is clothed in rich pasturage, while
elevated table-lands are dry and withered. There, too, the dry
is often attended with disastrous results. From 1827 to 183
Mr. Darwin records, not a drop of water fell; all traces of vege
disappeared; the rivers ran dry, and the herds perished in incalc
numbers; in the single province of Buenos Ayres, the loss
estimated at more than a million head of cattle.

To the north of the Rio Salado, at the portals of the Andes,
country assumes a look of implacable desolation; no winds ev
agitate the lower strata of the atmosphere. The water-courses whi
descend from the mountains lose themselves in the sand; salt ma
whence the very birds hold aloof, alone alternate with a soil
where intersected by crevices. The district of the Pampa
stretches northward to the spurs of the Andes consists of a s
free from salt, but wholly unproductive. These solitudes
are ploughed by running streams, none of which commu
the sea. They descend from the Andes, traverse the
east to west, and empty themselves into the saline lake
further to the north, and nearer the Equator, lies an alm
region of salt—a region of indescribable gloom, where n
bush, nor blade of emerald grass, delights the eye. Ei
frequently elapse in this land of desolation, worthy of
the circles in Dante's "Inferno," without the cheerin
shower of rain, and when at length it arrives, it splits

d melts them into wide pools of brackish mud. As soon as sun has absorbed the excessive humidity of the soil, myriads of crystals glitter on the surface, and convert the Desert into one nense mirror.

To the north-west of La Plata extends a desert of very different racter—the *Despoblado*, or uninhabited land, a plateau of the des, rising some 4200 feet above the level of the sea. This desert cloven into two portions by a deep valley, bordered with sharp ks, which affords the only practicable route from Bolivia to Buenos res. Winter, in this sombre world within a world, is a time of ror, when the spirit of Desolation goes to and fro in wrath unchained. even here humanity drags about the fetters of existence. The ller occasionally alights upon the wretched huts where the tunate descendants of the ancient Peruvians linger through life. r wealth consists in a few llamas. Their occupation, in hunting alpaca, the guanaco, and the chinchilla; in filtering the river sands scanty grains of gold; in collecting salt, and disposing of it to the bitants of the nearest towns.

"The aspect of the Puna, or Despoblado," says Von Tschudi,* "is arly monotonous and dreary. The expansive levels are scantily d with grasses of a yellowish-brown hue, and are never enlivened sh-looking verdure. Here and there, at distant intervals, may a few stunted Quenera trees,† or large patches of ground ith the Ratanha shrub.‡ Both are used by the Indians as r roofing their huts. The cold climate and sterile soil are mpediments to agriculture. Only one plant is cultivated ons with any degree of success. It is the *maca*, a grown like the potato, and, like it, used as an article of y of the Puna districts it constitutes the principal the inhabitants. It has an agreeable and somewhat r, and when boiled in milk it tastes like the chest-

* Von Tschudi, "Travels in Peru" (London, 1847), pp. 305, 306.
† *Polylepis racemosa.* ‡ *Krameria triandria.*

The most imposing spectacle presented by the Deserts of So
America is that of their frequent hurricanes. As the Simoom
the Sahara, so is the Pampero to the Pampas. Its approach is fo
told by signs which the native's experienced eye readily recogniz
All at once the air seems stricken motionless, and over the solitu
broods a solemn silence. A cloud white and light as snow—a clo
"no bigger than a man's hand"—rises in the south-west.
advances, and as it advances enlarges its proportions. Other clou
appear, and all gather into one imposing mass. The dust rises a
whirls round in thick columns suspended between heaven and eart
Lower and lower descend the congregated vapours, until they enve
the earth in a funeral shroud, whose folds the hurricane incessa
agitates, and which the forked lightnings seem to rend in fragm
Suffocating gusts of a fiery wind traverse space. And now the su
tempest stoops down from the summit of the Andes, and sweep
Savannah with resistless fury. Enormous masses of sand, upgathe
by the *rafale*, obscure the clearness of day; at noon the earth
covered with a darkness that may be felt. The thunder mingle
roar with the strident voices of the storm. All that lives, all
breathes, is at the mercy of the unchained elements, which
as pitiless in their wrath as a roused people. Thousands of a
perish in the Savannahs; and prostrate, with his face to the
man tremblingly awaits the expiring breath of the grand con

The horses and cattle of Europe are replaced in the P
South America by the herds of guanacos and llamas wh
them at the epoch of the Spanish conquest. Their owners,
of the Spaniards intermingled with the native races, po
the characteristics of the Arab.

Like the llanero of Venezuela, the gaucho of the P
the idea of the ancient centaur; and from the throne
to which hangs the inseparable *lasso*, he surveys the p
is lord and king with the fiery glance of a free and inde
He owes scant allegiance to any established authority, a
blue sky of heaven enjoys the blessings of uncont

l what to him the fever and turmoil of civilization, when, mounted his noble steed, he can roam at will, with none to say him nay, r leagues and leagues of grassy prairies!

CHAPTER III.

THE AUSTRALIAN INTERIOR.

OGRAPHERS have given the name of the "fifth division of the e" to that immense archipelago, or rather, that mass of archi- oes which remote geological convulsions have elevated in the c Ocean, between the three continents, Asia, Africa, and Ame- nd whose existence was first revealed to the Western World by maritime explorations of the Portuguese and the Dutch, in the eenth and seventeenth centuries. From the epoch when these rprises commenced, the spherical figure of the earth was established d dispute; and after the discovery of America, it became only able to suppose that, in virtue of a law without which our could not have maintained its equilibrium in space, there must continent intended to balance those of the Northern Hemi- But for many years all the researches of intrepid navigators them to the shores of small islands and islets, not a few of barren, uninhabited, and swept by the winds of ocean; , girdled with palms, enriched with vegetation, and land and genial airs, seemed to realize the poetical rtunate Islands,

nmer isles of Eden lying in dark purple spheres of sea."

however, by directing their investigations towards the region of the Indian Ocean, and by sailing beyond rn islands which seem to have been formerly connected an Peninsula, the Portuguese mariners were the first to ine of coast which they did not doubt was that of a

Austral Continent, whose satellites, so to speak, were the previous discovered islands. This supposed continent is still represented in old maps published at the close of the seventeenth and the beginn of the eighteenth centuries, by a mass of ill-defined contours, with t indication: *Terra Australis incognita.* The succeeding voyages Carpenter, Nuyts, Tasman, and the illustrious Cook, proved that t Austral or Southern Land was in effect a continent, or, at least, island of extraordinary dimensions, whose coasts alone—and th but a small extent inland—were inhabited by miserable tribes, w black skin, and hideous features, placed at the extreme limit whi separates man from the brute. The Dutch navigators, who had fi determined the principal outlines of this continent, named it N Holland, but after it passed into the hands of England, it recei as it still preserves the appellation of Australia.

Take away from this Australian Continent its fertile di in the south-east, where have sprung up and developed with amaz rapidity the flourishing colonies of New South Wales, Victoria, Queensland, and what remains? A country entirely wild, and, might almost venture to say, an immense Desert. The gloomy a and the barrenness of its northern shores, with few exceptions repulsed the early Portuguese and Dutch navigators, who litt pected what splendid treasures were hidden among its auriferous and rocks. They saw but insufficient rivers and scanty veg and went no further.

None of the rivers of New Holland are navigable t distance from their mouths. The want of water is sev the interior, where a treeless desert of sand, swamps, a intersected by streams called "creeks," which are dry f portion of the year; yet a belief long prevailed that fresh-water lake occupied the centre—a belief founded nature of the soil, and partly on the circumstance that that flow into the sea on the northern coast, betwee Van Diemen and Carpentaria, converge towards their they served for drains to some large body of water.

AUSTRALIAN LANDSCAPE.

The eastern side of the country is traversed by a great range of ...ly timbered down, clothed with grasses and herbage, and rising ...an elevation of 3500 feet. These are known as the Blue Moun...ns, and stretch from north to south over nearly thirty degrees of ...tude, from Cape York to Cape Wilson. All their western slopes ...cend gradually towards the interior, until they are lost in the vast ...ert plain of the interior.

The streams which flow in this direction either pour their waters ...o the great rivers, such as the Darling and the Murray, which has ... interna... navigation of 1800 miles, or lose themselves in the ...rshes and lakes, which the great summer heats periodically dry up. Another chain of mountains stretches from south to north along ... western coast of Australia, from Point d'Entrecasteaux to Murchi... River. A third chain, in the northern region, runs from east to ...t, between Camden Harbour and the Gulf of Carpentaria. The ...rior of the country is, as I have already indicated, in all proba...ty an immense plain, thinly sown with trees of the two families of ...iæ and Eucalypti, and tenanted by the wombat and the ...roo.

...er this vast portion of Australia, which still remains a blank ...he map, numerous expeditions of discovery have been attempted ...he earliest days of European colonization. Hardy pioneers— ...en who are the real, but obscure, and speedily forgotten ...f empires—have sacrificed their lives in the endeavour to ... track across the great island-continent from north to south. ... enterprise no sooner found itself securely planted on the ...n it felt that behind it lay a continent to acquire, and ...e instinct of the race bade it continue its mission of ... During the last quarter of a century, the colonial ... have liberally encouraged these explorations, and the ...tralian discovery have been illuminated by the names of ... Sturt (1845), Leichardt (1846–48), Kennedy (1848), ... Stuart (1858–62), second to none among our English ...patience, resolution, and heroic daring.

The problem remained: to cross the central wilderness of Au tralia, and prove the possibility of a passage from the southern sho to the northern, from Melbourne to the Gulf of Carpentaria. Th problem was finally solved, at no light cost, by the intrepid Bur and energetic Wills.

On the 20th of April 1860, there set out from Melbourne, und the auspices of the Government of Victoria, a small troop of gall explorers, under the immediate direction of Robert O'Hara Burke, man well-fitted for his post: born in the county of Galway in 182 after having served as captain in a Hungarian regiment, he h discharged for several years the duties of inspector of a body of t colonial police.

The second in command was a brave young Englishman, Will John Wills, twenty-six years of age, an assistant in the Observa at Melbourne.

The expedition consisted of eighteen persons, and was provi with horses, camels which had been expressly imported from Aral waggons, all kinds of scientific instruments, and the necessary amo of stores and provisions for a protracted journey.

Cooper's Creek, which marked about a third of the whol tance, was fixed upon as place of rendezvous and as the final ing-point. Thither, to save time, Burke and Wills, with six six camels, five horses, and some months' provisions, proce advance of the main body; and arriving ther on the 13th ber, Burke established a depôt, left it in charge of Bra officer, and three assistants, and with Wills, a couple of and Gray), the camels, and one horse, plunged on the 1 trackless Australian wilds.*

Keeping nearly due north, and near or upon th 140° E., they traversed, day after day, well-watered numerous clumps of wood, and tolerable indications grazing country. On the 12th of February 1861, the f had conquered every obstacle, and struck the marshes o

* Journal of W. J. Wills, *in loco*.

ver, which flows into the Gulf of Carpentaria. Their goal was reached, and the problem of a connecting route between north and south successfully solved.

The vast Australian solitudes hitherto traversed had presented every variety of aspect, from the stony plateaux and the watery lands where the rivers can keep no regular channel, and where wide spaces of dry bare ground separate great shallows of brackish water, to finely irrigated plains, clothed with herbs or bushes, and promising abundant resources for future colonists. Meteorological phenomena present in these regions the greatest uncertainties: either the dry season is so protracted as to ruin all vegetation, or the rains so thoroughly deluge the soil as by a contrary cause to ensure the same result. These climatic contradictions explain the variations observable in the narratives of the different travellers who have visited the interior. One point, however, is beyond all doubt; the hopeless sterility of Nuyts Land,—that immense sandy tract which, over an extent as yet unknown, is regarded as impassable, and stretches along the southern coast between Spencer Gulf and King George Harbour. As before said, the primary cause of the barrenness of Central Australia is the lack of water—running water and rain water. Yet the more sterile portions lie far nearer the coast than was formerly supposed; and monotonous as may be the descriptions of explorers, so far as the landscapes of Central Australia are concerned, we may safely consider that, with the exception of certain points, no obstacles exist sufficiently powerful to arrest the expansion of civilization, in a country especially where cattle-breeding is the principal industry, and the one which takes precedence of all others.

The difficulty encountered by each exploring party has been that of natural products of the soil adapted for human food. The traveller is compelled to carry with him a sufficiency of provisions to last him from his departure until his return. It was the insufficiency of rations which wrought the fatal dénouement of the heroic enterprise of Burke and Wills.

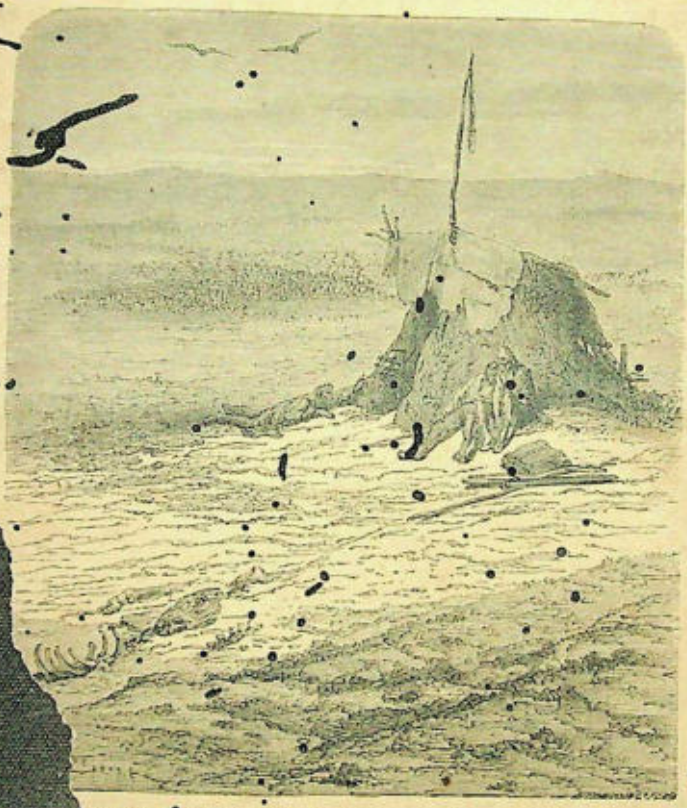
After reaching the Gulf of Carpentaria, there remained nothing more for Burke and his three companions but to retrace their steps to their depôt at Cooper's Creek. But their energies were exhausted, and from the beginning of April their provisions failed them. At the close of ten or twelve days' march, they were constrained to kill a horse. In the following week, Gray succumbed to the excess of fatigue. The three survivors dragged themselves on to the depôt, where they arrived on the morning of the 21st of April. But the men whom they had left in charge had taken their departure that very morning, after waiting long beyond the time originally fixed for their return.

"You may imagine our consternation," says Wills in his Journal, under the date of April 21st; "four months of harassing marches and privations of every kind had completely exhausted our strength. It was an extremely difficult task for either of us to accomplish a distance of only a few yards. The effort necessary to ascend the small elevation of the ground, even without a burden, induces an indescribable sensation of pain and helplessness, and the general lassitude makes one unfit for anything."

There was no resource now but to rejoin Brahé and his party if possible. Before quitting the depôt, the latter had left a small cache of provisions, which proved eminently serviceable. On the 23rd, Burke, Wills, and King resumed their march, at the rate of about five miles a-day, in the direction of Mount Despair, which was sixty miles distant, and where were placed the most advanced station, northward, of South Australia. A terrible fatality, however, was to pursue them; one of their camels, Landa, perished in the Desert, the other, Rajah, they were soon forced to kill for food; then themselves were compelled by sheer exhaustion to return to the depôt, which, meanwhile, had been revisited by Brahé without discovering a trace of their brief sojourn. Thus abandoned to the Desert, they existed upon the bounty of such natives as they met with, and who occasionally supplied them with a few cakes of *nardoo*, an aquatic plant whose pounded seeds the al

to tread. Such a regimen was insufficient to restore their exhausted
rength.

Early in June their afflictions were aggravated by a deplorable
atastrophe. The flames of their bivouac fire, driven by a strong
ind, reduced to ashes their hut and all that they possessed. There
as nothing for them now but to live with the friendly natives who



E, WILLS, AND KING IN THE DESERTS OF CENTRAL AUSTRALIA.

them. Unfortunately, they had disappeared. It was
empted to seek them out; Burke and Wills never saw

y the 29th of June, the latter, utterly exhausted, im-
companions should leave him in the wilderness, while
their search after the natives. Unwillingly they con-

sented, and taking a solemn farewell of their unfortunate comrad they dragged themselves away with aching hearts. Four or fi days afterwards, King returned with some birds he had contrived kill, but found Wills asleep in the arms of death. King was no alone, for the intrepid Burke had also fallen a victim to the cru spirit of the wilderness, resting on the barren ground, with his fa upturned to the southern stars. The sole survivor was fortun enough to fall in with the natives, who welcomed him cordially a carried him with them from camp to camp. After two months a a half of this strange existence, he was discovered by relief par sent out from Melbourne, under the command of Mr. H Pitt (Se tember 15, 1861), who also gathered the remains of the two gall but ill-fated leaders, and reverently consigned them to a decent gr

They had not died in vain. From the shores of Port Phi those of the Gulf of Carpentaria they had discovered and marke a practicable route; and when the great Australian colonies sl have pushed forward into the interior, and have occupied the bord of the northern gulf, they will remember with gratitude the br explorers who sacrificed their lives to effect the passage from on to the other.

CHAPTER IV.

VEGETABLE LIFE IN THE AFRICAN PLAINS.

THE facts actually ascertained in reference to the Flor of Central Africa, although as yet of a limited chara whole too comprehensive a subject to be fully discusse I must, therefore, confine myself to a rapid survey o botanical features of the countries whose general featur aspect I have sketched in the preceding chapters.

Senegambia and Upper Guinea, on the west coast

w table-land, situated upwards of 3000 feet above the sea-level, and rowed by deep gorges, in whose rocky beds the rivers roll and m, fed by the waters of numerous streams. Grassy savannahs and de-cultivated areas are here inhabited by a numerous population. veral travellers have explored these regions; but all have specially plied themselves to make known the colossal plants which flourish rein, and those, first and foremost, which have a particular interest, her from their Anak-like stature or the manifold uses of their pro-ts. I shall have occasion to speak of the arborescent species which, this part of the Old Continent, blend in immense and impenetrable ests. But owing to this very circumstance we possess few details ecting the plants which clothe the vast plains of Senegambia and r Guinea. We only know that there, as everywhere, the great y of the Gramineæ is largely represented. In general these es far exceed in height the plants which make the wealth and y of our English meads; and they chiefly belong to the tribe of iceæ. A legion of Cassias inhabit the low fresh hills of the gambian lands; and some are held in high estimation for their as the Cassia, or Senna, which is considered one of the most purgatives. The species generally recognized as best adapted cinal purposes are those with oboval and those with obtuse *Cassia obovata* and *Cassia obtusifolia*. The former is a herbaceous plant, from one to two feet high, with smooth leaves and racemes of yellow flowers; the latter differs form of its leaves, which are short and broad, or

he cereals are cultivated in Senegambia on a very large differ wholly from those which engage the attention n agriculturist. Barley will not grow even on the lateaux, on account of the constant and excessive e that it will germinate; but it develops so rapidly hrough all the phases of its vegetation in the space of nd yields but impoverished ears empty of grains; it is eople of Senegambia except as forage. But, on the

other hand, there are numerous Graminea adapted to hot regio which the natives cultivate for their uses. Among others I m name the Tocussa and the Coracan (*Eleusine Tocussa* and *E. Co cana*), with their curved digitate spikes and productive seeds; t *Pennicellaria spicata*, or Guinea Corn, a very tall grass, somew resembling maize, whose long cylindrical culms or blades bear ea multitude of white round grains, which, ground into meal, form savoury cakes, as you may read in Mungo Park's Travels; and *Durra, Doura, Indian Millet*, or *Sorgho Grass* (*Sorghum*), a co strong, broad-leaved grass, four to eight feet high, with round gr a little larger than mustard seed; it is the principal plan Africa, and exceedingly nutritious, the natives employing it in preparation of a favourite dish named Kouskoussou.

The cereals most widely cultivated in Senegal include the Co Millet (*Oplismenus colonus*); the Abyssinian Meadow Grass (*Abyssinica*), called "Teff" in Abyssinia, whose seeds are used making bread, and whose blades yield an abundant herbage; (*Oryza sativa*), and different varieties of maize. Leguminous p appear wanting in Senegal. Their absence is probably due t same causes as those which we have indicated as affecting the of barley. Cabbages and the different salads grow, in fact rapidity which prevents them from maturing; they flower i three weeks after being sown. The inhabitants consequ to those alimentary species which belong to hot countries, can only be obtained in Europe at an enormous exp artificial means. Among the plants with edible ro kinds of Yams such as the *Dioscorea alata*); Batatas *Batatas*); and the Manioc or Manihot (*Jatropha M* known as Cassava, which, although in itself a deadly deprived by heat of its noxious properties, and when becomes a nutritious and highly savoury food. It yi farinaceous material of Tapioca. Its leaves are cooli from its seeds an excellent oil is procured; and the ju

* Order, *Euphorbiacex*.

its root serves for empoisoning arrows. Good and evil are both largely mixed in this important plant.

The *Corchorus olitorius*,* an annual cultivated in Egypt as a herb, is largely grown in Senegal for the tenacious fibres of its and the oily juices of its seeds. The Black Pepper (*Piper nig-*) of India and the Sunda Isles we find perfectly acclimatized in part of Africa, and it flourishes even in a wild state. Finally, Coffee-tree (*Coffea Arabica*), the Cocoa (*Theobroma Cacao*), Indigo (*Indigofera tinctoria*), and the *Cocos oleracea*, are among the cultivated plants of Senegambia.

In Northern Guinea and the Gaboon, recently made famous by Chaillu's discovery of the gorilla, Savannahs and cultivated districts are intermingled, though their flora is still imperfectly known. A great number of grasses adorn the fresh and humid prairies, and canes and reeds abound, while, on the river-banks, in shady nooks, flourish some of the Screw-pine tribe,† notably the *Pandanus Candelabrum*, a highly curious plant, which attracts one's attention by its mode of vegetation, its graceful ribbon-like foliage, and its small but flowers. Thatching and cordage are obtained from the leaves; the fruit resembles a richly-coloured pine-apple, but is to the taste.

Savannahs of the neighbouring provinces, and especially those Coast, are in general sparsely inhabited, nor are those of the Niger an exception; man shrinks from a region deadly malaria seems to claim as its own. The flora is sisting chiefly of aquatic grasses, with blades of moderate es of comparatively little succulence. The herbaceous r food or industrial uses, which are most frequently and the Gaboon, resemble those already described o Senegambia. But there are many different Arums, *dium sagittum* and *Colocasia mucronatum*, properly Tara, or Tayo, and employed in making granulate tem of the former, and in boiling or roasting for food

* Order, *Tiliaceæ*. † Order, *Pandaneæ*.

the rhizomæ of the latter; Tobacco; the ox-heart Annona, pla
sometimes cultivated in Europe, where it never fructifies, though
aromatic fruits are its most valuable product, and are highly esteem
by the Africans,—these "Custard Apples" resembling thick cream, a
being eaten, like cream, with a spoon; the Banana,* with its giga
foliage—precious "Musa Sapientum"—valuable not only to "
men," but foolish men, as a substitute for wheat or the breadf
tree, and gratifying the savage with a succulent and nutritious f
Forty or fifty banana plants will flourish in a square space of
thousand feet, and an acre of ground will yield sufficient provision
fifty men. That area of land which, sown with wheat, would f
only one man, will nourish five-and-twenty if planted with banan

I must not forget the Pistachios,† which flourish spontane
in the vast plains of Central Africa, and the highly valuable
Cane (*Saccharum officinarum*), which, like the Cotton Plant,
rendered inestimable services to man, and yet has been the o
of unutterable crime and misery, promoting by its cultivation
accursed slave-trade. The Vine (*Vitis vinifera*) is cultivated
few districts. Among the herbaceous or sub-frutescent plants pe
to this region, and which enjoy a certain reputation on account
utility of their products, I may name the following:—

The Calebash Nutmeg (*Monodora myristica*), one of th
naceæ, remarkable for its withered fruits, which, when
its seeds, furnish a condiment deservedly esteemed by
Guinea Pepper (*Uvaria Æthiopica*), whose properties ar
and appreciated in this part of Western Africa; and
the Cucurbitaceæ, the *Telfairia pedata*, whose seeds
oleaginous substance.

To the east, in Nigritia or the Soudan, the cou
although situated at an elevation of 1200 to 1300 f
The vegetation here is very scanty; yet the copio
favour the growth of plants suitable for the prov
pastures are abundant, and formed by the principal

* Order, Musaceæ. † Order, Anacar

tæria, and the like), the Sedges, Rushes, &c. These meads are
thed with verdure for three or four months of the year, and much
quented by the shepherds who dwell in the vicinity of Lake Tchad.
Still further eastward, if we continue our wanderings, we plunge
to the warm regions of Darfour and Kordofan. Here the country
ises in bold outlines; numerous lofty mountain-chains are inter-
ted by narrow valleys and smooth expanses of meadow-land. All
t portion of Kordofan which lies west of the White Nile is a
irie some thirty-five miles long by twenty-eight broad, stretching
wards the rising sun, and relieved by small patches of shrubs of the
nily *Leguminosæ*, especially the Mimosa, with its graceful shrinking
ge, which shudders at the lightest touch, and its spherical rose-
or snow-white blossoms.

These meadow-lands suffer from excessive aridity; it is only with
rduous struggle that a few grasses resist the dryness which almost
stantly prevails; and frequently, as is the case in other parts of
stern Africa, the inhabitants can only procure water for their
s by sinking wells of extraordinary depth. Less arid, the
hern part of Kordofan is better clothed with vegetation; the
ry is more broken, and increases in picturesqueness of aspect as
pproach the neighbourhood of Mount Tegeler. Sennaar, which is
by the Blue Nile, is far from offering an equally luxuriant
along the river extends a vast belt of meadow, generally
nly blessed with a few herbaceous plants, a few Legu-
, deeply-buried roots; and its aspect, therefore, is one of
The landscape wants

glory in the grass, and the splendour in the flower"

potently to the sensibilities of the poet. Nor does
ove as we ascend the Sennaar to the Lake of Zana,
south-east, for though the rich black soil of the Kulla
a profuse vegetation, it is the vegetation peculiar to
the swamp; the wind rushes through thick sedges,
reeds, and waving grasses. On the northern border

of the lake the pasturages are fresh and green, and a many mig
easily lurk unseen among their gigantic Graminæ, the Panicas a
the Setarias. Still keeping our faces eastward, like the Ghebirs
ancient Iran, we perceive that Abyssinia is divided into two parts
the River Tacazze, an affluent of the Nile; the western being call
Amhora, and the eastern Tigré. Owing to its peculiar geographi
configuration and the elevation of its mountains, Abyssinia rejoi
in a wholly special Flora. In the Semen, west of the Tacazze, th
is a mountain lifting its crest above the limit of perpetual snow,
to an altitude of 14,000 feet. Up to a height of 6500 feet its slop
are thickly carpeted with fresh and fragrant sward, and the air thr
with the music of a hundred streams which flow from the perenn
fountains of ice and snow.

In the Tigré the country is not fertile, nor is it well populat
Its geological features are interesting, for we meet everywhere
isolated masses of limestone, arranged generally in horizontal st
of various extent, and bearing indisputable traces of a vast volc
labour. On the coast of the Red Sea, the oriental slopes only pr
at their base a few scattered thickets chiefly composed of th
shrubs and the Leguminosæ. We meet also with various kin
Aloes and Euphorbiaceæ (Spurge-Worts), as the *Euphorbia nerii*
Euphorbia grandidens, and *Euphorbia Abyssinica*. It is
King Juba II., of Mauritania, discovered the plant growing
Atlas, wrote a short treatise on its virtues, and named
physician Euphorbos (about the end of the first centu
root, generally speaking, is aperient, and the milky j
cases of rheumatism and cramp.

The plains of Tigré present a beautiful appe
variety of flowers that bloom among the grass; in
scarlet aloe, which is to be met with almost everywh
appears, like our gorse, to flower at all seasons, form
object in the foreground. The many varieties of mi
their different-coloured blossoms—pink, yellow, and w
be spread over the whole face of the country, wheth

l or valley. "When in blossom," says an English traveller,* many of them emit a fragrance so powerful as to render the whole ghbourhood more odorous than a perfumer's shop. The jessamine seen in profusion in many parts, but principally on the hills; and re is also a beautiful parasitical creeper (an æschynanthus), which ws, like the mistletoe, from the bark of other trees. It has a bright k-green fleshy leaf, with brilliant scarlet flowers."

The same traveller describes a tree called the *dima*,† which, ugh not very solid as food, adds much to the flavour of the *sine*. It has a large greenish shell, some nine inches long; inside it lie a number of seeds, and attached to them by fibres a quantity ellowish-white cakey powder, having a sweetish acid taste, and mixed with water forming an agreeable beverage, somewhat fbling lemonade. The Abyssinians mix with it red pepper salt, and eat it as a relish with their bread. When the tree hes a certain size, its trunk almost always becomes hollow; and it frequently contains a store of wild honey, which may easily tained by means of a small axe and fire.

Iore to the south, in the Shoa, we meet with an almost analo- egetation: the Socotrine Aloes (*Aloe socotrina*), which supplies rmacopœia with an active cathartic, is particularly abundant. *rus edulis*,‡ a small branching shrub whose leaves possess properties to those of the Tea-plant, and are employed purpose by the Abyssinians, is widely cultivated. The from them a stimulating drink called Kat. Nor should usso, or Casso, named after its discoverer *Brayera* n infusion of whose bark or leaves forms one of the nifuges in the world; and the *Musa ensete*, a a, with gigantic leaves and nerves of a vivid red, shes in our European plantations.

ultivated plants may be included most of those which

* ansfield Parkyns, "Life in Abyssinia," i. 226, 227.
† Jansonia digitata, a species of Baobab (Order, *Sterculaceæ*).
‡ er. *Celastraceæ*. § Order. *Rosaceæ*.

I have noticed under the head of Senegambia; while, owing to t considerable elevation of the mountains, we find many others whi belong to cool and temperate climates—such, for example, as rye a barley. The Sugar Cane, the Pomegranate, and numerous Aura tiaceæ, as, for example, the Citron and the Orange, have been lik wise introduced into this part of Southern Africa.

Vegetable Life in South Africa.

1. Mesembryanthemum inflexum. 2. Hottentot's Fig (*Mes edule*). 3.
4. Euphorbia grandidens. 5. Stapelia hi

From the coast of Aden, where almost complet prior to the rainy season—from the coast of Aden to situated at the easternmost point of Africa, the trav a constant succession of mountains or elevated tabl by the shepherds of the Somali tribes,—a people not brigandage. Respecting the coast of Ajan we h

hat its arid and sandy soil supports a scanty vegetation of nited plants. The Zanguebar coast is not more familiar to the tanist, and is mainly covered with marshes.

But the littoral of Western Africa is gifted with a flora as luxu- nt as it is varied. According to Dr. Welwitsch, who has explored s region, previously almost a *terra incognita* to Europeans, "the cial feature in the neighbourhood of Benguela is the abundance of asitical *Loranthaceæ*, or mistletoe, on the thickets of the thorny mosa, to which are attached those Roccellæ (or Archils), the *Roc- lla tinctoria* and *R. fuciformis*, that yield so brilliant a lilac dye. the gardens of Benguela the vegetables of Europe are most essfully cultivated, as well as a great number of fruit trees nging both to tropical and temperate climes: citron and orange, olive, the cashew-nut, the anana, the fig, the vine, the pome- ate, the elais-palm, the banana, the anona, and the corrossol. vine bears grapes twice every year, and the crop on each occasion bundant and of fine flavour." The gardens in the vicinity of Mossa- es, between the fifteenth and sixteenth parallels of south latitude, bit a curious medley of vegetables on every side, where you may urishing side by side the banana and the potato, manioc and ugar-cane and flax, barley, and every kind of Spanish potato." miles from Cape Negro the coast rises for from 300 to above the sea-level, forming a continuous plateau, where the meagre when compared with that a little further to the nevertheless to the traveller some objects of the highest us here that Dr. Welwitsch met with the strange plant nemoration of its intrepid discoverer, Sir William *Welwitschia*,* but which the natives call *Tumboa*. ts two original cotyledonary leaves appear to grow d extend horizontally in opposite directions, raised the surface of the sand, whilst the intervening stock ardens, assuming an obconical shape, flat at the top, ering below into the descending root. As years go

* Order, *Gnetaceæ*.

on, the original pair of leaves, having attained their full si
hard, tough, fibrous consistence, do not die away, but gradually sp
up into shreds; the woody mass which bears them rises very lit
higher, but increases horizontally both above and below the inserti
of the leaves, so as to clasp their base in a deep marginal slit
cavity; and from the upper side, at the base of the leaf, sev
short flowering stalks are annually developed. These are er
dichotomously branched jointed stems, rising from six inches to a f
in height, and bearing a pair of small opposite scales at each fork
joint, each branch being terminated by an oblong cone, under t
scales of which are the flowers and seeds. The result is, that
country is studded with these misshapen table-like or anvil
masses of wood, whose flat tops, pitted with the scars of old flow
stems, never rise above a foot from the ground, but vary, accor
to age, in a horizontal diameter of from a few inches to five or
feet—those of about eighteen inches diameter being supposed to
already above a hundred years old." *

These fantastic monstrous shapes were found by Dr. Welwi
with their deeply-embedded roots, on the dry plateau of the Ben
coast, in 15° 40′ south latitude. Herr Montein met with i
perfectly similar situation on quartzose soil, in the neighbo
the Nicolas River, 14° 20′ south latitude; and Mr. Baine
Anderson, in Dawaraland, between 22° and 23° south l
the neighbourhood of Whalefish Bay, and in a district w
drop of rain falls. We may therefore place the *ha*
remarkable plant between the 14th and 23rd parallel
tude. The crown, when divested of its leaves, bear
blance to a fungus.

If we now approach the Cape of Good Hop
Tormentoso, or "Cape of Storms," of the early navi
observe a characteristic vegetation peculiar to a solid
sometimes hilly, but generally dry. It is in the des
steppes situated within the confines of Caffraria that

* Brande's "Dictionary of Science, Literature, and Art," iii.

baceous bulbous plants display their beauties, which are now miliar to our English gardens under the names of Gladiolus, Oxalis, a, and Tulbaya. To those magnificent ornaments of the floral rld we must add some less known plants, remarkable in other pects; such as the *Mollugo cerviana*, which, with a few Ficoideæ, ni the almost exclusive nourishment of the herbivorous animals

VEGETABLE LIFE OF CAPE COLONY.

2. Aloe socotrina. 3. Aloe ciliaris. 4. Aloe arborescens.
5. Aloe plicatilis. 6. Gladiolus blandus.

e countries. The Gramineæ are rare in the plains of , on the other hand, they contain a number of oleagi- ded in divers families. Here, for instance, are those *sita*, whose stems so closely resemble waxen tapers; , of which some species—as, notably, the *Mesem- dulæ*, or Hottentot's Fig, distributed over the interior rica, and the *Mesembryanthemum tuberosum*—are

eagerly sought by the Hottentots, Caffres, and natives gene[illegible]lly, w[illegible] eat the fruits of the former and the roots of the latter; the *Stape[illegible] hirsuta*, or Carrion Plant, and several others of the same genus, wh[illegible] carrion-smelling flowers are singularly handsome, though their od[illegible] is most offensive; a great number of aloes, particularly the *A[illegible] verrucosa*, *A. ciliaris*, *A. plicatilis*, and *A. arborescens*, each dis[illegible]

Vegetable Life of Cape Colony.

1. Helichrysum fruticosum. 2. Erica Cavendishiana. 3. Protea longifolia.

guished by a strange wayward boldness of form [illegible] finally, those larger Euphorbias of which I have alr[illegible] which yield a white milky juice that harden[illegible] on exp[illegible] It is mainly on the slopes or stony hills of the Ca[illegible] with numerous and remarkable species of the Immort[illegible] white, yellow, or lilac, and satin-smooth flowers. Th[illegible]

(*Helichrysum fruticosum*) is one of those peculiar to the Cape tricts. It is in analogous but more sandy localities that those ceful little shrubs, with varied corollas, flourish, which are so ular in England under the name of *Ericas*, and which frequently ibit the highest beauty of form and colour. In the engraving is

VEGETABLE LIFE OF CAPE COLONY

lerræfolium (Ivy-leaved Geranium). 2. Oxalis rosacea (Wood-Sorrel).
nium glaucum. 4. Pelargonium zonale (Zone-leaved Geranium).
5. Pelargonium tricuspidatum.

te *Erica Cavendishiana*, a deservedly great favourite conservatories. There, too, the traveller delightedly almost interminable succession of Pelargoniums, or in clusters of delicate bloom, and in exquisitely What a blank would their absence leave in our res! Here and there he notes dense coppices of the

Arduinia spinosa, the Lycium Afrum, the Euclea ondulata, wh
berries are eaten by the Hottentots; several species of Rhus,* amo
others the *Rhus lucidum;* and, finally, a great number of
strange fantastic Proteaceæ, with their hard dry evergreen leaves a
curiously beautiful flowers. At the foot of the mountains, in t
countries bordering on Caffraria, different Cycadaceæ are found, es
cially the *Zamia* and *Encephalartus*, an elegant plant with a sh
spherical trunk, surmounted by a crown of long rigid palmated lea
The natives prepare with their pith a species of cake which they
instead of bread. Ferns are not numerous at the Cape; the m
remarkable, undoubtedly, is the *Todea Africana*. The hills a
meadows of this part of South Africa do not always exhibit
marked an aridity; rivers and streams refresh the soil, and t
where the current is not too swift nor the depth too great, grows
beautiful *Calla* of Ethiopia, a species of Aroidea, whose snow-w
fragrant flowers resemble a large horn in shape; the *Aponoge
distachyum*, another aquatic plant, with white flowers and floati
leaves, is not less common in similar positions; then on the ba
in fresh and shady nooks of greenery, thrives the *Strelitzia regi*
gorgeous-flowered genus of *Musaceæ*, named after Charlotte of M
lenburg-Strelitz, queen of George III. The foliage of this
cent plant consists of long-stalked leaves sheathing at
arising from a contracted stem, the flower stalk encircled
the sheath of the leaf-stalk; while from its upper portion
large bract or spathe placed obliquely, within which lie
resplendent in orange and purple.

In the Desert of Kahalari exists an abundant and
tion. According to Dr. Livingstone, it is an imm
nourishes a prodigious quantity of herbaceous pla
very small elevation, and besprinkled at intervals
bushy shrubs. The herbs which are enabled to
prolonged droughts of these arid localities are specie
roots, creeping or spindle-like, and deeply buried

* Order, *Anacardiaceæ*.

Citrullus vulgaris and *C. amarus* are found in enormous quanti-
s. Dr. Livingstone speaks of another individual of the gourd
e, probably a kind of *Cucumis*, whose fruits colour red when
e, and which has sometimes a sweet and sometimes a bitter
vour. In these vast regions, where a desolating aridity prevails,
rivers and streams dry up for a great portion of the year, and
soil of their bed, generally black and loamy, is rapidly covered
h a profuse vegetation, composed in great part of grasses and
h-plants.

The banks of the rivers Mokolo and Zouga, and the shores of
ke Ngami, are covered with herbs and small thorny stunted
hes, including the *Acacia detinens*. In the south of Africa the
s so dry that only plants of a fleshy consistency can endure the
; elsewhere, in more temperate climes, these latter plants are
very abundant, but the surrounding herbage destroys them.
g those which grow there in great numbers I may name the
eæ, and particularly the *Mesembryanthemum inflexum*, which
ry widely spread, and whose stems and leaves are eaten by
orous animals. This plant, says Dr. Livingstone, is so useful
is cultivated by the Dutch Boers on an extensive scale. On
rthward route towards Linianty, this illustrious traveller fell in
meadows of such rank fertility that its herbage frequently rose
his vehicles. The natives, designated Makalatos, show some
ltural taste and skill, and cultivate durra, maize, two kinds of
arachides, pumpkins, and the like. Everywhere, along the
of the Gambye and the Liba, he met with exceptionally
land, where the grasses attained an unusual development.
ounted wide verdurous plains, consisting of plants with
nd graminæ of tall stature. Owing to the burning
ght these districts, herbaceous plants are developed
ary rapidity.

season the Liba meadows are covered, like our own,
se variety of mushrooms, some nutritious, others
e former are much relished by the natives. One of

the most common, and one of the finest flavour, is found, says Livingstone, on all the ant-hills; it is completely white, very go even when eaten raw, and about eight inches in diameter. There another of a brilliant red or superb blue, but it is poisonous.

The banks of the Quilo, like those of the Quango, are endow with a most luxurious vegetation; the same is the case with banks of the Zambesi. Everywhere spreads a gigantic and abund herbage. In the environs of the small town of Cassanga, the nati cultivate manioc, potatoes, haricots, tomatoes, &c. There are fo also bananas and guava plants, and probably all the legumes a fruit trees recognized by Dr. Welwitsch at Benguela, which l nearly under the same latitude. From the table-land of Cassa you may survey nearly the whole of the valley watered by Quango. It is a gently undulating plain, covered with herbs, sown with great woods. The coffee-tree was formerly cultivate the province of Tété, but has been abandoned; cassias, hov flourish, and indigo. Among the cultivated plants of Tété L stone, moreover, mentions some species which are not yet botani distinguished—such as the Loatsa (*Penniscetum typhoideum*) several of the bean tribe, one of which grows underground li arachides.

CHAPTER V.

VEGETABLE LIFE IN THE PRAIRIES, PAMPAS, AND LLANOS OF NEW WORLD.

Of all the provinces, as yet uninhabited or only which compose the northern regions of the New W so vast an extent of prairies as that which is vicinity of the Neosho and the Vert-de-Gris, betwe frontier and the River Arkansas. Woods of sm

re generally, limited patches of copse and thicket—are met
at intervals in these plains. The *Smilax rotundifolia*, a
cies of sarsaparilla, with round leaves and sarmentous stems;
e *Rhus toxicodendrum*, a shrub with a very poisonous juice;
l the *Asimina triloba*, a plant bearing nutritious fruit, are,
h a few other subfrutescent species, the denizens of these lonely
lities. Annual or perennial plants abound in the prairies, and
in there a considerable development, especially in the more humid
ricts. The plains bordering on the Swan's Marsh, situated upon
upper course of the River Osage, nourish a great number of species,
elegant as they are varied. As in our own meadows, the Gramineæ,
Cyperaceæ (or Sedges), the Leguminosæ, and the Compositæ—
tter especially—are very extensively diffused. But, in contrast
e majority of our species, their representatives are in general of
kable dimensions, with flowers of extraordinary splendour, and
f them have been naturalized in our British gardens.

he American prairies, again, like the meadow-lands of Europe,
lternated with dry, gravelly spaces, marshes, swampy angles, and
d tracts. It is curious to trace a certain likeness between the
which inhabit these localities in both continents. Thus,
écul, who explored, in 1848 and 1849, nearly the whole of the
of Missouri to the foot of the Rocky Mountains, Louisiana,
and a part of Northern Mexico, discovered in the vicinity of
wan's Marsh, Water-Plantains (*Alisma*), Sagittarias, and
aceas, in the inundated districts; Characeæ—their tubular
s incrusted with carbonate of lime—bladder-plants, and the
l floating Naiadaceæ, in deeper pools and stagnant waters;
Lythraceæ (or Loose-Strife tribe) on the banks of the brook-
ut the commonest aquatic plant in these morasses, and that
ceals, so to speak, all the other plants proper to such
Nelumbium calophyllum, with its rose-coloured
s and rhizomes are eaten by the natives.

souri are sufficiently fertile. Among
amp places we

several *Compositæ*; the *Liatris*, with their violet flowers and [illegible] spiky bunches, the *Calliopsis tinctoria* of the dyers, the *Gaillardia* of Lindheimer, and the *Tripsacum dactyloides*. Asters, Erigeron, Gaillardias, Helianthi (sun-flowers), Solidagos, the *Rudbeckia hirta* and the *Coreopsis*, are found almost as far south as Texas. By the side of these *Compositæ* flourish several *Desmodiums* and *Cassias*, some graceful *Baptisias*—with blue flowers and light green foliage—the *Melanthum Virginicum*, the *Euphorbia marginata*, the *Asclepias Cornuti*—now naturalised in the neighbourhood of Paris—the *Hibiscus palustris* and *H. moscheutos*, gigantic Malvaceæ, whose splendidly-beautiful flowers are often three or four inches in diameter. As plants widely spread in the stonier Prairies, we may note the Gauras, different varieties of *Œnothera*, and especially the *Silphium laciniatum* (vulgarly called the Magnetic Plant, or Compass Plant of the Prairies). Its leaves *are said* to turn their faces uniformly east and west, so that their edges are consequently directed due north and south. The plant is also known as Pilot-weed, Polar-plant, Rosin-weed, and Turpentine-weed; the latter name derived from the copious resin exuded by its stems, which grow to a height of three or four feet, as well as by the leaves, which are deeply pinnatifid.

In the small woods which skirt the Prairies is found in abundance, twining round the bushes, the *Apios tuberosa*, a leguminous plant formerly recommended to European cultivation on account of the rounded tubercles which grow upon its subterranean stems. The Arabians collect them in the spring, and carefully dry them to form food. The Apios belongs to the family of Umbelliferæ, and is consequently allied to celery, parsnip, and carrot.

In Missouri, and as far as the confines of Mississippi, we meet in with very productive sandy plains alternating with [illegible] uplands. This country recalls, on the whole, the aspect [illegible] which we have just described, and the plants which [illegible] almost the same.

On the hills and woody slopes in the [illegible] likewise meet

Trécul collected there numerous Gramineæ, some species of Carex, ...ntains, Euphorbias, Polygalas, and Vervains; many genera, in ...t, which in France, and similar soils elsewhere, have numerous ...presentatives. It is in the grassy tracts of the wooded districts ...at the larger species of *Phlox* flourish, while the smaller varieties of ... same genus vegetate upon the hills. The low humid meadows ...hant us with their gorgeous scarlet *Actæas*,* their yellow Bal-

Vegetable Life in the American Prairies.

1. Liatris squarrosa.
2. Calliopsis tinctoria.
3. Asclepias Cornuti.
4. Tripsacum dactyloides.
5. Gaura Lindheimeri.

their *Echinacea purpureas*, and their superb Lilies; those ... are dry and rather stony are covered with the broad golden ... of the gay *Œnothera macrocarpa*.† ...

...long the shrubs which people the marshy tracts of this same ... I must point out the *Sassafras*, a kind of laurel with deci... ...flow... ...which precede the foliage, and small

* ...der, *Actæa*.
† ... Primrose Tribe.

dark-blue fruit. It is found from Canada to Florida; a mere bush the north, but a tree fifty feet high in the south. The wood is s light, of a coarse fibre, with a pungent aromatic taste, and a str agreeable odour. The wood is brought to market in the shape chips, but for medicinal purposes the thick spongy bark of the roo prepared, and it is found extremely valuable as a powerful stimul sodorific, and diuretic. The mucilaginous leaves are employed thickening soup. An infusion of the bark or wood makes a plea beverage, formerly known as *Saloop*; and the wood also yields an which is used medicinally.

But it is in the state of Texas, and especially near San Ant de Bejar, that those immense desert spaces commence which occupy the northern region of Mexico. The southern districts of Texas o in their prevailing landscapes a mixture of beautiful prairies shady woods. Among the plants peculiar to humid and localities I may particularize the *Sarracenias*, a group of rem able exogens, whose leaves are hollowed out into tubes or pitc open at the upper end, and streaked with bands of different col the Eriocaulons, a kind of rush, carrying their small flow spherical capitals on the summits of their tall branching stem the Nelumbios (*Nelumbium calophyllum*), aquatic plants of beauty, American congeners of the celebrated Lotus, the root which takes the reason prisoner." The nuts are wholeso edible, and the root-stocks are also occasionally eaten. These are likewise found, in analogous habitats, in Mississippi and ana, accompanied by the light-green Magnolia, the Dog-berry Florida, several Wax-berries, and the Sassafras laurel, now a tized in Europe, and whose bark is employed as I have said, n ally, while its wood and roots are made use of by turners manufacturers.

Prairies abound in Texas, wide rolling sweeps of grassy with an apparently interminable horizon [illegible] river—leagues upon leagues [illegible] pastural, and wh[illegible]

its deadly rifle. Among those which skirt the Bay of Matagorda, extend in the vicinity of Victoria, Gonzalès, and Seguin, M. Tré- discovered an ample variety of Compositæ; of Gramineæ, more ecially those belonging to the genera *Poa*, *Spartina*, *Dactyloc- tum*; Cyperaceæ, Euphorbias, Cucumbers, and Gourds. From the

VEGETABLE LIFE IN TEXAS.

1. Nelumbium caloplyllum.
2. Sarracenia purpurea.
3. Erlocaulon flavifolium.
4. Laurus sassafras.

airies our European gardeners have of late years received a of the genus *Panicum*, the *Black Mosquito Grass*, which ng creeping rhizomes may be employed with undoubted suc- rrest the inland movement of the Dunes and shifting sa (*Nuphar lute*

the *Nuphar advena* and the *Nymphæa odorata*. In the same loca
ties vegetates a weak variety of our European *Sagittaria*, and
Pistia spatulata spreads itself upon the water, like our Engl
Duckweed, both being members of the family *Pistaceæ*.

As far as New Braunfels, the Prairies are occasionally relieved
clumps of fine old trees, but below that point the traveller
encounters, and that at rare intervals, a few scarce coppices
scanty thickets. Growing more common at San Antonio de B
they abound in the region of Castroville, and spread over nearly
entire country to the very borders of Mexico.

These bushes or coppices mainly consist of the *Prosa*
losa, the *Guaiacum angustifolium*, the *Xanthoxylum ine*
few Acacias.

The Guaiacum* is noticeable for its hard and heavy w
rally known as *Lignum Vitæ*, sometimes as *Guaiacum*
occasionally as *Brazil wood*. It also yields a peculiar re
duct, which is medicinally employed, in powder, pill, and ti
the relief of chronic rheumatism and chronic skin diseases
a greenish-brown colour and though it has scarcely any ta
a hot arid sensation in the mouth.

The *Xantoxylon* type, of the order Xanthoxylaceæ, de
name from the yellowness of its timber. Its fruits have a
aromatic taste, like pepper. The popular name of "toothac
is applied to some of the American species, from the relief th
and fruits are supposed to give in cases of that distressing aff

In the neighbourhood of Castroville, Trécul found, 1
scattered among the thickets, a species of *Ephedra*, closely r
the *Ephedra altissima*, whose feeble reed-like branches wer
covered with small red fruits, producing a novel and attracti
As a plant curious from its mode of vegetation, and which
in Texas as well as in Louisiana, I may mention the *Tillandsi*
oides, so named after Professor Tillands, of Abo. This is a
[illegible] on the boughs of

oak. It hangs down like a tuft of long gray hair, in
e same fashion as certain lichens (*usnea*) in European
communicating to the trees a strange and positively
The plant is collected, and the outer cellular portion
l by soaking in water, the fibrous residuum is then ex-

VEGETABLE LIFE IN THE TEXAN PRAIRIES

1. Yucca Treculeana.
2. Silphium terebinthinaceum.
3. Manfillaria radiantha.
4. Echinocactus robustus.
5. Cereus Peruvianus.
6. Opuntia microdasys.

stuff cushions, mattresses, and pillows; whence it is s
ed "Vegetable horse-hair."

e thickets that dot the central Prairies commonly flourish
Cumara, and the curious *Ungnadia speciosa*, a species
y reduced scale.

It was in Texas, and in the rocky, arid, and hilly pla
French botanist Trécul discovered several notable varieti
to one of which, a new, and certainly the most beautifu
name has very justly been affixed: the *Yucca Trécule*
its tall panicle of gorgeous flowers from the centre of a cr
rigid, spear-like leaves, like a victorious trophy. In E
we note the first appearance, in the drier and stonier po
Prairies, of a representation of the family *Cactaceæ*, t
frutescens, frequently growing side by side with th
terebinthinaceum. The *Opuntia* is more generally k
"Indian Fig" or "Prickly Pear," from the large purpl
which it yields. The *Silphium* belongs to the family of C
But Western Texas is the true birth-place of these old agint
some of which, such as the *Echinocactus robusta*, the *M*
rodantha, and the *Opuntia microdasys* ("small-thorny Opun
cultivated in our apartments, where they require but v
attention. M. Trécul has discovered in this region a new
variety of Echinocactus (*E. Tréculeanus*), some kinds of C
especially, the *Cereus Peruvianus*, a beautiful plant with
vers.

Such are the principal plants which, in North Amer
the vegetation of the Prairies and the Savannahs.
ndensed description will show the reader that the
ely spread belong to the genera in which are grou
on inhabitants of our own Old World meadows and g

f we now transport ourselves, on the poet's winged P
s no account of distance or of natural obstacles, to the

beautiful varieties of plants. Among them the *Gramineæ* family
dominates, and, without attaining the proportions and the quality
the herbs which we shall meet with in the interior, form breadths
low very charming in their rare fresh greenness.

om the summit of the Cordilleras, in the neighbourhood of
at an altitude of about 3200 feet, the eye surveys almost the
extent of those vast level plains which stretch from the base of
ountain-chain to remote Brazil, Guiana, and Venezuela.

he Steppes comprised between Bogota and the river Meta are
d, in general, of Gramineæ with crawling stems, and with nearly
very tall culms, especially in the cooler localities. Herbage
undant that the traveller who penetrates into these immense
experiences almost insurmountable difficulties. He himself
horse are nearly hidden by the tall grasses, which frequently
a stature of five to seven feet. And such is their vigour, that
ving been burnt to the ground by one of the terrible confla-
so frequent in these countries, they spring up again with
s swiftness; if the plants had not flowered prior to the pas-
the destructive flames, they do so afterwards, and even when
ves have been wholly destroyed. The lofty table-lands of
and Tukerres, in New Grenada, present a succession of rich
ges, perfumed by some species of Labiatæ, and notably by
Hierbmeria Browniana, which thrives among the Gramineæ,
bler is highly esteemed.

he barren and sandy plains of Peru, fertilized by the numerous
r-courses which furrow them, are covered with thick blooms and
ure in the rainy season. With the Gramineæ and Juncaceæ—
grasses and rushes common in these Steppes—mingle different
bers of the Liliaceæ family, and especially several kinds of Lily.
higher region of the eastern face of the Peruvian Cordillera,
ated between 10,000 and 13,000 feet of elevation, forms an
ense undulating plateau watered by the upper course of the
anon. Everywhere, over a considerable area, the plains are
ed with a meagre vegetation, or alternate with wide morasses,

lakes, and brooks. Among the plants which people them is a spe
of the Gramineæ, *Stipa Ichu*; and there are also several Ap
varieties, Compositæ, Leguminosæ, and one of the Cyperaceæ fam
the *Cyperus articulatus*.

The Llanos of Caraccas, and of the Rio Apure and the Mo
which roam immense herds of cattle, are, in the strictest sens
terra, says Humboldt,* "grassy plains." Their prevalent vege
belonging to the two families of Cyperaceæ and Gramineæ, consi
various species of *Paspalum*, *P. leptostachyum* and *P. linicular*
Kyllingia, of *Panicum*, *Anthephora*, *Aristida*, *Vilfa*, and *Anthist*
Only here and there are found, interspersed among the Gramin
few herbaceous dicotyledonous plants, consisting of two ve
growing species of Mimosa (Sensitive Plant)—Mimosa interm
Mimosa dormiens—which are great favourites with the wild
and cattle. The natives give to this group of plants, which
their delicate feathery leaves on being touched, the expressiv
of *Dormideras*—"sleepy plants." Not a tree is visible fo
but where solitary individuals occur, they are, in moist pl
Mauritia Palm; in arid districts, a Protacea—namely, the
complicata; also the highly useful Palma da Corija, or de S
and our *Corypha inermis*, an umbrella palm, whose leaves
to thatch the roofs of huts.

The Mauritia palm, Palm Moriche, *Mauritia flexuosa*, Quite
Ita palm—for by any or all of these names it is known—belo
the family of *Lepidocaryeæ*. The trunk grows as high as 26
but it probably requires from 120 to 150 years to reach this he
It extends high up on the declivity of the Duida Mountains,
forms in moist places beautiful groups of a shining emerald verd
like that of our European alder groves. The trees preserve
humidity of the ground by their shade, and hence the Indians
that the Mauritia draws the water round its roots by a myster
attraction. From its tops the Indians frequently suspend their h
mocks to escape the attacks of the mosquitoes.

* Humboldt, "Ansichten der Natur"—Steppes and Deserts, note 17.

Sir Walter Raleigh was the first who brought to England this
it of the Mauritia palm, which he very justly likened, on account
its scales, to a fir cone.

The plains of the Rio Negro and the Amazons are the home and
itat of the most remarkable of all aquatic plants, the *Victoria*

VEGETABLE LIFE IN THE PLAINS OF THE META.

1. Anthephora elegans.
2. Panicum Cajennense.
3. Anthistiria ciliata.
4. Aristida capillacea.
5. Cyperus articulatus.

truly deserving its *regal* rank on account of its curious con-
ation and splendid beauty. It is said to have been first observed
Haüke, about 1801, and afterwards to have been noticed by
land, D'Orbigny, and others; but the first person who accurately

* Order, *Nymphæeæ*.

described it was Pöppig, in 1832, who saw it in the river Amazon
Sir Richard Schomburgk, who discovered it in the rivers of Guiana
was, I believe, the first to introduce it in England, where a splend
specimen may be seen at Kew, another at Chatsworth, and a third
the Botanic Garden of Glasgow. Its thick fleshy root-stocks send
a number of long cylindrical leaf-stalks, traversed by air canals, a
armed with stout conical prickles. The blade of the leaf is circul
and floats on the surface of the water; when fully developed,
measures from six to twelve feet in diameter, and its margin bei
uniformly turned upwards to the depth of two or three inches
assumes the appearance of a large shallow tray. The lower sur
is traversed by a number of very prominent veins, radiating from
centre to the margin, and connected with one another by sma
transverse nerves; so that the whole under-side, which is of a pu
colour, is divided into a network of irregular quadrangular com
ments or open cells, admirably fitting the leaf for floating on
water. The flowers rise upon prickly stalks. They are more th
foot in diameter, with the white outer petals inclined downwa
while the central rose-coloured ones, with the stamens, remain
the whole presenting the fanciful appearance of a central rose
crown resting on a circular range of snowy and most gracefully
petals. The fruit is a sort of globular capsule, about the s
child's head, and formidably beset with prickles. The int
fleshy, and divided into numerous cells, full of round far
seeds, which are eaten roasted by the Spaniards. Hence, i
parts of South America, it is called *Maïs del Agua*, or Water Ma

The pools and lagoons of this region nourish numerous ot
aquatic plants, among which it will suffice to particularize the *Sc*
lapsus fluitans and the *Raphia taedigera*.

Turning now to the vast area of the Brazilian empire, we fin
divided into *matos* (or woods) and *campos* (or open plains). Wh
the inhabitants would convert into cultivable land a district occup
by forest, they set fire to it during the dry season, and soon a ve
tation of frutescent but dwarf species succeeds the primitive veg

n. By renewing this purifying process a second and a third time, soil finally becomes covered with a species of fern closely nabling our large Pteris, *Pteris caudata*; and if the spot be e more abandoned, it is speedily taken possession of by a viscous, yish, and fœtid species of Gramineæ, well known locally by the

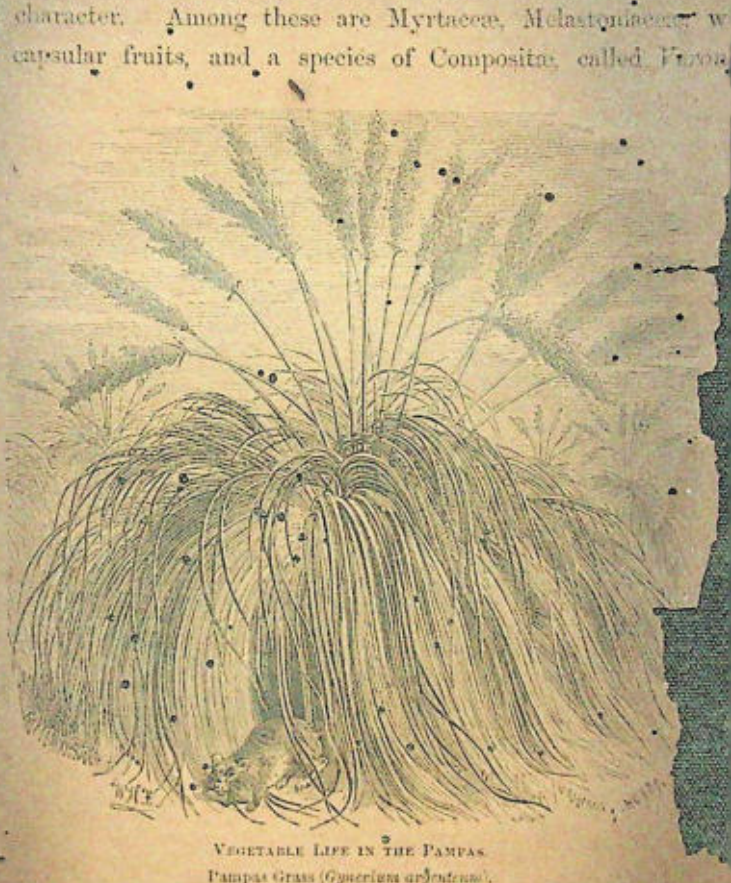
AQUATIC PLANTS OF GUIANA

1 Victoria regia. 2 Raphia taedigera. 3 Scyndapsus fragrans

ne of *Capim gordura*, to botanists by that of *Tristegis glutinosa*. boundless a voracity has this plant, that it wholly expels from tain regions another and less tenacious variety of the Gramineæ, *Saccharum*, or *Sapa*. The *Capim gordura* constitutes in itself ost the entire flora of the artificial *campos*. It is but an indif- ent fodder, and cattle derive from it little vigour.

In general, the natural *campos* bear a certain resemblance to our adows; grass, however, is less abundant; they consist, especially

in the colder localities of Gramineæ which do not perhaps exc
our British species in dimensions, but differ greatly in the size
their leaves and often also in their spreading inflorescence. By th
side, as is the case with us, grow other plants of a more grace
floral character. Among these are Myrtaceæ, Melastomaceæ w
their capsular fruits, and a species of Compositæ called Vern



VEGETABLE LIFE IN THE PAMPAS.
Pampas Grass (*Gynerium argenteum*).

The wayfarer who traverses the sterile campos is astonished
discover, on the tortuous and stunted trees that grow there at r
intervals, some flowers of a singular loveliness. Yet who can refi
his admiration from the gorgeous Vochyaceæ; the Malpighiace

Salvertia, fragrant as the lily of the valley, and with its blossoms posed in thyrses which outvie in beauty those of the chestnut.

In the genial smiling country which extends from Monte Video the mouth of the Rio Negro the vegetation is almost wholly ined to Gramineæ. It is in this region that the feathery Pampas s (*Gynerium argenteum*) flourishes luxuriantly, covering leagues leagues with its silvery panicles and drooping leaves, which, n stirred by a gentle wind, ripple like the slow-moving, spray-ming waters of a sunny sea. It has become of late years a rite ornament of our British gardens, and may justly be taken pe of tender loveliness.* Beyond the Rio Negro the country on a wilder aspect, and it is with difficulty the most adven-s botanist can penetrate into its recesses.

rly all the southern districts of Patagonia form, as we have y seen, an immense and almost level plain, whose soil is gene-dry, arid, and impeded with large pebbles; the northern ts, on the other hand, offer a less monotonous landscape, are up with rocks and ravines, interspersed among tolerably astures, whose flora has not yet been fully investigated.

CHAPTER VI.

THE FLORA OF THE AUSTRALIAN PLAINS.

Deserts of the Australian interior have been laboriously tra-ed; not, as we have seen, without much suffering, and even ifice, by a handful of intrepid travellers, who have proposed to nselves simply the solution of certain geographical problems. It

* The Pampas grass is very hardy. Its stems are from ten to fourteen feet high, its s six or eight feet long, and its panicles of flowers silvery-white, and from eighteen to two feet in length. Another Brazilian species of the same genus, *Gynerium saccharoides*, yields a considerable quantity of sugar.

will therefore be understood that we owe to them only a few in dental notices of their botanical features. For an accurate exami tion of these the pioneers of commerce have neither the means; opportunities, nor the requisite scientific knowledge. As far as flora is concerned, the Australian interior is wholly "virgin soil, new botanical world, perhaps, awaiting the advent of a Colun Only the littoral districts have been satisfactorily explored; and in the south, we meet with the names of Labillardière, Robert Bro Gaudichaud, D'Urville, Sieber, Lesson, Cunningham, and other nent botanists. To these celebrated names we must also add tho Dr. Mueller, Director of the Botanical Gardens at Melbourne William Hooker, and Mr. Bentham. Their united labours provided the public with a vast amount of curious and auth information, and have established the fact that the botany o Holland, like its zoology, has a physiognomy peculiarly its own that many, nay, most of its vegetable species, are not less ch teristic than its strange and astonishing animal types. One is a tempted to adopt in sober earnest what Sydney Smith said in hum exaggeration, that, "in this remote part of the earth, Nature (made horses, oxen, ducks, geese, oaks, elms, and all re useful productions for the rest of the world) seems dete have a bit of play, and to amuse herself as she pleases. doubtedly she has indulged in the most wayward and forms. If there exist any relations between the vege Australia and that of any other part of the globe, it is certai the districts of Southern Africa which lie near the Cape of Hope that Australia exhibits the greatest affinity. It would seem if these two continents in some remote age had not been separa as they now are, by "leagues of salt water," but that their veget species had been able to propagate themselves freely from the on the other.

According to Richard, the approximative number of species di guished by botanists amounts to about five thousand; but so m

* Sydney Smith, in *Edinburgh Review*, for 1812.

overies have been made of later years, that we may raise the
mbe to seven thousand. While the Australian plants are distri-
d among numerous families, each of the latter comprises but a
limited number of individuals. The predominant plants belong,
he main, to these families or orders:—Leguminosæ, Compositæ,
aceæ, Gramineæ, Cyperaceæ, Filices, Proteaceæ, Epacridæ, Orchi-
æ, in a proportion which varies, moreover, according to the
ous districts explored.

The fertility of the soil, and the climatic conditions of the
hern shores of the Australian continent, are highly favourable to
troduction of new species. Our English settlers have availed
elves to the utmost of this circumstance, and have cultivated
large scale all the most useful fruit trees and vegetables of
and others imported from tropical climes; so that mingled in
e prolific gardens may be seen the fig-tree and the banana,
va, the orange-tree, the olive, and the apple—cabbages,
turnips, peas. Even the vine has been successfully natu-
d its manufactured products are not inferior in excellence
ious Rhenish wines.

icating the most curious indigenous plants of New Holland,
hore particularly confine ourselves to those of Victoria, one
st known districts, and perhaps also one of the most exten-
st diversified, and most picturesque. The plains are, in
sufficiently grassy and fertile, especially in those parts which
n the brooks and rivers. The plants most extensively distri-
belong to the Gramineæ and Cyperaceæ; we find, among the
ner, the *Pennisetum fasciculare*, a great number of Poaceæ, and
Arundo conspicua; in foliage and general appearance the
er presents some striking analogies with the Pampas Grass;
ng the Poaceæ predominates the *Cyperus vaginatus*, a common
ct on the banks of the river Murray in those parts which are
ject to frequent inundations. A strong tenacious netting is made
n the fibres of its leaves. To these herbs we have to add some
vering plants, such as the star-like *Lobelias;* numerous species of

mint (as *Mentha Australis*, *M. satureioïdes*, *M. grandiflora*, and *gracilis*), from which an essential oil is extracted for use in the manufacture of perfumes; the *Sida pulchella* and *Lavatera plebeia*, of which stout fibre or solid thread is made, the fibres of Australian flax (*Linum marginale*) being adapted to the same purpose.

VEGETABLE LIFE IN VICTORIA.

1. Rose gracilis (*Arundo conspicua*).
2. Astelia Banksii.
3. Hectia Pitcairniæfolia.
4. Xanthorrhœa arborea.

Restias, a curious rush-like order of Endogens, also inhabit the moist places: as do the Kingias, very common grasses; the *Astelia Banksii*, a species of Liliaceæ, with grass-formed leaves and a short tenacious stem; and the *Xerotes longifolia*. The Nardoo (*Nardus macropus*, or, as it is sometimes called, *N. salvatrix*), whose spore and spore-cases are pounded by the native Australians and made into

ead or porridge, is a kind of cryptogamous plant, with leaves formed four folioles, like those of a truffle. It abounds in the low grounds d. inundated districts, especially on the banks of the Murray. ally, the Stag-horn (*Acrostichum grande*), a gigantic mushroom, gs to the branches of the great trees.

Small bushy clumps are scattered over the plains, and flourish peculiar vigour along the water-courses. They consist of various The traveller will not fail to notice a whole series of Legu- —*Chlorozema*, *Pultenæa*, *Viminaria*, *Mirbelia*, *Podolobium* shrubs of exceeding elegance, and now form the rare orna- of our English gardens); of Epacridæ—*Epacris stiphelia*, *E. phogon*, and others, which have also been imported into our e-parterres; a great number of Euribias, a genus of subfrutescent sitæ, of which a few are rendered interesting by their heath- liage; the *Pimelea axiflora*, whose supple and tenacious bark oned into bands and straps; the *Myrsine variabilis*, with its tems and drupaceous fruit; the *Argilia crassifolia*, a singular with long, narrow, and very rigid leaves; the *Callistemon* (vulgarly called "stonewood"), employed for xylographic the *Casuarina equisetifolia*,* or "Swamp Oak"—also called ary Tree"—a lofty tree, with very durable wood, long, slender, emerald-green branches, and conical fruit, inclosing small uts; various species of Melaleuca, yielding the green aro- il called cajaputi or cajeput oil, valuable as a stimulant asmodic; finally, some Cordylines, or Tis, plants of the d order Liliaceæ, and nearly allied to the Dragon's Blood Tree, aining a height of ten to fifteen feet, with a berry-like fruit, and ceolate leaves of a reddish hue, which afford a nutriment for cattle, atch for houses, and whose fibres are frequently made into cloth. e root, when baked, is much used as an article of food, and the mented juice yields an intoxicating beverage.

The dry, rocky, arid, and sandy districts, which may be com- red to the Landes of Brittany, are clothed with a peculiar vegeta-

* Order, *Amentaceæ*.

tion. The strangest plant, which is also the most widely distribut is undoubtedly the *Xanthorrhœa arborea*,* forming a conspicu feature in the dreary landscape, and when stripped of its lea resembling a black man holding a spear. The leaves afford g fodder for cattle, while the natives eat the soft white centre of

VEGETABLE LIFE ON THE AUSTRALIAN PLAINS.

1. Doryanthes excelsa.
2. Aralia crassifolia.
3. Dryandra repens.
4. Cordyline congesta.

top of the stem. They yield two kinds of fragrant resin—on a yellow colour, balsamic and inodorous, called Botany Bay; and other red, called Black Boy Gum. The tree—which the set have christened "Black Boy" and "Grass Gum"—has a thick tru encrusted in a thick coating of the persistent basis of old lea

* Order, *Liliaceæ*.

lued together by the yellow or red resin with which the plant bounds, and usually burned and blackened outside by bush-fires. he leaves are long, wiry, and grass-like, and are borne in a dense tuft the top of the stem, hanging gracefully all around it. Their long ower-stalks aspire from its centre, sometimes growing as high as fteen or twenty feet, and carrying aloft a thick cylindrical flower pike.

Among the lowlier plants are found a few Hectias, such as the *Hectia Pitcairniæfolia*, one of the Bromelias, very curious from its mode of vegetation; and the *Stipa crinita*, a very common grass. The leaves of the latter have been manufactured into paper of tolerable consistency.

The sandy and colder tracts are the habitat of the annual or perennial Compositæ, distinguished by their smooth and shining flowers. On the other hand, the dry rocky surfaces are besprinkled with inconsiderable woods, or rather thickets, formed in part of the *Santalum acuminatum*, whose nutritious fruit are called "peaches" by the colonists; the *Santalum persicarium*, or sandal wood; seve *Nitrarias*,* with edible fruits; a great number of Acacias, nota the *Acacia verticillata*, *A. sophora*, and *A. doratoxylon*, whose hard wood is employed in the fabrication of javelins; a consid series of Proteaceæ, particularly the *Banksia Australis*, *B. se* and *B. integrifolia*, so characteristic in aspect and foliage; and *Eucalypti*,† or "Gum Trees," of small stature—among others, "Traveller's Tree," or *Eucalyptus oleosa*.‡ Its roots extend hor zontally, and retain a quantity of water sufficient to quench the way farer's thirst in the hour of need. All the Eucalypti are curious trees, with entire and leathery leaves, affording an unusual amount of aromatic oil. Many of the species abound in resinous secretions; some attain a great size, with trunks of from 8 to 16 feet in diameter, and 150 or 160 in length. The *Eucalyptus resinifera*—"Red Gum" or "Iron Bark Tree"—reaches to an elevation of

* Order, *Malpighiaceæ*. † Order, *Myrtaceæ*.

‡ The same name, "Traveller's Tree," is applied to the *Urania speciosa*.

150 to 200 feet. When wounded, a red juice flows from it ver freely, hardening into irregular, inodorous, and transparent mass in the air, and furnishing as much as sixty gallons from a single tre

Finally, I may refer to the *Dryandra*, whose foliage is ve graceful, and its conformation very varied. Sometimes it is found

VEGETABLE LIFE ON THE AUSTRALIAN PLAINS.

1. Acacia verticillata. 2. Casuarina equisetifolia, or "Black Boy Tree."
3. Corypha Australis, or "Australian Palm."

a bush, three to seven feet high; and sometimes, as in the *Dryandra repens*, creeping along the ground.

On the more temperate heights the traveller encounters some plants of a fantastic character: as, for instance, the *Doryanthes excelsa*, with its upright gigantic leaves, more than 6 feet long, and from 2½ to 3½ inches broad; from their centre rises a strong stalk,

15 or 18 feet high, terminated by a compact and voluminous cluster great deep-red flowers. There, too, are found the magnificent arborescent ferns, *Alsophila Australis* and *Dicksonia Antarctica*. The trunk of the former aspires to a stature of 25 to 90 feet; that of the second, to 12 to 28 feet; and in both the stems are terminated by a cluster of immense flowers, which give to these plants a quite distinctive character.

Nor must we quit the Australian Flora and its marvels without alluding to the *Corypha Australis*, which begins to make its appearance at the mouth of the Snowy River. It is a gigantic palm, growing solitarily, or in thin groups, in low, cool, and even moist places. Its trunk probably attains to 140 feet in height; and the top of its stem is crowned by a gorgeous crest of fan-shaped leaves, which are employed in the manufacture of straw hats.

CHAPTER VII.

ANIMAL LIFE IN THE PRAIRIES OF THE OLD WORLD:— HERBIVOROUS ANIMALS.

To the prodigal Flora of the Tropics, which we shall soon see displaying in the virgin forests its exuberant fecundity, corresponds a Fauna no less rich, and marked by a singular variety.

This Fauna offers, especially in the Old World, an impressive character of power, strength, superior force—I had almost said, *majesty*. In truth, if we do calmly compare the mammals and the birds of tropical America with those which roam the wild plains of Africa, Hindostan, the Indo-Chinese peninsula, and the great islands of the Indian Ocean, we cannot but recognize the evident superiority of the latter. The anthropoid Ape, the enormous Pachyderms, Elephant, Rhinoceros, Hippopotamus, Giraffe, and, among animals of the

same order, the Antelopes, many of which attain the dimensions of the Horse, belong exclusively to the Eastern Hemisphere. The genus Camel, represented in Asia by the Bactrian Camel, in Africa by the Dromedary, is but weakly typified in South America by the Llama, the Vicuña, and the Alpaca, not inelegant in form, but of a marked inferior stature. And what equality is there between the lordly Tiger of the rank Indian jungles, and the sleek, stealthy Jaguar of the American wilderness? Or who will venture to compare the so-called "Lion of America," the Puma or Cougouar, with the regal quadruped which makes the lone Libyan wastes re-echo with his terrible roar?

Among the Birds, the Phenicoptera, with its disproportionate legs and neck, distributed over all the ancient continent below 40° of latitude, and the Ostrich, properly so called, are much superior in dimensions to their analogues on the other side of the Atlantic, the American Flamingo and the Nandou. So do the Eagles and Vultures of Europe, Asia, and Africa prevail in numbers and force over those of the New World. And the ancient continent can likewise claim, as its own the gigantic Epiornis, the wonderful "Roc Bird" of the well-known Oriental legend, whose petrified eggs and some of whose fossil bones have been discovered in Madagascar. It is true, however, that the greatest of living Raptores, the Condor, inhabits exclusively the Cordillera of the Andes:—

> "Stands solitary, stands immovable
> Upon some highest cliff, and rolls his eye,
> Clear, constant, unobservant, unabashed,
> In the cold light, above the dews of morn."—(*W. S. Landor.*)

But the balance is re-established by the Erpetological and Entomological Fauna of the New World, which can oppose its huge Boas, its Caïmans and Pythons, to the Crocodiles and Gavials of Africa and Asia; its Crotali and Trigonocephali to the Najas of India, the Echidnas of the Cape, and the Cerastes of Egypt and the Sahara; while the Bull Frog of the United States and the Pipa of Guiana are only found on the banks of the vast lonesome swamps of the new

continent. As far as the Desert World is concerned, in both hemispheres the legions are innumerable, and their energies commensurate to the greatness of the continual work of destruction and purification which they seem destined to accomplish in all tropical countries.

It is unnecessary to carry any further the parallel between the two hemispheres. We shall more clearly detect their analogies and differences by pursuing the study, already opened up in the Steppes and Seas of Sand, of the principal species proper to the various forms of the Desert, the different regions and divisions of the Savage World.

Yet I must confess that the difficulties of the study increase with the extent of the field we are called upon to explore. The Steppes and Wildernesses of Sand constitute, both in Africa and Asia, regions which are clearly defined, and the poverty both of their fauna and their flora fixes a definite limit to the researches of the naturalist. Such is not the case in the immense countries which now lie before us. Instead of sighing, like Alexander, for more worlds to conquer, the student of science is ever deploring the impossibility of exhausting even a single division of the grand work before him. "Art is long; life is short." The most industrious among us can never rise to the full height of his glorious task; must always remain like a child on the shore of the ocean of truth, and be content with the few shells his nerveless hand contrives to gather. In the wide regions we are about to traverse we feel at every step the colossal character of the enterprise. Every instant their aspect changes; Nature never repeats herself; their products vary with the latitude, the climate, and the soil. To pass in review all the trees and plants and flowers which flourish there, all the animals and peoples which dwell among them, would be nothing less than to embrace in a vast encyclopædia the description and history of two organic kingdoms. But such is not the design of the present volume. I have not undertaken to give an exact picture of nature, which would task to the uttermost the powers of men of such diverse genius as Humboldt, Owen, Lyell, Darwin, Tyndall, Hooker, and Ruskin, but to sketch the bold outlines and more pro-

minent features of the physiognomy of the Desert World, and not t reproduce its more minute details.

My embarrassment, then, arises less from the multitude and infini variety of the objects we have to examine, than from the difficulty harmonizing the study with the divisions of this work. How, in fa can I establish a positive distinction between the animals of t Prairies or the Savannahs and those of the Forests, between those the latter and the animals proper to the Mountains? For su a purpose it is needful that each of these forms of the Des World should possess its peculiar fauna; which is true only with very narrow limits. In reality, most animals inhabit or frequent, according to circumstances, sometimes one district, sometimes another, without its being possible to assign with any amount of precision their habitual, or simply their occasional, abode.

I shall avail myself, therefore, of the liberty allowed to every writer who does not design a purely didactical work, by not unnecessarily troubling myself whether the animals whose organization or characteristics attract our notice, particularly affect a low or elevated locality, the shady wood or open plain, the pestilential swamp or the river-watered valley, and by permitting myself, except in the case of some evident and constant partiality, to place them where the most eminent observers assure us they are really, if not exclusively, met with.

On this account, the plains, more or less densely wooded and broken up, which occupy the greater portion of the African Continent, will readily furnish us with the opportunity of studying the majority of animals indigenous to that continent, and, in general, to the entire Tropical zone of the Old World. In fact, nearly all the genera of Mammals, Birds, and Reptiles, are there represented by their most characteristic types. Clothed with a luxuriant vegetation; watered by periodical rains and numerous streams; intersected by thick masses of forests, groves, and thickets; relieved from monotonous uniformity by mountain and ravine, by marshes and lakes of vast extent,—these fields ever exhibit that aspect of busy life under which we love to

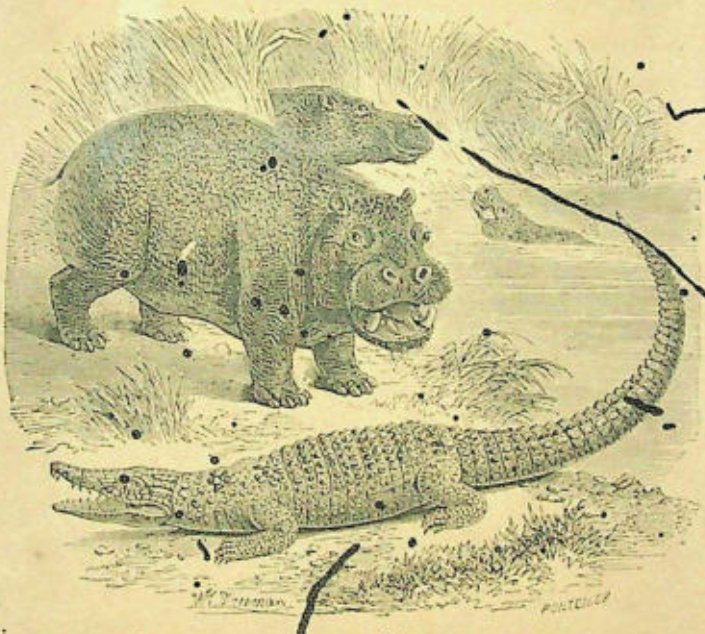
present to ourselves the earth when she first emerged from the boiling seas of Chaos, when the forces which had seethed within her bowels for so many thousands of centuries had been tranquillized by the Divine will, and she was despatched on her mysterious course to be the theatre of man's glorious destiny.

During the daytime silence and solitude prevail over the open plains. It is the hour when most animals seek, under the foliage of the trees, among the tall rank grasses, in the bosom of the waters or under the surface of the earth, a shelter against the swift burning arrows of the sun, and repose immovable in their different lairs. But when the great orb of day sinks towards the horizon, all Nature seems to awake. More imperious needs succeed to those of rest and slumber; hunger and thirst stimulate the most sluggish into exertion. Then the reptile begins to stir in the mud where he lay embedded; the herbivora return to their fresh pastures, and move towards the rivers and ponds in whose waters they may slake their thirst; the carnaria take the same road; they know that in the open plain they will find victims for their murderous jaws. The Desert is astir with strange sounds and mysterious voices; the air re-echoes the thousand discordant cries which ring from the mountains and the rocks; black shadows pass, re-pass, and flit to and fro, in every direction; terror, rage, agony, voracity, all these instincts obtain expression in the dreadful concert; it is the orgie of the appetites, the grand "Witches' Sabbath" of Nature, whose furious animation slackens towards the middle of the night, until, at sunrise, the lively accents and joyous melodies of the birds, and the peaceful pastimes of the other animals of the day, succeed to the lamentations and sinister incantations of the prowlers of the darkness.

In the foremost rank of the great animals to which the fauna of Asia and Africa owes its superiority, I have named the huge pachyderms,* those mighty colossi which may be regarded as the ana-

* *Pachydermata*, from παχύς, thick, and δέρμα, skin; an order of quadrupeds distinguished by the thickness of their hides.

logues, in the terrestrial creation, of the Cetacean giants of the marin creation. The Pachyderms formed in Cuvier's system a sufficiently natural order, which modern systematists have dismembered, and, a I believe, a little arbitrarily. This order comprised, besides th elephants, the hippopotami, the rhinoceroses, and the tapirs, all th Porcidæ family, and even the Solidungulates, such as the horse and ass In the present work I shall adopt Cuvier's division. The elephant the denizen of the forests where, in a succeeding chapter, we sha



HIPPOPOTAMUS AND CROCODILE OF THE RIVER NILE.

encounter both him and the rhinoceros. But the hippopotamus belongs incontestably to the fauna of the plain. His name (from the Greek) signifies "River Horse." And, indeed, he lives in the rivers, t pools, the deep marshes; his manners are essentially amphibiou He dives and swims with a surprising ease and agility, considering t enormous bulk of his body, and the shortness of his heavy, unwield legs. He is able to remain a long time under water. His colour a brownish-black, and his proportions, ten to twelve feet in lengt

and eight to ten in height. His head is immensely large; the mouth cavernous in its prodigious width; the teeth immensely strong, the incisors and canines of the lower jaw being long, and curved forwards; these canines or tusks sometimes measure more than two feet in length, and weigh upwards of six pounds each. Those in the upper jaw are much smaller, and the front teeth are of a moderate size. The broad thick lips are beset with scattered tufts of short bristles; the small quick eyes are placed very near the top of the head; the small ears are slightly pointed, and lined with short thick hair. His food mainly consists of the coarse herbage that flourishes on the banks of lakes and rivers; but Milne Edwards speaks of three or four of them standing knee-deep in the water, forming an irregular line, and pouncing upon the fish brought within their reach by the rapid currents. At night-time they abandon their watery haunts to prowl among the sugar-cane plantations, the fields of millet and rice, which they devour with eagerness. Their march is so impetuous, that they break down every barrier; nothing can resist them.

The hippopotamus is spread over all eastern and southern Africa; is found in Nubia, Ethiopia, Abyssinia; at the Cape, the Senegal and the Congo. Both the settlers and the natives of these countries hunt them with ardour for the sake of the ivory they yield, nor is their flesh despised by a keen appetite and vigorous stomach. Sometimes they excavate, in the animal's ordinary route, a tolerably deep pit, set with sharp pointed poles, and concealed by a covering of leafy branches: sometimes, in the shade of the evening, they lie in ambush among the bushes, and aim at his huge bulk the deadly bullet, as he comes up from the water, labouring and bellowing. It is necessary to aim well at his head; for the rest of his body is almost as invulnerable as that of Achilles.

Here is a lively picture from Sir Samuel Baker's valuable volumes, in which the hippopotamus is a foremost figure.

"We were towing through high reeds," he says,* "the mouth invisible, and the rope mowing over the high tops of the grass, when

* Sir S. Baker, "The Albert N'yanza," &c., i. 65–67.

the noise disturbed a hippopotamus from his slumber, and he was immediately perceived close to the boat. He was about half-grown, and in an instant about twenty men jumped into the water in search of him, thinking him a mere baby; but as he suddenly appeared, and was about three times as large as they had expected, they were not very eager to close. However the reis pluckily led the way, and seized him by the hind leg, when the crowd of men rushed in, and we had a grand tussle. Ropes were thrown from the vessel, and nooses were quickly slipped over his head; but he had the best of the struggle, and was dragging the people into the open river; I was therefore obliged to end the sport by putting a ball through his head. He was scored all over by the tusks of some other hippopotamus that had been bullying him."

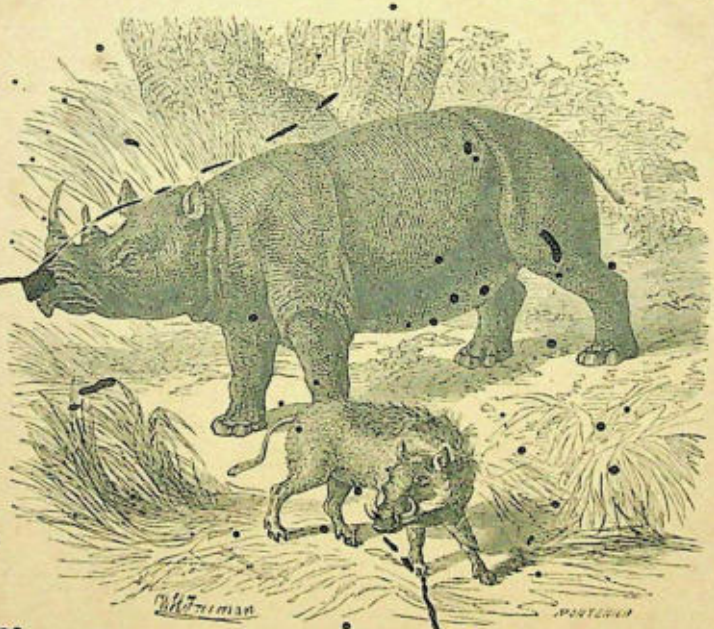
After conquering your enemy, kill him and eat him: such is the maxim of savage life. It was carried out by Sir Samuel Baker and his men, much to the satisfaction of the conquerors. "A new dish!" exclaims our traveller; "there is no longer mock-turtle soup; mock-turtle is *mock* hippopotamus. I tried boiling the fat, flesh, and skin together, the result being that the skin assumes the appearance of the green fat of the turtle, but is far superior. A piece of the head thus boiled, and then soused in vinegar, with chopped onions, cayenne pepper, and salt, throws brawn completely in the shade."

The same traveller relates that the natives on the shores of the Albert N'yanza, previous to embarking on a voyage, cast a handful of beads into the lake, to propitiate the hippopotamus, that the canoe may not be upset.

The genus *Tapir* is wanting in Africa; but we find a species, *Tapirus Indicus*, in India and the Indian Archipelago, where it was first noticed by Diard and Duvaucel. These naturalists saw an individual of this species at Barrackpore, near Calcutta, which he had been imported from the island of Sumatra. "I was surprised," says Diard, "that so large an animal had not hitherto been discovered; but I was much more so, on seeing in the Asiatic Society's Museum the head of a similar animal, a native of Malacca

which had been sent to the Society, on the 29th of April 1806, by M. Farquharie, governor of that province." This tapir is as common at Malacca as the rhinoceros and elephant. In size he closely approaches the common ass. He is black all over, except the ears, which are fringed with white, and on the back, which is of a pale gray. His habits are identical with those of the American tapirs, to be described hereafter.

In the African plains, from Nubia and Senegal to the Cape, we

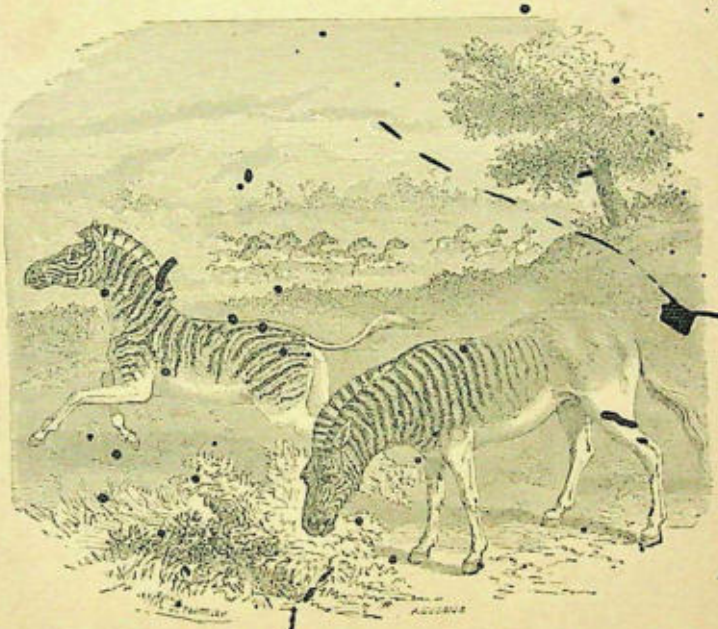


RHINOCEROS.
African Phacocœrus (*Chœripotamus Africanus*).

meet with a Pachyderm intermediate between the hippopotamus and the wild boar: this is the *Phacocœrus*, which was known to the ancients and designated by credulous Ælian the *Sus tetrakeros*, or "Beast with Four Horns." He has no horns, however, but only, beneath each ear, a horny protuberance, which greatly disfigures his head, and procures him the popular appellation of the "Warty Hog"—the "Bush Vark," or "Bush Hog" of South Africa (*Chœripotamus*

Africanus). He has four projecting tusks, and long sharp tufted ears. His stature, his feet, his tail, the mane of stiff bristles which garnishes his neck, identify him with the wild boar; but his body, almost naked on the flanks and hinder part, likens him to an hippopotamus. He is gregarious, of fierce and brutal habits, and lives chiefly in the bushes or tall herbage.

The Solidungulæ (or Solid-hoofed), which roam among the wide pasturages of the Tropical regions of the Ancient World, contrast, by



The Daw and the Quagga.

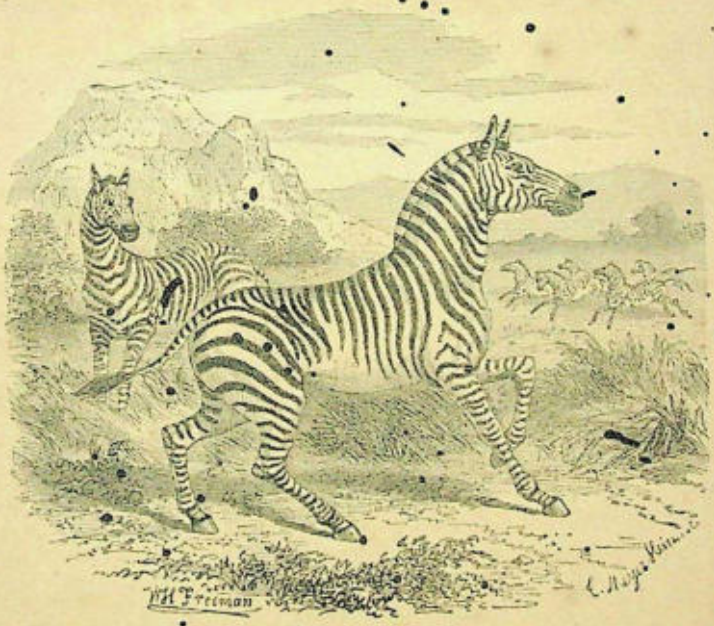
the elegance of their forms and the beauty of their clothing, with the unwieldy Pachyderms, of rugged and swarthy hide, placed by Cuvier under the same classification. The Wild Horse does not exist in these latitudes, though we may find there the most beautiful species of the genus: the Hémione, the Onagra, the Zebra, the Daw, and the Quagga. The *Hemionus* ("half-ass"), which we are endeavouring to acclimatize in Europe, and numerous specimens of which may be seen in the Zoological Gardens of London and Paris, is of a clear

brown colour all over the body, except the belly and legs, which are white. His mane is short, and his tail garnished only with a tuft of hairs at the extremity. The species is Asiatic, and appears to have originated in India, whence it spread westward into Asia Minor, and northward into the Steppes which stretch to the base of the Himálayas. The modern names are *Koulem*, *Kiang*, and *Dziggethai* (or "Mountain Ass"). He roams in great troops across the dreary Asiatic deserts, and is fond of bitter and saline herbage, and brackish water. Now, as of old, he has "the range of the mountains for his pasture," and the "salt places" for his dwelling. His swiftness and wariness render his chase an exciting pastime, and in Persia he is considered the noblest of game.

The *Hemippus* ("half-horse"), a species closely allied to the Hemiohus, is a native of the fertile districts of Syria and Arabia. Another species, the *Tarpan*, roams the Steppes of Tartary, and is with great difficulty tamed to the use of man. He is of a reddish colour, but the mane and tail are black, and along the back runs a black stripe. The *Onágra*, *Onager*, or Wild Ass of Tartary, is represented in Abyssinia by a smaller variety, of very graceful form, whose hide exhibits already, upon the legs, some of those well-defined stripes which so magnificently adorn the "outer vestment" of the Quagga, the Daw, and, especially, the Zebra.

All these Solidungulæ are identical in habits and character: social among themselves, they are fierce and mistrustful towards other animals. When in peril, they seek safety at first by rapid flight; but if driven to bay, they assume a courageous bearing, assail their enemies intrepidly, and frequently compel them to retreat. It is even asserted that the Quagga (*Asinus Quaggá*) will mingle with herds of domestic animals, and defend them against the attacks of beasts of prey. According to Dr. Gray, this animal derives his name from his voice, which resembles the barking of a dog, or a sound like *Couagg*, or *Quag*. Pennant calls him the *Quacha*. He resembles the horse in his haughty bearing and rapid movements. His head, neck, mane, and shoulders are blackish-brown, banded with

white; the stomach, hind parts, and legs are whitish; the dorsal line is black; the ears have two irregular black bands and a white tip. In the *Daw*, the blackish-brown tint extends over all the upper parts of the body, as well as the stripes, which are alternately black and light brown. The Quagga and the Daw belong to Southern Africa, and especially to Caffraria. The habitat of the Zebra appears to be more extended in range. He is found even as far north as Abyssinia. He was known to the Romans under the name of the *Hippotigres*,



ZEBRAS (*Equus Zebra*).

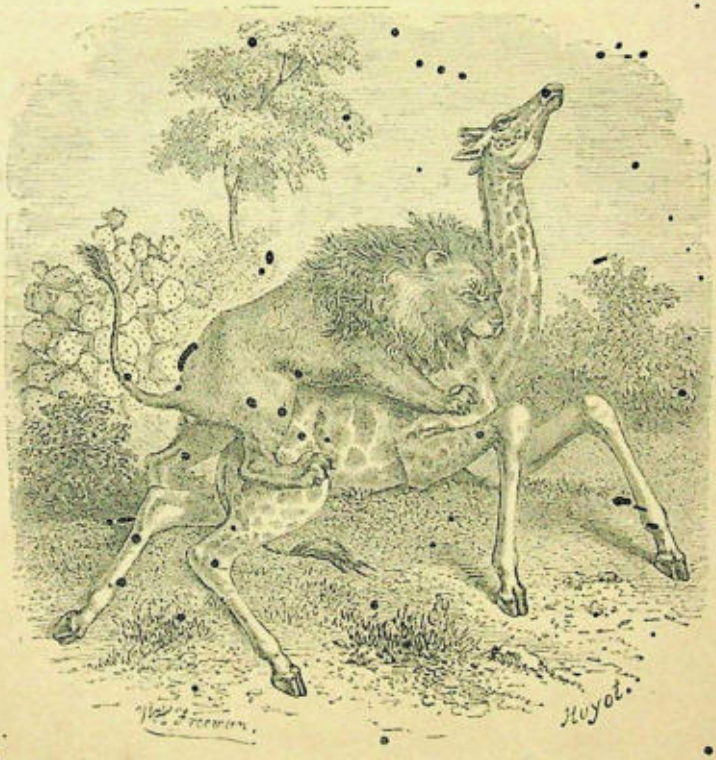
and figured in the sanguinary sports of the Amphitheatre. Assuredly he is the handsomest species of the genus *Equus* (Horse). He is as tall as the Hemionus; his legs are shapely, his mien and bearing full of spirit; he has a well-proportioned head, and a coat of incomparable richness of design, with the skin lustrous, and large black stripes symmetrically arranged over the whole body, on a ground of pure white.

Africa, as I have said above, is the native country of the large

Ruminants. Not less remarkable than the Camel in the fantastic originality of his form, which matches the exquisite richness of his skin, the gigantic *Giraffe* (*Camelopardalis Giraffa*) is distributed over nearly the whole continent south of the Sahara. Sometimes he even ventures into the Desert; but most frequently his long neck and tall legs are seen in the fertile plains of Negroland, the Soudan, the Senegal, and Nubia. "His head," says a popular zoologist, "resembles that of the camel in the absence of a naked muzzle, and in the shape and organization of the nostrils, which are oblique and narrow apertures, defended by the hair which grows from their margins, and surrounded by cutaneous muscular fibres, by which the animal can close them at will. This is a beautiful provision for the defence of the air passages, and the irritable membrane lining the olfactory cavities, against the fine particles of sand which the storms of the Desert raise in almost suffocating clouds. The large, dark, and lustrous eyes of the giraffe, which beam with a peculiarly mild but fearless expression, are so placed as to take in a wider range of the horizon than is subject to the vision of any other quadruped. While browsing on his favourite acacia, the giraffe, by means of his laterally-projecting orbits, can direct his sight so as to anticipate a threatened attack in the rear from the stealthy lion, or any other foe of the Desert. To an open attack he sometimes makes a successful defence by striking out his powerful and well-armed feet; and the king of beasts is said to be frequently repelled and disabled by the wounds which the giraffe has thus inflicted with his hoofs." The lion, however, seldom attacks him unless he can surprise him in a state of repose, when he will leap upon his victim's back and tear him to pieces.

Le Vaillant has justly observed that if precedency among animals were determined by their height, the giraffe would hold the first rank. The most careless observer must be impressed by the enormous length of his fore-legs, and his long tapering neck, which enables him to browse upon the fresh foliage and green young shoots of the loftiest trees; nor can he fail to admire his small and elevated head, his brilliant beaming eyes, and his mildness of aspect. Unusual

as are the animal's proportions, they are not inharmonious, and his appearance is eminently picturesque. When full grown, he measures seventeen feet from the top of the head to the fore-feet. This, however, is a maximum. It should be added that his fore-legs are not so much longer than the hind, but the shoulders are extraordinarily high. The animal's colour is a light fawn, marked with numerous



A LION RENDING A GIRAFFE.

darker spots. His horns consist of two porous bony substances, about three inches long, which form, as it were, a part of the skull.

Several species of antelopes and wild oxen traverse in numerous herds the wide prairies of Africa and Asia. Among the African species, I may name the *Bubalus*, which lives principally in the north-west, and whose keen stout horns, disposed like the prongs of a pitchfork, render him exceedingly formidable; the *Gnu*, or Con-

nochetæ (*Catoblepas Gnu*), which inhabits the wild karoos and hilly districts of South Africa, in migratory herds, and is distinguished by the weird ugliness of his head, with its curved horns, and its beautiful flowing mane, white at the base, and black at the tips; the *Oreas Lanâa*, improperly called the "Cape Eland" (*Antilope Oreas*), a graceful animal, as large as the horse, and five feet high at the shoulder, with straight pointed horns, whose great strength is augmented by a spiral wreath; and the *Oryx* (*Oryx gazella*), Egyptian Antelope, or Pasom, somewhat superior in size to a deer, with horns three feet long, black hoofs and horns, a white head, and neck and upper part of the body of a pale bluish-gray.

Tropical Asia presents but a very small number of Antelopes, properly so called, of which the *Nylghau* or White-footed Antelope (*Portax picta*) is the largest. Its face is long and narrow; its black, round, and pointed horns, though only about seven inches long, are slightly curved forwards; the broad ears are fringed with white hairs; along the top of the deep narrow neck runs a slight mane of black hair, which is continued to some distance down the back; a long hanging tuft of a similar colour adorns the breast. This animal is said to have abounded in the forests between Delhi and Lahore in the days of Aurungzebe, and formed one of the objects of the chase with that "king of kings" during his expedition to Cashmere. The Hindoo name, "Nyl-ghau," signifies "blue ox," which is true of the male, but the female is a pale brown. He is a courageous animal, very difficult to tame; travellers affirm that when attacked he throws himself on his knees, and in this position moves forward, until, suddenly leaping to his feet, he rushes impetuously upon his enemy, and smites him vigorously with his sharp horns.

I must not omit to particularize, among the great Ruminants of the Tropical regions of the Old World, the Buffaloes, or Wild Oxen, which feed in immense troops in the fertile and well-watered prairies. The two African species or varieties which are best known are, the Buffalo of Caffraria, and the Short-horned Buffalo. The former is not confined to the Caffre country, as his name would lead one to suppose;

but ranges as far as Abyssinia. His horns, very wide, and close together at the base, form, above the eyes, a kind of helmet very useful to the animal in pushing aside the bushes that impede his progress. His hair is rough and black over the whole body. The short-horned buffalo has a smooth brown skin, muzzle nearly black, ears large, horns arched and of moderate dimensions.

1. Antelope Gnu. 2. Oreas Lanna (or Eland). 3. Striped or Banded Gnu.

These buffaloes, despite of their ferocious aspect and savage habits, are wholly inoffensive, and in all cases of danger are tempted at first to take to flight; but should they be pressed too closely, or wounded, their irascible and vindictive disposition speedily displays itself. When the negroes hunt the buffalo, says Paul Gervais, they are very careful to attack isolated individuals only, because, in the herds of these animals some will always be found disposed to avenge the death

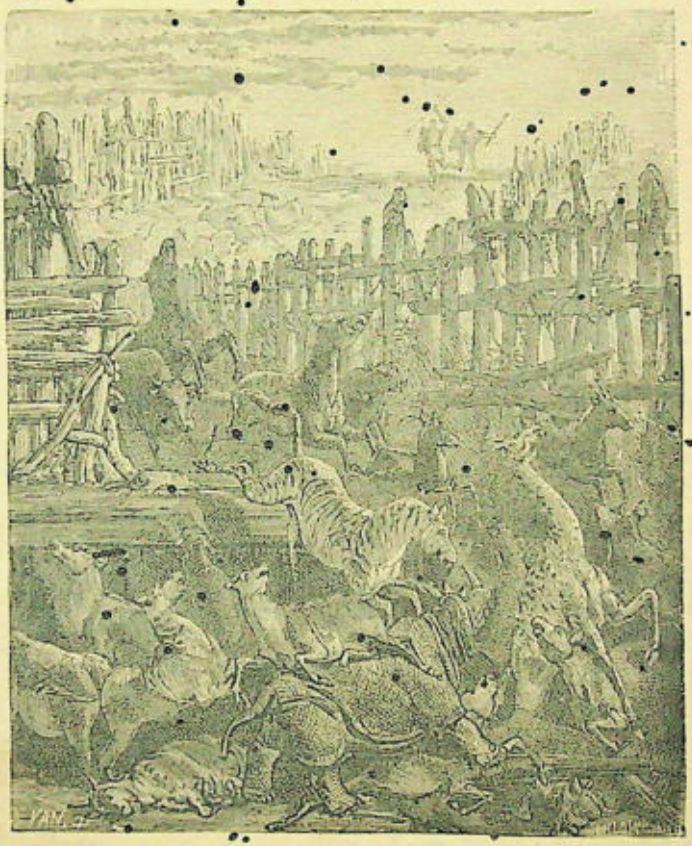
of their companions, and pursue the hunters to the uttermost. In their excesses of fury they strike the ground with their horns; dash their bodies against the trees in which their enemies have taken refuge; sometimes they will spend their rage upon one another, or upon the bodies of those of their kind which have been brought low.

Asia is the home of the Common Buffalo (*Bos bubalus*), and from thence he has migrated into several islands of the Indian Archipelago, Eastern Europe, and even into Italy. In France and Great Britain he has long been domesticated. But there also exist in several Indian provinces some savage species of the *Arnee Buffalo* (*Bos Arni* of Dr. Shaw), easily recognized by his horns of prodigious size and length, which frequently measure six feet in length, and eighteen inches in circumference at the base.

Travellers have asserted that nearly all the herbivora, and in particular the more feeble and timorous, evince a marked preference for open and level places; to such an extent, that the herds of antelopes, gazelles, and zebras may be seen abandoning their pastures when the herbage is unusually luxuriant. It is in the thickets, the matted and almost impenetrable jungles, and among the tall rank grasses, that the beast of prey glides stealthily and unseen upon his intended victim. Where the surface of the ground is smooth and bare, the herbivora can descry an approaching enemy, and take to flight or make ready for defence. It is not, however, the carnaria that they have most cause to dread, but man; not less cruel he than the stealthy lion or the prowling tiger, and far more formidable since European commerce has furnished the savage with firearms. He quickly learns to make use of these; but prior to their introduction into wilderness, prairie, and forest, he had devised against his prey various more or less successful means of destruction.

In Central Africa, for instance, the Bakouain Negroes, to capture *en masse* buffaloes, zebras, giraffes, antelopes, and even rhinoceroses, which gather in crowds around the grateful waters, construct a colossal and all-devouring snare, which they call a *Hopo*.

"This snare," says Dr. Livingstone,* "consists of two very stout and very high fences, approaching each other so as to assume the shape of a V; at the apex of the angle, instead of completely joining them, they are prolonged in a straight line, forming an alley about fifty paces in length, abutting on a ditch which may measure from four to



An African Hopo, or Snare for Herbivorous Animals.

five yards square, and be from six to eight feet deep. Trunks of trees are arranged cross-wise on the borders of this trench, chiefly on the side from which the animals will arrive, and upon the opposite one, by which they will endeavour to escape. These trees form an advanced border above the ditch, rendering flight impossible, and the

* Livingstone, "Missionary Travels and Researches in South Africa."

whole is carefully covered over with reeds, which hide the snare, and make it resemble a trap placed among the herbage. As the two fences are often a mile in length, while the base of the triangle which they define is nearly of the same dimensions, a company who form around the hopo a circle of three to four miles in circumference, by gradually drawing it closer, are certain to collect a great quantity of game. The hunters direct by their cries the animals which they surround, and cause them to reach the summit of the hopo. Men concealed at this point then fling their javelins into the midst of the affrighted herd, which, dashing headlong through the solitary opening it can find, involves itself in the narrow alley leading to the ditch. The animals fall in pell-mell, until the snare is filled with a living mass, which enables the others to escape by passing over the bodies of the victims. The spectacle is horrifying; the hunters, intoxicated by the pursuit, and no longer controlling themselves, strike these graceful animals with a delirious joy, while the poor creatures, crushed to the bottom of the abyss beneath the weight of the dead and dying, raise from time to time the pile of carcasses, by struggling, in the midst of their agonies against the burden which suffocates them."

Of the *corral* in which the Cingalese entraps the elephant, and of the ingenious snares laid by the Malay or the Indian for the murderous tiger, I shall speak hereafter. Between man and the carnivora it was natural that a deadly war should be incessantly waged; but humanity would seem to dictate towards the inoffensive herbivora a less sanguinary hostility.

CHAPTER VIII.

ANIMAL LIFE IN THE PRAIRIES OF THE OLD WORLD, CONTINUED:—THE CARNIVORA.

NEXT to man, the most dangerous enemies of the peaceful herbivora are the great Carnivora of the *Felidæ* genus, in whose first rank zoologists and poets were formerly wont to place the lion.

The so-called "king of animals," however, has of late years lost much of his prestige. Observant travellers have watched him with a jealous and suspicious eye; intrepid hunters have dared to measure themselves against him, and to beard him in his retreats. Our popular heroes suffer greatly by this close examination. Achilles to his Myrmidons, I suspect, was less godlike than he appeared to the warriors of Troy, who saw him only in the rush and tumult of the Certain it is that the researches of modern science have stripped lion of most of the splendid attributes with which romance vested him. Here is a glowing picture:—

> "The lion,
> Who long has reign'd the terror of the woods,
> And dared the boldest huntsman to the combat,
> When caught at length within some hidden snare,
> With foaming jaws he bites the toils that hold him,
> And roars, and rolls his fiery eyes in vain,
> While the surrounding swains wound him at pleasure."—(*Nathaniel Rowe.*)

But the fact is, that with all his prodigious strength, his terrible teeth and claws, his imposing physiognomy and attitudes, he is an animal more prudent than courageous, and very unlike the highly-coloured portrait which Buffon painted. There have not been wanting well-accredited authorities to accuse him of cowardice; as our own countryman Livingstone, and the Frenchman Delegorgue. According to the latter, he is but a nocturnal robber, whom a ray of light disconcerts, or the

barking of dogs, and the shouts of men, women, and children, or a blow from a well-applied whip, will frequently put to flight. Even if provoked, or wounded by man, he will often refuse to fight to the last extremity; or if he accept the challenge, and succeed in harassing his antagonist, he contents himself by breaking a limb or two, by marking his chest with his teeth and nails, after which he leaves him and goes his way. "I have known," says Delegorgue, "an intrepid hunter who, twice in seven years, had been treated in this fashion by a wounded lion; the first encounter cost him two broken limbs; the second, six fractures, without counting the deep scars left by his claws on several parts of the body. Another, named Vermaës, in his daring, was held for more than a minute by a lion, and got quit with four deep marks of his canine teeth; glorious scars, which he showed to me with an air of lively satisfaction." Livingstone records a similar adventure which befell himself with a lion at which he had aimed a couple of shots. The wounded animal turned upon his aggressor, harried him, severely injured an arm, and then directed his wrath against one of the doctor's companions, whom he seized by the shoulder. He intended, in all probability, to administer a similar correction to this individual, when suddenly the two bullets he had received produced their effect, and he fell dead.

These facts prove, at least, that if the lion is not brave he is not malicious, and that the reputation for generosity which he has borne from remote times was not undeserved. It is only in his old age that the lion willingly enters upon a regimen of human flesh, from sheer want of power to obtain any other easily. When a lion is too old, says Livingstone, to provide himself with game by hunting, he frequently enters into the very villages and kills the goats; if, then, a woman or a child go out at night, he makes them equally his prey; and as thenceforth he has no other means of subsistence, he continues to feed himself in this manner. Hence has arisen the saying, that if a lion once tastes human flesh he prefers it to all other kinds. The beasts which attack man are invariably aged lions. When one of them conquers the fear inspired by man so far as to approach a

village and seize the goats, the inhabitants invariably say, "His teeth are worn out, and he will soon kill somebody;" and feeling the necessity of defending themselves, they hunt him immediately.

It is generally believed, on the authority of Buffon, that the lion lives in retirement with his mate, that he hunts in solitary dignity, and will suffer no other carnaria, not even one of his own race, to hunt in his own domain. This is an error. Lions, on the contrary, often assemble in a "hunting-party," four or five in number, when they fly at "high game," such as a buffalo or a giraffe. M. Vardon saw three lions throw themselves at once on a buffalo which he had just wounded with a musket-shot. "During the day-time, in winter," says Delegorgue, "you may frequently see troops of lions, which assemble together for the purpose of marking off and driving the game towards the ravines, or wooded glens difficult of access, where some of their companions are posted; these are strict *battues*, conducted without any noise, the odours of the lions being sufficient to enforce the retreat of the herbivora which they pursue." The lion himself may, in his turn, be chased and tracked with dogs, like a wild boar, a wolf, or a stag; but most frequently the hunters pursue and shoot him on foot, and this is but a pleasure-jaunt for a man of sang-froid, if a good shot, and well acquainted with the animal's habits.

We know that the roar of the lion—that is, of the hungry lion—is considered the most terrible of cries, which inspires all the animals, and even man, with unconquerable dread. It appears, however, that man—to say nothing of his dogs—speedily grows accustomed to it, and that the lion, in his turn, cannot be frightened by the barking of the latter. A very curious fact, remarked by Livingstone, is the singular resemblance of the lion's roar to the cry of the ostrich. "I have carefully inquired," says the great African traveller, "the opinion of Europeans who have heard both. I have asked them if they could discover the least difference between the roar of the one and the cry of the other. They have all informed me that they could not perceive any, at whatever distance the animal might be placed. The voice of the lion, generally, is deeper than the ostrich's; but up to the present

time I have only been able to distinguish it with certainty because it is heard during the day, and the ostrich's during the night."

Lions were formerly common enough in all Southern Asia, Persia, Asia Minor, and even Greece. They long ago disappeared from these countries, and are rarely met with now-a-days in Hindostan. The Indian lion is smaller than his African congener; his mane is shorter and less abundant, and several naturalists signalize him as a distinct species, intermediary between the true African lion and the American puma. There are three varieties of Asiatic lions: the Bengal, the Persian or Arabian, and the maneless lion of Goojerat—the latter confined to a very narrow district. The African "king of beasts" is spread over the entire continent from the Mediterranean to the Cape of Good Hope; but the species includes three kinds: the Barbary lion, with a deep yellowish-brown fur and a full flowing mane; the Senegal, whose fur is of a brighter yellow, and whose mane thinner; and the Cape, of which there are two varieties, one brown, the other yellowish; the former being the fiercer and more powerful animal.

A lion of the largest size measures about eight feet from the nose to the tail, and the tail itself about four feet. The male has usually a thick shaggy mane; the head is large, with rounded ears, and the face covered with short close hair; great strength and muscular force distinguish his conformation; and the tail terminates in a tuft of hair, which is not fully developed until he is six or seven years old.

In Africa the lion has for his fellows the Leopard and the Panther. Many writers at one time confounded these two Felidæ, and even classified them with the Indian tiger. For the vulgar, every great cat with a spotted skin *is* a tiger. But scientific naturalists neither apply this name to the American jaguar nor to other spotted Felidæ of the Old or New World; and it is with difficulty they now agree to recognize in the Leopard and the Panther two ill-defined varieties of the same species. Assuredly they exhibit very marked differences. The Leopard is nearly as large as the lion; his limbs are robust, his head is strong. From nose to tail he measures four feet, his tail is two feet and a half long, and his body so flexible that he

accomplishes the most surprising leaps, and swims, and climbs trees, or crawls along the ground, serpent-like, with admirable ease. Compared with the jaguar and panther of naturalists, he is uniformly of a paler and more yellowish colour, and rather smaller, while the spots on his skin are rose-formed, or consist of several dots partially united into a circular figure in some instances, and in others into a quadrangular, triangular, or other less determinate forms. The lower part of the neck and inner parts of the limbs are white; the spots are continued upon the tail, which is long, and black at the extremity.

THE AFRICAN LEOPARD.

The Panther is larger than the leopard, measuring about six feet and a half from nose to tail, which is itself about three feet long. On his sleek hide the spots are disposed in circles of four or five, with, usually, a central spot in each circle, in which, as well as in his deeper colour, he differs from the leopard. Both are handsome, stealthy, and ferocious animals; supple, agile, and muscular. The leopard (*Felis leopardus*) is a native of Africa, principally ranging

along its western coast and on the confines of the Sahara. The panther (*Felis pardus*) is also an African denizen, though likewise found in Arabia, Persia, and Hindostan. During the day he lurks in the thickets and among the tall grasses, but when the shades of night descend he issues from his lair, and haunts the brooks and pools whither the herbivora resort to quench their thirst. There, upon some rock, he lies in ambuscade, commanding the track pursued by innocent victims, and darting with unerring precision upon the first which presents itself.

Neither leopard nor panther often ventures to assail man. When attacked by him, they seek at first to make their escape, and only turn at bay when escape is impossible. In Java, and some other of the great Indian islands, there exists a black panther, which has gained, it is difficult to say *how*, the reputation of extraordinary ferocity and daring. Sometimes, in the world of man, great reputations are built upon equally slight foundations. He owes his fame to the imagination of the natives, and differs from his congeners in no single respect but the blackish colour of his skin. A skilful naturalist, who was for some years a resident in Java, relates that, while botanizing in the fields and jungles early in the day, he frequently roused the black panthers in their lairs. At first he was somewhat startled by the apparition of an animal of such terrible renown, but seeing him turn tail very quickly on his approach, he soon grew re-assured, and troubled himself no more at these rencontres than if he had met a dog or a cat.

We now come to the most formidable of all the Carnaria: the Tiger, properly so called, or Royal Tiger, whose portrait Buffon has been pleased to paint with his boldest brush and most glowing colours, without any other motive apparently than a love of antithesis, or the artist's desire to give force and effect to a striking picture. He had endowed the king of animals with all the regal qualities his imagination could suggest, and by way of contrast he ascribed to the tiger the lowest and cruellest instincts. He painted him as the Moloch

of the brute creation; the Domitian, Caligula, or Nero of the jungles. He was blood-thirsty, treacherous, cowardly, and hideous. His limbs were too short, his head was too large, he was ill-proportioned; in a word, on the unfortunate beast he poured out all the vials of his satiric wrath.

With this *pièce de fantaisie* it would be curious to contrast the graver and more authentic description of the impartial Daubenton. He asserted that the tiger was very little known to Europeans, and that in France there existed but a single specimen, and that a very badly prepared one, in the "Cabinet du Roi." But we are now better informed, and the tiger, perhaps, up to a certain point, is rehabilitated. Let us take him first in his physical aspect. All travellers agree in describing him as the handsomest of animals. He has not the grave countenance, the majestic attitudes of the lion; but he has all the grace, all the suppleness, all the lively and undulatory movements of the domestic cat. He does not stand so high upon his legs as the lion, and he lacks that full flowing mane which invests the physiognomy of the latter with a human and truly noble air; but all the parts of his head and body, despite of Buffon, are admirably proportioned. Not quite so tall as the lion, and less robust in appearance, he is endowed with a surprising vigour. He can carry off, while in full career, and making the most rapid leaps, the heaviest prey—a kid, for instance, an antelope of full size, even a bull, it is said, and, necessarily, a man. Finally, his skin, symmetrically striped, like a zebra's, with wavy bands of brown and black, on a reddish ground, with the contour of the face, the chin and belly of the purest white, defies all comparison. The stripes of his head, legs, and tail are disposed with irreproachable symmetry in curves of the most graceful character. So much for his physical character; let us pass to his moral.

His appetites, and consequently his manners and instincts, differ but little from those of the other Felidæ, and, in particular, of the lion. While he has a keen love of living flesh and warm blood, he does not scorn to return, under the pressure of hunger, to a dead prey already partially devoured. Like all the carnaria, a sagacious instinct

prompts him to kill in provision for coming as well as for present hunger. This is the reason that Buffon has stigmatized him as "unnecessarily cruel."

"The bound with which he throws himself upon his prey," says an English naturalist, "is as wonderful in its extent as it is terrible in its effects." Pennant justly observes that the distance which it clears in this deadly leap is scarcely credible. Man is a mere puppet in his gripe; and the Indian buffalo is not only borne down by the ferocious beast, but carried off by his enormous strength. If he fails in his spring, it has been said that he will take to flight. This may be true in certain instances; but, in general, far from slinking away, he pursues the affrighted prey with a speedy activity which is seldom exerted in vain. Hence we are led to the observation of Pliny celebrating his swiftness, for which the Roman zoologist has been censured, and apparently most unjustly; nor is he the only author among the ancients who notices his speed. Appian speaks of the swift tiger as the offspring of the zephyr. Pliny, says Pennant, has been frequently taken to task by the moderns for calling the tiger "animal tremendæ velocitatis;" they allow it great agility in its bounds, but deny it swiftness in pursuit. Two travellers of authority, both eye-witnesses, confirm what Pliny says: the one, indeed, only mentions in general his vast fleetness; the other saw a trial between one and a swift horse, whose rider escaped merely by getting in time amidst a circle of armed men. The chase of this animal was a favourite diversion with the great Cam-Hi, the Chinese monarch, in whose company our countryman, Mr. Bell, that faithful traveller, and the Père Gerbillon, saw these proofs of the tiger's speed.

The Latin "tigris" is from a Persian word signifying "swift as an arrow," which we find incorporated in the name of the river Tigris.

The tiger's habits are essentially nocturnal, and almost aquatic. His favourite haunts are the banks of rivers and lakes, not only because he may there pounce upon the herbivora which come to drink, but because he can there satisfy himself with a banquet of fish. To this he is as partial as any European epicure, and in

angling his skill and dexterity are not unworthy of an Izaak Walton. He is the "complete angler" of the carnivorous world! He swims admirably, and in pursuit of his prey never hesitates at the most tremendous "header," so that the Arnee Buffaloes, which traverse immense distances by yielding themselves to the swift river-currents, have more cause to dread his attacks than those of the crocodiles.

Buffon has calumniated the tiger by accusing him of cowardice, while, as we have seen, he has not less grossly flattered the lion by representing him as the perfect type of intrepidity. During the day the tiger, after having supped freely, sleeps in his den; he avoids man, and when aroused by the hunters his first movement is one of flight. But by night or day, if he be an hungered, no obstacle arrests, no peril daunts him; and he pounces upon man as he would upon any other prey. He penetrates into isolated habitations; breaks into the villages, and sometimes even into the towns; seizes the domestic animals in their very stables; men even within the shelter of their own houses; and sometimes devours his spoil upon the spot; sometimes, if he fears pursuit, drags it off to his secret lair.

At Goa, in a butcher's stall, was slain a tiger which had fallen asleep there after gorging himself with food; and in the vicinity of that once famous, but now degraded city, a cross marks the spot where a Portuguese officer, marching at the head of his men, was seized before their eyes by a tiger, and carried off before they could make the slightest effort to save him.

Tigers are found in India, in the Indo-Chinese Peninsula, at Borneo, at Java, and at Sumatra. Civilization has hunted them out of the Celestial Empire, but they are met with in Tartary, even in extremely cold latitudes. The tigers of the North a beneficent Nature has furnished with much longer hair than their congeners of the Tropical zone, and they seem to form a distinct variety of the species. Wherever the tiger exists, war *à l'outrance* is declared between man and him! It is a vendetta which has been handed down from the remotest antiquity, and is as bitter now as in any past generation. Every year hundreds of persons fall victims to

his appetite and his prowess; every year hundreds of his race are shot down by the relentless sportsman, or ensnared and killed by the peasants, whose cattle and whose lives he threatens.

By the Malays and the half-savage Indians who dwell among the Indo-Chinese jungles, he is hunted in the same way that the African negroes hunt the lion and the leopard. When the presence of one of these scourges becomes known in a district, they place some dainty bait on the bank of the river where he drinks and plants himself every night, and they form an ambush among the thickets, taking care to mark the direction of the wind. It is not long before the tiger directs his steps towards the enticing booty, and the hunters' arrows or musket-balls stretch him dead, in most cases, before he can seize it.

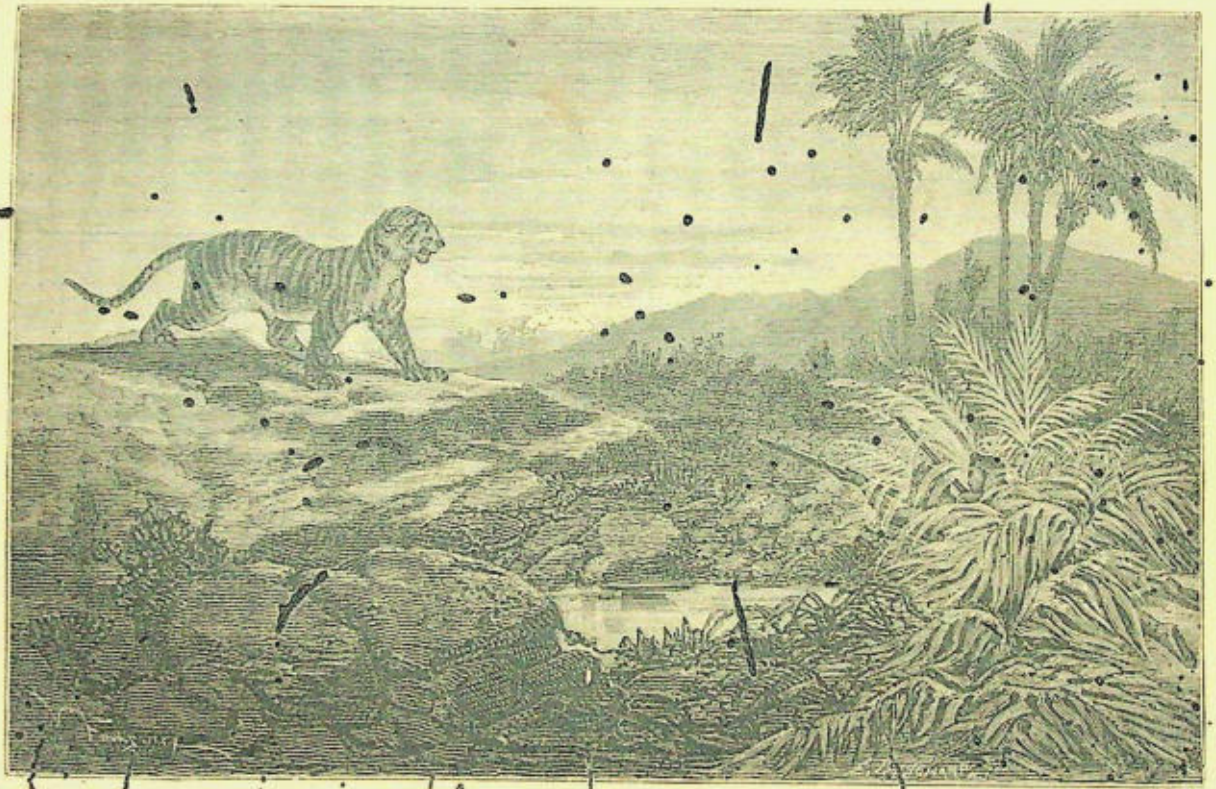
A vast amount of pompous preparation attaches to the tiger-hunt of India. It is a sumptuous expedition, commanded by some distinguished chief—an European officer, a native prince, or a stranger of rank—in which each person has his allotted station and particular duties. Usually the hunters are mounted on elephants, so that the tiger cannot reach them on the back of the colossus, without being arrested by the trunk of the latter or his formidable tusks. Each sportsman provides himself with three or four rifles, besides revolvers and cutlasses. Formerly the Hindu rajahs made use in this chase of arrows and lances, but now they greatly prefer the European weapons. The expedition is never an *impromptu* affair. It is always organized against an enemy whose presence has been discovered in the district, and whose den is pretty well known. The march commences at sunrise, that the beast may be surprised while enjoying his siesta, after the fatigues and the plunder of the night. Suddenly awaking, says Mr. Stocqueler,* he bounds out of the jungle, and is saluted by a discharge which often proves sufficient; but sometimes the animal is safe and sound, or only wounded; then he furiously springs upon the first elephant within his reach. If the hunter has not time to plant a ball in his chest or head, the position of the *mahout*, or

* Stocqueler, "Handbook to India."

driver, is very critical; for, placed on the elephant's neck, he has no other defence than the sharp iron-pointed stick which he uses to guide his colossal steed. Fortunately the hunters are arrayed in a compact mass, and a few well-directed shots terminate the struggle.

The most favourable districts for tiger-hunting, continues Mr. Stocqueler, are those of Goruckpore on the frontiers of Nepaul. Sir Roger Martin relates that in this quarter once reigned a tiger of such ferocity, and so greedy of human blood, that he was the terror of all the "country-side." Once he broke open, in full day-light, the cabin-door of a Taroo; but the native dealt him such a lusty blow on the head with his hatchet that he took to flight, and ever afterwards preserved the mark of the wound, which caused him to be easily recognized, and dreaded all the more. Sir Roger resolved to free the country from this plague; he took the field like a gallant soldier, but slew eight-and-forty tigers before he fell in with the Balafré of ill renown, who defended himself gallantly, and proved no easy victim. Abbye Singh, rajah of Omorah, one of the oldest hunters of the country, slew, it is said, to his own hand more than five hundred tigers; a fact which illustrates their numerousness in the Terae, Nepaul, and Goruckpore. Despite the activity and address of the hunters, they would never succeed in purging the country; but civilization and clearances of the ground are driving the wild beasts inch by inch towards the north, where the hardy amateurs of "sport" must now go in quest of them.

Among the Felidæ of the Old World peculiar to Tropical Asia, I must cite the *Ïnaoudeaon*, distinguished by his woolly and tufted tail, from whence he has received the name of the "Fox-tailed Tiger," and the *Guépard*, or "Maned Leopard," "Hunting Leopard," and "Cheetah." I am inclined to believe that these two varieties really signify one animal; the *Guepardu jubata* of naturalists. "Intermediate in size and shape between the leopard and the hound," says Barnett, "he is slenderer in his body, more elevated on his legs, and less flattened on the fore part of his head than the former, while he



TIGER HUNTING IN THE INDO-CHINESE PENINSULA.

at of the Fennec is for ostrich eggs, which, as he cannot open them th his teeth on account of their size, he breaks by dashing them ainst hard angular stones. He is not only met with at the pe, but in Dongola, Nubia, and the Sahara south of Tunis and Constantina.

I cannot conclude this chapter without alluding to a few of the Carnivora with elongated snout and non-retractile claws, which inhabit the plains of Southern Asia and the great adjacent islands.

AND INDIAN GENET.

The first place [illegible] he *Cuon Bansul*, or Pariah Dog of India, which seems allied to both the Wild Dog, the Wolf, and the Jackal. His eyes are prominent, his skin is of a reddish-yellow, brightest about the head, spotted with black upon the tail. He is a gregarious animal, hunting in large troops, and waging war against hares, gazelles, antelopes. He will even venture to attack the buffaloes. Some varieties of this species range high up on the mountains.

From the order of Carnivora I might also select, in the wild plains in the Old World, more than one curious species for our investigation, if my space permitted me to pass in review the two families of the Viverridæ and the Mustelidæ. To the former belong the famous *Ichneumon*, that assiduous reptile-destroyer which the ancient Egyptians included in their religious *cultus*; the *Genets* (*Viverra genetta*) with their sleek, soft fur, natives of the western parts of Asia, India, and Java; the *Civets* (*Viverra civetta*),

Striped Paradoxure of Java devouring a Crested Goura.

which furnish the commerce of Europe and the East with a once popular scent, to which important medical virtues were attributed; the *Zibeth* (*Viverra zibetha*), a maneless civet, peculiar to Asia as the latter is to Africa, and met with in Sumatra, Borneo, Amboyna, the Celebes, and Hindostan; and, finally, the *Paradoxures* (animals with a fantastic or paradoxical tail), so named by Cuvier because the individual studied by that great naturalist kept his tail constantly coiled up, and inclined on the same side. All these Carni-

deficient in the peculiarly graceful form, both of head and body, which characterizes the latter. His tail is entirely that of a rat; and his limbs, although more elongated than in any other species of that group, seem to be better fitted for strong muscular exertion than for active and long-continued speed." His anatomical structure and general habits are those of the Felidæ, but the fur is crisper. The general ground-colour is a bright yellowish-brown above, lighter on the sides, and nearly white beneath. On the back, sides, and limbs he is marked with numerous black spots, which on the tail are so closely set together that they appear like rings. The cheetah is easily tamed, and trained to the chase; for which purpose, like our stag-hounds, he is bred and employed in Persia and India.

The other families of digitigrade Carnivora, Dogs, Hyænas, Viverras (*Viverra*, Civet), Mustelidæ (*Mustela*, Weasel), are largely represented in the prairies and jungles of the tropical regions of the Old World. Wild dogs, with straight ears, a pendant tail, scanty bristling hair, thin flanks, wander in numerous troops over the plains of Southern Africa, living, like the wolf or the hyæna, by hunting the small quadrupeds and devouring the remains of carcasses abandoned by the greater Carnivora. The jackals, and even the hyænas, range far beyond the limits of the Desert. At the Cape exists a larger and more ferocious species of hyæna than that of the Sahara, from which it differs externally, its skin being marked with spots instead of stripes. Moreover, the disproportion in the height of the fore and hind legs is more marked in this animal than in his North African congener.

At the Cape, also, and in a great part of South Africa, we find another species, the *Hyæna villosa*, or "Sea-Shore Wolf;" distinguished from the preceding by having stripes on the legs, while the rest of the body is of a dark grayish-brown. Allied to the Hyænas is the *Proteles*, or "Aard-Wolf" (*Proteles Lalandii*), an animal nearly as large as a jackal, inhabiting the southern parts of the African Continent. He has the teeth and pointed head of the civits; the

striped fur and stiff bristly hair of the hyænas. The general colour is a yellowish-gray, radiated with transverse stripes of dusky black; the tail is short and bushy. The fore-feet are provided with five toes; the hinder ones with four; all the claws being strong and large. He burrows like a fox, and prowls abroad at night in search of food, which consists chiefly of carrion and small vermin. But it is said that he particularly affects the enormous fatty tail of the

Spotted Hyænas (*Hyæna crocuta*)

African sheep, devouring with avidity the semi-fluid mass, which requires no mastication.

One of the most curious and most graceful of the South African carnaria is the *Fennec*, or *Zorda* (*Megatolis*), a genus of Canidæ, resembling the European fox in form and stature, but his hair of a light brown colour; his muzzle is of extreme fineness, and his eye lively and intelligent; his enormous ears gift him with an extraordinary delicacy of hearing. Every animal has its particular taste, and

ora are of small stature; their short paws are furnished with demi-retractile claws; their body is excessively elongated, and of a worm-like shape; their tail is long and flexible, the muzzle tapering, the fur soft, and of a tawny or reddish colour, with spots or bands of black or brown.

The Mustelidæ are allied to the Viverridæ in their general conformation. Their skin is equally soft, and capable of furnishing a beautiful fur; but its colour is generally uniform. The head is more rounded, the muzzle more obtuse, the tail shorter, than in members of the preceding family. Finally, a great number are plantigrades. These animals are more commonly distributed over the cold regions of the Northern hemisphere than in countries bordering on the Tropics. The genus *Ratel* (*Ratellus mellivorus*), however, is represented both in India and South Africa. The Cape species is celebrated for the havoc it makes among the nests of the wild bees, of whose honey it is singularly fond, and to whose discovery it is assisted by the voice and movements of a bird called the Honey-Guide. It has a rough tongue, short legs, with very long claws, a blunt, black nose, no external ears, a remarkably tough and loose skin, with thick hair. Its colours are ashen gray on the upper parts, and black on the inferior, and its length from the nose to the tip of the tail is forty inches, the tail measuring twelve. The Indian species, differing but little from the African, inhabits Bengal.

CHAPTER IX.

ANIMAL LIFE IN THE PRAIRIES OF THE OLD WORLD:—

BIRDS AND REPTILES.

THE savannahs and marshes of the ancient continent are frequented by birds of great stature: Cursores, Raptores, and Palmipeds. The colossus of the feathered world, the *Ostrich*, which has been aptly

surnamed the Camel-Bird (*Struthio camelus*), inhabits the arid plains of the African interior, and frequently penetrates into the Sahara. The male is of a glossy black, with white on the wings and tail; the female wears an uniformly dusky livery. It is the loose flexible plumes of the male which are so prized for a lady's toilette, and which figure in the crest of the prince of Wales. The female's feathers are of inferior value, and improperly designated in commerce, "vulture-feathers."

The Ostrich lives with his fellows in flocks of some number. He feeds voraciously on grass, grain, young twigs, and will swallow pieces of wood, leather, metal, or any hard substance. In his apparent want of taste he is probably guided by instinct, for these objects are probably useful in promoting the work of digestion. Some travellers have represented him as a stupid animal; but this is an error, for he displays both vigilance and shrewdness in avoiding the attacks of his enemies. The chase of this bird is exceedingly laborious, for though he does not fly he skims the ground, and his wings impel him forward with a velocity which distances the swiftest horse. But neither his speed nor his strength avails against the stratagems of man. The Arab horsemen surround the flock in a circle, which they gradually contract as they advance, until the poor birds are confined in a very narrow area, and dashing madly against one another, fall exhausted with fatigue. They are then slain by a few blows from a stick.

The female lays from ten to twelve eggs in a hole in the sand, she broods over them during the night, occasionally leaving them the hottest part of the day. In procuring the eggs, which weigh about three pounds each, and are reputed a great delicacy, the natives are very careful not to touch any with their hands, as the parent birds would be sure to discover it on their return, and not only discontinue laying any more in the same place, but trample to pieces all those which have not been removed. A long stick is accordingly made use of to push them from the nest.

Another gigantic bird, whose wings are but partially developed, and

those legs are long and robust, the *galeated* or *helmeted Cassowary* (*Casuarius*), is a native of Java and the adjacent islands of the Indian archipelago. His head is surmounted by a sort of osseous crest or horny helmet. In size he is much inferior to the ostrich, not exceeding five feet when erect; but he is robustly built, and of exceeding strength. His plumage is very poorly supplied with feathers, so as to resemble at a little distance, it is said, a coat of coarse or hang-

Le Casoar à casque.

hair. He [illegible] the ostrich; is equally voracious, not more dainty in his food.

At that season of the year when the coming winter in our Northern hemisphere already "casts its shadows before," legions of migratory birds swarm towards the tropical regions of Africa and Asia. Storks and cranes, and aquatic birds, descend upon those vast and genial southern prairies, where they obtain in abundance the precious food denied them in less favoured climes.

A beautiful crane, of ashen plumage, with a shapely ebon-black

neck, and her head adorned with two white tufts of plumes, the "Lady of Numidia," selects for her dwelling-place the eastern and western shores of the African Continent.

The Stork (*Ciconia*) is a cosmopolitan bird which alternately favours with his presence the North of Europe and the Torrid Zone, everywhere discharging with fidelity his useful sanitary mission by destroying myriads of noxious vermin. To kill them was considered by the ancients a foul crime, which could only be fitly punished by death, and the Egyptians included the Stork with the Ibis in their allegorical and mysterious worship. In his migrations he avoids the two extremes of heat and cold, never going farther north than Russia, nor, in winter, further south than the land of the Nile. The White Stork (*Ciconia alba*) is upwards of three feet six inches long. One species, popularly known as the *Marabout*, never quits Africa and the Indies. The name is also applied to the light silken feathers which embellish the wings of the species—one of the ugliest, let me add, created by Nature, with his bald head and neck, his huge beak, and absurdly meditative postures.

The chief of the birds of the shore and river-bank, the Flamingo (*Phœnicopterus*), may merit admiration on account of his dazzling scarlet plumage and handsome bearing. Owing to the great length of his legs and neck he stands nearly five feet high, and measures six feet from the point of the beak to the tip of the claws. The small round head is furnished with a bill nearly seven inches long, which is higher than it is wide, light and hollow, having a membrane at the base, and suddenly curving downwards from the middle. The legs and thighs are singularly delicate and slender. The Flamingoes are timid and suspicious birds; they keep together when feeding, drawn up in artificial array like the lines of a battalion of British infantry, with some of their number planted as sentinels to give notice of the approach of danger. Their voice has a peculiarly deep trumpet-like sound. At the note of alarm they all take to flight, swooping through the air in the form of a triangle.

They are skilful fishers. They wade deep into the water, where their long necks enable them to seize their prey with ease. Their food consists of spawn, insects, and molluscous animals. Owing to their peculiar structure they are both waders and swimmers.

Several of the African Grallatores wage a murderous war against reptiles in the marshes and the meads; a war which claims the gratitude of man, who could never defend himself against their prolific increase and pertinacious attacks. I have already referred to the

ROSE FLAMINGOES (*Phœnicopterus antiquorum*).

Stork; it is needful I should also mention the Ibis, once an object of worship on the banks of the Nile; the Jacana, his long claws armed with sharpened nails that transfix his prey; the formidable-billed Balæniceps, which devours the young crocodiles; and the famous Serpent-Bird of the Cape, belonging to the Grallatores by his legs, to the Raptores by the talons and crooked beak with which he is provided, as well as by the structure of his internal organs. These birds are the allies and protectors of man, as Michelet has shown with characteristic eloquence in his rhapsodical prose poem, "*L'Oiseau*," yet

even these, in their combined efforts, are insufficient against the prolific races of aquatic and terrestrial reptiles, some formidable by their size and strength, some by their subtlety and venom. The narratives of the adventurous men who have not feared to incur

"The moving accidents of flood and field,"

in traversing the wild regions of the Ancient World, are full of striking accounts of encounters with these monsters, and of the miseries they inflict upon the countries cursed with their presence.

"In Afric's sunny clime," flood, and river, and lake are haunted by the loathsome and dangerous Crocodile (*Lacerta crocodilus*), one of the most powerful species of the Saurian race. Though he preys chiefly on fish, his capacious jaws will devour any animal that comes within their reach; and when one reflects that he often attains the length of twenty to thirty feet, that the upper part of his body is clothed with an almost impenetrable scaly armour, that his long, oar-like tail is of immense strength, one can readily comprehend the vast amount of destruction such a monster can effect. Happily his movements on land are impeded by the unwieldiness of his body, which prevents him from turning except with great difficulty, and enables his intended victims to effect their escape. In the water, however, he glides along with great rapidity.

The female deposits her eggs, which are not much larger than those of a goose, in the sand or mud near the banks of the rivers or streams which she frequents. By a beneficent provision of Nature, the young are largely devoured by birds, ichneumons, and other animals, preventing their otherwise rapid increase. The colour of a full-grown crocodile is a blackish-brown above and yellowish-white beneath, the upper parts of the legs and sides being relieved by shades of deep yellow, and in some places tinged with green. The mouth is of vast width, and both jaws bristle with a terrible array of sharp-pointed teeth.

The African species all belong to the same genus, of which the Crocodile of the Nile is the type.

At the Gaboon, the negroes hunt their enemies either with muskets or a kind of harpoon. Their vulnerable points are the attachment of the anterior limbs, and, of course, the eyes. It is here that their assailants endeavour to mark them.* They are killed every day without their number appearing to be sensibly diminished, and, what is singular enough, without their seeming to grow mistrustful. During the heat of the noon, they retire among the reeds and rushes for repose, but never remain long in any one place. At evening and at morning they sally forth in quest of prey. They swim without making any noise, scarcely disturbing the water, which they cleave like dogs; they will also remain motionless on its surface, glancing around them with cruel, dull, sinister eyes. The negro does not feel towards them so great an horror as Europeans experience, who are powerfully affected by their exceeding hideousness. They eat their flesh, with which their huge bony skeleton is scantily furnished, and, according to Du Chaillu, can never obtain enough of the much-prized delicacy.*

The Indian Crocodile, the *Gavial* or *Gavial* (*Crocodilus Gangeticus*), is of the same size as his African congener, but easily distinguished by the peculiar conformation of his mouth; the jaws being remarkably straight, long, and narrow. The sides of the head are straight and perpendicular, the upper surface quadrilateral; and the mandible, instead of sloping gradually from the forehead, sinks suddenly to follow a straight and almost horizontal direction. The teeth are nearly double in number those of the Nilotic monster, but he is far less dangerous, and feeds only on fish. There are two species: the Gavial of the Ganges, found in all the great rivers of Southern Asia; and the Gavial of Schlegel, belonging exclusively to the island of Borneo.

Serpents of every size, venomous and non-venomous, multiply in the jungles, marshes, and woods of all tropical countries. Africa and Asia are abundantly provided with them. In Senegal they are all, or mostly all, inoffensive, and the objects of devout worship on the part of the negroes of Dahomey; but naturalists have not yet determined their respective genera. It is certain, however, that they do

* Du Chaillu, "Travels in Equatorial Africa."

not all belong to the same species. In size, says the French traveller, Dr. Répin, they vary from three to ten feet. Their head is large, flattened, and triangular; the neck not quite so large as the remainder of the body; in these respects resembling the entire host of *Ophidia*. They vary in colour from a bright yellow to a yellowish-green, according perhaps to their age. Most of them are marked upon the back, for their whole length, with two brown lines, while a few are irregularly spotted. The long and prehensile tail, and the facility with which some of them climb, would refer them probably to the genus *Leptophis* of Duméril and Bibron. At Whydah, these divinities are lodged in a temple shaded by lofty and beautiful trees. This curious edifice is described as a kind of rotunda, from thirty to forty feet in diameter, and from twenty-two to twenty-five feet high. Its walls, constructed of sunburnt clay, are pierced, like those of the Dahomean houses, by two opposite gates, affording free ingress and egress to the deities of the place. The roof, formed of branches curiously interlaced and covered with a layer of dried grass, is constantly tapestried with a myriad serpents. Some climb or descend by writhing round the trunks of trees arranged for this purpose along the walls; others, suspended by the tail, balance themselves indifferently in the air; others, again, lie coiled up in spiral folds on the ground or among the grasses of the temple roof. They never want for nourishment; the devout supply them with constant renewals of food, and in such abundance, that the priests, who, moreover, exercise the double profession of sorcerers and doctors, are in no greater peril of starvation than their gods!

The spotted serpents of which Dr. Répin speaks may possibly be no other than *Pythons*, those gigantic Ophidians of the tropical regions of the Old World which are found in Africa, in India, in the Indian Archipelago, and even in Australia. It should be noted, however, that their size generally exceeds that of the largest serpents which Dr. Répin saw at Whydah. Their length is from fifteen to twenty-five feet—specimens have been met with measuring thirty—and their maximum diameter ranges from ten to twelve inches.

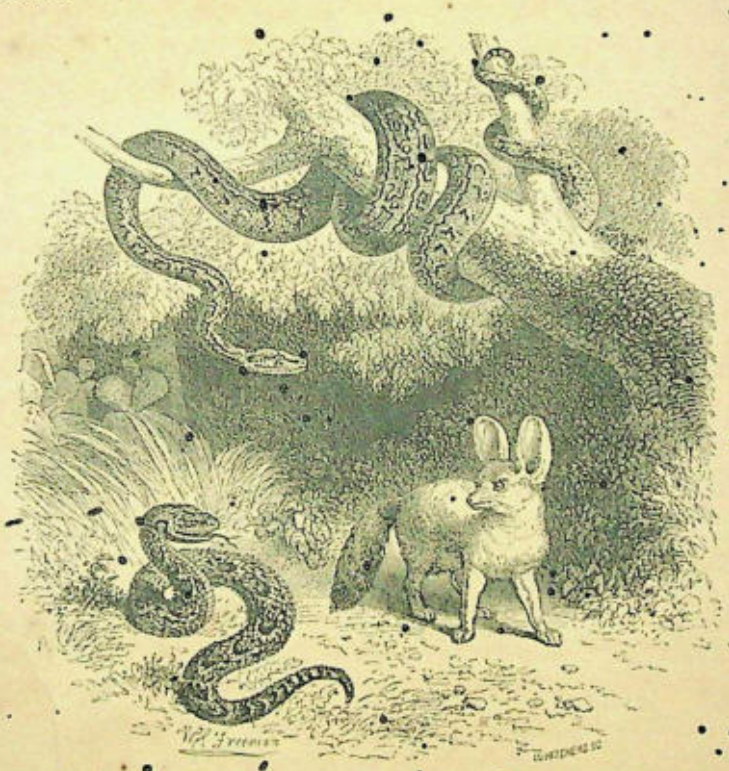
Their back is variegated with large spots, whose form, colour, and disposition differ according to their species. The tail is short, and not prehensile. Their favourite haunt is the low marshy ground, rank with moist herbage, where they prey upon birds and small animals, swallowing them whole—swallowing them even alive—after having seized them in the invincible folds of their long sinuous bodies, and always commencing with their hinder parts. So greedy a repast must necessarily be followed by a slow and difficult digestion, and cannot be renewed at any very brief interval. They eat in effect but once a month, or once in two months. During the lethargic and semi-somnolent condition which invariably follows their debauch, they fall easy victims to the attacks of their enemies. The principal African species of this genus are, the Python of Seba, of Central Africa, and the Royal Python of Senegambia.

The species peculiar to Asiatic climes is the Python Molure, a native of the Indian Peninsula, and of the islands of Java and Sumatra. The Python of the Sunda Islands, called by the natives *Ular-Sawa*, attains the length of fully thirty feet. It has a large flat head, of a bluish-gray colour, a thick yellowish muzzle, and cylindrical neck. Its body is marked with deep-blue spots, with a yellow or tawny border; its yellow tail with blue rings. Its ordinary habitat is the rivers; it feeds on rats and birds, but also pursues, when ashore, the largest animals.

We are indebted to Dr. Livingstone for much curious information respecting the serpents of South Africa, and especially in reference to the *Striking Echidna*, a singularly formidable viper, which the negroes designate *Picakolou*. He tells us that he killed one day a reptile of this species, which was of a deep brown colour, verging on black, and measured seven feet and a half in length.* These reptiles possess so abundant and deadly a venom, that when one of them is attacked by a band of dogs, the first dog bitten dies immediately; the second, five minutes afterwards; the third, at the end of an hour; and the fourth, after a more or less lengthened agony. A great

* Dr. Livingstone, "Missionary Travels and Researches."

number of beasts is annually destroyed by the Picakolous; the fangs of an individual killed at Kolobeng distilled poison for several hours after its head had been severed from its body. It is probably this plentiful secretion which the natives call "the serpent's spittle," and which leads them to suppose that the Picakolou is endowed with a power of injecting it into its enemies' eyes when the wind is favourable.



Python Molure. Echidna, or *Picakolou*. Fennec (*Megalotis*).

Other venomous species exist in this part of Africa, of which several are vipers, and among others the Puff-Adder (*Vipera inflata*). The natives have named it *Noga-Poutsane*, or the Goats' Serpent, because it makes at night a bleating exactly resembling that animal. There were certainly no goats, says Livingstone, in the place where I happened to hear it. The natives suppose that by this bleating it

hopes to deceive the traveller, and draw him within its reach. Some species emit, when they are frightened, a peculiar odour, strong enough to indicate their presence when they have found their way into the huts. There are also several varieties of Cobras (the *Naja-Haje* of Dr. Smith). When they are attacked, they raise their head a foot from the ground, extend their neck in a threatening manner, dart their tongue to and fro with extreme rapidity, while rage glares in their fixed and glassy eyes.

Different serpents of the genus *Dendrophis*, as, for example, the Green Climber (*Bucephalus viridis*), scale the trees in search of birds and their eggs, to which they are curiously partial. The Bucephalus is armed with fangs; nevertheless it is not venomous, and these fangs, which turn inwards, are only of use in preventing the retrogression of their prey, only one part of which is enclosed between its jaws.

The Cobra or Naja (*Vipera naja*), the "Hooded Snake" and "Spectacle Snake" of the English, the "Cobra de Capella" of the Portuguese, must be classed among those serpents which are the most dangerous through their violence, and the subtle character of their venom. It is easily recognized by its faculty of dilating the back and sides of the neck, under the influence of fear or rage, to which it owes its popular appellation; the elevated skin of the back of the neck presenting much the appearance of a hood (*capella*). It is usually three or four feet in length; of a pale reddish-brown colour above, and bluish or yellowish-white below; with a characteristic mark on the back of the neck closely resembling the figure of an old-fashioned pair of spectacles. It is a sluggish creature, and easily killed, but its poison is of the most fatal quality, causing death within two hours. It frequents the purlieus of human residences in India, and occasionally penetrates into the very houses, attracted apparently by the domestic poultry, and by the humidity of the wells and drainage. In Ceylon, the natives, if journeying abroad by night, carry a small stick with a loose iron ring, whose strange metallic sound, as they strike it on the earth, frightens the cobra from their path. The poison is harmless if taken internally. It is secreted in a large gland

in the serpent's head, and flows, when the animal compresses its mouth on any object, through a cavity of the tooth into the wound.*

The Indian species plays a conspicuous part in the displays of the Hindu jugglers, who exercise a strange power over them by the tones of their voice and the sounds of various musical instruments, compelling them to rise partially from the ground and go through a succession of fantastic movements. Something of this power is also due to the fascination of the juggler's eye. Serpent-charming is of remote antiquity in Egypt and in most Oriental nations, where the profession would seem to be hereditary. Several allusions to it occur in Holy Writ.†

CHAPTER X.

ANIMAL LIFE IN THE PRAIRIES OF THE NEW WORLD:—HERBIVORA, INSECTIVORA, AND CARNIVORA.

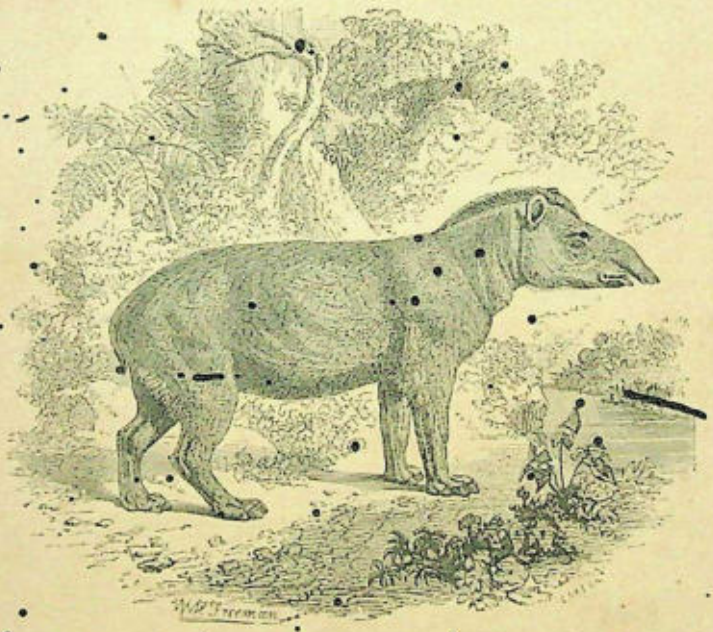
WE have seen that the order of Pachydermata, which furnished the Ancient World with the most gigantic species of the terrestrial creation, is represented in the New World by comparatively insignificant types: the Tapir and the Peccary. The first, although far inferior in stature to the elephant, the rhinoceros and the hippopotamus, is, nevertheless, one of the largest American Herbivora; the bison, llama, and stag alone exceeding it in size.

Two species are distinguished, which both inhabit South America,—the *American Tapir* and the *Tapir Pinchaca*. The former is about as large as a mule or an ass. His skin is black, covered with rough brown hair. He has a long bowed neck, legs and feet resembling those of the hog, and a nose prolonged into a kind of trumpet. He feeds on leaves and many kinds of fruit, and sometimes does much

* F. Buckland, "Curiosities of Natural History."

† As in Jer. viii. 7; and Psalm lviii. 4, 5.

injury in the mandioca fields of the Indians. His flesh is very good eating, and considered exceedingly wholesome. It is even reputed to be a remedy for the ague. A very shy and timid animal, he wanders about principally at night. "When the Indian discovers a feeding-place," says Mr. Wallace,* "he builds a stage between two trees, about eight feet above the ground, and there stations himself soon after dusk, armed with a gun, or with his bow and arrow. Though such a heavy animal, the tapir steps as lightly as a cat, and can only be heard approaching by the gentle rustling of the bushes; the



American Tapir (*Tapirus Americanus*).

slightest sound or smell will alarm him, and the Indian lies still as death for hours, till the animal approaches sufficiently near to be shot, or until, scenting his enemy, he makes off in another direction." When compelled to stand at bay, however, he defends himself with extraordinary vigour. D'Azara assures us that if the jaguar flings himself upon the tapir, the latter will drag him onward and onward

* Wallace, "Travels on the Amazon and Rio Negro."

through the densest bushes, until, torn cruelly by the thorns and brambles, he is constrained to let his would-be victim escape.

The *Tapir Pinchaca* appears to be confined to the region of the Cordilleran table-lands. The name "Pinchaca," bestowed on the species by M. Roulin, is that of a fabulous animal mentioned in the traditions of New Grenada. It is distinguished from the former species by the absence of those lateral folds on the snout and occipital ridge to be remarked in the American Tapir, by its long thick hair—which, however, does not form a mane on the neck—and by a white mark at the extremity of the lower jaw.

The *Peccaries* are the wild boars of Tropical America. They are smaller than those of the Old World; have fewer teeth, and their tail is rudimentary. They live in numerous herds, and not only defend themselves energetically against aggressors, but when the latter have grown fatigued, assume the offensive, and pursue them with incredible fury. Hunting them, therefore, is for man, no less than for the jaguar, a dangerous adventure. When one of them has been seized by the latter, or slain by the former, the herd combine in pursuit of the murderer, and if he does not succeed in escaping them by a rapid retreat, or by opposing some insurmountable obstacle to their headlong career, he is infallibly torn to pieces.

The genus *Horse*, or, to adopt the new nomenclature, the family of *Equidæ*, are altogether wanting in the American Fauna; that is, in the native indigenous Fauna of the New World. Previous to the era of Spanish Conquest, America did not possess a single species analagous to the horse, the onagra, the hemionus, the zebra, or the quagga; and the reader of the animated pages of Prescott or Arthur Helps will remember with what terror the Peruvians as well as the Mexicans regarded the mounted cavaliers of Pizarro and Cortez. The horse, however, when introduced by Europeans, multiplied rapidly in the Savannahs, where he soon became wild, and breeding with the ass, produced the mule, which, in the Spanish-American States, as in the mother-country, is now the most useful auxiliary of man. The European ox is likewise acclimatized over the entire extent of the

HUNTER PURSUED BY PECCARIES

w continent; and immense herds of the latter species, ogether troops of horses and mules, people the Llanos and Pampas of th America, where the first conquerors had only met with herds stags (*Cervus Mexicanus*), llamas, and cobiais.

The *Llamu*, or *Guanaco* (*Auchenia llama*), and his congeners, the ma and the Alpaca (*Auchenia*), are now only found among the es of the Andes, their native country, to which they have re-ted before the restless advance of man. In describing them I ll freely avail myself of Dr. Von Tschudi's interesting notices.*

The Llama measures from the sole of the hoof to the top of the head, four feet six to eight inches; from the sole of the hoof to the shoulders, from two feet eleven inches to three feet. The female is usually smaller and less strong than the male, but her wool is finer and better. A great variety of colour prevails; the more general is brown, with shades of yellow or black; frequently speckled, but very rarely quite white or black. The speckled brown llama is, in some districts, called the moromoro

The burden carried by this useful animal, the camel of the New World, should not exceed from one hundred to one hundred and twenty-five pounds. If the load be too heavy, he lies down, and no force or persuasion will induce him to resume his journey until the excess be removed. In the silver mines his utility is very great, as he frequently carries the metal from the mines in places where the declivities are so steep that neither asses nor mules can keep their ng. His abstemiousness is remarkable, and he will not feed uring the night.

"A flock of llamas journeying over the table-lands," says Dr. Von chudi, "is a beautiful sight. They proceed at a slow and measured e, gazing eagerly around on every side. When any strange object res them, the flock separates, and disperses in various directions, and arrieros have no little difficulty in re-assembling them. The Indians very fond of these animals. They adorn them by tying bows of nbons to their ears, and hanging bells round their necks; and before

* Dr. Von Tschudi, "Travels in Peru" (London, 1847).

loading, they always fondle and caress them affectionately. If, during a journey, one of the llamas is fatigued and lies down, the Indian kneels beside the animal, and addresses to it the most coaxing and endearing expressions. But notwithstanding all the care and attention bestowed on them, many llamas perish on every journey to the coast, as they are not able to bear the warm climate."

When resting they make a peculiar humming noise, which, if it proceed from a numerous flock and is heard at some distance, resembles a concert of Æolian harps.

The flesh of the llama is spongy, and not agreeable in flavour. Its wool is used in manufacturing coarse cloths.

The Alpaca (*Auchenia*), or Paco, is smaller than the llama. It measures only three feet three inches from the lower part of the hoof to the top of the head, and to the shoulders two feet and a half. In form it resembles the sheep, but has a longer neck and a more graceful head. Its fleece is very long, in some parts four or five inches, and exquisitely soft. Its colour is usually either white or black, but in some few instances is speckled. Of its wool the Indians weave their blankets. It is also exported to Europe, and especially to England, in large quantities, though since the alpaca was naturalized in Australia, through the patriotic exertions of Mr. Ledger, England has begun to obtain a supply from her great and thriving colony.*

The alpacas are kept in large flocks, which graze, throughout the year, on the green and level heights, and are driven to the huts only at shearing-time. Their shyness is very great, and at the approach of a stranger they take to rapid flight. Their obstinacy is remarkable. If one of these animals should be separated from the flock he will throw himself on the ground, and neither force nor persuasion will induce him to rise; he will frequently suffer the severest punishment rather than go the way his driver wishes. Few animals seem to stand in such urgent need of the companionship of their species,

* It was introduced into England by the Earl of Derby in 1836. An alpaca factory, covering eleven acres, was erected at Saltaire, near Shipley, Yorkshire, by Mr. Titus Salt, in 1852, and is now the largest establishment of its kind in the world.

d it is only when brought to the Indian huts very young that they be separated from their flocks.

The largest animal of this tribe is the Huanacu or Guanaco. He asures five feet from the bottom of the hoof to the top of the head, d three feet three inches to the shoulders. So nearly does he resemble e llama in form that, until very recently, zoologists supposed the tter to be an improved species of the huanacu, and that the huanacu was neither more nor less than a wild llama. But there are specific differences between them. The huanacu is of a uniform reddish-brown colour on the neck, back, and thighs. The under part of the body, the middle line of the breast, and the inner side of the limbs are of a dingy white. The wool is shorter and coarser than that of the llama, and of nearly uniform length on all parts of the body. The huanacus assemble in small herds of five or seven, and if taken very young may be tamed, but can with difficulty be trained as beasts of burden.

The Vicuña is a more beautiful animal than either of the preceding. His size is a medium between that of the llama and alpaca. He measures four feet one inch to the top of the head, and two feet six inches to the top of the shoulders. He is distinguished by his longer and shapelier neck, by the superior fineness of his short curly wool. The crown of the head, the upper part of the neck, the back, and thighs are of a peculiar reddish-yellow hue, which the natives call *color de vicuña*. The lower part of the neck and the inner parts of the limbs are of a bright ochreous colour, and the breast and lower part of the body white.

During the wet season the vicuña browses on the scanty vegetation of the Cordilleran ridges. He never ventures up to the bare rocky summits, for his hoofs, being accustomed only to the yielding sward, are very soft and tender. He lives in herds, consisting of from six to fifteen females, and one male, who is the protector and leader of the herd, and who, while the females graze, stands a few paces apart, carefully watching over their safety. At the approach of danger he gives a signal, consisting of a kind of whistling sound and a

quick movement of the foot. Immediately the herd draws close together, each animal stretching out his head in the direction of the impending alarm. Then they take to flight; first moving leisurely and cautiously, but quickening their pace to the utmost degree of speed; whilst the male vicuña, who covers the retreat, occasionally halts to observe the motions of the enemy. The females reward his devotion by the warmest affection and fidelity, and will suffer themselves to be killed or captured rather than desert him.

The mode in which the Indians hunt the vicuña is sufficiently curious. In the *Chacu*, as it is termed, the whole company, seventy or eighty in number, proceed to the Attos—the most secluded districts of the Peruvian mountains—which are the animal's favourite haunts, with an abundant supply of rope and cord, and numerous stakes. Selecting a spacious open area, they drive the stakes into the ground in a circle, at intervals of from twelve to fifteen feet apart, and connect them together by ropes fastened at the height of two or two and a half feet from the ground. The circular space within this enclosure measures about half a league in circumference; an opening of about two hundred paces in width is left for entrance. On the ropes which are carried round the stakes, the Indian women hang pieces of coloured rag that flutter gaily in the wind.

The chacu being thus made ready, the Indians, who are mounted on horseback, range over the country within a circuit of several miles, driving before them all the herds of vicuñas they encounter, and forcing them into the chacu. When a sufficient number is collected, they close the entrance. The timid animals do not attempt to leap over the ropes, being affrighted by the fluttering rags, and when thus secured, the Indians easily kill them with their *bolas*.

These bolas consist of three balls, composed either of lead or stone; two of them heavier than the third. They are fastened to long elastic strings, made of twisted sinews of the vicuna, and the opposite ends of the strings are all tied together. The Indian holds the lightest of the three balls in his hand, and swings the two others in a wide circle above his head; then, taking his aim at the distance of

about fifteen or twenty paces, he lets go the hand-ball, whereupon all three whirl in a circle, and cling round the object aimed at. The aim is usually directed at the animal's hind legs, and the cords twisting round them, he is unable to move. Great skill and long practice are required to throw the bolas dexterously; a novice in the art incurs the risk of dangerously hurting either himself or his horse, by not giving the balls the proper swing, or by letting go the hand-ball too soon.

1. Guanaco. 2. Llama. 3. Vicuña.

The vicuñas, after being secured by the bolas, are killed; their skins belong to the Church, and their flesh, which is tenderer and better flavoured than that of the llama, is distributed in equal portions among the hunters.

Under the dynasty of the Incas, the Peruvians rendered almost divine worship to the llama and his congeners, adorning the temples with large figures of these animals fashioned in gold and silver."

Dr. Von Tschudi, "Travels in Peru."

If the natives of the South American continent possess neither the Ox nor the Sheep, they have at least a precious resource in the Bison, and the Musk Ox, or Ovibos. Of the latter I shall speak when my survey brings me to the colder regions of North America.

The Bison is wholly confined to the great prairies of this continent, which he traverses from north to south, and reciprocally, in his periodical migrations. According to some naturalists, he is a variety of the Aurochs, the fierce wild bull that formerly tenanted the forests of Gaul, Germany, and Sarmatia, and is still found in the densely-wooded districts of Moldavia, Wallachia, Lithuania, and Caucasia. Herds of Aurochs (*Bos Bison*), under the special protection of the Russian Emperor, and believed to number fully eight hundred animals, still roam in the depths of the great Lithuanian forest [illegible]Bialowieza. The American genus commonly called Buffalo, but [illegible] be confounded with the buffaloes of the Old World, occurs as far as the Great Martin Lake, in latitude 63°, and congregates in [illegible] less thousands on the wide undulating prairies between the Mi[illegible] and the Rocky Mountains. Their flesh is supposed to supp[illegible] provision some 300,000 Indians, who pursue them on horseb[illegible] kill them with bow and arrow, spear or rifle. The cha[illegible] and has proved a great attraction to the more adventu[illegible] the New World. It is exciting because it is perilous, [illegible] animal will often turn upon his adversary, and in speed [illegible] the swiftest horse. He finds a formidable enemy in [illegible] Hunting in packs of one or two hundred, the latter fli[illegible] upon two or three solitary bisons, and, surrounding the[illegible] huge brutes to death. Never have they courage enough, however, to attack a herd, though the latter, when they catch sight of wolves, manifest the greatest alarm, form into battle array, and are only prevented by excess of terror from taking to flight. This panic-stricken feeling the Indian often turns to his advantage. He clothes himself in the skin of a white wolf, and with bow and arrows in his hands, boldly faces a herd, crawling towards them on his hands and knees; the affrighted buffaloes press closely together to receive the supposed

wolf, who, on arriving at a convenient proximity, suddenly springs to his feet, and utters an unearthly yell. They fall into a frenzy of terror which enables him to select several victims.

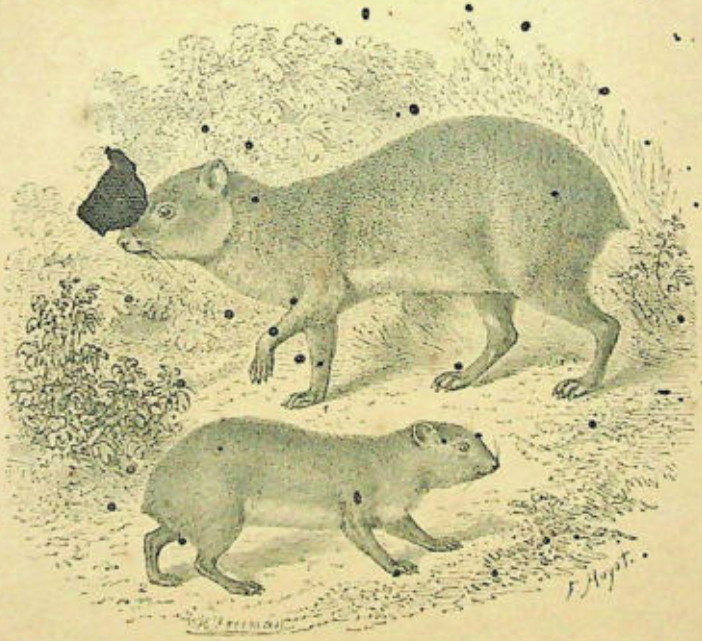
The Indians also capture great numbers by setting fire to the ss of the prairies; the flames compel them to retire to the centre, ere they are easily slain. Or they endeavour to throw them into anic of alarm, in which case they seem possessed with a sudden dness, and, if driven towards a precipice, will dash themselves head- g over it, falling crushed and bleeding into the chasm beneath.

The American bison is similar to the European, but his tail and bs are shorter; the horns are shorter and more blunt; the tail has r vertebræ; and the mane is fuller and shaggier. His flesh is excellent eating, having a flavour like that of veni[illegible]. The tallow forms an important article of trade, one bull s[illegible]nes yielding 150 pounds. The skins are much used by the Indians for blankets, d when tanned they employ them as coverings for their beds and wams. Spread upon frames of wicker-work, they make admirable es. The long hair or fleece, of which a male bison yields six to ht pounds, is spun and woven into cloth.

The favourite nourishment of the bison, says Humboldt, is the *Tripsacum dactyloides*, called "Buffalo-Grass" in North Carolina, nd a species of trefoil, resembling *Trifolium repens*, which Burton as named *Trifolium bisonicum*. It is remarkable, he continues, hat the Buffalo, or Bison of the North, has exercised an influence pon geographical discovery in the mountainous regions where no road is laid down. Assembled in herds of several thousands, and seeking a milder climate, they migrate at the approach of winter into the countries situated south of Arkansas. Their massive form and size render it difficult for them to cross the mountains; and, conse- quently, wherever the traveller finds a track beaten out by numerous hoofs—a "buffalo-path," in fact—he may confidently adopt it as the most convenient route for himself and his steed. In this manner have been discovered the best passes in the Cumberland Mountains, the Rocky Mountains, from the sources of the Yellow-Stone to the

River La Plata; and, finally, from the southern branch of the River Columbia to the Rio Colorado of California.

The animals which we most frequently meet with in the Steppes of South America are the small spotted Stag (*Cervus Mexicanus*); mailed Armadillos; some species of Tatous, which glide like rats in the burrows of the hares; troops of indolent Cobiais; of Civ agreeably striped, but infecting the air with their emanations; the great maneless Lion, the Jaguar or American Tiger, wh



1. Agouti. 2. Capybara.

strength is sufficient to slay the young bulls and carry them off to the summits of the hills.

The *Cervus Mexicanus* wanders in numerous troops in the grassy Llanos of the Caraccas. He is only spotted while young; and varieties completely white have been discovered. On the slopes of the Andes he is never found at a greater elevation than 1600 to 1900 feet. At 3000 feet he is replaced by a much larger variety, slightly differing from the European stag.

wolf, who, on arriving at a convenient proximity, suddenly springs to his feet, and utters an unearthly yell. They fall into a frenzy of terror which enables him to select several victims.

The Indians also capture great numbers by setting fire to the ss of the prairies; the flames compel them to retire to the centre, ere they are easily slain. Or they endeavour to throw them into anic of alarm, in which case they seem possessed with a sudden dness, and, if driven towards a precipice, will dash themselves head- g over it, falling crushed and bleeding into the chasm beneath.

The American bison is similar to the European, but his tail and bs are shorter; the horns are shorter and more blunt; the tail has er vertebræ; and the mane is fuller and shaggier. His flesh is excellent eating, having a flavour like that of veni[illegible]. The tallow forms an important article of trade, one bull s[illegible]nes yielding 150 pounds. The skins are much used by the Indians for blankets, d when tanned they employ them as coverings for their beds and wams. Spread upon frames of wicker-work, they make admirable es. The long hair or fleece, of which a male bison yields six to ht pounds, is spun and woven into cloth.

The favourite nourishment of the bison, says Humboldt, is the *Tripsacum dactyloides*, called "Buffalo-Grass" in North Carolina, nd a species of trefoil, resembling *Trifolium repens*, which Burton as named *Trifolium bisonicum*. It is remarkable, he continues, hat the Buffalo, or Bison of the North, has exercised an influence pon geographical discovery in the mountainous regions where no road is laid down. Assembled in herds of several thousands, and seeking a milder climate, they migrate at the approach of winter into the countries situated south of Arkansas. Their massive form and size render it difficult for them to cross the mountains; and, conse- quently, wherever the traveller finds a track beaten out by numerous hoofs—a "buffalo-path," in fact—he may confidently adopt it as the most convenient route for himself and his steed. In this manner have been discovered the best passes in the Cumberland Mountains, the Rocky Mountains, from the sources of the Yellow-Stone to the

The Rodents of the genera Capybara, Agouti, and Paca, are widely diffused over the plains of Tropical America. Of the three, the Capybara (*Hydrochærus capybara*) is the largest. He attains the size of a sheep, has a voluminous head, small round ears, eyes large and black, a thick divided nose flanked by formidable whiskers, a short neck, a thick body covered with short, coarse, russet hair, and short legs; altogether, *not* a "thing of beauty." Like the peccary, he is tailless, and in a manner web-footed, being thus adapted for a semi-aquatic life.

These great Rodents, says the illustrious author of "The Origin of Species," in one of his earlier works,* are generally called "*Carpinchos;*" they occasionally frequent the islands in the mouth of the Plata, where the water is quite salt, but are more abundant on the borders of fresh-water lakes and rivers. In the day-time they either lie among the aquatic plants, or openly feed on the turf plain. When viewed at a distance, from their manner of walking and colour, they resemble pigs; but when seated on their haunches, and attentively watching any object with one eye, they re-assume the appearance of their congeners, the Cavies. Both the front and side view of their head wears quite a ludicrous aspect, from the great depth of their jaw.

The Capybara leads no joyous life apparently, for in the water he is perseveringly pursued by the crocodile, and in the plain by the jaguar. He runs so awkwardly as to be easily caught by hand, and the South Americans profess to relish his flesh.

The Paca (*Cœlogenys*) differs from the Capybara in the complex structure of his molar teeth. He inhabits the woody regions of South America, where he is generally found in the vicinity of water, concealing himself in burrows so near the surface, that the pedestrian's foot often intrudes within them. His form is thick and clumsy, spotted with white on the sides, and intermediate in size and appearance between a hog and a hare.† He is about a foot in height and

* Dr. Darwin, "Journal of a Naturalist" (Voyage of the Beagle, 3rd Vol.)

† H. W. Bates, "The Naturalist on the River Amazons."

two feet in length, with hind limbs much longer than the fore, but considerably bent. The claws are thick, strong, and conical; the eyes large, prominent, and of a brownish hue; the ears nearly naked, and whiskers rigid. The paca is heavy and corpulent, but swims and dives with remarkable agility. As he feeds only on fruits and tender plants, his flesh is exceedingly savoury, and a staple dish in many parts of America. His burrow is provided with three apertures, and his capture is managed by closing up two of these, and digging up the third.

The Agouti (*Dasyprocta Agouti*) is another South American Rodent, about one-third the size of the Paca; he swims, but does not dive. He has sometimes been named "the rabbit of the South American continent," but differs from it in many essential points and really belongs to the *Cavidæ*, or guinea-pig tribe. He possesses the voracious appetite of the hog, and devours indiscriminately everything that comes in his way. He conveys his food to his mouth with his fore-paws, like a squirrel, and as he has long hind legs, runs, or rather leaps, with considerable swiftness. He is hunted very perseveringly on account of the devastation he causes among the sugar-canes. There is a larger species called the *Mara*, or Pampas Hare (*Dasyprocta Patachonica*), which will wander for miles away from its home.

Among the most interesting Rodents of the New World must be classed the Vizcacha and the Chinchilla, whose furs are so highly valued. The Vizcacha, or Bizcacha (*Calomys bizcacha*), somewhat resembles a rabbit, but his teeth are larger, and he has a long tail. He lives, it is said, on roots, and never wanders far from his burrow. His flesh, when cooked, is very white and savoury. The Chinchilla (*C. lanigera*) inhabits the cold mountain-valleys, where his close, fine gray fur is an invaluable protection. He is a pretty animal, much like the rabbit, but with a squirrel's tail; of a mild and sociable disposition; and living with his kind on the most amicable terms.

Nor must the Beaver be forgotten, the most industrial animal of

the Rodentia, which has wholly disappeared from Europe, and is yearly growing scarcer in America.

The Beaver (*Castor fiber*) is specially recognizable by his broad horizontally-flattened tail, which is of a nearly oval form, but slightly convex on its upper surface, and covered with scales. His hind feet are webbed, and together with the tail, which acts as a rudder, propel him through the water with ease and swiftness. His length, exclusive of his tail, which measures one foot, is about three feet; colour, a deep chestnut; hair, very fine, glossy, and smooth. The incisor teeth are large, and so hard, that the North American Indians used them in fabricating their horn-tipped spears and cutting bone, until iron tools were introduced from Europe.

The sagacity with which he constructs his habitation has long been a theme of eulogy, and has furnished moralists with many an apt image and pregnant illustration. Water is the necessity of his life. It is indispensably necessary that the stream near which the animal lives should never run dry; and to prevent so dire a misfortune, he is gifted with an instinct which teaches him to keep the water at or about the same mark, by building a dam across the channel.

In order to comprehend the art with which this dam is constructed, we must watch the beaver at his patient toil.*

When the animal has fixed upon a tree which he believes suitable for his purpose, he sits upright, and with his chisel-like teeth cuts a bold groove completely round the trunk. He then widens the groove in exact proportion to its depth, so that when the tree is nearly cut through, it somewhat resembles the "contracted portion of an hour-glass." When this stage has been reached he looks anxiously at the tree, and views it on every side, as if to measure the direction in which it should fall. Having settled this question, he goes to the opposite side, and with two or three powerful bites cuts away the wood, so that the overbalanced tree comes to the ground.

* Rev. J. G. Wood, "Homes Without Hands."

The beaver next proceeds to cut it up into lengths of about a yard or so, employing a similar method of severing the wood. The next part of the task is to make these rounded and pointed logs into a dam. For this purpose the logs are laid horizontally, and covered with stones and earth until they can resist the force of the water. Vast numbers are thus laid; and, as fast as the water rises, fresh materials are added, being obtained mostly from the trunks and branches of trees which have been stripped of their bark by the beavers.

In those places where the stream runs slowly the dam is carried straight across the river; but where the current is strong, a convex shape is given to it, so as to resist the force of the rushing water. The dam is frequently of great size, measuring two or three hundred yards in length, and ten or twelve feet in thickness. In many localities the streams have been diverted by these erections into entirely different channels.

It is in this manner that the beavers keep the water to the required level; we must next see how they make use of it. They build their houses close to the water, and communicating with it by means of subterranean passages, one entrance of which passes into the house, or "lodge," as it is technically named, and the other into the water, so far below the surface that it cannot be closed by ice. It is, therefore, always possible for the beaver to gain access to the provision stores, and to return to its house, without being perceived from the land.

"The lodges," says Mr. Wood, "are nearly circular in form, and much resemble the well-known snow-houses of the Esquimaux, being domed, and about half as high as they are wide—the average height being three feet, and the diameter six or seven feet. These are the interior dominions, the exterior measurement being much greater, on account of the great thickness of the walls, which are continually strengthened with mud and branches, so that, during the severe frosts they are nearly as hard as solid stone. Each lodge will accommodate several inhabitants, whose beds are arranged round the walls."

There is no animal, however, whose sagacity can foil human

ingenuity. The trappers, who hunt the beaver for the sake of his fur, and the peculiar odoriferous secretion called *castor*, are more than a match for all his artifices. Not even in winter-time is he safe from their pursuit. Striking the ice smartly, they judge from the sound whether they are near an aperture; and as soon as they are satisfied, cut away the ice and stop up the opening, so that the beavers, if alarmed, may not escape into the water. They then proceed to the shore, and by repeated soundings trace the course of the beavers' subterranean passage, which is sometimes eight or ten yards long, and by closely watching the different apertures invariably catch the inhabitants. While thus engaged, they must be careful not to spill any blood, as in case of such a mishap the rest of the beavers take alarm, retreat to the water, and cannot be captured. The trappers entertain a superstitious notion, which leads them to remove a knee-cap from each beaver and throw it into the fire.

The beavers generally quit their huts in the summer-time, though one or two of the houses may be tenanted by a mother and her young family. Those old beavers which are free from domestic ties take to the water, and swim up and down the stream in bachelor-like liberty until the month of August, when they return to a settled life. There are, also, certain individuals called by the trappers "*les paresseux*," or "the idlers," which do not live in houses, and construct no dam, but dwell in subterranean tunnels like those of our common water-rat. They are always males; gay young bachelors, with no incentives, we will suppose, to an industrious career. Neither in the beaver nor in the human world, however, does idleness prosper, for the capture of "les paresseux" is a comparatively easy task.

South America is the home of those singular Edentate Mammals, with scaly shields, which the natives call *Tatous*, but which are better known to Europeans by the name of *Armadillos* (*Priodonta gigas*). Cuvier has divided the whole genus into five groups, distinguished from one another by the number and form of their teeth and claws:—"Cachecames," "Apars," "Encouberts," "Cabassous," and "Prio-

dontes." Their general characteristics, however, are the same, and to describe one is virtually to describe all.

The body of the Armadillo has been invested by nature with a complete suit of armour: thus the head is protected by an oval or triangular plate, the shoulders by a large buckler, and the haunches by a similar buckler; while between these solid portions intervenes a series of transverse bands, or zones of shell, which accommodate this coat of mail to the various postures of the body; the tail also is covered by a series of calcareous rings, so that the animal exhibits a peculiar and somewhat ungainly appearance. Like the hedgehog, he can roll himself up into a ball, and present a solid impervious substance to the attacks of any adversary. The interior surface of the body, not covered by the shell, is clothed with coarse scattered hair, some of which also emerge between the joints of the coat of mail.

This strange quadruped, like a mediæval knight,—

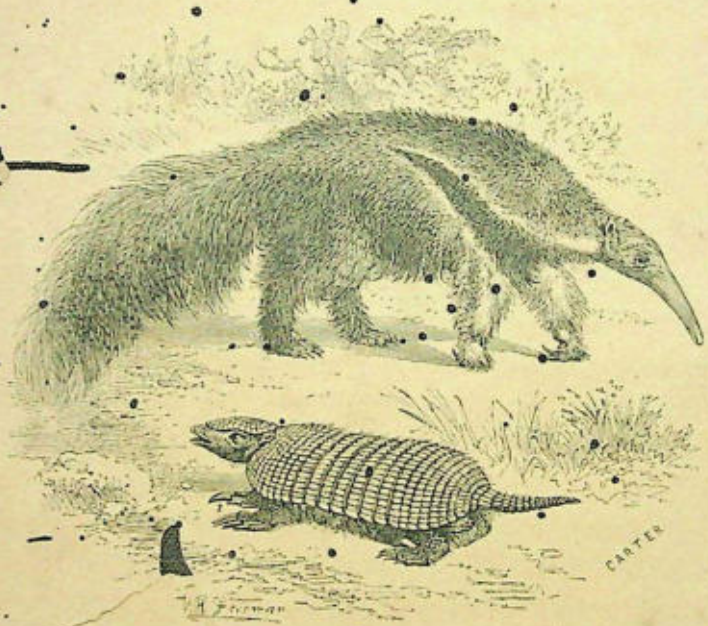
"In armour sheathed from top to toe,"—

has a rather pointed snout, long ears, short and thick limbs, and stout claws. Nature has thus fitted him by a peculiarly admirable organization for those habits of burrowing, which he performs with such astonishing rapidity that it is almost impossible to capture him by digging. His hunters therefore smoke him out of his subterraneous lair; as soon as he reaches the surface he rolls himself up, and is easily taken prisoner. He is then roasted in his shell, and devoured with avidity, his flesh being as great a dainty to a South American Indian as turtle to a London alderman.

By the side of the armadillos we may place another individual of the Edentata, not less strange in form: this is the *Tamanoir*, or Great Ant-Eater (*Myrmecophaga jubata*), which feeds exclusively on ants, digging open their hills with his powerful crooked claws, and drawing his long flexible tongue, covered with viscous saliva, lightly over the myriad insects that immediately sally forth to defend their homes.

"The habits of the Myrmecophaga jubata are now pretty well

known. It is not uncommon in the drier forests of the Amazons valley. The Brazilians call the species the *Tamanduá bandeira*, or the Banner Ant-Eater; the term banner," says Mr. Bates,* "being applied in allusion to the curious coloration of the animal, each side of the body having a broad oblique stripe, half gray and half black, which gives it some resemblance to a heraldic banner. It has an excessively long, slender muzzle, and a warm-like extensile tongue. Its jaws are destitute of teeth. The claws are much elongated, and



1. Armadillo Loricata. 2. Ant-Eater.

its gait is very awkward. It lives on the ground, but all the other species of this singular genus are arboreal. I met with four species altogether. One was the *Myrmecophaga tetradactyla*, or Little Ant-Eater; the two others, more curious and less known, were very small kinds, called *Tamanduá-i* (*Myrmecophaga tamandua*). Both are similar in size—ten inches in length, exclusive of the tail—and in the number of the claws, having two of unequal length to the anterior

* H. W. Bates, "The Naturalist on the Amazons," pp. 112, 113.

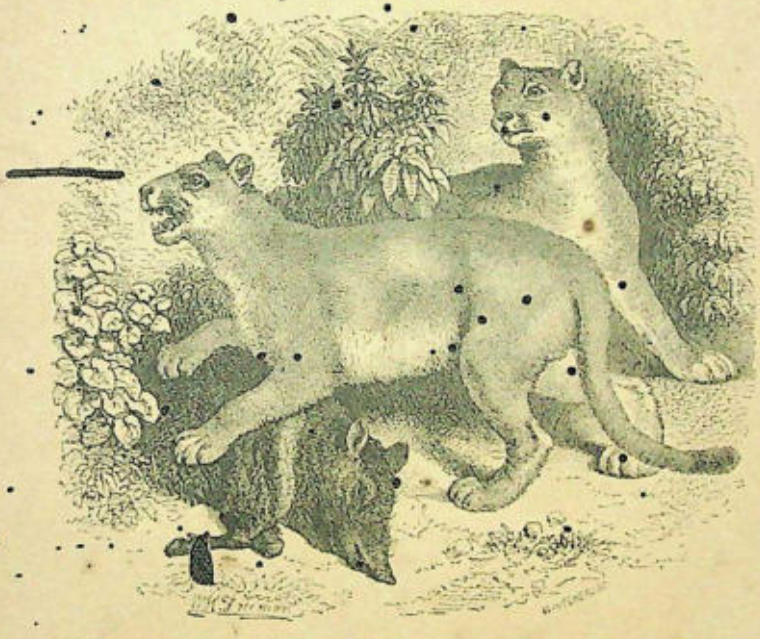
feet, and four to the hind feet. One species is clothed with grayish-yellow silky hair; this is of rare occurrence. The other has a fur of a dingy brown colour, without silky lustre. One was brought to me alive, having been caught by an Indian clinging motionless inside a hollow tree. I kept it in the house about twenty-four hours. It had a moderately long snout, curved downwards, and extremely small eyes. It remained nearly all the time without motion, except when irritated, in which case it reared itself on its hind-legs from the back of a chair to which it clung, and clawed out with its fore-paws like a cat. Its manner of clinging with its claws, and the sluggishness of its motions, gave it a great resemblance to a sloth. It uttered no sound, and remained all night on the spot where I had placed it in the morning. The next day I put it on a tree in the open air, and at night it escaped. These small Tamanduás are nocturnal in their habits, and feed on those species of termites which construct earthy nests, that look like ugly excrescences on the trunks and branches of trees. The different kinds of ant-eaters are thus adapted to various modes of life, terrestrial and arboreal."

In Tropical America the most remarkable representatives of the Carnivora are two great species of Felidæ: the Puma, or Cougouar (*Felis concolor*), also called the Lion of America; and the Jaguar, or Ounce (*Felis onca*), sometimes distinguished as the American Tiger.

The Puma measures about five feet from nose to tail; the tail alone measuring two feet and a half. His colour is a brownish-red, with small patches of deeper tint, only shown up by certain lights; the breast, belly, and inner flanks are of a reddish ash; the lower jaw and throat entirely white; the tail of a dusky ferruginous tinge, tipped with black. As he grows older, however, his general colour becomes a silvery fawn. He has no mane. His manners—that is, his habits and disposition—are rather those of the panther than the lion. He climbs trees with cat-like expertness, whether in chase of birds, or to secure a vantage-point from which he may pounce upon some unsuspecting victim. He never attacks the larger quadrupeds, confining himself to such "small deer" as young calves, colts, and

sheep. Men, children, dogs—these he suffers to pass by unmolested. His depredations are nocturnal. When domesticated, he may well be likened to the common cat, and he shows his pleasure at being caressed by the same kind of gentle purring. But he is a ferocious animal, and will kill fifty sheep or more in order to drink their blood.

A much more formidable animal is the Jaguar. In size and strength he is but little inferior to the tiger. He has a large and rounded head; his pliant body is marked on the back with long



Couguars, or Pumas.

uninterrupted stripes, on the legs and thighs with full black spots; his ground colour is a pale brownish-yellow; his legs are short, thick, and robust. He extends his ravages over all Central and South America, and over a considerable range of the northern continent. Like the tiger, he loves the shade of hot swampy jungles, the neighbourhood of the river and the lake. He generally preys on animals of domestic origin, which have grown wild in the prairies and the pampas, but he will also attack the bisons, and the other herbivora.

Fish, too, he does not disdain to eat; and in default of other food, will even seize upon the caïmans. It is rare that he attacks man; but if attacked by him, he defends himself courageously, and his muscular strength renders him exceedingly formidable. Not even an Ajax could maintain a combat with him as Fitz-James fought with Roderick Dhu, when—

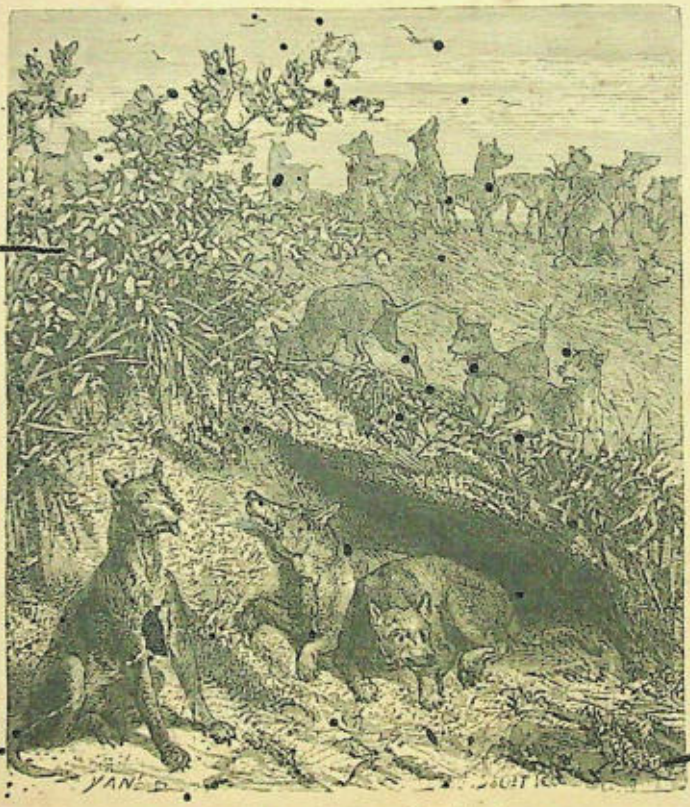
"Foot, and point, and eye opposed,
In dubious strife they darkly closed;"

Bison attacked by a Jaguar.

if man would win, he must arm himself with bow and arrow, keen spear, or unerring rifle. The hunter, thus provided, pursues him with restless animosity to obtain his fur, which is much esteemed in commerce, where it is improperly designated by the names of "Great Panther," and "American Tiger."

According to Humboldt, the Pampas are colonized with dogs grown wild, which gather in great numbers in subterranean caverns, and oftentimes, when stimulated by hunger, fling themselves upon man, in whose defence they originally displayed their courage.

In North America there exists a very curious species of Rodents, belonging to the sub-genus *Spermophilus*, or *Spermatophilus*—that is, "grain-eaters." They are better known by the hunter's name, "Prairie Dogs." Mr. Murray remarks that it is difficult to say *why* they obtained such an absurd appellation, for they do not bear the slightest resemblance to the canine species, either in formation or



Prairie Wolves (*Arctomys Ludovicianus*).

habits.* "In size," he says, "they vary extremely but in general they are not larger than a squirrel, and not unlike one in appearance, except that they want his bushy tail; the head is also somewhat rounder. They burrow under the light soil, and throw it up round the entrance to their dwelling like the English rabbit; on this little

* Hon. C. A. Murray, "Travels in North America."

mound they generally sit, chirping and chattering to one another, like two neighbour gossips in a village. Their number is incredible, and their cities (for they deserve no less a name) full of activity and bustle. I do not know what their occupations are; but I have seen them constantly running from one hole to another, although they do not ever pay any distant visits. They seem on the approach of danger always to retire to their own homes; but their great delight apparently consists in braving it, with the usual insolence of cowardice when secure from punishment; for, as you approach, they wag their little tails, elevate their heads, and chatter at you like a monkey, louder and louder the nearer you come; but no sooner is the hand raised to any missile, whether gun, arrow, stick, or stone, than they pop into the hole with a rapidity only equalled by that sudden disappearance of Punch, with which, when a child, I have been so much delighted in the streets and squares of London."

Captain Murray observes that as there is generally neither rain nor dew on the plains which they inhabit, during the summer, while, on the other hand, these little creatures never wander far from their "towns," it seems reasonable to conclude they need no other liquid than they can extract from the grass they eat. It is certain that they pass the winter in a complete state of lethargy and torpor, for they accumulate no supply of provisions against that season; while the herbage which thrives about their habitat dies up in autumn, and soon afterwards the frosts render it impossible for them to procure their ordinary food. When the prairie dog feels the approach of his time of somnolence—generally about the end of October—he closes all the passages of his dormitory to protect him from the cold, and wholly resigns himself to the pleasures of repose. He remains thus immured and inert until awakened by the first warm airs of spring, when he throws wide his gates and reappears on the surface of the refreshened earth, in all his whilome liveliness and gaiety.

CHAPTER XI.

ANIMAL LIFE IN THE PRAIRIES OF THE NEW WORLD:— BIRDS AND REPTILES.

We have seen in a preceding chapter that the great terrestrial and aquatic birds ("Waders") of the wild plains of the Ancient World have few analogues in America, and that the small number of genera which are represented therein are represented by much smaller species. I have cited the Ostrich and the Phenicopterus. The American Ostrich, or Nandou (*Rhea*), is not above half the size of his African congener, from which he differs in having the feet three-toed, and each toe armed with a claw. Moreover, his head and neck are more fully clothed with plumage; the wings are plumed, and more perfectly developed; and he is tailless. The neck has sixteen vertebræ. Though endowed with more perfect wings than the Ostrich of Africa, he is nevertheless incapable of flight, representing another grade in Nature's slow ascent from the wingless bird to the bird possessed of full powers of flight. He inhabits the wide grassy plains of South America below the Equator, and as far south as latitude 42°. He is never seen across the Cordilleras, but roams in great numbers the banks of La Plata and its tributaries. He is generally seen in small troops.

There are at least three species: the *Rhea Americana*, about five feet high; the *Rhea macrorhyncha*, distinguished by its large bill; and the *Rhea Darwinii*, the smallest, which inhabits Patagonia.

The Flamingoes proper to the New World are: the Red Flamingo, all whose plumage glows with a more or less vivid red; and the Fiery Flamingo, probably only a variety of the preceding. Both are natives of the dreary Patagonian desert, of Chili, and some other southern districts.

The order of Waders, and that of Palmipeds, include, in the low

marshy levels of this continent, some characteristic species: notably, the Jacanas and the Kamichis; the Agami or Trumpet-Bird, remarkable for its pastoral instinct, its domestic aptitudes, and the ringing sound of its voice; the Savacou, which, in the structure of its enormous beak and its general habits, is allied to the African Balæniceps. Here, as in Africa, a species of rapacious Grallator flourishes, the *Cariama*, delivering "a war to the knife" against the reptile legions. Raptores more accurately defined—such, for example, as the *Falco cachinnans*, or Laughing Vulture—share in the destructive campaign against frogs, toads, lizards, and small serpents. And in the New, as in the Old World, Nature does not neglect the work of purification, intrusting it in the savannahs and the pampas to various kinds of Vulturidæ, which devour the putrid carcasses that would otherwise pollute the atmosphere. The *Cathartes-Urubu* and the *Aura* are the most common species; the Mexicans call them *Zopilotes*. They are found in all Central and Southern America, and frequently range to very high latitudes. They are of small size, very social, easy familiarized with man, and may be seen in great numbers, not alone in the deserts and plains, but in the great towns, where they efficiently play the part of great sanitary reformers. They are gifted with extraordinary delicacy of scent; they detect the existence of carrion at great distances, and flock from the four quarters of heaven to banquet upon it. The *Sarcoramphus Papa*, or "King of the Vultures," a species closely allied to the great Condor of the Andes, is likewise encountered very frequently in the plains of Tropical America, but only where the herbage has been set on fire; which is a common enough occurrence, either through lightning, or by accident or design on the part of the Indians. Then he arrives on rapid pinion to prey upon the lizards, and frogs, and serpents which are destroyed by the scathing and consuming flames. His attire is more elegant than his mission in creation would seem to render necessary. The plumage on the upper part of the body is of a reddish hue, the neck and head of a delicate bluish violet, the beak red, the crest orange, the eyebrows white, and the wings black. He is about the

size of the domestic Turkey. The tawny *Caracara*, a bird of the genus *Polyborus*, as large as the common Kite, and with a tail nine inches long; and the *Harpy Eagle* (Thrasaëtus), distinguished by its formidable beak and legs, its erect crest and flashing eyes—both widely distributed in all the hot regions of the New World—belong to the *Falconidæ* family (in the latest classification), as well as the great white-headed Fishing Eagle, or Pygargue (*Haliaëtus Leucocephalus*), which inhabits the northern continent. The latter has been elo-

1. Cathartes-Urubu. 2. King of the Vultures.

quently described by the Paisley ornithologist, the celebrated Wilson: *—"Elevated on the high dead branch of some gigantic tree that commands a wide view of the neighbouring shore and ocean, he seems calmly to contemplate the motions of the various feathered tribes that pursue their busy avocations below; all the winged multitudes that subsist by the bounty of this vast liquid magazine of Nature. High over all these hovers one whose action instantly

* A. Wilson, "American Ornithology."

arrests his attention. By his wide curvature of wing and sudden suspension in the air, he knows him to be the Fish Hawk, settling over some devoted victim of the deep. His eye kindles at the sight, and, balancing himself with half-opened wings on the branch, he watches the result. Down, rapid as an arrow from heaven, descends the distant object of his attention, the roar of his wings reaching the ear as he disappears in the deep, making the surges foam around. At this moment, the eager looks of the eagle are all ardour, and, levelling his neck for flight, he sees the fish hawk emerge struggling with his prey, and mounting in the air with screams of exultation. These are the signals for our hero, who, launching into the air, instantly gives chase, and soon gains on the hawk; each exerts his utmost to mount above the other, displaying in these rencounters the most elegant and sublime aërial evolutions. The unencumbered eagle rapidly advances, and is just on the point of reaching his opponent, when, with a sudden scream, probably of despair and honest execration, the latter drops the fish; the eagle, poising himself for a moment, as if to take a more certain aim, descends like a whirlwind, snatches it in his grasp ere it reaches the wafer, and bears his ill-gotten booty silently away to the woods."

A similar picture, let me add, has been painted by the poet Spenser, though he refers, of course, to the British Eagle:—

> "Like to an eagle, in his kingly pride,
> Soaring through his wide empire of the air
> To weather his broad sails, by chance has spied
> A goshawk, which hath seizèd for her share
> Upon some fowl that should her feast prepare.
> With dreadful force he flies at her again,
> That with his voice which none endure or dare
> Her from the quarry he away doth drive,
> And from her griping pounce the greedy prey doth rive."

The *Reptilia* are represented in America by a very great number of species, many being remarkable for their great size or the terrible venom with which they are provided. The crocodiles of the American continent form a distinct genus, sometimes designated *Alligator*, and

sometimes *Caiman*. The Alligators, or Caimans (*Alligator lucius*), are Saurians of huge bulk; with a long flat head, thick neck and body, a cavernous mouth suggestive of infinite voracity, dull cruel eyes, and a long taper tail, which, strongly compressed on the sides, is surmounted with a double series of strong plates, that unite about the middle, and form a single row to the extremity. It is this tail that gives them most of their progressive power in the water, and though it obstructs their movements on land, it is useful even then as

ALLIGATORS, OR CAIMANS.

a powerful weapon of defence. Transverse rows of square bony plates, rising in the centre into keel-shaped ridges, protect the body, and render the hideous animal exceedingly formidable as an antagonist. It frequently attains the length of eighteen, and is seldom less than fifteen feet. Its teeth are numerous, sharp, and strong; its claws long and tenacious. It feeds generally on fish, turtle, fowl, or whatever other prey may fall within its reach; and woe to the unfortunate animal that comes to the river-bank in quest of water within the range of this ferocious saurian.

The caiman never attacks man if his intended victim is on his guard, but he is cunning enough to know when this may be done with impunity. Mr. Bates records an affecting instance. The river Amazons at Caiçara had sunk one season to a very low point, so that the port and bathing-place of the village now lay at the foot of a long sloping bank, and a large caiman made his appearance in the shallow and muddy water. "We were all obliged," says our traveller,* "to be very careful in taking our bath; most of the people simply using a calabash, pouring the water over themselves while standing on the brink. A large trading canoe, belonging to a Barra merchant, arrived at this time, and the Indian crew, as usual, spent the first day or two after their coming into port in drunkenness and debauchery ashore. One of the men, during the greatest heat of the day, when almost every one was enjoying his afternoon's nap, took it into his head whilst in a tipsy state to go down and bathe. He was seen only by the Suiz de Paz (Justice of Peace), a feeble old man who was lying in his hammock, in the open verandah at the rear of his house on the top of the bank, and who shouted to the besotted Indian to beware of the alligator. Before he could repeat his warning the man stumbled, and a pair of gaping jaws, appearing suddenly above the surface, seized him round the waist and drew him under the water. A cry of agony was the last sign made by the wretched victim. The village was aroused; the young men, with praiseworthy readiness, seized their harpoons and hurried down to the bank; but of course it was too late, a winding track of blood on the surface of the water was all that could be seen. They embarked, however, in light boats, determined on vengeance; the monster was traced, and when, after a short lapse of time, he came up to breathe, one leg sticking out from his jaws, was dispatched with bitter curses."

In the temperate regions of North America, where crocodiles still exist, these animals pass the entire winter in lethargic torpor. In the Pampas of tropical America, on the contrary, it is during the hot season that they remain inert in the mud of the dried-up marshes.

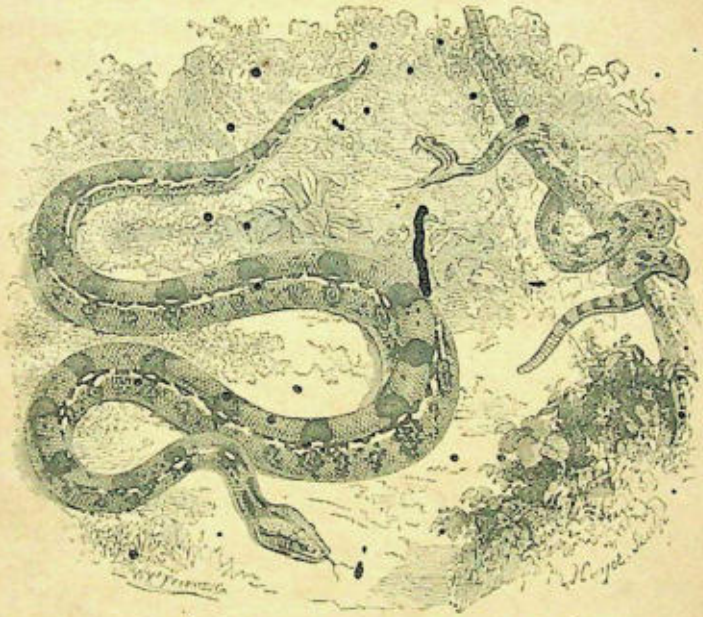
* H. W. Bates, "The Naturalist on the Amazons."

According to the statements of the natives," says Humboldt, "you may sometimes see, on the return of the rainy season, the humid clay slowly uplifted and loosened in great clods. A violent detonation soon makes itself heard, and the earth is flung up into the air to a great height, as in eruptions of small mud volcanoes. If you understand the cause of this phenomenon you will quickly take to flight, for from this retreat immediately emerges a monstrous water-serpent or plated crocodile, which the first shower has awakened from his lethargy." The great water-serpent here spoken of is, in all probability, the gigantic Boa-Constrictor, one of the most dangerous denizens of the marshy plains of equatorial America. Travellers of unimpeachable authority assert that this frightful reptile often attains the length of thirty-six to forty-five feet. Day and night he lurks among the tall rank herbage; in the morning and the evening he places himself in ambush on the border of some lake or water-course to surprise the quadrupeds which flock thither to quench their thirst. By means of his prehensile tail he suspends himself to a tree on the shore, and patiently awaits the coming prey. When an animal passes within his reach, he swiftly seizes it, enfolds it in his spiral coils, crushes it against the tree which serves for his *point d'appui*, compresses its bleeding mass into a convenient form, covers it with a glutinous saliva, and swallows it. In this fashion the boa will devour a stag or even an ox entire, nor does he fear to attack the puma and the jaguar. Whether he is dangerous to man may reasonably be doubted; his immense size, at all events, renders it easy to avoid him. He preys upon fish in default of other provision, and to catch his victims often remains for a considerable time with his head and a portion of his body plunged under water.

The true scourges of tropical America and the Antilles are the *Rattlesnake* and the lance-headed *Viper*.

The Rattlesnake (*Crotalus horridus*) is one of the deadliest of venomous serpents, is frequently six feet in length, and as thick as a man's leg. But Providence has furnished it with an antidote to its own poison, or, at least, with an instrument which makes

it its own betrayer, and warns man involuntarily against its formidable presence. This is the *rattle* to which it owes its vulgar appellation. The rattle is situated at the end of the tail, and consists of several hard, dry, bony processes. Imagine a string of hollow, dry, semi-transparent bones, nearly of the same size and figure, and resembling, to some extent the shape of the human *os sacrum*:



CROTALUS, AND BOA-CONSTRICTOR.

imagine these so placed that the tip of every uppermost bone runs within two of the bones below it; imagine these constantly clattering against each other, as the reptile moves, with a hoarse, dull, echoing sound, and you will be able to form some idea of the permanent warning of its approach which the Crotalus carries about with it. The rattle is placed with the broad part perpendicular to the body and not horizontal; and the first joint is attached to the last vertebra of the tail by means of a thick muscle beneath it, no less than by membranes which unite it to the skin. The bony rings increase in number with the reptile's age, and it gains an additional one, it is said, at each casting of the skin.

The *Crotalus horridus* is of a yellowish-brown colour, varied with patches of a deeper hue, and from the head to some distance down the neck run two or three longitudinal stripes of the same. Its habits are sluggish; it moves slowly, and only bites when angered, or for the purpose of killing its prey. It is provided with two kinds of teeth—viz., the smaller, which, planted in each jaw, serve to hold and retain the food; and secondly, the fangs or poisonous teeth, which kill the prey, and are placed outside the upper jaw. It feeds principally upon the smaller mammals and upon birds, which it seems certain it possesses a peculiar power of fascinating—the effect, it may be, of intense fear. "When the piercing eye of the rattle-snake is fixed on them," says Mr. Murray, "terror and amazement render them incapable of escaping; and, while involuntarily keeping their eyes fixed on those of the reptile, birds have been seen to drop into its mouth, as if paralyzed, squirrels descend from their trees, and leverets run into the jaws of the expecting devourer." Hogs and peccaries, however, are unaffected by this panic, and feed greedily upon the reptile which causes it, whose venomous fangs cannot penetrate their formidable hide. Its poison, once imbibed, is very fatal, acting upon man and the larger mammals, such as the horse or ass, in a few hours.

The lance-headed Viper, or Trigonocephalus (*Bothrops lanceolatus*), is most common in the West Indian Islands, where it is justly dreaded. It has been computed that, at Martinique, fifty persons out of a population of 125,000 souls die annually from the bite of these odious reptiles. Their fecundity is frightful. Every female brings forth sixty young, which on their very advent into the world are completely armed and able to wound. This viper, moreover, carries no warning rattle; nothing indicates its presence; and in the countries which it inhabits, the wayfarer, if prudent, will beat the herbs and bushes as he advances with a switch. Then the Trigonocephalus, if there be one in the way, will take flight and reveal itself, for it is too large to glide away unseen. Therefore, the negroes of Martinique, who, of necessity, are assiduous reptile-hunters, state as an incontrovertible

axiom, confirmed by immemorial experience, that "a serpent seen is a serpent dead." In truth, the serpent is only formidable to man when not perceived, and when one treads upon it accidentally. In the open field its defeat and death are inevitable, however little coolness or skill its assailant may possess. And to warn us of the presence of the Trigonocephalus, Nature has supplied us with numerous watchful sentinels in the small birds, whose not unreasonable hat

TRIGONOCEPHALUS PURSUED BY BIRDS.

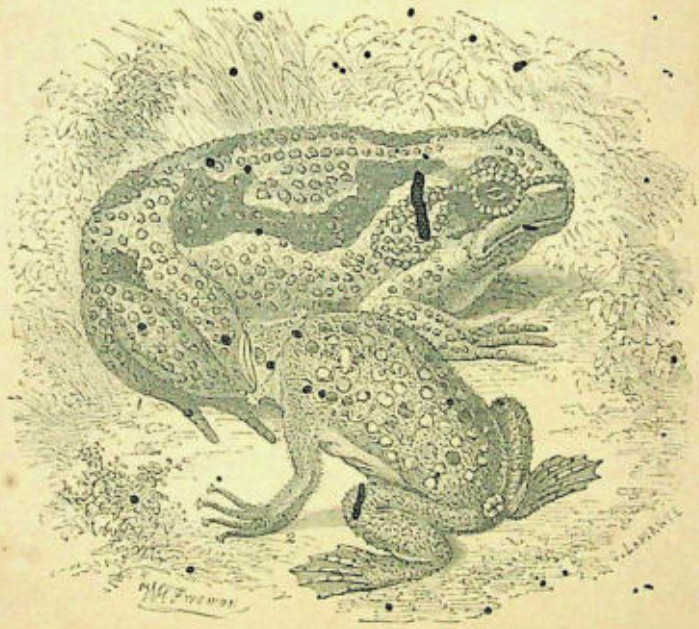
against this serpent is a remarkable proof of their intelligence. ever your destiny conduct you to the Antilles, says a naturalist, blooded sportsman as you may be, do not slay the little bird the grateful negroes, though he sings but little, have wished to name the nightingale; for if you do so, they will regard you with suspicion and dislike. He is their protector, and he watches also over you. No sooner does he see, from his aërial station, the scales of the reptile

gliding into the herbage or glittering among the large leaves, than he can no longer control himself. He flies to and fro, he leaps from branch to branch, summoning with a lamentable cry all the feathered tribe from the neighbouring trees. From far and near the cry widens and is repeated; from all directions flock nightingales, and thrushes, grosbeaks, and humming-birds, and hovering above the assassin, furiously denounce it, and indicate its lurking-place to man. Irritated by such a concert of maledictions, the serpent elevates its crest, but, lo! they are far beyond its reach! And the cries, the murmurs, the insults are redoubled! It seeks to conceal itself, but these cries persistently accompany it. Wherever it drags its slimy shining bulk, they follow, they harass, and they denounce it. Either night comes on, or it succeeds in completely hiding itself from their watchful gaze, before they reluctantly leave it to its own devices. Great the consternation if their enemy escape them! But what joy, what triumphal sounds, if man appears upon the scene and slays it!

I have previously alluded to the enormous toads found in South America, and to the gigantic frog which belongs to the northern continent. Among the former I may particularize as one of the largest known species, the *Agua;* and, as remarkable for its mode of gestation, the *Pipa.* The Surinam Toad, or *Pipa Surinamensis* (the *Bufo Pipa* of Linné), is distinguished by its large triangular head, and horizontally flattened body, with a granulated back. It is now ascertained that the female deposits her spawn at the brink of some shallow or stagnant pool; the male then collects the heap and cautiously places it on the back of the female, where, after impregnation, they are pressed into cellules produced by the tumefaction of the skin. In rather less than three months the eggs are hatched, and the young emerge in a complete state.

The Bull-Frog (*Rana pipilus*), of North America, is from six to eight inches long and from three to four inches broad. When his limbs are fully extended he measures about eighteen inches in length.

Its back is of a sombre green colour, varied with black; the under parts being of a whitish hue, tinged with green, and thickly spotted. The fore-feet have only four toes, and are unwebbed; the hind-feet are large, long, and widely webbed. Its voice may be compared to the distant lowing of a bull, and a chorus of them at night is sufficient to arouse the soundest sleeper. They prey upon ducklings, goslings, and small birds, drowning before devouring them. Spite of its size



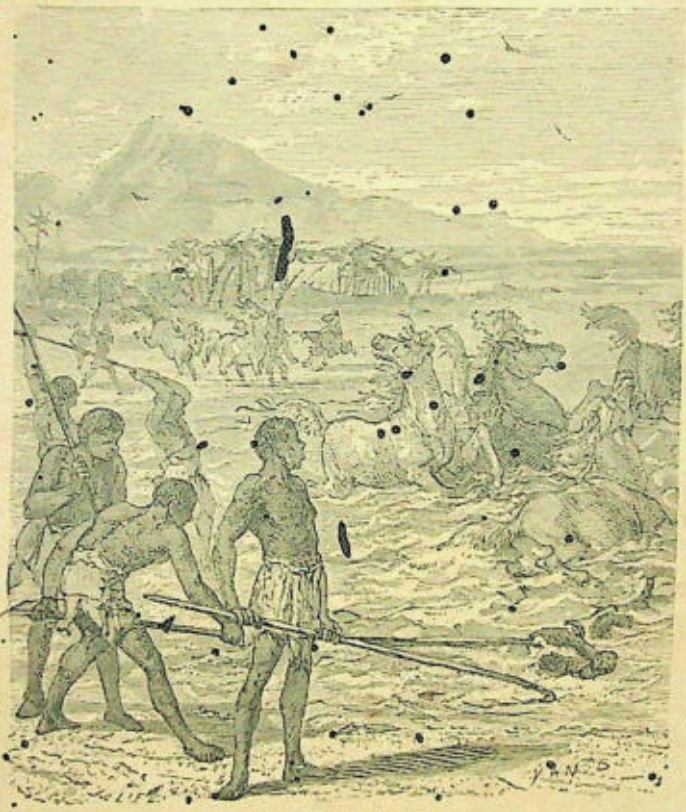
1. Bufo Agua. 2. Pipa Surinamensis.

and ungainliness, it is very nimble, and can accomplish a leap of upwards of six feet in height.

Incomplete as is this rapid survey of the Fauna of the New World Deserts, I cannot terminate it without referring to the strange and formidable fish which haunt the pools, lakes, and marshes of South America—those *Gymnoti*, or Electrical Eels, sometimes five, six, and even eight feet long, which emit electrical discharges of sufficient violence to strike down a man, a horse, or an ox. It is by this singular property the gymnotus supports its existence; its shocks

stupify the smaller fishes and other animals that come within its range, so that they fall an easy prey to its voracity. The electrical organs consist of four bundles of parallel membranaceous laminæ arranged along the inner side of the tail, and constituting a remarkably powerful battery.

In hunting the gymnoti the Indians adopt a cruel expedient. They



FISHING FOR GYMNOTI.

drive a herd of horses and mules into the ponds which these eels inhabit, and harpoon them when they have spent their electrical force on the unhappy quadrupeds. The fish swim on the surface of the water like serpents, and skilfully glide beneath the animal's body, discharging the whole length of their electrical battery, and attacking simultaneously the digestive viscera, and, above all, the gastric plexus

of nerves. Fain would the horses escape their enemies' attacks, but the Indians drive them back into the water with stout canes of bamboo and long whips. After awhile the eels grow exhausted; the animals show less alarm; and the Indians begin to ply their harpoons with equal agility and success. There are several species of this remarkable fish, and most, if not all, are valued as wholesome food. The Gymnotus Electricus, however, is the only one which possesses any electrical powers.

CHAPTER XII.

ANIMAL LIFE IN THE AUSTRALIAN PRAIRIES.

THE first naturalists who explored the littoral of the Australian continent and its adjacent islands were struck with astonishment at the sight of the strange and almost monstrous animals they discovered there. Far more certainly than Columbus had they fallen in with a New World; a new world of zoology and botany; a world apart, peopled by beings wholly different from those they had elsewhere studied, and some of which exhibited a complexity and originality of organization and structure wholly antagonistic to the received theories of fundamental characteristics belonging to the various classes of the animal kingdom. The Australian Fauna, in this respect, can only be compared to that of Madagascar, which equally bears an impress peculiarly its own, and presents but a few features of kinship with the Indian Fauna. It is the latter also that the Australian Fauna most closely approaches, or, to speak more correctly, from which it least widely diverges.

The great Herbivora—Pachyderms, Ruminants, and Solidungulates—are absolutely wanting in Australia, as well as the Carnivora properly so called—Apes and Lemuridæ. The class of Mammals is only repre-

sented by a small number of Cheiroptera and Rodents; by some Amphibia, Phocæ, and Otidæ (Seals and Bustards), which inhabit the bays carved out of its long line of coast; by the Marsupials and a very limited order of Monotremata. The two latter groups are pre-eminently characteristic of the Australian Fauna; the second belongs exclusively to it. Little, indeed, is wanting to make it identical with the sub-class of the Marsupials, represented only in South America by the genera Opossum didelphis, Hemiurus, and Chironectes, and elsewhere limited to New Holland, Tasmania, New Guinea, New Zealand, and some other less important islands of Oceania.

The Marsupials (from the Greek *μάρσυπος*, a purse) owe their distinctive name to a very curious peculiarity in the organization of the females. The latter bring their young into the world while still very feeble, and of themselves fix them to their breasts, where they remain attached until they have acquired that degree of development which all other mammals possess at their birth. Generally the breasts are covered with a loose skin, forming a sort of pouch or purse, in which the young are concealed, which protects them against climatic changes, and enables the mother conveniently to carry them everywhere about with her. Two particular bones, called the marsupial bones, attached to the pubis, and placed amidst the abdominal muscles, support this pouch. They assist, says Professor Owen, in producing a compression of the mammary gland, necessary for the alimentation of a peculiarly feeble offspring, and they defend the abdominal viscera from the pressure of the young as they increase in size, during their mammary or marsupial existence, and still more when they return to the pouch for temporary shelter.

The marsupials present, moreover, in the different families composing the order, a great diversity of organization. Most of them are herbivorous or frugivorous; but there are some which prefer animal nourishment, and which, in their habits as well as in the structure of their jaws and their digestive apparatus, closely approach the carnivora.

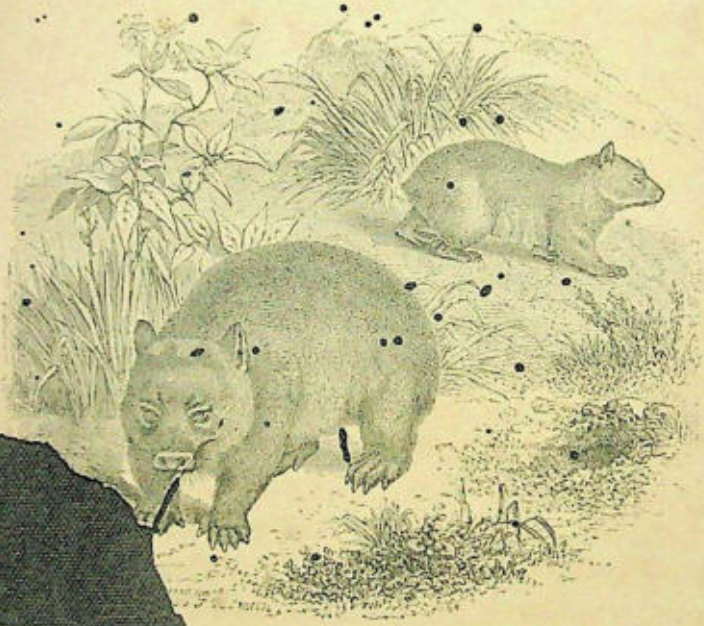
The order of which I am speaking includes some animals of great

size. Such is the Great Kangaroo (*Macropus giganteus*), which generally measures about seven and a half feet in length from nose to the tip of the tail, the tail being rather more than three feet in length, and fully twelve inches in circumference at the base. In its erect sitting posture, when it rests on its hind-legs and the root of its tail as on a tripod, its height amounts to about fifty inches; but when it rises on its toes to look around, its stature exceeds that of a man. The great length of its hind-legs is a notable peculiarity; their feet are provided with only four toes, the central being very long, of great strength, and terminated in a large and powerful hoof-like nail or claw. The fore-legs, on the contrary, are very short, and the feet divided into five toes, each furnished with a short and somewhat hooked claw. The animal's head is small, with rather pointed ears, and large but placid eyes; it has a thin and gracefully proportioned neck; so that a startling discrepancy is observable between the fore and the posterior parts of the animal, though the general effect is neither ungraceful nor unpleasing. It should be noticed that the kangaroo never folds his tail between his legs, which, I may add, are extraordinarily strong. The thighs are thick, the tarsi long and robust. He only walks on all fours when hotly pressed, and then his appearance is decidedly ungainly. In escaping from an enemy he rears himself upright, skims the plain with bounding leaps, and in a few minutes leaves behind him the swiftest horse or dog. But if all avenues of retreat be closed to him, he plants himself firmly against a tree or a rock and fights with obstinate courage, ripping up his assailants with his potent hind-feet, like a stag with his horns or a wild boar with his tusks.

The diet of the kangaroo is essentially "vegetarian;" he lives upon leaves, herbs, and roots, and employs his fore-paws, like the Rodents, to carry his food to his mouth. The animal's habits are mild and inoffensive. They roamed very peacefully about the Australian prairies before the new continent was opened up to European enterprise; having no other enemies to fear than the natives, who were scattered in small tribes over a few points of an immense

territory. Their chase is now one of the favourite amusements of the colonists, who destroy them in great numbers. They are easily domesticated, and may be regarded as already acclimatized in Europe, where, it is hoped, they may prove of great utility. The flesh of the tame Kangaroo is very good, but that of the wild animal is still better. Their skin, covered with a thick hair of an uniformly gray colour, may be adapted to various purposes.

The genus comprehends several species of very different dimen-



Brown Wombat (*Phascolomys latifrons*).

angaroo, already mentioned; the Woolly or
r), which rather exceeds it in size; and the
an a rat.

e Kangaroos, as the most remarkable types
ls, the Phascolomys, the Phascolarctos, the
nas.

he kangaroo, has been introduced into
be perfectly acclimatized, and specimens

may be seen both in the London Zoological Gardens and the Jardin Zoologique of Paris. He is better known by his native name of the Wombat (*Phascolomys Wombat*), and was first discovered by Bass, the gallant explorer and surgeon, whose name is indissolubly connected with the bright deeds of Australian discovery. The large-browed wombat might, at first sight, be mistaken for a small bear. His loins are thick, his limbs short, his hair coarse—thickly set on the loins, back, and head, thinly scattered about the belly—and of a light, shining sandy-brown. It is difficult to say why he is surnamed *latifrons*, for his forehead is no larger than that of other animals of his family; and, at all events, he exhibits, by way of compensation, an extraordinary extent of surface in the hinder parts, which, as they are utterly deficient in tail, present a very grotesque appearance. He burrows like the badger, and on the Australian continent never quits his retreat until night sets in. He lives on herbs and roots. The natives roast his flesh, and esteem it a viand of no ordinary excellence.

The Phascolarctos, or Koala (*Phascolarctos cinereus*), is closely allied to the wombat. He is strongly but clumsily made, with robust limbs and powerful claws, which he employs in clinging to the branches of the trees where he chiefly makes his h ever, he frequently visits *terra firma*, and burrow concealing himself in a torpid state in his subterra the cold season. His fore-feet have each five toe opposed to the other three—a circumstance note He has no tail, like the wombat. His coat very thick and extremely soft, darkest on under the throat and belly. An elongated tipped with black leather. The eyes are almost hidden in the plenitude of fur. sooth to say, a stupid animal; but at nig active state. He feeds upon the fresh y their blossoms and young shoots; and bling the Phalanga, in habits seems clos

The *Phalangas* form the typical genus of the tribe of Phalangistins, which comprehends, in addition, the genera *Trichosura*, *Petaurista*, and *Dromicia*. Several species are met with in Malaysia, but they chiefly belong to the Australian Fauna. They live chiefly in trees, feeding on various kinds of small animals, insects, eggs, and fruits, which they grasp between their fore-paws, and so bring to their mouth. Their appearance may be imagined by putting together a rather short head with short ears and short woolly fur; a squirrel-like body and long prehensile tail, sometimes completely covered with hair: the body measures about twenty-six inches, and the tail about fifteen inches. The two principal species are the Sooty Phalanga (*Phalangista fuliginosa*), found in Van Diemen's Land, and named in reference to its smoky black fur; and the Vulpine Phalanga, or Vulpine Opossum (*P. vulpinâ*), widely distributed over Australia, and having a fox-like character about his head. The Flying Phalangas are also allied to this genus.

The *Thylacyni* are distinguished from the Opossums by the hind-feet having no thumb, by a hairy and non-prehensile tail, and by having two incisors less to each jaw. Only one species is known to exist in Australia,* where it is called the "Tasmanian Wolf," and sometimes "Tiger" and "Hyæna." It resembles a wolf in many respects, but its hinder parts are sensibly higher than its fore; its elongated muzzle is almost cylindrical in shape, and very thick; and his tail, broad at the base, tapers away to a fine point. The colour is gray, striped with black across the hinder limbs.

Of the *Thylacynus cynocephalus* M. Paul Gervais furnishes the following description †—

"There exists in Tasmania an animal of carnivorous habits almost large as a wolf, and whose external forms at the first glance do not differ sufficiently from those of the latter to prevent one from including him in the family *Canidæ*; but this member of the Carnivora, though he has also the wolf's appetite, and commits havoc

* Gould, "Quadrupeds of Australia," *in loc.*

† M. P. Gervais, "Histoire Naturelle d[illegible]ères," subnom. *Thylacynus.*

in the same manner among the flocks of the colonists, belongs, like most of the Australian Mammals, to the sub-class of Marsupials. There is also much analogy, in many of its osteological characteristics, with the extinct genera of the Hyenodons and Ptérodons; but the latter are in reality Monodelphia, and should be ranged among the Carnivora properly so called. The English settlers in Van Diemen's Land give the thylacynus the name of *Zebra Wolf*, because it has, in effect, the greater portion of the dorsal region and the base of the

THYLACYNUS CYNOCEPHALUS

tail marked with transversal brown lines, like zebra stripes. This carnivorous animal is also their *Dog-headed Opossum*.

"Allied to other Marsupials by the totality of its anatomic characteristics, it is nevertheless easy to distinguish generically; in the first place it is of great size, and its exterior recalls that of the Wolf, though it has a longer head and a tail garnished with very short hair; the latter is, at the same time, a little depressed. Moreover, it numbers forty-six [illegible] with wide intervals between each

It is digitigrade: it has five toes on the fore, and four toes on its hinder feet; its marsupial bones are simply rudimental."

If there be one group of animals more than another whose unforeseen discovery has succeeded in astonishing and embarrassing zoologists, it is assuredly that which has been designated by the name of *Monotremata*. It is the lowest order of vertebrated animals, the very bottom of the scale, approximating in many characteristic points to the family of Birds. The pelvis, it is true, is furnished with marsupial bones, but these animals possess no pouch. The skull is smooth, the brain-case proportionately very small, the snout much prolonged, while the jaws have neither teeth nor soft movable lips. The shoulder-bones do not resemble those of a mammal, but in some respects the scapular joint of the bird; in other respects, that of the reptiles. The feet have five toes, each armed with a long nail; and, in addition, the hind-feet are provided with a perforated spur-like weapon, which is connected with a gland. The genus derives its distinctive name from the circumstance that the orifices of the urinary canals, the intestinal and the generative canals, open, as in birds, into a common vent. The mammary glands, of which only one exists on each side, are not furnished with nipples, but open by simple slits on each side of the abdomen.

This order includes two families: the *Ornithorhynchidæ* and the *Echidnidæ*, both belonging to Australia and Tasmania. The former are aquatic in their habits, the latter terrestrial.

The Echidna (*Echidna Hystrix*), or Porcupine Ant-Eater, resembles the Porcupine in his general appearance and coat of spines, the Ant-Eater in his snout, mouth, and long lubricated tongue. His [illegible] are very short and thick, and each is furnished with five broad rounded toes; the four toes are armed with a long blunt claw, but on the hind-feet one toe is without a claw, two are short and blunt, and one is of great length, rather curved, and sharp pointed. He measures about twelve inches, and all over the upper-parts of the body and tail is thickly beset with formidable spines, very sharp and strong; over the head, legs, and under-parts with bristly hair of a

deep brown colour. His short tail is covered with perpendicular spines. Digging up the ground with his keen claws, he discovers a host of insects, which he rolls over his long red cylindrical tongue. He is very timid, and when any one approaches him, coils himself up in a ball, like a hedgehog.

The *Ornithorhynchus* ("Bird-beaked"), or *Duck-Billed Platypus*, is another extraordinary animal, which seems to serve as the connecting link between the aquatic birds and the mammalia. His length

1. Ornithorhynchus. 2. Echidna.

is about twenty inches; his body, long and flattened like an otter's, is covered with a thick soft fur, moderately dark brown above and whitish beneath; his tail is flat and obtuse; his feet are furnished with a membrane that unites the toes; and he has an elongated, enlarged, and flattened muzzle like a duck's beak. It is evident, therefore, that he can live only on soft food, and that his habits must be aquatic; and hence we find him burrowing in the banks of the streams, and groping for his food, like a duck, among

the mud and water. The settlers term him characteristically "the River-Mole."

A word of allusion must now be permitted to the *Petrogale*, a genus of the Kangaroo family, described by Dr. Gray. The Brush-tailed Rock Wallaby (*P. penicillata*) has a rough long fur, of a dusky brown hue, tinged with red and gray; a white streak passes down the middle of the throat; his tail is very black, like a raven's plumage, long, and furnished with thick hairs forming a brush. The male is about three feet and a half long. Another species is called the Short-Eared Rock Kangaroo (*P. brachiotis*). Both are excessively wild and shy in their habits, frequenting in the day-time the most inaccessible rocks and the loftiest mountain-peaks, and descending, at the approach of twilight, to feed in the retired and grassy valleys. They flock together in such numbers as to form well-beaten paths along the mountain-sides, and leap from crag to crag with all the agility of the chamois.

The Ornithological Fauna of Australia and the islands of Oceania is incomparably richer than the Mammalogical Fauna, and includes several species of the most dazzling plumage; but nearly all these species inhabit the forests which cover a part of the littoral and probably of the interior. However we must signalize, as peculiar to the Prairies, a great number of the *Brevipennes* (*i.e.*, Short-wings), the Emu or Emeu (*Dromaius Novæ Hollandiæ*); two Palmipeds, the Black Swan and the Cercopsis; and, finally, a bird, the only one of its order, almost as much of a paradox among bipeds as is the ornithorhynchus among quadrupeds, the Apteryx.

The Emu is allied to the cassowary; he is nearly equal to the ostrich in bulk, but has a thicker body, shorter legs, and a shorter neck. He measures more than seven feet in length; his plumage exhibits a mixture of brown and gray; his beak is black, his head covered with feathers; he has real wings, though they are of so small a size as to be useless for flight; they are covered with feathers like the rest of the body, from which, when the bird is not in motion,

they can hardly be discerned. Internally, the emu differs, it is said, from all other species, particularly in having no gizzard, and in the extremely small size of his liver.

Emus are killed, according to Captain (now Sir George) Grey, in precisely the same manner as kangaroos, but as they are more prized by the natives, a greater degree of excitement prevails when an emu is slain; shout succeeds shout, and the distant natives take up the cry until it is sometimes re-echoed for miles. The feast which follows the death, however, is a very exclusive one, for the flesh is much too delicious to be made a common article of food. Heavy penalties are accordingly pronounced against young men, and unauthorized persons, who venture to touch it; and these, invariably, are rigidly enforced.*

Every schoolboy knows the famous quotation in his Latin grammar which tells of a

"Rara avis, simillimaque nigro cygno."

A *Black Swan* is no longer a "rara avis." The species (*Cygnus atratus*) belongs to New Holland and Tasmania, and is of the same size as the common swan. His plumage is wholly black, with the exception of the primary pens, which are white; his beak is red, and so is the featherless skin surrounding it at the base. He has been successfully acclimatized in Europe, and ornaments the lakes and streams of many English parks.

The Cereopsis, or Cerefaced Goose, of New Holland, is a Palmiped genus, about the size of a common goose, which, in general appearance, he resembles, except that his legs are longer, averaging from two and a half to three feet. The plumage is of a dingy gray. A large patch of dull white occupies the top of the head; the quill-feathers, both of the wings and tail, are of a dusty black. His voice has a hoarse deep clang, like that of a storm-bell. He usually weighs from seven to ten pounds, and makes an excellent dish for an Australian

* Sir. G. Grey, "Expeditions of Discovery in North-Western and Western Australia" (1840).

Christmas table. Specimens may be seen both in the Zoological Gardens of London and Paris.

The *Apteryx Australis*, or Wingless Emu—the *Kiwi* of the New Zealanders—somewhat resembles a penguin in form, and stands about two feet in height. The only living specimen in Europe lives, I believe, in the London Zoological Gardens. As it does not appear to rank, in scientific classification, with any other family or genus,

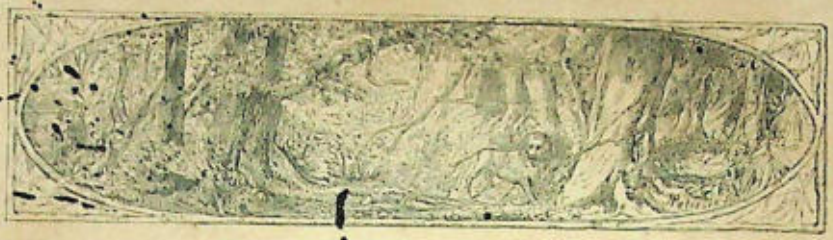
APTERYX AUSTRALIS.

naturalists have erected it into a distinct order—the *Nullipennes*, or Wingless. The wings of the apteryx are literally rudiments; a mere stump, terminated by a hook. None of his bones are hollow; he has no abdominal air-cells; his feathers have no accessory plume; his feet have a short and elevated hind-toe; his eyes are small; he feeds on insects; and his habits are nocturnal. He is a bird of great physical power, and runs with ostrich-like swiftness; taking

refuge, when pursued, in burrows, hollow trees, and the clefts of the rocks. His cry resembles a loud whistle, and the natives entrap the bird by imitating it. When the female has been taken, the male is easily caught, owing to his reluctance to leave her. He will, however, defend himself vigorously with his spurs.

The Erpetological Fauna of Australia, and, in general, of Oceania, is very poor, and comprehends no great species. I may notice a genus of lizards, the Chlamydosaurus, discovered by Allan Cunningham, the naturalist attached to Captain King's expedition, about 1820. It measures about seventeen inches in length, of which twelve inches are apportioned to the tail; is of a yellowish-brown colour; has a large head, with prominent eyes; and a membraneous ruff or tippet round its neck, covering its shoulders, and when expanded spreading about five inches in the form of an open umbrella. If attacked or terrified, it elevates the frill or ruff and makes for a tree; where, if overtaken, it throws itself upon a stem, raising its head and chest as high as it can upon the fore-legs, then doubling its tail underneath the body, and displaying a very formidable set of teeth from the concavity of its large frill, it boldly faces any opponent, biting fiercely whatever is presented to it, and even venturing so far in its rage as to fairly make a fierce charge at its enemy.

Venomous serpents are numerous: particularly the *Hydrophis*, or Water-Snake, very common in the neighbouring seas, where it feeds on fishes. The back part of the body and tail being much compressed, and vertically raised, endows it with the capacity of swimming.



BOOK IV.

THE FORESTS.

CHAPTER I.

THE VIRGIN FORESTS.

"The noonday sun
Now shone upon the Forest, one vast mass
Of mingling shade . . . .
Like restless serpents, clothed
In rainbow and in fire, the parasites,
Starred with ten thousand blossoms, flow around
The gray trunks, and, as gamesome infants' eyes,
With gentle meanings, and most innocent wiles,
Fold their beams round the hearts of those that love,
These twine their tendrils with the wedded boughs
Uniting their close union; the woven leaves
Make net-work of the dark blue light of day,
And the night's noontide clearness, mutable
As shapes in the weird clouds."

SHELLEY.

IN all parts of the world some regions exist where, owing to a concourse of favourable circumstances, the productive forces of Nature have been able to manifest themselves with an exceptional energy—where vegetable life, in particular, has acquired an extraordinary development. The rich soil is covered, over more or less extensive areas, with vivacious plants, robust and of great stature, which closely rooted, one against another, with inter-

twining and overarching boughs, sustaining by their bulk and shading with their foliage other and weaker plants, have formed in the course of innumerable ages those masses of umbrageous gloom called Forests.

These, undoubtedly, are one of the grandest and most impressive monuments of the Creative Power; one, I may add, of the most eloquent, for there is nothing in all Nature whose study better repays the student, or which more largely abounds in important lessons.

The virgin forest, moreover, is one of the sanctuaries of Nature, where her mysteries are seldom profaned by man. There life reveals itself, and moves at liberty, under an infinite variety of forms. It is the asylum of a multitude of animals of all classes, which find therein, united, the two essential conditions of existence—shelter and nourishment. Without the difficult approaches, the obscurity and the profound depth of the forests, says a naturalist, what would become of the species of mammals, birds, and reptiles, against which man wages incessant war? Nature, then, seems to have provided these immense reservoirs to prevent their species from being totally annihilated. Independently of the trees which constitute the forests, a host of other plants make them their exclusive *habitat;* thence the specific and eminently characteristic names—such as *Sylvestris, Sylvaticus, Nemorosus*—imposed upon a great number among them. Such plants are distinguished from their congeners by the great dimensions of their stems; but, on the other hand, they do not possess the brilliantly-coloured flowers which adorn the plants of the mountains and the plains always exposed to the action of the solar light.

The forests, moreover, offer for the botanist this remarkable and singularly precious circumstance, that they form natural collections of trees of the same species, or of several species of the same genus, or at least of the same family; so that their limits circumscribe the *habitat* of these grand vegetables, and permit us to determine with ease their geographical distribution.

The forests fill an important function in the general economy of the globe, by the influence which they exercise upon the mean

THE VIRGIN FOREST OF THE GABOON.

temperature and the other meteorological conditions of the regions they shelter. All other things being equal, the temperature of well-wooded countries is perceptibly less elevated and more uniform than that of dry and open districts. The amount of humidity which is retained on the surface of the soil by wide-spread woods is considerable; it results from the lesser evaporation of the waters, the abundant transpiration of the leaves, and the heavy rains which inundate the forests during the tropical summer. Forests, like mountains, seem to attract the clouds. So the plains which lie on their borders are ever better watered and fertile than those whose horizon no obstacle encumbers.

Thus, then, in the forests of this bright and beautiful world of vegetation, most of the pleasures which man can derive from external nature are garnered up, and most of the lessons he requires are written. All kinds of precious grace and teaching, says Mr. Ruskin,* are united in this link between the Earth and the Stars: wonderful in universal adaptation to his need, desire, and discipline; God's daily preparation of the earth for him, with beautiful means of life. "First, a carpet to make it soft for him; then, a coloured fantasy of embroidery thereon; then, tall spreading of foliage to shade him from sun heat, and shade also the fallen rain, that it may not dry quickly back into the clouds, but stay to nourish the springs among the moss. Stout wood to bear this leafage: easily to be cut, yet tough and light, to make houses for him, or instruments (lance-shaft, or plough handle, according to his temper); useless it had been, if harder; useless, if less fibrous; useless, if less elastic. Winter comes, and the shade of leafage falls away, to let the sun warm the earth; the strong boughs remain, breaking the strength of winter winds. The seeds which are to prolong the race, innumerable according to the need, are made beautiful and palatable, varied into infinitude of appeal to the fancy of man, or provision for his service: cold juice or glowing spice, or balm, or incense, softening oil, preserving resin, medicine of styptic, febrifuge, or lulling charm—and all these presented in forms

* Ruskin, "Modern Painters," vol. v., pt. vi., c. i., § 3, 4.

of endless change. Fragility and force, softness and strength, in all degrees of aspects; unerring uprightness, as of temple-pillars, or undivided wandering of feeble tendrils on the ground; mighty resistances of rigid arm and limb to the storms of ages, or wavings to and fro with faintest pulse of summer streamlet. Roots cleaving the strength of rock, or binding the transience of the sand; crests basking in sunshine of the desert, or hiding by dripping spring and lightless cave; foliage for tossing in entangled fields beneath every wave of ocean—clothing with variegated, everlasting fibres, the peaks of the trackless mountains, or ministering at cottage doors to every gentlest passion and simplest joy of humanity."

Considered in their physiological aspect, it is evident that the forests have played, from the remotest ages of our planet, a pre-eminently useful part, by absorbing the carbonic acid with which the atmosphere was surcharged, fixing the carbon, and restoring to the air a quantity of oxygen sufficient for the support of animal life, impossible or rudimentary previous to their creation. And they still serve to maintain the chemical equilibrium of the atmosphere, by incessantly refeeding it with the oxygen which the respiration of animals and the phenomena of combustion have transformed into carbonic acid.

Forests formerly abounded in Europe. In Gallia, Germania, Illyria, Sarmatia, whole provinces were covered with immense woods of ancient and patriarchal trees. Civilization has destroyed them in great part, and often without discernment. At the present day few forests in Europe remain untouched. They are rare in Western Asia, in Central Asia, and in Northern Asia; rarer still in the Chinese empire, where the population is denser than in any other country of the world, and where it is the great object of the policy of the State that not a rood of land shall be lost for the culture of plants valuable as food or for industrial purposes. It is only to the south of the Himalaya Mountains, in the still savage and scantily peopled regions of India and Indo-China, that one sees the great vegetables of the Tropical Zone agglomerated in compact masses of considerable extent.

In Africa, forests of any size or density only exist in the mountainous countries and towards the western littoral; as, notably, in the Soudan, the Senegal, in Guinea, at the Gaboon, and on the coasts of Angola and Benguela. In North America, civilization has accomplished, in less than three centuries, the work which in Europe occupied a much longer period. The magnificent forests which spread their awful shades—their vast luxuriance of gloom—over the surface of this continent have fallen before the axe of the pioneer. Only at a few points is realized the fine picture of the poet; only in a few untrodden recesses still flourishes the primeval forest, where—

> "The murmuring pines and the hemlocks,
> Bearded with moss, and in garments green, indistinct in the twilight,
> Stand like Druids of old, with voices sad and prophetic,
> Stand like harpers hoar, with beards that rest on their bosoms."*

When Captain Palliser's expedition attempted to reach the head waters of the North Thompson from the source of the North Saskatchewan River, the leader encountered a forest-growth so dense, and so encumbered with fallen timber, that it proved an insurmountable obstacle. Viscount Milton and Mr. Cheadle, in their adventurous journey across the Rocky Mountains to British Columbia, were involved in one of these wildernesses, and with difficulty effected a passage. "No one," they remark,† "who has not seen a primeval forest, where trees of gigantic size have grown and fallen undisturbed for ages, can form any idea of the collection of timber, or the impenetrable character of such a region. There were pines and thujas of every size—the patriarch of 300 feet in height standing alone, or thickly-clustering groups of young ones struggling for the vacant place of some prostrate giant. The fallen trees lay piled around, forming barriers often six or eight feet high on every side: trunks of huge cedars, moss-grown and decayed, lay half-buried in the ground on which others as mighty had recently fallen; trees still green and living, recently blown down, blocking the view with the walls of earth held

* Longfellow, "Poetical Works"—*Evangeline*.

† Milton and Cheadle, "North-West Passage by Land," chap. xv.

in their matted roots; living trunks, dead trunks, rotten trunks; dry, barkless trunks, and trunks moist and green with moss; bare trunks, and trunks with branches—prostrate, reclining, horizontal, propped up at different angles; timber of every size, in every stage of growth and decay, in every possible position, entangled in every possible combination. The swampy ground was densely covered with American dog-wood, and elsewhere with thickets of the aralea, a tough-stemmed trailer, with leaves as large as those of the rhubarb-plant, and growing in many places as high as a man's shoulders. Both stem and leaves are covered with sharp spines, which pierce your clothes as you force your way through the tangled growth, and make the legs and hands of the pioneers scarlet from the inflammation of myriads of punctures."

Far grander the scene, however—far richer in form and colour—which meets our gaze in the stupendous forest growth still covering the basins of the Amazon and the Orinoco. As a companion to the foregoing picture, we borrow one of this brighter and more wonderful region as painted with equal truth and vigour by Mr. Bates:—*

"The ground was thickly carpeted with Lycopodiums,† but it was also encumbered with masses of vegetable *débris* and a thick coating of dead leaves. Fruits of many kinds were scattered about, amongst which were numerous species of beans, some of the pods a foot long, flat and leathery in texture, others hard as stone. In one place might be seen a quantity of large empty wooden vessels; such they appeared to be, but in reality they had fallen from the Sapucaya tree. They are called *Monkey's Drinking-cups* (Cuyas de Macaco), and are the capsules of the nuts sold under this appellation in Covent Garden Market. The top of the vessel is pierced with a circular hole, in which a natural lid fits easily. When the nuts ripen this lid becomes loosened, and down falls the heavy shell with a crash, scattering the nuts over the ground. The tree ‡ which bears this extra-

* H. W. Bates, "The Naturalist on the River Amazons."

† Order *Lyco* [illegible] *ceæ*: club-mosses.

‡ *Lecyti* [illegible] order *Lecythidaceæ*).

ordinary burthen is of immense height. It is closely allied to the Brazil-nut tree,* whose seeds are likewise enclosed in large wooden vessels, but these are without lids, and fall entire to the ground. It is at least 120 feet high, and rises to the noble stature of 100 feet before it throws off any branches. From twelve to twenty of these sweet edible nuts lie in a pod. The monkeys are very partial to them, and will patiently sit for hours hammering at a capsule with a stone, in order to open it; and as soon as they have succeeded, the on-lookers rush to the spot, to purloin as many as they can. The natives assail the quarreling party with stones, a proceeding which incites the monkeys to revenge themselves by a discharge of nuts. By this means the Indians load their boats without trouble, and the monkeys are left to make a fresh foray."

In his forest wanderings, Mr. Bates was especially attracted by the colossal trees. He says that, on the whole, they had not remarkably thick stems; the great and uniform height to which they grow without throwing off a branch is a much more noticeable feature than their thickness; but at intervals he paused before a veritable giant. Only one of these huge patriarchs of the woods can flourish within a given space; it monopolizes the domain, and none but humble individuals can nestle within its shadow. The cylindrical trunks of these giant trees were generally about twenty to twenty-five feet in circumference. Von Martius, another Brazilian traveller, mentions having measured trees in the Pará district, belonging to various species (Symphonia coccinea, Lecythis spirula, and Crataeva Tapia), which were fifty to sixty feet in girth at the point where they become cylindrical! The height of the vast column-like stems could not be less than 100 feet from the ground to their lowest branch. The total height of the Pao d'Ano† and the Massaranduba, stem and crown together, may be computed at from 180 to 200 feet. Where one of them stands, the vast canopy of leafiness rises above the other forest trees like a domed cathedral above the minor buildings of a city.

A very curious feature in these trees is the growth of buttress-

* Bertholletia Excelsa (*Lecythidaceæ*). † Order, *Bignoniaceæ*.

shaped projections around the lower part of their stems. The spaces between these buttresses, which may be compared to thin walls of wood, form spacious chambers, like stalls in a stable; some of them large enough to hold half-a-dozen persons. "The purpose of these structures," says Mr. Bates, "is as obvious at the first glance, as that of the similar props of brickwork which support a high wall. They are not peculiar to one species, but are common to most of the larger forest trees. Their nature and manner of growth are explained when a series of young trees of different ages is examined. It is then seen that they are the roots, which have raised themselves ridge-like out of the earth; growing gradually upwards as the increasing height of the tree required augmented support. Thus they are plainly intended to sustain the massive crown and trunk in these crowded forests, where lateral growth of the roots in the earth is rendered difficult by the number of competitors."

Among other remarkable inhabitants of the Brazilian wilderness, we may name the lofty Moira-tingu,* the Samaüma,† and the Massaranduba or Cow tree.‡ The Eriodendron Samaüma, or Silk-cotton tree, holds in the New World the same position as the Bombax in the Old. It rises to an enormous stature without branches, and then spreads out a glorious mass of foliage. The bark is light in color, and the capsule pod contains a large quantity of down, of a buff tint, and exquisite silky softness. The Massaranduba is also called the Palo de Vacca, the Arbor de Lacte, the Galactodendron utile, or the Cow tree. Its bark furnishes an abundant supply of milk as pleasant to drink as that of the cow. If exposed to the air it thickens into a glue, which is excessively tenacious, and often employed to cement broken crockery. The tree has a wild, strange appearance, owing to its deeply scored, reddish, and rugged bark, a decoction of which is used as a red dye for cloth.

Did our readers ever hear of the Pashiuba, or bulging-stemmed palm? § It is not one of the tallest kinds, for its height, when full

* Order, *Leguminosæ*: tribe, Mimosæ.
† Order, *Sterculiaceæ*.
‡ Order, *Urticaceæ*.
§ Iriartea Ventricosa.

grown, seldom exceeds forty feet; the leaves are somewhat less drooping, and the leaflets broader, than in other species; but if less beautiful, it is, perhaps, far more remarkable. Its roots grow above ground, radiating from the trunk at an elevation of ten or twelve feet, so that the tree seems to be supported on stilts; and when it is old, a person can stand upright amongst the roots with the perpendicular stem wholly above his head! About midway, this stem bulges out in a circular swelling, which gives it its distinctive name. The roots closely resemble straight rods, but they are studded with stout thorns, whilst the trunk of the Pashiúba is perfectly smooth.

It is in the vast primeval forests of Central and Southern America, and in the leafy wildernesses of the great East Indian islands—Borneo, Sumatra, Java, Madagascar—that man may still contemplate in all its savage majesty the prodigious Flora of the Tropics. These, too, are the haunts of many remarkable animals—mammals, and birds, and reptiles—which are there comparatively safe from the pitiless persecution of the hunter and the trapper.

To obtain an idea—which, however, can only be very vague and imperfect—of the strange and imposing spectacle and the unexpected scenes which at every step astonish the traveller in the great Tropical woodlands, we must study the descriptions of those few but richly gifted adventurers who, after exploring them with the enlightened spirit of science, have been able to embody the results in language worthy of the subject.

In the foremost rank of those who have possessed the twofold qualification of scientific knowledge and descriptive power, we must place the illustrious Humboldt. His works are a rich store-house from which later writers have freely borrowed the materials of their essays. In reference to the phrases "Virgin Forest," "Primeval Forest," he has some judicious observations:—Ought we to call, he says, by either of these appellations every kind of wild thick wood, encumbered with vigorous trees, upon which man has never laid his destructive hand? In that case they would be appropriate in a number of very different countries, under the Temperate, ay, and

even under the Frigid Zone. But if we intend them to designate the impenetrability of an almost boundless forest, the impossibility of clearing a path with the pioneer's axe between serried ranks of trees, not one of which is less than from eight to ten feet in diameter, such virgin forests belong exclusively to tropical regions. We must not believe, however, according to the ordinary story in Europe, in the creeping parasitical lianas which, by the interlacement and entanglement of their branches, render the equatorial forests impenetrable. The lianas form but a comparatively insignificant portion of the underwood. The principal obstacle is found in the arborescent plants, which leave not a space uncovered, and this, too, in a country where all vegetables spreading over the soil become ligneous. If a traveller, as soon as he arrives in a tropical clime, whether in the continent or the islands, believes, even before he has penetrated inland, that he is transported to the heart of the virgin forests, his error simply originates in his impatience to realize a long-cherished desire. All Tropical forests are not virgin forests.

The true virgin forests, notwithstanding the recent explorations of Wallace, Bates, and Agassiz, are very imperfectly known; because it is, in truth, perfectly impossible to survey them in every direction on account of their vast extent and astonishing impenetrability. When we are told by the traveller that he opened for himself a [illegible] with his trusty hatchet, we readily understand that he achieved [illegible] boasted victory in places where the obstacles were reduced to [illegible] lianas and brushwood of no great density, and that he turned aside from the massive barriers formed by the closely-planted trunks of colossal trees. Than these mighty vegetable Anakim, nothing, says a naturalist, is more imperfectly known in botany. The stems of most being bare and branchless up to a considerable height, their fructification is frequently beyond the reach of man. In vain would he level them by their base: their summits remain suspended by the interlacement of the neighbouring summits, and like so many Tantaluses, our travellers see themselves shunned by the fruits which their eyes devour. The rivers, those "tracks which march" through the leafy,

even under the Frigid Zone. But if we intend them to designate the impenetrability of an almost boundless forest, the impossibility of clearing a path with the pioneer's axe between serried ranks of trees, not one of which is less than from eight to ten feet in diameter, such virgin forests belong exclusively to tropical regions. We must not believe, however, according to the ordinary story in Europe, in the creeping parasitical lianas which, by the interlacement and entanglement of their branches, render the equatorial forests impenetrable. The lianas form but a comparatively insignificant portion of the underwood. The principal obstacle is found in the arborescent plants, which leave not a space uncovered, and this, too, in a country where all vegetables spreading over the soil become ligneous. If a traveller, as soon as he arrives in a tropical clime, whether in the continent or the islands, believes, even before he has penetrated inland, that he is transported to the heart of the virgin forests, his error simply originates in his impatience to realize a long-cherished desire. All Tropical forests are not virgin forests.

The true virgin forests, notwithstanding the recent explorations of Wallace, Bates, and Agassiz, are very imperfectly known; because it is, in truth, perfectly impossible to survey them in every direction on account of their vast extent and astonishing impenetrability. When we are told by the traveller that he opened for himself a [illegible] with his trusty hatchet, we readily understand that he achieved a boasted victory in places where the obstacles were reduced to [illegible] lianas and brushwood of no great density, and that he turned aside from the massive barriers formed by the closely-planted trunks of colossal trees. Than these mighty vegetable Anakim, nothing, says a naturalist, is more imperfectly known in botany. The stems of most being bare and branchless up to a considerable height, their fructification is frequently beyond the reach of man. In vain would he level them by their base: their summits remain suspended by the interlacement of the neighbouring summits, and like so many Tantaluses, our travellers see themselves shunned by the fruits which their eyes devour. The rivers, those "tracks which march" through the leafy,

THE VIRGIN FOREST IN BRAZIL.

woody depths, and the tortuous paths trodden down by generations of wild beasts in their quest after new pastures, after fresh hunting-grounds, or fountains to slake their thirst, are the only roads which can be pursued by the explorer.

As far as concerns their botanical composition, the virgin forests of the Tropics are distinguished from those of cold and temperate regions by general characters which it will, perhaps, be useful to indicate. If, for example, we adopt as our standard of comparison the European forest, we there remark, in the first place, the complete absence of trees belonging to the important groups of Acotyledons and Monocotyledons, and, in consequence, of the superb palms and elegant arboreal ferns of tropical countries. Or, considering only the Dicotyledonous plants, we see again that, in lands bordering on the Equator, there is scarcely a family of this class which does not furnish its contingent of woody plants, offering most frequently, with forms of infinite variety, clearly displayed and brilliant flowers, remarkable either for their beauty or their fragrance,—

"Sweet as Sabæan odours from the shores
Of Araby the Blest:"

le our trees are comprised in a small number of natural groups, present in general very opposite features; as, for instance, an t uniform character or aspect, and flowers scarcely visible and of legance.

suffices to name the families of the Coniferæ and the Amentaceæ, which compose the greater portion of the Flora of our forests. Moreover, as Humboldt observes, in the Temperate Zone, particularly in Europe and the north of Asia, certain species of trees (*plantæ sociales*) grow together, and form of themselves forests which we may designate by their specific name. In the forests of oaks, firs, and birches which cover the countries of the North, in the forests of limes of the East, one unique species of Amentaceæ, Coniferæ, or Tiliaceæ generally prevails. This uniform society is foreign to the Tropical forests. The infinite variety of flowers which expand in these *Hylæa* do not permit us to ask of what the virgin forests

are composed. An innumerable quantity of different families stand side by side; even in the most confined spaces it is rare to see trees of the same nature re-united. Every day, as the traveller advances, he discovers new forms; oftentimes the outline of the leaf, and the ramification of a tree attract his attention, without his being able to distinguish the flowers.

There is yet another feature, more striking still, and more general than those previously mentioned, which broadly distinguishes the arborescent vegetation of the Tropics from that of northern climates. Here the plants, exposed annually to an often intense degree of cold which lasts for several months, experience a kind of suspension of their vital activity, cease to flower and to fructify, and entirely shed their foliage; the resinous species are the only exceptions to this rule. In the neighbourhood of the Equator, on the contrary, it is during the hottest, driest season that vegetation suffers; then the herbaceous plants and bushes of the plains die down; but the great trees of the virgin forests are hardly affected; their foliage incessantly renews itself; their branches are at all times loaded with fruits and flowers, and to the wayfarer's eyes they present the glorious spectacle of an eternal freshness, of a life which never wanes.

Compared with these great points of difference, common to the virgin forests of the Tropics, the peculiar features resulting from the botanical constitution which distinguishes more or less exactly one region from another, have, as the reader will understand, but a secondary importance.

With the exception of a few countries which possess a Flora *sui generis*—such, for example, as Madagascar and Australia—the same aspects, the same general forms are almost everywhere reproduced.

More distinctive differences may be remarked, at the first glance, in the animal life which peoples the forests of the different quarters of the world; but yet these animals everywhere display the same habits. The great majority of the insects and the birds, the apes, the squirrels, and, in general, all the arboreal animals, awake and put themselves in motion at the first glimpse of day, and animate the

forest with their murmurs, their songs, their utterances, their lively sports and frolicsome gambols.

I borrow from the entertaining pages of an English traveller the following description of the diurnal cycle of phenomena which revolves in the depths of a virgin forest.*

In the early dawn the sky is invariably cloudless; the heavy dew of the previous night's rain, which lay on the moist foliage, becoming quickly dissipated by the glowing sun, which, rising straight out of the east, mounts rapidly towards the zenith. All nature is fresh, new leaves and flower-buds expanding rapidly. Some mornings a single tree will appear in flower amidst what was the preceding evening a uniform green mass of forest,—a dome of blossom suddenly created as if by magic. The birds are all active; from the wild fruit trees, not far off, we hear the shrill yelping of the Tucano (*Ramphastos vitellinus*). Small flocks of parrots flow over on most mornings at a great height, appearing in distinct relief against the blue sky, always two by two chattering to each other, the pairs being separated by regular intervals. Their bright colours, however, are not discernible such a height.

Towards two o'clock the heat rapidly increases, and every voice ird or mammal grows hushed; only in the trees sounds at intervals rsh whirr of a cicada. The leaves, so moist and fresh in early g, now become lax and drooping; the flowers shed their petals. n most days in June or July a heavy shower will fall some time in the afternoon, producing a most welcome coolness. The approach of the rain clouds takes place after a uniform fashion very interesting to observe. First, the cool sea-breeze, which commenced to blow about ten o'clock, and which increases in force with the increasing power of the sun, flags, and finally dies away. The heat and electric tension of the atmosphere then grows almost insupportable. Languor and uneasiness seize on every one; even the denizens of the forest betraying it by their motions. White clouds rising in the east gather into cumuli, with an increasing blackness along their lower portions.

* H. W. Bates, "The Naturalist on the Amazons," pp. 33, 35.

The whole eastern horizon becomes almost suddenly black, and this darkness spreads upwards, obscuring the "orb of day."

Then through the forest hurtles a mighty wind, swaying the lofty tree-tops; a vivid flash of lightning bursts forth, then breaks a crash of thunder, and down streams the deluging rain. Such storms soon cease, leaving bluish-black motionless clouds in the sky until night. Meantime all nature is refreshed; but heaps of flower-leaves and fallen petals lie under the trees. Towards evening life revives again, and the ringing uproar is resumed from bush and tree. The following morning the sun again rises in a cloudless sky, and so the cycle is completed; spring, summer, and autumn, as it were, in one tropical day. The days are more or less like this throughout the year in this country. A little difference exists between the dry and wet seasons; but generally the dry season, which lasts from July to December, is varied with showers; and the wet, from January to June, with sunny days.

"It results from this," says Mr. Bates, "that the periodical phenomena of plants and animals do not take place at about the same time in all species, or in the individuals of any given species, as they do in temperate countries. Of course there is no hybernation, and as the dry season is not excessive, is there any summer torpidity as in some tropical countries. Plants do not flower or shed their leaves, nor do birds moult, pair, or breed simultaneously. In Europe a woodland scene has its spring, its summer, its autumnal, and its winter aspects. In the equatorial forests the aspect is the same, or nearly so, every day in the year—budding, flowering, fruiting, and leaf-shedding are always going on in one species or other. The activity of birds and insects proceeds without interruption, each species having its own separate times. The colonies of wasps, for instance, do not die off annually, leaving only the queens, as in cold climates; but the succession of generations and colonies goes on incessantly. It is never either spring, summer, or autumn, but each day is a combination of all three. With the day and night always of equal length, the atmospheric disturbances of each day neutralizing

themselves before each succeeding morn; with the sun in its course proceeding mid-way across the sky, and the daily temperature the same within two or three degrees throughout the year, how grand in its perfect equilibrium and simplicity is the march of Nature under the Equator!"

Now night comes on, not, as in temperate climes, with a hush and a silence that are almost breathless, but with a thousand strange and formidable sounds. In Asia, in Africa, in America, as well as in the great islands of the Pacific Ocean, the forests and the savannahs re-echo all night with discordant cries. The branches are torn down with a crash as the beasts of prey sweep past, and earth resounds beneath their headlong steps. It is no longer the gay, fresh movement of happy life which in the golden noon of day converts the forest into a veritable Eden; it is the rush to and fro of scattered animals, pressed by hunger and thirst, either in flight or pursuit; it is the roar of rage or the wail of agony; it is, in a word, the mêlée of sharpened appetites; it is the "Witches' Sabbath" of the savage world, at which no European, however hardened by the perils of an adventurous career, can be present for the first time without experiencing a deep emotion of melancholy and apprehension.

CHAPTER II.

VEGETABLE LIFE IN THE FORESTS OF THE OLD WORLD.

I do not think that in all Europe, nor, indeed, in the entire Temperate Zone of the Old World, exists such an agglomeration of plants and trees as may merit the appellation of "primeval" or "virgin forest." At all events, this forest, if it really exists, will assuredly be composed of the very trees which we see every day in our own woods, our fields, our parks, and even in our towns, and which have long ceased

to awaken in us the idea of wild nature. With the woods of Great Britain, France, or Spain we are all familiar:—

> "The beam
> Of noon is broken there by chestnut boughs
> Down the steep verdant sides; the air
> So freshened by the leaping stream, which throws
> Eternal showers of spray on the mossed roots
> Of trees, and veins of turf, and long dark shoots
> Of ivy-plants, and fragrant hanging bells
> Of hyacinths, and on late anemones
> That muffle its wet banks." *

Our poets have sung of the murmurous groves of pines, and the deep dark beech-woods that clothe with shadows the rounded forms of the chalk-hills, and the long alleys of blossoming chestnut, fragrant lime, or sombre yew. Therefore, without losing valuable time in these familiar shades, without pausing before the oak which the history of a thousand years has made immortal, let us rapidly traverse the Corsican forests, where among the twisted leaves of the elms flourishes the gigantic Larician pine; those of Greece, where thrive the pines of Cephalonia and Apollo, and the oaks sacred also to the divinity of Delphi and Dodona—those oaks, dumb to-day, which formerly gave utterance to oracles not less reverend than those of the Pythoness. We will not even suffer ourselves to be delayed among the forests of Eastern Europe, of Asia Minor, and of Persia, where dominate species as the pine, the beech, and the chestnut. It is not enough to have crossed the Indus—that mighty river on whose banks halted the legions of Alexander—that the exuberant vegetation of the Tropical world breaks upon us in all its glorious verdure and prodigious richness, though confined to a comparatively limited area.

The wooded region of the western Ghauts, from Goa to Cape Camorin, exhibits the greatest abundance of plants peculiar to Southern Asia.

To form an idea of the variety and potency of the Flora of this region, says M. Lanoye,† we must contemplate the specimens immured

* Matthew Arnold, New Poems: "Empedocles on Etna," p. 16.
† F. de Lanoye, "L'Inde Contemporaine," c. 1er.

TROPICAL VEGETATION.

1. Calamus Rotang.
2. Bamboos.
3. Borassus flabelliformis.
4. Diospyros ebenum.

European gardens, and augment tenfold their etiolated propor-
we must bring together, in the dazzling confusion of Nature,
the Mimosas, the Musas, the odorous Screw-pines, the Mangoes, and
the Orange trees; twine around their trunks the many-branched
stems of the Bignonias, the Nagatelly, the Dictantes-Sambas, and the
Lianas which furnish pepper and the betel-nut; group under their
shade the most beautiful varieties of Azaleas, Jasmines, and Gardenias;
unite those Laurels whence we extract camphor, cassia, and cinnamon,
with the red Santul, the Nopals, and the Dragon trees which supply
the costly gum-lacs; the Shrubs which give us spikenard, cardamoms,
and amome, with those Canes which secrete sugar. Above these
masses of flowers, above these sources of honey and perfume, we must
next display the immense leaves of the Talipot and the Bourbon-
palm, must spread in undulations the aërial palm-crests of the Cocoa-
nut and the gigantic Bamboo; must accumulate the sombre verdure
of the Teaks and the Tamarinds, and the impenetrable branches of the
consecrated Pines. Then, all this being accomplished, we shall still
but a vague and colourless perception of the Indian Flora, and
ly of that which clothes the base of the Western Ghauts to the
d to the south of the city of Goa.

difficulty of picturing to ourselves the entirety of so glorious
a scene reveals the impossibility of seizing all its details, of
one by one all its elements. Our attention, however, will
ed by a small number of species remarkable above all others
by their extraordinary dimensions, the elegance of their bearing, the
beauty of their flowers and foliage, or by some peculiar and destruc-
tive property.

We notice in the first place several trees whose close relationship
cannot be mistaken to the date trees which we have already met with
in the open Desert, and which, we may remember, constituted the
entire wealth of the inhabitants of the oases. We find representatives
of the immense family of palms in every tropical country, and even
in the coral islands of the great ocean. India possesses several
species. I shall refer only to the *Borassus flabelliformis*, whose

trunk, 90 to 120 feet in height, is surmounted by a crown of fan-shaped leaves, folded longitudinally in their first half, cut in the other, and sustained by prickly supports. The other half is made use of by the Hindus in the shape of paper, or rather tablets, on which they write with the point of a stylet. The spadices (clustered flowers), if incised before reaching maturity, yield a liquid which, after fermentation, forms the favourite Indian beverage of "palm-wine."

The Bamboo, the most gigantic of the tropical Gramineæ, is plentifully distributed over India, Indo-China, and China, where it frequently flourishes in considerable masses. In height it equals the loftiest palms. Its culm is smooth, glittering, straight, and flexible, of a beautiful yellow colour, and regularly intersected by annular rings marked by so many brown streaks. It wavers gently to and fro with the impulse of the wind, as if to refresh with its breath the light undulating foliage.

Almost innumerable are the services which this heaven-sent plant renders to the inhabitants of the countries where it flourishes. In hedges or plantations it forms around their abodes a formidable defence. With its stems sawn either in accordance with their diameter, or split longitudinally, the natives not only fabricate a host of utensils and articles of furniture, but build their barks and construct their houses. They extract from the spaces between the joints of the young plant a feculent substance which supplies them with an agreeable nutriment, analogous to *sago*. A saccharine juice flows spontaneously from the joints formed by the knots; when fermented it becomes alcoholic and heady like hydromel. The bamboo also proves serviceable in the manufacture of mats and cordage. The slender stems are split into thin strips, which are probably softened in water. These strips, woven together, form mats or carpets of extreme solidity.

The Banana,* like the Bamboo and most of the palms, is a cosmo-

* Order, *Musaceæ*.

n plant throughout the tropic world. Its native habitat is ed to be Asia. The Oriental Christians have a tradition that this tree, which they call the *Lignum Vitæ*, was that whose fruit was forbidden to our first parents. Hence the name of *Musa paradisiaca*, given by botanists to one of the two species of the genus; the other is the Banana of the wise men, *Musa sapientum*. However this may be, it is certain that if the use of the banana was at any time interdicted to man, the prohibition has been annulled for many generations; and its fruits form one of the most wholesome and most general articles of food in tropical countries. Although the wild banana maintains its place honourably in the forests of these regions, it is not a tree, but an herbaceous plant. It propagates itself through its suckers, and its stem perishes immediately after fructification. Its mode of vegetation is analogous to that of the Liliaceæ. From a bulbous and fleshy platform issue, beneath, its fibrous roots; above, enormous leaves, often nearly a yard wide and two to three yards long. The petioles of these leaves are adhesive. By folding themselves one another, and successively drying up, they grow into a stem which times attains the dimensions of the trunk of an ordinary tree seven feet) and the stature of twelve to sixteen feet, and which ersed throughout its centre by a stalk springing from the bulb. alk rises again several inches above the terminal leaf, then sinks towards the ground, and terminates in a stem which ar at its extremity the male flowers, and at its base the female flowers, then the fruit. The latter, collected in clusters of twelve to fourteen, are elongated, of a prismatic triangular form, enveloped in a rind, green at first, then yellow, and internally consist of a soft, feculent, sugary pulp, very nutritious, and agreeable to the taste.

In its native clime the banana is born, grows, flourishes, fructifies, and dies in the space of twelve or eighteen months. In the climates most akin to ours, and in our European gardens, its development is not only on a smaller scale, but occupies a longer period, and it has been known to reach the age of ten or a dozen years.

By the side of these weak-stemmed plants, with their soft and

spongy contexture, grow hosts of robust trees, whose timber is compact and sometimes exceedingly hard, and whose branches spread to immense span. My readers will probably remember the lines in which Southey so admirably describes one of the most majestic and most singular of these: the Banyan, or Indian Fig-tree (*Ficus Indica*),*

THE BANYAN TREE (*Ficus Indica*).

also designated the "Multiplying Fig-tree," the "Admirable Fig-tree," and "Tree of Life." The passage will bear transcription:†—

"It was a goodly sight to see
That venerable tree,
For o'er the lawn, irregularly spread,
Fifty straight columns propped its lofty head;

* Order, *Moraceæ*. † Southey, "Poetical Works"—*The Curse of Kehama*.

And many a long depending shoot
Seeking to strike its root,
Straight, like a plummet, grew towards the ground.
Some on the lower boughs, which crossed their way,
Fixing their bearded fibres, round and round,
With many a ring and wild contortion wound:
Some to the passing wind, at times with sway
Of gentle motion swung:
Others of younger growth, unmoved, were hung
Like stone-drops from the cavern's fretted height.
Beneath was smooth and fair to sight,
Nor weeds nor briars deformed the natural floor;
And through the leafy cope which bowered it o'er,
Came gleams of chequered light."

The Banyan surpasses in diameter the finest oaks of Europe, and throws off numerous branches, of which several redescend towards the earth, force their way into it, take root therein, and in their turn develop into new trunks, whence spring other boughs that go through the same process of fructification; so that a single stem spreads in time into a kind of forest, and the canopy formed by the outgrowth of a solitary tree will frequently overshadow an area of 1700 square yards. The evergreen foliage of this beautiful tree forms an immense vault, which has justly been compared to the domed roof of a stately edifice supported by a host of columns. Here a myriad birds raise their notes of joy; underneath, the weary pilgrim finds a delightful asylum; from branch to branch leap the mocking ape and the nimble squirrel. The Hindus hold their "Pagod tree" in great veneration. It is to them one of the emblems of their god Siva, and in its dense deep shade they assemble to celebrate their sacrificial rites, whether in honour of this potent deity, or whether in honour of Ganesha, a rural divinity, analogous in his attributes to the Pan of the Greeks and Latins.

Several other tropical trees possess, like the banyan, the property of producing adventitious roots which spring from the trunk or branches which implant themselves in the soil; but not one enjoys an equal power of reproduction and multiplication.

One of the greatest trees of southern Asia, and possibly one of

the greatest in the world, is the Teak or Indian Oak (*Tectona gr*
which covers vast areas of ground in Hindostan. It flourish
in Pegu, Ava, Siam, Java, and the Burman Empire. It works
easily, and though porous, is permanent and strong; is readily
seasoned, and shrinks but little; is of an oleaginous character, and
therefore does not corrode iron. It is as strong as oak, and more
buoyant. Its durability is more uniform and decided; and to insure
that durability it needs less care and preparation; for it may be
taken into use almost green from the forest, without danger of dry
or wet rot. It will endure all climates and all alternations of
climate.*

The teak of Malabar, grown on the high table-lands in the south
of India, is esteemed the best, because it is the heaviest, the most
durable, contains the most oil, and is the closest in its fibre. Next
in quality ranks that of Java, and inferior to these in some respects
is the teak of Burmah, Rangoon, and Siam; which, however, is the
most buoyant, and the best fitted for masts and spars.

African teak, let me note, is not teak properly so called, but
timber of the *Oldfieldia Africana*. It is largely imported from
west coast of Africa, and though an useful wood, lacks the
valuable properties of the genuine teak.

The teak is a handsome and even stately tree, often at
the noble stature of 130 to 150 feet, with a trunk of prop
diameter, upright, well-shaped, and surmounted by wide-spre
branches. Its large leaves are oval, of a velvety under-surface, and
besprinkled on the upper with whitish spots. Its flowers cluster at
the extremity of the branch in an ample and beautiful panicle. The
poisonous properties of its wood preserve it from the attacks of vermin;
but render it dangerous to work, for men who are but lightly
wounded by its splinters die after a very brief interval.

A less useful timber than the teak, but much esteemed for the
manufacture of articles of luxury, is furnished by the *Diospyros
ebenum* and the *Santalum album*.

* Cranfurd, "The Eastern Archipelago."

the Flora of tropical Asia a very important position is occupied Laurel family. Several species of this family deserve to be particularized on account of their commercial value: thus, from the *Laurus camphora* comes the camphor most esteemed by British physicians, while the aromatic rinds of the *Laurus cinnamomum*, *Culilawan*, *Malabathrum*, and *Cassia*, constitute the various kinds of cinnamon. The *Laurus cassia* is not to be confounded with another Indian tree, one of the Leguminosæ, the *Cassia fistula*, whose enormous cods formerly played an important rôle under the name of Cassia in therapeutic science. While speaking of trees which produce aromatic substances, I must not forget to mention the *Styrax benzoïn*, and the *Boswellia serrata*. The former is a member of the family *Styracaceæ*, whose trees or shrubs, chiefly tropical, are known by their monopetalous flowers, their epipetalous stamens, their long radicle, leafy cotyledons, and by a part at least of the ovules being suspended. The *Styrax benzoïn*, a native of the Indian islands, yields the resin called benzoin. The juice exudes from incisions made in the bark, and when dried, is removed by a knife or chisel. Each tree yields about three pounds' weight annually, the portion formed during the first three years being superior in quality to that which subsequently exudes. It is largely employed by perfumers, and in medicine is esteemed a remedy for chronic pulmonary disorders. *Styrax officinale*, a native of the Levant, furnishes the balsamic resinous substance known as storax, which is also one of the materials manipulated by perfumers, and in medicine is used as a stimulating expectorant.

The *Boswellia serrata* supplies the fragrant incense whose vapours were anciently supposed to be peculiarly agreeable to the gods made by man's hands of conceited by his imagination.

India is also the native country and home-land of the Indigo plants (*Indigofera tinctoria*, and *Indigofera anil*, of the Leguminosæ family), and the *Gossypiums*, from whose expanded fruits is obtained the all-powerful cotton; and in Cochin-China we meet with the *Croton sebiferum* or *Stillingia sebifera* (family of the Euphorbiaceæ).

whose berries contain a rich concrete substance called "tree-t employed, in the far East, in the manufacture of tapers. The tree, popularly known as the "Tallow Tree," has rhomboid leaves, with two prominent glands at the point of attachment between the stalk and the leaf; and its flower catkins are from two to four inches long. "Its fruits contain three seeds thickly coated with a fatty substance which yields the tallow. This is obtained by steaming the seeds in large caldrons, and then bruising them sufficiently to loosen the fat without breaking the seeds, which are removed by sifting. The fat is afterwards made into flat circular cakes, and pressed in a wedge-press, when the pure tallow exudes in a liquid state, and soon hardens into a white brittle mass. This tallow is very extensively used for candle-making in China; but as the candles made of it become soft in hot weather, they generally receive a coating of insect wax. A liquid oil is obtained from the seeds by pressing. The tree yields a hard wood used by the Chinese for printing blocks, and its leaves are employed for dyeing black."*

Climbing and epiphytous† plants are very numerous in India but there are none, perhaps, which in vegetative force and tenaci can be compared to those of the *Calamus*, and particularly of *Calamus rotang* (family of the *Palmaceæ*). These Lianas are remarkable for their flexible stem, which attaches itself to trees, and frequently attains the prodigious length of 200, 250, and even 350 yards. This stem is formed of a series of internodes, or jointed pieces, more or less wide apart, each of which bears a feathery flower, with elongated sheath. The Calami frequently render the forests which they inhabit virtually impenetrable, through their long, flexible, and tenacious arms, stretching across from tree to tree, or crawling over the ground, and bristling with formidable thorns. It is these stems which are imported into Europe as bamboos, cut into different lengths, and there employed for various industrial purposes.

* Brande, "Dictionary of Science, Literature, and Art," iii. 610.

† From the Greek ἐπί, upon, and φυτόν, a plant.

t it is time we took our leave of India, and allowed "observa-ith extensive view" to survey the far-spreading African forests. There, in the first place, we are called upon to salute the patriarch of the tropical Flora, the *Baobab* (*Adansonia digitata*), a gigantic genus of the family *Bombaceæ*.

This colossus of the vegetable world was discovered in Senegal by

1. Baobab. 2. Elæis Guineensis, or Guinea Palm. 3. Acacia verek.

the French botanist Adanson, in 1749. He measured the trunks of several individuals, and found them from 65 to 78 feet in circumference, with mighty branches, each of which was equal to a great oak or magnificent chestnut. One baobab he computed at 90 feet in girth, and its rounded crest extended over an area of upwards of 170 yards in circuit. A root which was exposed to view, through the

washing away of the superjacent soil, measured 110 feet in l
Adanson estimated the age of some of these Anakim of trees at
years. They were just shooting above the ground, if this reckoning
be true, at the time that Constantine, the first Christian emperor,
removed the seat of empire from Rome to Constantinople.

There are other gigantic trees in the forests of Senegambia, as, for instance, the *Khaya Senegalensis*, which rears its crest to a height of 50 or 60 yards, whose hard reddish-coloured timber belongs to the species known in commerce under the name of *Mahogany*. Another kind of mahogany, but less valuable, called Senegal Mahogany, is furnished by the *Swietenia Senegalensis* (family of *Meliaceæ*, tribe of *Cedrelaceæ*), named after Baron von Swieten, a Dutch botanist. It forms a stately tree, some 60 or 80 feet high. *Swietenia Mahogani*, a native of the warmer regions of America and the West Indies, yields the mahogany of commerce. The first discovery of the existence of this kind of wood is ascribed to the carpenter on board Sir Walter Raleigh's vessel, when lying off Trinidad in 1595. It is considered to reach perfection under the venerable age of two hundred years. The seeds prepared with oil are used by the modern Mexicans as they were by the ancient Aztecs, for cosmetic purposes; and the bark is considered a febrifuge.

Among the most curious trees of the Senegal, whose Flora quite a character of its own, travellers have singled out the Tree (*Bassia butyracea*, family of the *Sapotaceæ*), whose fruits contain an edible fatty substance, used by the natives as a substitute for butter; and the Henna (*Lawsonia inermis*), which also flourishes on the eastern coast and in Upper Egypt. The henna is a shrub from six to seven feet high. Its flowers exhale a goat-like odour, which seems much affected by the Orientals and the natives of Africa. Its roots, of a deep red hue, are distinguished by a bitter taste and astringent properties. Finally, its leaves supply an orange-red colouring matter, with which the Arabs and negroes tint their hair, beard, and nails.

Let us not pass over without the tribute of our respectful notice

the numerous tribe of Acacias, which form vast forests in the districts [illegible] of the Senegal, and yield the gum-arabic of commerce. The best known species of this important and useful group are the *Acacia Arabica*, or Red Gum-tree, the *Acacia Adansoni*, the *Acacia vera*, and the *Acacia verek*.

We also meet at Senegal with a tree which I ought, perhaps, to have ranked of right among those of India, and which, like many others, belong rather to the whole zone of the Tropics than to any particular country; I refer to the Tamarind (*Tamarindus Indica*),* whose well-known name is supposed to be derived from the Arabic *Tamar*, signifying "dates," and *Indus*, in allusion to its original habitat. There is only one species of the genus, but the East Indian variety has long pods, with six to twelve seeds, while the West Indian has much shorter pods, containing one to four seeds. It is a tree of graceful appearance, with elegant pinnated foliage and numerous racemes of fragrant flowers. The pods are slightly curved, and consist of a brittle [illegible] shell, enclosing a soft, acid, brown pulp, traversed by strong [illegible] fibres, a thin membranous covering wraps up the seeds. The [illegible] has a savour at once acid and sugary, and acts as a gentle [illegible]ve. The timber is useful for building purposes, and furnishes [illegible]ent charcoal for the manufacture of gunpowder.

[illegible]e *Sterculiaceæ* have numerous representatives at the Senegal. [illegible]all and handsome trees remind the traveller in their appearance of our English oaks. The seeds of the *Sterculia acuminata* and *tomentosa* are masticated by the negroes until reduced to a fluid paste, in which form they employ it to dye their cotton-stuffs yellow. The dye is very bright, and, it is said, extremely durable.

We know that a great part of the Gaboon is occupied by virgin forests, where Fig-trees are predominant, and in marshy soils the Mangle or Mangrove trees (*Rhizophora mangle*), which must not be confounded with the savoury-fruited Mangoes of Eastern India. The Mangroves form, in the family of the *Rhizophoras*, a genus distributed

* Order, *Leguminosæ*.

in the moist localities of the Tropics, and we shall hereafter meet with them in South America.

Equatorial Africa possesses several species of Palm-trees peculiar to it. Such are the Thorny Date-tree, the *Borassus* of Ethiopia, the *Raphia vinifera* of Congo, which, as its name "wine-bearing" indicates, furnishes a wine analogous to that extracted in other regions from other trees of the same family; the *Elæis Guinensis*, or Guinea Palm, whence we obtain the well-known product of palm oil. This oil, or palm-tree butter, forms an important article of food among the Guinea negroes. It is imported into Europe in large quantities, and employed in the manufacture of soap.

The forests of the Hottentot and Bechuana countries, and in general of all those regions bordering on the Cape Colony, are frequently of great extent, but mainly composed of trees of small stature, or even of shrubs, such as the Cape Olive, a few Acacias, some Compositæ and Conifers. Forests, as I have said, are rare in the explored portions of the west African coast; they become denser and more numerous as we leave the great ocean in our rear, and penetrate into that vast interior which for ages has been haunted by so many mysteries. Their Flora, however, offers no special character, and does not materially differ from that of Guinea and Senegambia.

CHAPTER III.

VEGETABLE LIFE IN THE FORESTS OF THE GREAT ISLANDS.

I HAVE said that under the same parallels of latitude, or under neighbouring parallels, the physiognomy of the virgin forests was everywhere nearly the same, and hence we must study from a point close at hand the species which compose them, to determine the distinctive characters of the great agglomerations of vegetables peculiar to diffe-

ent countries. And yet the traveller who, after having explored the primeval forests of Africa and Asia, should be transported to the wild and wooded regions of the great Indian Archipelago and the Pacific Ocean, could not fail to be struck with the novel spectacle presented to his gaze. Undoubtedly he would meet, at first, with a great number of plants not unknown to him; but he would not fail to discover many others which he had not hitherto observed, and especially would he contemplate with astonishment—perhaps with admiration—the chaos of this rich, various, dense, but disordered vegetation. It seems, in truth, as if within these "summer isles of Eden" Nature had hastened to accumulate her choicest products, and feeling herself restricted within narrow limits, had carefully laboured not to lose the smallest particle of space—not even of the aërial territory, if I may so speak—allotted to her. Not only are the trees set in the closest possible array, but they struggle with wonderful effort to develop the exuberance of their strength. Nearly all display an abundant and persistent foliage; their branches are, in general, thick and spongy, begin to shoot at the base of the trunk; in such wise that the boughs extend close to the ground, and by interlacing with of neighbouring trees, form impenetrable thickets. Many send from their trunk and their branches, frail flexible roots like lianas, which descend to the earth, plant themselves in the soil, contribute to render the forests absolutely impervious. Nor is this all; the plants grow there, literally, one upon another. Nowhere, under the Tropics, does one see a similar profusion of epiphytous plants; not a single tree but is invaded by the close-clinging roots and flexible ramifications of these parasites, mingled with brightly-blossoming lianas, whose multifold stems are of immeasurable length. Species worthy of note, either on account of their beauty, their various uses, or formidable poisonous properties, and belonging to widely-differing families, abound, moreover, in these perennial forests.

Ceylon, which has justly been named by the Orientals "a pearl detached from Hindostan," so admirable is its situation, so marvellous is its fertility, so exhaustless its mineral wealth, is the native country

of the *Laurus cinnamomum*—which was early transplanted to the neighbouring continent—and of the Artocarpus, or Bread-fruit tree, one of the most curious and most useful plants of this region.

The Bread-fruit Tree (*Artocarpus incisa*) is a tree of the family *Muriaceæ*, some 45 to 55 feet high. Make an incision in its bark, wherever you will, and it exudes a white lacteal fluid, which hardens

Bread-fruit Tree of Ceylon (*Artocarpus incisa*).

on exposure to the air. Its branches are very numerous, and those nearest its base attain a considerable length. Its leaves are large, consistent, and somewhat deeply cut. It owes its name of "Bread-fruit tree" to its ovoid or rounded fruit, about the size of an ostrich's egg, which forms the staple food of the Cingalese. When fully ripe, the pulp or flesh is white, firm, farinaceous, and very agreeable to the

taste. The natives boil it whole, or cut it into slices for roasting, and prepare it for the table in numerous other modes. Two or three trees, it is said, suffice for the provisioning of one man. My readers will remember that its introduction in the West Indian Islands was signalized by the famous Mutiny of the Bounty, and led indirectly to the settlement of Pitcairn's Island; thus originating a strange and sufficiently poetical romance.

In the forests of Ceylon also flourish the *Cambogia Guttu*, the *Stalagmites Cambogioides*, and the *Garcinia morella* (family *Guttiferæ*), whence camboge is extracted. This substance, at once medicinal and tinctorial, exudes in a liquid state from wounds made in the bark of the trees; it solidifies spontaneously in the vessels wherein it is collected.

Immense forests overspread the humid plains of Sumatra. They are constituted in the main of numerous species of Fig-trees (*Ficoidæ*), whose abundant and persistent leaves form an obscure vault, impenetrable by the sun's "golden arrows." Above this leafy dome shoot the rigid trunks of trees of lofty stature. Of these, the most remarkable, perhaps, is the Ipo-antiar (*Antiaris toxicaria*), whose juice, after having undergone certain preparations, becomes one of the deadliest of poisons. It was for a long time unknown with what substance the Malays envenomed their arrows and their famous *kris*, or dagger; nor was it until the beginning of the present century that the traveller Leschenault ascertained, not without difficulty, that it had for its basis the juice of a very tall tree, with decaying leaves, to which he gave the name of *Antiaris toxicaria*. This is the celebrated Upas, whose deadly properties were formerly exaggerated in so many wonderful fables. The poison is prepared in an earthen vessel, and mixed up with certain quantities of the seed of the pimento and the pepper-tree, and the roots of various kinds of ginger. These are mixed together slowly, except the pimento-grains, which are precipitated one by one to the bottom of the vessel by means of a small stick. Each grain produces a slight fermentation, and rises to the surface. It is then extracted, to be plunged anew into the mixture,

and this process is eight or nine times repeated; after which the mixture is complete. It appears that the Upas-antiar, taken internally, acts at first as a purgative, but afterwards its influence extends to the brain, and produces death with frightful tetanic con-

1. Nipa fruticans. 2. Sugar Palm (*Arenga saccharifera*). 3. Ipo-Antiar (*Antiaris toxicaria*).

vulsions. Introduced into the blood through a wound, it kills small animals in a few moments, and men in a few hours.

Marvel-loving writers formerly asserted that this deadly poison was employed in the execution of criminals, who, however, received a pardon if they contrived to reach a tree and bring back a supply of its venom. Birds, it was said, dropped dead while flying over it—as was formerly told of the pestilential waters of the Dead Sea—and

the whole country around was desolated by its noxious effluvia. But the fact is, the upas tree is merely a tree with poisonous secretions, and in no way affects the atmosphere of the locality where it lives.

A not less terrible poison is furnished by the Liana Tieuté (*Strychnos Tieuté*), a member of the family *Loganiaceæ*. It has an exceedingly long stem, but does not yield, like the upas, a whitish milky juice. Its voluminous roots are covered with a thin reddish bark, of a peculiarly bitter taste. By boiling these roots the Javanese obtain the poisonous resin called in Malaysia *Upas tieuté*, and which was at one time supposed to be identical with the essential element introduced by the Indians of South America into their famous *Ourari* or *Wourali*. Sir Richard Schomburgk, however, has shown that the latter is obtained from the *Strychnos toxifera*, a native of Guiana.

There are several other species of Strychnos; all with flattened, disc-like, and silky seeds, surrounded by pulp. *S. nux vomica*, a moderate-sized tree, with fruit much like an orange in appearance, furnishes the valuable medicine and fatal poison—for it is both—*Nux vomica*. The seeds have an intensely bitter taste, owing to the presence of two most virulent poisons, *Strychnia* and *Brucia*; the pulp is innocuous, and greedily devoured by birds. *Strychnos* [illegible]*a*, a native of Malabar, furnished a variety of Snakewood, in cases of bites by serpents is esteemed an infallible remedy. *S. Pseudo-quina*, which flourishes in Brazil, yields a bark scarcely inferior in value as a tonic and a febrifuge to quinine.

I have spoken of the abundance and variety of the epiphytous plants which grow profusely in the islands of the Indian Ocean. In Sumatra and in Borneo, the more venerable trees are clothed in a rich garment of lycopodiums and ferns, and these often glow with dazzling orchidaceous flowers, while by their side flourish strange aroidaceæ, with climbing crawling stems, and aërial suckers. But of all these brilliant parasites, the most extraordinary, without doubt, is the *Rafflesia Arnoldi*—a plant without any stem, which grows along the surface of the ground upon the roots of the *lianas*, and princi-

pally of the *lissus*, a species of vine peculiar to tropical countries. It was discovered by Dr. Arnold, while in attendance upon Sir Stamford Raffles, Governor of Java. It produces only a fleshy flower, of a wine-like colour, with an intolerably disgusting odour; but it acquires extraordinary, and one might say monstrous dimensions, for it seldom measures less than a yard in diameter, and its weight frequently exceeds four pounds.

Upon the humid coasts of Borneo and Sumatra, the *Casuarinas* mingle their weeping branches with those of the mangroves and fig trees. Palms are common in these two great islands, as well as at Ceylon and at Java. I may mention among the most useful the *Nipa fruticans* and the Sugar Palm (*Areca saccharifera*). The transformed leaves which accompany the inflorescence of the Nipa are brimful of a sugared and effervescent liquid, which is extracted by pressure, and converted into a palm wine of indifferent quality, consumed in great quantities in the Sunda Archipelago. A very sweet liquid, a species of syrup fit for the confection of dainty sweetmeats, escapes from incisions made into the floral envelopes of the *Areca saccharifera*. A tree-wax, analogous to that of the *Croton sebiferum*, is furnished by the tree which the natives of Borneo designate by the name of Engrar-Minjah (*Pterocarpus trinervis*). And, finally, it is at Borneo and at Java that we meet with the *Dryobalanops camphora*, whence is procured a species of camphor preferred by the Chinese to that of the *Laurus camphora*; the *Urceola elastica*, whose milky sap indurates into a kind of caoutchouc, called Suitawan; and the *Isonandra-Percha* (genus *Bassia butyracea*, family of the Sapotaceæ), which of recent years has become the staple of an extensive commerce. It is from this tree we obtain the valuable product of gutta-percha, which has received such various and ingenious applications, and is scarcely less useful in the arts than in the sciences.

Java is perhaps the most fertile of the Sunda Islands. Immense forests extend over its plains, and climb up its mountain-slopes to an elevation of upwards of 6500 feet. The damp localities are peopled with Clusiaceæ, and with other trees of thick soft trunks and

FLORA OF THE EAST INDIAN ISLANDS —

1. Rafflesia Arnoldia.
2. Niphobolus pubescens.
3. Phalænopsis amabilis.
4. Ærides suavcolens.
5. Cycas circinnalis.
6. Nepenthes distillatoria.
7. Scindapsus pertusa.

branches. Mangroves and Avicennias thrive upon the littoral. The latter are specially noticeable on account of their roots, which climb to a great distance above the muddy soil, and throw off a number of suckers, not unlike gigantic water-pipes (*asperges*). Among the palms most abundant at Java, I confine myself to naming the Borrassus, the Corypha, and the Areca. The Vaquois (a species of *Pandanus*), which in stature and appearance resemble the palms, are also widely diffused in that rich and fertile island. In the forests of its interior swarm such splendid Ferns as the *Niphobolus pubescens*, and such graceful Archids as the *Aerides suaveolens*, with its far-shooting fronds and flowers, and the *Phalænopsis amabilis*. There, too, the traveller pauses before the *Cycas circinnalis*, whose trunk, upright and cylindrical as a Grecian column, is surmounted by a crest of feathery leaves, each six to seven feet in length, stiff, and cut into numerous strips, somewhat like our native bracken; or he refreshes himself with the pure liquid which the winding *Nepenthes distillatoria*, or Pitcher plant, collects in its horn-shaped leaves, as a constant source of nutriment for its active life; or, finally, he gazes wonderingly at the *Scindapsus pertusus*, an epiphytous plant, whose cartilaginous leaves are perforated with an infinity of small circular holes, and which twines itself round the tallest forest-trees in an embrace as close as love's!

The forest-flora of the Moluccas differs but little from that of the Sunda Islands. It presents, however, a few plants particularly calculated to excite our interest. Thus, at Amboyna, the Sago-Palms, with other trees of the same family, accumulate in immense woods, spreading over hundreds of acres. Everybody knows that the pith of this palm is a white farinaceous substance, called *sayo*, which not only enters largely into the daily food of the natives, but forms an important item in the European bill of fare, at least for children and invalids. Amboyna, moreover, is the classic land of spices. The air is thick with "Sabæan odours." Every breeze comes laden with perfumes. The Nutmeg (*Myristica aromatica*), the Clove (*Caryophyllus aromaticus*), and the Pepper-plants grow there in a wild state.

In the Philippines vegetation is singularly favoured by the humidity of the climate and the elevation of the temperature, so that the Flora of these richly-endowed islands displays a prodigious variety. Not a single family of tropical plants but is here represented by several species. Hill and valley and plain alike are characterized by the exuberant growth of leaf and fruit and flower; the graceful forms might have enchanted an ancient Greek, the wealth of glowing and intense colour would have fired the imagination of Turner, and defied the palette of Titian or Tintoretto. There are landscapes of such beauty and fertility as the fancy of artist or poet never conceived. Ferns and Orchids are, perhaps, even more abundant here than in the forests of Java, Borneo, or Sumatra. The Bamboo attains to unusual proportions; the Areca (*Areca catechu*) raises to the sky its tall shapely stem, crested with plume-like leaves; and the Betel-nut tree supplies in profusion the grains which, mixed with the fruits of the gigantic palm, constitute the *Pinangue*; a kind of *quid*, which the Orientals chew delightedly, and to which they attribute very valuable stomachic and digestive properties. Under the dense shade of the great forests we are amazed by untold numbers of various kinds of plants, all adorned by richly coloured leaves, which invest the scene with a singular charm, nay, with something of a fairy character; and amongst these we single out the *Dracæna terminalis*, with its blood-empurpled foliage, which, recently introduced into Europe, has already become one of the greatest ornaments of our parks and gardens.

I have previously had occasion to remark the singularity of character which in Australia distinguishes almost every member either of the vegetable or the animal kingdom. I have already said that this immense island-continent seems to have been the chosen theatre for a distinct creative display, where every type differs from the representatives of our scientific classifications in other parts of the globe. The reader has been able to form some idea of the fancifulness of the vegetable forms peculiar to the Australian savannahs. Nor are those which constitute the so-called forests less strangely fantastic. On the southern coast, which is the coolest, the forests are of very moderate

extent. In fact, they may be more correctly described as enormous thickets scattered in tolerably sheltered localities. Most of the trees which compose them have trunks of great feebleness compared with their height, which is often prodigious, and they do not begin to ramify until near their summits. Their bark is smooth, and usually of a grayish-white. Of all their species it can only be said that two—the *Stadmannia australe* and the *Alectryon*—bear fruit which men can eat even under the pressure of hunger. Finally—and this without doubt is the most singular feature of a truly exceptional vegetation—while all the trees and herbaceous plants of the Old and New Worlds develop their leaves horizontally, or on a plane tangent to the cylindrical surface of the trunk or stem, in Australia the leaves of the trees are disposed vertically; in such wise that they give scarcely any shade, and yet are themselves exposed in the very slightest degree to the action of the solar rays. It is owing to this latter circumstance they are always weakly coloured; and thus they give to the densest forests and the most robust trees a sickly tint, a sort of pallor of disease, which saddens the gaze accustomed to the varied tones and vivid hues of the verdure of tropical forests, or to the bold contrasts of light and shade exhibited by the woods of Europe and North America.

The Australian species are comprised in a small number of families, notably in those of the Coniferæ and Myrtaceæ. Certain forests are wholly composed of Casuarinas; others, of Acacias; others again, of Eucalypti. Some of the latter trees may be ranged among the greatest with which botanists are acquainted. The Blue Gum (*Eucalyptus globulus*) attains, for instance, the extraordinary stature of upwards of 300 feet, and does not send out a single branch until half this distance from the ground. Its upright cylindrical trunk furnishes a timber much appreciated by ship-wrights, and especially makes admirable masts. The Eucalypti secrete in abundance a white, sugary, and aromatic substance; whence they derive their popular name of "gum trees"—a name which is also bestowed very frequently upon the gum-bearing Acacias.

The family of Coniferæ exhibit themselves in Australia, like every

other group of plants, under strange and novel forms. The shape of those trees is generally fusiform and pyramidal; their leaves are sometimes extraordinarily small, sometimes large and flattened. Many are of great size; none, however, attaining the gigantic proportions of the celebrated columnar Pine of New Caledonia, which Cook's companions mistook for a colossal mass of basaltic pillars, and which Moore, like

1. Ravenala Madagascariensis. 2. Heritiera argentea. 3. Tafighin.

a true son of industrious Albion, compared to an enormous factory-chimney. This tree exceeds 160 feet in height, and its ramifications, all of the same height, radiate regularly around its trunk, from the base even to the summit.

I have now to ask the reader's companionship on an excursion

A FOREST IN MADAGASCAR.

into the forests of the great African island of Madagascar. The insalubrity of the climate and the jealous inhospitality of the inhabitants will not permit us to penetrate far into their luxuriant depths; but the most superficial glance will satisfy us upon their wild magnificence and the original variety of their superb flora.*

We should seek in vain among their leafy, blossoming glades, for the famous Manchineal, a member of the American *Euphorbiaceæ*, which holds a high place in the records of vegetable poisons; but the toxicological amateur will find ample compensation in examining the formidable Tanghin,† whose deadly juice, mixed with some other substances, plays an important part in the judicial ordeals popular among the Malagasy.

The Tanghin, or Tanguen (*T. venenifera*), is the only plant of its genus, and is confined to Madagascar. It is described as a tree with smooth alternate leaves of moderate thickness, clustered towards the points of the branches, with large terminal cymes of flowers, having a salver-shaped carolla, with rose-coloured lobes. The ovary is twofold, with a long style and thick stigma; but usually only one attains to perfection, and forms an ellipsoid fruit, somewhat pointed at the ends, invested in a smooth purplish-green skin, and containing a hard stone surrounded by a thick fibrous pulp. The poisonous seed of the Tanghin is esteemed by the natives an infallible criterion of guilt or innocence. After being pounded, a small piece is swallowed by the supposed criminal. If he be cursed with a strong stomach, which retains the poison, he speedily dies, and is held guilty; if his feeble digestion rejects it, he necessarily escapes, and his innocence is considered proven.

Beneficent Nature has planted by the side of this fatal tree a species of infinite value, the *Ravenala Madagascariensis*, or "Traveller's-Tree," which derives the latter designation from the base of its petiole of its large leaves, expanded and hollowed out into a kind of gutter, being constantly filled with fresh water, and serving as a reservoir for the thirsty wayfarer. The Vacquois, or Vacoa (*Pan-*

* Rev. W. Ellis, "Three Visits to Madagascar." † Order, *Apocynaceæ*.

danus utilis), one of the Screw-Pines, is of much utility to the natives, who fabricate sacks and bags out of its tenacious leaves. The manufacture of these bags is a source of comparative wealth for the poorer inhabitants of Madagascar, and to a still greater extent for those of Réunion and the Mauritius, whence they are exported annually by millions.

The Malagasy forests also include several resinous species; among others, the Copal-Tree, which furnishes the well-known gum used in Europe as a varnish; and the *Vahea*, a genus of Apocynaceæ, yielding caoutchouc, which will hereafter figure largely in the exports from this magnificent island. There are two species, namely, *Vahea Madagascariensis*—the "Voua Héri" of the natives—and *Vahea gummifera*. Numerous lianas, and a multitude of epiphytous plants, ferns, and orchids, envelop and intertangle the trunks of the great trees. I shall specify only the Beaded Liana (*Abrus precatorius*), whose small hard fruits, rounded and of a scarlet red, make graceful wreaths and necklaces; the *Angræcum sesquipedale* (an orchid), with bright irregular flowers; and the *Angræcum fragrans*, whose perfumed leaves supply a wholesome and savoury infusion. Finally, the *Heritiera argented*, a tree about as large as our lindens, which certain botanists place among the Byttneriaceæ, and others among the Sterculiaceæ, is noticeable on account of its abundant foliage glittering silver-white.

CHAPTER IV.

VEGETABLE LIFE IN THE FORESTS OF THE NEW WORLD.

NATURE, said Linné, is admirable above all in the smallest things: *Natura maxime miranda in minimis*. He might, perhaps, have more justly said, *Natura non minus miranda in minimis quam in maximis*: Nature is not less wonderful in the least than in the

greatest. Whether any created thing occupies a more or less considerable space, or contains a greater or lesser quantity of matter, is of no importance to the naturalist, who only studies the structure of the organs, the springs of life, and the different forces which set them in motion; and considered from this point of view, a vibrio* and an elephant, a penicillium and a baobab, possess for him the same importance, the same amount of interest. It would, however, be unjust not to recognize the fact that there is something very legitimate in the kind of reverential admiration which every man is conscious of in the presence of those things that symbolize, to a certain extent, power, strength, majesty, endurance—of those that possess in a high degree the two valuable qualities of force and greatness. Coleridge tells us that we admire the cataract because it is the type of power. Probably our feelings for the oak are connected with its emblematic properties of permanency, vigour, and durability. All the logic of logicians, and all the sentiment of natural philosophers, will never induce the mass of men to regard with the same interest an ant and a lion, a tuft of moss and a forest of oaks, a grain of sand and an Alpine peak. I do not think, therefore, that I am stooping to a merely vulgar prejudice in signalling out to the reader, among the vegetables of the forests, those whose exceptional dimensions and venerable antiquity are for every traveller an object of astonishment and curiosity. The truth is, that from their contemplation we derive a more vivid conception of Almighty Power than from the examination of even the most wonderful microscopical mechanism. To the still small voice of Nature our ears are deafened by the clash and clang of an ever-active world; but we cannot refuse to listen to the roar of the ocean or the reverberation of the thunder. As we move swiftly onward in the press of the crowd and the race of life, we ignore the tiny blade and the delicate organism beneath our feet; but our eyes

* The genus *Vibrio* is the type of a tribe of animalcules commonly known as microscopic eels, remarkable for their extraordinary minuteness. One species is parasitic upon wheat, and when full grown attains a quarter of an inch in length; but the young are so microscopically small that 30,000 might be contained in a single grain of wheat.

must perforce be opened to the splendours of the sea, the undulating summits of snow-crowned mountains, the sapphire vault of the starry heavens. Those things realize to us, at once and with impressive force, the ubiquitous majesty of the Divine Builder. And it is well that they should lift us for a while above the materialism of our daily lives into a purer atmosphere of thought and feeling—should bid us, while still lingering in the dusty track, expand our souls to hear

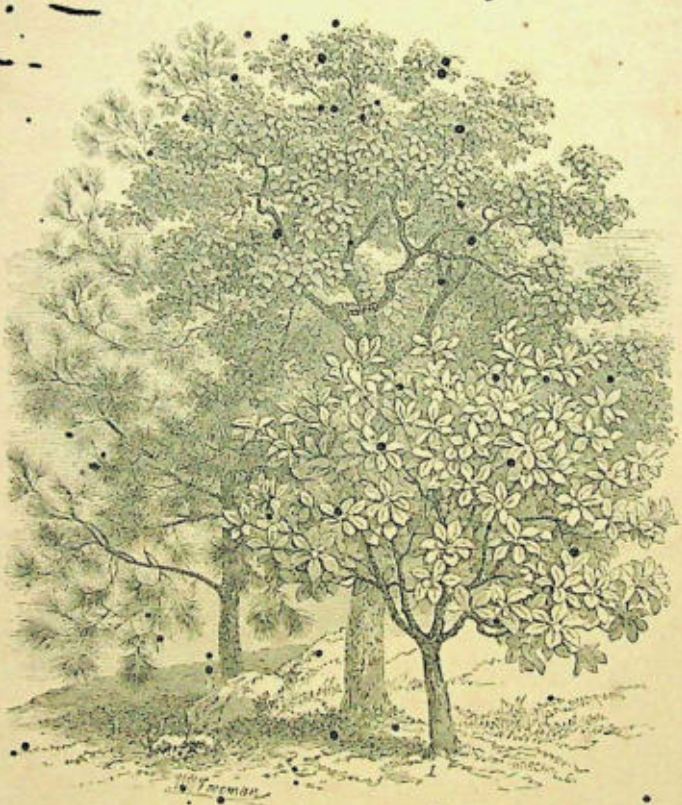
"The mighty waters rolling evermore."

It is not only in tropical regions that we meet with the giants of the vegetable world. Europe possesses a few of them; isolated, it is true, but comparable in their stature to the most robust denizens of the Torrid Zone: such are the chestnut-tree of Etna, and the plane of Boudjoukdéré, near Constantinople, of which so many travellers have spoken. The remains of the virgin forests of North America also abound in species analogous to our own, and capable of attaining, with an almost incalculable longivity, truly extraordinary proportions.

The lofty table-lands of California (the Rocky Mountains) nourish an entire tribe of gigantic Coniferæ, frequently assembled in immense forests. The *Pinus Lambertiana*, the *Pinus Sabiniana*, and the *Pinus insignis*, are not less than 160 to 180 feet in height; the *Douglas Fir* boasts of an almost equal stature, with a circumference which varies from 18 to 36 feet. Yet these colossal trees are surpassed by the *Sequoia sempervirens*, which is 240 to 260 feet high, and by the Titan of Titans, the huge *Wellingtonia gigantea*, which is also a Sequoia. I shall mention a few individuals of the latter species, whose dimensions may defy all comparison with the greatest trees of the Tropics.

According to Müller, about ninety-four of these Coniferæ flourish on a plateau of the Sierra Nevada, at an altitude of 5400 feet. They are distributed in small groups over a fertile soil. The gold-seekers have named one of them the "Miner's Cabin." Its trunk, 320 feet in height, presents an excavation 16 feet in width. The "Three

"Sisters" are individuals springing from one root; the "Old Bachelor," stripped of its branches by successive hurricanes, stands in solitary desolation; the "Family" consists of two aged trees around which four-and-twenty scions have sprung up. The "Riding-School" is an enormous hollow trunk, prostrate on the ground, into which a man on horseback may enter as far as thirty yards. Another



1 Large-leaved Magnolia. 2 Virginian Catalpa. 3 Pinus Sabiniana.

hollow trunk has been exhibited at San Francisco, where they have constructed out of it a saloon, adorned with tapestry and furniture, capable of accommodating forty persons.

Other resinous trees of smaller dimensions grow in the more or less humid localities of North America; such are the *Chamæcyparis thyoïdes*, which does not exceed 80 feet in height, and the Western

Thuya of pyramidal outline. Nor must I forget to name, among the Conifers of this continent, the Cypress of Louisiana, a tree of handsome appearance, about 100 feet high and 12 to 15 feet in circumference, which lives, it is said, 5500 to 6000 years. Its leaves are shrunken like those of the larch; and from its roots, somewhat deeply buried, spring several protuberances, or rounded conical exostoses, which sometimes grow to the height of three feet without bourgeoning.

The forests of the West and of the South which have hitherto escaped the torch and the axe of the pioneer present to the traveller's admiring gaze those magnificent species described so eloquently by Chateaubriand and Cooper, and which are even less remarkable for their gigantic stature than for the majestic elegance of their port, the beauty of their foliage, and the dazzling splendour of their flowers. Some of these forests are partly formed of Oaks whose leaves assume in autumn a purple tint, like the "pupureum lumen" of the Latin poet. In others the dominant trees are the Plane of the West, the Maple, the round-crested Tulip, the large-leaved Catalpa, the Magnolia with white and scented blossoms. To their trunks clings a whole world of climbing, creeping, and parasitic plants; as the Virgin Vine, the Sumach, and the Virginian Jasmine.

Mexico, as far as relates to its climate and productions, has been divided into three distinctly marked regions, defined not by latitude, but by the elevation of various portions of its territory. The upper region, or Cold Lands, is that of the lofty mountains; the mean region, or Temperate Lands, that of the intermediate plateaus; the inferior region, or Hot Lands, is that of the low plains, sometimes arid, sometimes marshy or wooded.

The arborescent Flora of the first two regions very nearly approximates to that of our northern countries; it principally consists of Pines, Firs, Oaks, and Arbute Trees. But in the Hot Lands the vegetation generally assumes, as we descend towards the south, all the characteristics of the tropical Flora. The feathery and graceful Palm trees re-appear, mingled with Coryphas, Oreodoxas, Malpighiaceæ

and Bignoniaceæ. There also grows the *Crescentia cujete*, or Calabash-tree, which is likewise found in the Antilles; it has a tortuous trunk, long branches extended horizontally, and ovoid fruits, clothed with a hard woody bark, which the Indians fabricate into vessels of divers forms, painting them in the liveliest colours.

Mexico is the country of the *Morus tinctoria* and the *Hæmatoxylon Campechianum*. These two trees furnish the dye-wood which forms so important an article of commerce: the first, under the name of the "yellow wood of Tampico" or "Tuspan;" the second, under that of "Campeachy wood." It is in the hottest and most humid parts of the southern provinces of this Republic that we meet, for the first time, with one of the most precious trees of the Equinoctial Zone, the Cacao-tree (*Theobroma cacao*), whose bruised and roasted seeds, mixed with variable amounts of sugar and starch, form the different kinds of Cocoa; or, sweetened and flavoured with vanilla or other substances, the article known as Chocolate. It is but a small tree, with large entire leaves, and clustered flowers growing from the sides of the old stems and branches. Its large pentagonal fruits vary from six to ten inches in length and three to five in breadth, and contain between fifty and a hundred seeds.

The *Vanilla planifolia*, another Mexican native famous for its succulent fruit, is a plant of the Orchidaceous order, which climbs about other trees in the manner of ivy. It is the only genus of the family which possesses any economical value. The delicate perfume of its fruit is due to the presence of benzoic acid, which forms in crystals upon the pod, if left undisturbed.

Already, in Central America, we encounter the first ranks, the vanguard, as it were, of those vast impenetrable forests which spread over the whole northern region of South America to the banks of the Amazon, and cover with dense foliage immense areas in Guiana and Brazil. If we would pause again to wonder at the Giants of the Vegetable Kingdom, we shall find many well worthy of our consideration. Such, for example, is the *Bertholletia excelsa*, a colossal Lecy-

thidacean on the borders of the Orinoco, whose large fruits are known in Europe as "Brazil nuts," the seeds being enclosed in large woody vessels. The Sapucaya (*Lecythis ollaria*) is scarcely less abundant and of immense height. Its fruit, popularly called "Monkey's Drinking-cups" (Cuyas de Macaco), consists of a cup-like vessel, with a circular hole at the top, in which a natural lid fits neatly. When the nuts are ripe this lid becomes loosened, and the heavy cup falls with a crash, scattering the nuts over the ground.

"What attracted us chiefly," says a traveller in the virgin forests, "were the colossal trees. The general run had not remarkably thick stems; the great and uniform height to which they grow without emitting a branch, was a much more noticeable feature than their thickness; but at intervals of a furlong or so a veritable giant towered up. Only one of these monstrous trees can grow within a given space; it monopolises the domain, and none but individuals of much inferior size can find a footing near it. The cylindrical trunks of these larger trees were generally 20 to 25 feet in circumference. Von Martius mentions having measured trees in the Pará district belonging to various species (Symphonia coccinea, Lecythis spirula, and Cratæva Tagia), which were 50 to 60 feet in girth at the point where they become cylindrical. The height of the vast column-like stems could not be less than 100 feet from the ground to their lowest branch. Mr. Leavens, at the saw-mills, told me they frequently squared logs for sawing 100 feet long, of the Pas d'Arco and the Massaranduba. The total height of these trees, stem and crown together, may be estimated at from 180 to 200 feet: where one of them stands, the vast dome of foliage rises above the other forest trees as a domed cathedral does above the other buildings in a city.

"A very remarkable feature in these trees," says Mr. Bates,* "is the growth of buttressed-shaped projections around the lower part of their stems. The spaces between these buttresses, which are generally thin walls of wood, form spacious chambers, and may be compared to stalls in a stable: some of them are large enough to hold

* H. W. Bates, "The Naturalist on the Amazons," pp. 37–39.

half-a-dozen persons. The purpose of these structures is as obvious, at the first glance, as that of the similar props of brickwork which support a high wall. They are not peculiar to one species, but are common to most of the larger forest trees. Their nature and manner of growth are explained when a series of young trees of different ages is examined. It is then seen that they are the roots which have raised themselves ridge-like out of the earth; growing gradually upwards as the increasing height of the tree required augmented support. Thus they are plainly intended to sustain the massive crown and trunk in these crowded forests, whose lateral growth of the roots in the earth is rendered difficult by the multitude of competitors."

Scarcely less remarkable, and certainly not less useful, than the Traveller's Tree of Madagascar is the Massaranduba, or Cow Tree, of these grand Brazilian wildernesses. It is one of the largest of the forest monarchs, but rather reminds you of monarchy in its decay than of regal pomp, owing to its deeply-scored reddish and ragged back. A decoction of this bark is used as a red dye for cloth. The copious milk-like fluid which the tree supplies, and which may even be drawn from dry logs that have stood for days in the sun, is wholesome and nutritious, if taken in moderate quantities. On exposure to the air it soon thickens into an excessively tenacious glue.

But, apart from these monstrous trees, the virgin forest possesses an abundance of interest for even the least observant traveller, while in its various phases it is adapted to astonish, to impress, and to awe a thoughtful mind. It is true that it does not boast of that profusion of floral ornament, of those gay and exquisite buds and blossoms, which make the charm of our English woods; but in its infinite variety of foliage the grace of colour and beauty of form are ever present. What most seizes upon the soul, however, is its intense silence—which the occasional scream of some wild animal, or the infrequent song of some pensive bird, or the sudden crash of some over-toppling tree, does but render the more significant and appalling. The hush is like that

which prevails on a battle-field before the dread voices of the cannon speak of death and carnage, but, unlike that hush, it is never interrupted. Morning comes with its cold gray lights, noon with its warmth and radiance and splendour, night with its orbed noon and pearly dews, but the hush still reigns undisturbed, and it seems to the traveller as if it would never be broken but by the sounds which shall proclaim the end of all things!

It is rather by the varied characteristics of the species which

1. Bertiera Brasiliense. 2. Alsophila horrida. 3. Panicum plicatum. 4. Maranta. 5. Caladium violaceum.

compose it, by their fantastic structures and useful properties, than by its gigantic outcomes, that the wild flora of these forest-regions appeals to our admiration. We are struck at first by the infinite variety, richness, and elegance of the vegetable forms. Especially do we pause in wonder before those glorious Tree-Ferns which I take to

be the finest growth of the tropical wilderness. These Ferns, from 36 to 50 feet in height, are not unlike Palms in their physiognomy; their stem is only less upright, shorter, and more scaly; their foliage, slightly dentated on the edges, is more delicate, of a looser and more transparent texture. To this family belong the *Blechnum Brasiliense* and the *Alsophila horrida*. Not less attractive in appearance are the *Clusia* [illegible] or the *Carolinea insignis*. The former of these trees belong to a family (that of the Clusiaceæ) nearly all whose representatives throw off from every point of their branches long aërial roots. The traveller reposes with a feeling of Sybaritic delight under its thick and evergreen foliage, enriched with brilliant flowers. The second, with its shrunken leaves, owes the specific epithet (*insignis*, "remarkable") which botanists have imposed upon it, to the peculiar structure of its flowers. The latter bear in the centre of their chalice a great number of stamens, which form a silken tuft of the most graceful design.

The Gramineæ, like the Ferns,—to use an expression of Humboldt's,—"ennoble themselves" under the Tropics: witness the Bamboo, the Sugar-Cane, the Sorgho, and the great Panicums. Of the latter genus we have already seen in Africa numerous species. America in its turn offers to our attention the *Panicum maximum* and *plicatum*, wood-inhabiting Gramineæ, which without attaining to the dimensions of the bamboo, or even to that of the cane, far surpass that of their European congener, the millet.

The graceful palms abound in South America. The greatest of all, the Cocoa-tree, seems there to have discovered its true home, for it nowhere else acquires a greater development. There, too, the Banana flourishes marvellously, no less than the Cocoa-tree, in a wild state, and, like the latter, is carefully cultivated on account of its nourishing and savoury fruits. A multitude of lianas and epiphytous plants twine round the trunks and branches of the trees, and frequently choke up their failing life. Some are indigenous to all tropical countries: the *Calamus Rotang*, for example; others are more particularly, or even exclusively, proper to the New World.

The family of Aroideæ is there represented by the *Pothos*, whose fleshy and herbaceous stems are surmounted by leaves sometimes arrow-headed, sometimes digitate or elongated, and always divided by thick cord-like nerves. We know that the Aroideæ alone possess, in the vegetable kingdom, the property of disengaging, while flowering, a heat appreciable by the thermometer. To this family belong the

1. Banana. 2. Carolinea insignis. 3. Clusia rosea.

Caladiums, a genus closely allied to the Pothos. With these lianas mingle the branching stems of the Passifloræ, or Passion-Flowers, so named because Pierre de Ceza, in his "Histoire du Pérou," asserted that he had recognized in the fantastic flowers of this genus of plants all the instruments of our Saviour's Passion—an idea which could only have been conceived by an imaginative and credulous Spaniard.

Elsewhere the Bignonias open by hundreds their large and richly-coloured flowers; the Bauhinias stretch along the trees their long leafless branches, often 40 to 45 feet in length, which sometimes hang vertically from the lofty summits of the Swietenias, or Mahogany trees, and sometimes extend obliquely from one huge trunk to another, like the ropes of a ship. The Tiger-Cats, says Humboldt, display a wonderful agility in mounting or descending these graceful vegetable shrouds.

Upon the umbrageous banks of the Rio Magdalena grows a creeping *Aristolochus*, whose flowers in their extraordinary development surpass those of the *Rafflesia Arnoldi*, measuring often three feet and a half in circumference. The forests of which we are now speaking also nourish numerous species of Convolvulus; I may particularize the *Convolvulus batatas*, a climbing plant, whose roots produce the feculent and saccharine tubercules known over the wide world by the name of "Patates," and frequently but erroneously confounded with that most useful vegetable, the Potato. The root of another Convolvulus, a native of Mexico, constitutes the *Jalap officinalis*, which figures in the veterinary pharmacopœia as an important purgative.

Certain lianas, common enough in the South American forests, belong to the family of *Sapindaceæ*, which, like the orders Loganiceæ and Euphorbiaceæ, owe their reputation chiefly to the medicinal or poisonous substances extracted from them. Among the Sapindaceæ I shall mention only the genus *Paullinia*, which includes several species endowed with narcotic properties. These properties appear especially developed in the *Paullinia pinnata*. Its bark, leaves, and fruit contain an abundant acrid principle with which the Indians of Brazil prepare a slow but certain poison. The Indians of Guiana extract from the *Paullinia curura* another substance with which they envenom their arrows, and which was long supposed to be the veritable *Wourali*. But Sir Richard Schomburgk has shown that the latter formidable poison is really extracted, as I have already recorded, from the *Strychnos toxifera*, a shrub of the family *Loganiceæ*, which flourishes in Guiana and Brazil. To the same family and

the same countries belong the *Ignatia amara*, whose seeds are known by the name of "St. Ignatius' Beans." These beans contain two alkaloids, *Strychnine* and *Brucine*, which we also extract from the *Nux vomica*, and which must be classed among the most violent poisons known to the toxicologist.

While speaking of the poisonous plants of South America, a few words in reference to the Manchineal (*Hippomane Mancenilla*) will not be inappropriate. This tree thrives best, it is said, on the sea-shore. It bears a profusion of very pretty fruit, resembling in colour and form the Red Apple (the Spanish *Manzanilla*), and exhaling an agreeable, lemon-like odour. They are, therefore, scarcely less beguiling than Dead Sea fruits; but they are also very poisonous, yet less deadly than the milky juice which flows from the slightest incision made in the tree's thick and grayish bark. This juice, received into the stomach, or introduced into the blood through a wound, slays the victim with awful quickness. If it do but touch the skin, it excites a violent irritation, and raises swellings or boils of the worst description. The very vapour which it emits causes a painful itching in the eyes, the lips, and the nostrils. It was formerly asserted that to sleep under the shade of a Manchineal tree was certain death; but the naturalist Jacquin, in the interests of science, courageously made the experiment, and proved the falsity of the story.

The Manchineal is not unfrequently confounded with other poisonous Euphorbiaceæ, as the *Sapium aucuparium* and the *Excæcaria agallocha*, which flourish in very nearly the same regions. The *Excæcaria*, it is said, is not less dangerous than the Manchineal. It owes its name (*ex*, and *cæcus*, "blind") to the circumstance (or the fable) that some European sailors, while felling wood in the forest, having accidentally struck with their axe a tree of this species, were blinded by the milky juice which sprang into their eyes.

By a kind of compensation, the Tropical Forests, which contain so many poisonous plants, produce also a great number of the highest utility to man. Some offer him efficient remedies against the diseases which beset his frame; others nourish him with the fecula

their roots or the delicious substance of their fruits; others again supply him with textile fibres, dyeing or resinous materials, and woods which the artist and the artisan convert to numerous uses. This vegetable wealth has been widely distributed over South America. It will suffice to indicate a few of its more notable sources.

If we direct our attention to medicinal plants, we shall probably find none more precious than the Quinquina, whose bark is the most effective of all febrifuges, and which is endowed, moreover, with very valuable tonic and depuratory properties. Sir Samuel Baker, in his recent address to the British Association at Dundee, pronounced it the traveller's best friend, the powerful weapon with which he could securely enter the African wilderness, and successfully contend against its demon-host of fevers and agues. The Quinquinas (genus, *Cinchona;* family, *Rubiaceæ*) are trees or evergreen shrubs with large and handsome leaves, and flowers whose form and fragrance remind one of the lilac. They are diffused over the two slopes, but chiefly along the eastern slope, of the Andean Cordilleras, in the republics of Venezuela, New Granada, Ecuador, Peru, and Bolivia. The traveller meets them occasionally in picturesque groups or thickets which the Peruvians call *Manchas* (spots); but they are more frequently scattered in immense forests.

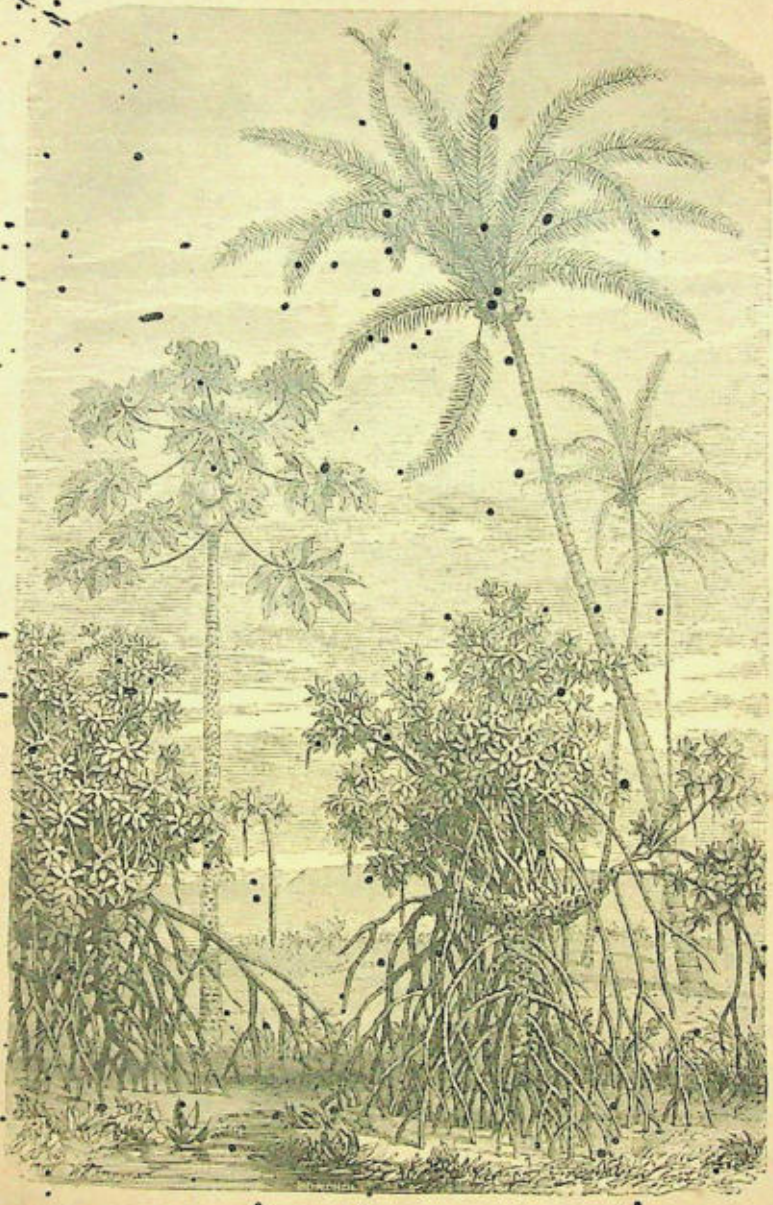
What of the lactiferous and resinous plants? South America is the native land of the trees whence we extract the resinous gums called "Animé d'Amérique," "White Amber," and "Soft Brazilian Copal," and the "Hevea Guyanensis," which furnishes the greater portion of the caoutchouc imported into Europe.

Caoutchouc was described for the first time in 1736, by the scientific travellers Bouguer and La Condamine, members of a Commission despatched to Peru by the Parisian "Académie des Sciences," to measure an arc of the meridian. A few years later, the engineer Fresneau, who resided for a long time in Guiana, collected, with the assistance of a native, ample information in reference to caoutchouc and the tree which produced it. Finally, in 1768, was found in a work by the traveller Aublet on the Flora of Guiana, the description

and figure of the *Hevea*. This tree attains a height of 50 to 70 fe[et]. The almond enclosed in the kernels of its fruits is white, of a ve[ry] agreeable taste, and much esteemed by the Indians, who also extract from it an oil for seasoning their food.

The Banana, the American Agave, the Bamboo, and divers Palm-trees supply the inhabitants of South America with suitable materials for the fabrication of various tissues, from the finest and most brilliant linen cloth to the rude mats which ornament the cabin of the savage. Trees bearing fruits or edible roots are innumerable. To the Bananas and Cocoa-trees which I have already mentioned, we may add, as the most useful, the Maranteas or Canneas, especially the *Maranta arundinacea*, *M. alloya*, and *M. nobilis*, whose roots, rasped and washed, constitute the popular and valuable farina so widely known as *Arrow-root*; the Guavas (*Psidium pyriferum*, and *P. pomiferum*), whose gilded fruits contain a succulent and perfumed pulp; the Papaw tree (*Carica papaya*), resembling the Palm in its port and aspect, and also loaded with large yellowish fruit, whose flesh is exceedingly savoury and aromatic. The Papaw, moreover, enjoys some extremely remarkable properties; thus, its milky juice exhales, when burnt, an ammoniacal odour, and chemical analysis has recognized therein the presence of *fibrine*. Mix some of this juice in water, plunge into the mixture fresh hard meat, and in a few moments it will become exquisitely tender. The very exhalations of the tree operate in the same manner, and the inhabitants of the regions where it flourishes suspend to its branches such meat and poultry as they wish to soften.

The immense forests of Brazil and Guiana are for the whole world an inexhaustible storehouse of woods for dyeing and cabinet work. They spread their dense masses of foliage along the borders of the sea, where the Mangroves (*Rhizophora mangle*) plunge their adventitious roots into the mud inundated by the surging tides of those regions, and form a kind of impenetrable palisade, behind which grow in infinite variety trees of the costliest timber. Such are the *Swietenia*,



FLORA OF THE NEW WORLD.

1. Papaw Tree (*Papaw Sativa*). 2. Great American Cocoa-Nut Tree.
3. Mangrove (*Rhizophora mangle*).

Mahogany trees; the *Ferolia Guyanensis*, which supplies the well-known rose or satin wood; the *Jacaranda Brasiliensis*, and the *Dalbergia*, which yield the violet ebony; the *Sterculia acuminata*, whose flowers exhale a fœtid odour, and whose timber, called "stinkwood," is nevertheless held in high esteem on account of its durability, the fineness of its texture, and the excellent polish of which it is susceptible. Nor must we forget the *Cæsalpineæ*, whose woods are impregnated with a red colouring matter which varies in tint according to the species, and which are largely employed by the dyer under the names of "Brazil wood" and "Pernambuco wood." A great number of other woods which we procure from these countries, and which are in daily use in cabinet work, toys, marquetry, and dyeing, belong to vegetable species as yet undetermined. We might, however, almost venture to assert that whatever tree you accidentally and at haphazard struck down in these forests, either its timber, bark, or roots would be found capable of being utilized.

I have not mentioned, among the species proper to the Forests of the New World, those which are common with our own, and which abound upon elevated lands. The extraordinary height to which not only isolated mountains, but whole districts rise, in the vicinity of the Equator, and the low temperature which is the consequence of this elevation, provide the inhabitant of the Torrid Zone with a remarkable spectacle. For while, as Humboldt remarks, he may look around him upon groves of palms and bananas, he also sees those vegetable forms which are regarded as more particularly belonging to the countries of the North. Cypresses, firs, and oaks, barberries and alders, closely resembling our own, cover the table-lands of Southern Mexico and that part of the Andes which the Equator traverses. Thus Nature allows the denizen of the Torrid Zone to see, without quitting his native land, all the vegetable forms of the earth, at the same time that from one pole to the other the entire vault of heaven reveals to his gaze its luminous worlds.

I conclude my account of the South American Forests with a

picture taken from the interesting volume of Mr. Bates, and drawn on the bank of a forest stream flowing into the Murucupé. "A glorious vegetation," he says, "piled up to an immense height, clothes the banks of the creek, which traverses a broad tract of semi-cultivated ground, and the varied masses of greenery are lighted up with the sunny glow. Open palm-thatched huts peep forth at intervals from amidst groves of bananas, mango, cotton, and papaw trees and palms. Both banks are masked by lofty walls of green drapery, here and there a break occurring. The projecting boughs of the trees are hung with natural garlands and festoons, and an endless variety of creeping plants clothe the water frontage, some of which, especially the Bignonias, are ornamented with large, gaily-coloured flowers. Art could not have assorted together beautiful vegetable forms so harmoniously as is here done by Nature. Palms, as usual, form a large proportion of the lower trees; some of them, however, shoot up their slim stems to a height of sixty feet or more, and wave their branches of nodding plumes between you and the sky. One kind of palm, the Pashiúba (*Iriartea Exorhiza*), which grows here in greater abundance than elsewhere, is especially attractive. It is not one of the tallest kinds, for when full-grown its height is not more, perhaps, than forty feet; the leaves are somewhat less drooping, and the leaflets much broader than in other species, so that they have not that feathery appearance which those of some palms have, but still they possess their own peculiar beauty."

Probably there is no richer field on earth for the naturalist, the poet, or the artist than the virgin forest;—

"To mark the structure of a plant or tree,
And all fair things of earth, how fair they be!"

CHAPTER V.

ANIMAL LIFE IN THE TROPICAL FORESTS:—THE ELEPHANT—THE RHINOCEROS.

SOME thousands of years ago—no long period in the history of creation, though so far outstripping the written records of man—gigantic animals, with huge trunks and ivory tusks, forming the family of Proboscideæ, were distributed throughout all the northern regions of Europe, Asia, and America.

Of this family the most ancient and colossal representative is the *Dinotherium*, which appears to have flourished in the Miocene period of the Tertiary epoch, and a skull of which was disinterred at Eppelsheim, in Hesse Darmstadt, in 1836, measuring about four feet in length and three in breadth; whence Cuvier inferred that the total length of the animal was probably eighteen feet. This pachyderm, which far surpassed in size the largest living elephant, had a comparatively short trunk, and tusks inserted in front of the lower jaw. Such a lower jaw could hardly have been otherwise than cumbrous and inconvenient to the quadruped if he lived on land. No such disadvantage, as Dr. Buckland remarks,* would have attended this structure in a large animal destined to live in water; and the aquatic habits of the family of Tapirs, to which the Dinotherium was most nearly allied, render it probable that, like them, it was an inhabitant of fresh-water lakes and rivers.

Two other kinds of Proboscidians, the *Mastodon* and the *Mammoth*, belong to the Pleiocene period, the last of the Tertiary epoch, and to the Intermediate or Glacial deposits, which immediately preceded the modern epoch. The Mastodon only differed essentially from the Elephant in his dental apparatus. His molar teeth were covered with conical projections, whence his name; he had two small tusks,

* Dr. Buckland, Bridgewater Treatise, "On Geology and Palæontology," &c.

planted in the lower jaw like those of the Dinotherium, but bent forward, and two others in the upper jaw, having the same direction, but being of a prodigious length. Buffon named it the "Animal of the Ohio," because its fossil remains were discovered on the banks of that great river. They have also been found in other parts of North America, and particularly in the saline morass known as Big-bone Lick, in the northern districts of Kentucky. Several skeletons, almost perfect, have been excavated at a moderate depth, and some of them in a vertical position, as if the animals had been stricken with death while standing, and suddenly engulfed in the mud.

Many curious fables are told by the Indians in reference to this extinct quadruped. The Shawnee Indians believe that contemporary with them lived a race of men of proportionate dimensions, and that the Great Being destroyed both the one and the other with thunderbolts. Those of Virginia state that the "Great Man on High" slew this colossal genus, because it was exterminating the animals created for the use of man, and that none escaped but the hugest bull, who, having been wounded by the celestial bolts, fled towards the great lakes, in whose solitudes he wanders to this very day. The Indians of Canada and Louisiana designate the Mastodon by the name of "Father of the Bulls," probably on account of the bones of cattle disinterred with his own.

The Mammoth (*Elephas primigenius*) is known to us only by the fossil remains which have been discovered enbedded in the glacial deposits of the Intermediate epoch. The first discovery took place in 1799, under circumstances which are thus recorded in the *Zoologist*.

In 1799, a Tungusian fisherman observed, in a bank on the shore of the Frozen Ocean, at the mouth of the river Lena, a shapeless mass almost enveloped in ice, and he was quite unable to determine what it might be. In the following year a larger portion of this mass became visible, but the fisherman was still unable to discover its nature. Towards the end of the following summer, however, one of the tusks and an entire side of a fossilized animal were

exposed. But it was not until the fifth year from its discovery, when the ice had melted sooner than usual, that the enormous animal became entirely detached from the bank or cliff in which it was first observed, and came thundering down upon a sand-bank below. In the month of March 1804, the fisherman extracted the tusks, which were nine feet six inches long, and together weighed 360 pounds, and sold them at Yakoutsk for fifty roubles. Two years afterwards, Mr. Adams, a traveller, visited the animal, and found it much mutilated. The Yakoutes residing in the neighbourhood had cut away the flesh to feed their dogs; wild beasts had also eaten a great quantity of it. Nevertheless, with the exception of a fore-leg, the skeleton was entire: the other bones being still held together by ligaments and portions of skin. The head was covered with dried skin; one of the ears was entire, and furnished with a tuft of hairs; the pupil of the eye was still to be distinguished; the brain was in the skull, but somewhat dried; the lower lip had been gnawed by animals, the upper one was entirely gone, and the teeth were consequently exposed; the neck was furnished with a long mane; the skin was covered with long hair and a reddish wool; the portion of skin still remaining was so heavy that two men could scarcely carry it; according to Mr. Adams, more than thirty pounds' weight of hair and wool was collected from the wet sand into which it had been trodden by the white bears while devouring the flesh. This skeleton is now preserved in the Museum of the Academy of St. Petersburg. The height of the creature is about nine feet, and its extreme length to the tip of the tail about sixteen feet.

A second carcass was afterwards discovered on the bank of the Asaleia, which empties its waters into the Frozen Sea, by the traveller Sarytcheff. It was standing upright, and wholly covered with its skin and fur. Finally, a third has been recently found in the same region, and the Museum at Paris possesses a portion of its skin, with a tuft of wool, and some relics of the mane.

The Mammoth, therefore, would seem to be a link connecting the past and the present worlds, a being whose body has outlived its

destination. Evidently it was adapted to brave the winters of a boreal clime; its long, warm, and woolly coat forming an admirable defence against the severest cold. It probably inhabited the icy plains, and the banks of the lakes and rivers; its food consisting of lichens, reeds, and the young shoots of the willows and other trees which thrive in moist situations.

The Mammoth naturally leads us to an examination of his descendant and congener, the Elephant; the largest and strongest, the most sagacious and docile of all living animals.

Elephants, of which only two species at present exist, the Asiatic and African, are natives of tropical regions, where they prefer to inhabit the depths of the forests, quitting their umbrageous recesses only at night, in search of food, or to quench their thirst in the nearest stream.

The whole form of the animal suggests the idea of unwieldy strength. His head is large, with extremely small eyes, and very large and pendulous ears; he has an arched back, and a huge thick body, which rests upon clumsy and shapeless legs; his feet are slightly divided into five rounded heaps; the upper jaw is armed with two enormous projecting tusks, which measure in many instances six or seven feet; and he is endowed with an extraordinary proboscis or trunk, of such strength that it can uproot trees, and of such delicacy that it can gather grass. This organ, nearly eight feet in length, conveys the food to the mouth, and pumps up the enormous draughts of water, which by its recurvature are turned into and driven down the capacious throat, or showered over the body. Its length supplies the place of a long neck, which would have been incompatible with the support of the large head and weighty tusks. A glance at the head will show the thickness and strength of the trunk at its insertion; and the massy arched bones of the face and thick masculine neck, are wonderfully adapted for supporting and working this powerful and marvellous instrument.

The Asiatic Elephant (*Elephas maximus* of Linné, *Elephas Indicus* of Cuvier) has small ears and tusks. A head elongated in

height, and terminating in a kind of double pyramid. His hide is a clear brown colour. This species includes several varieties; that of Indo-China is remarkable for its prodigious height, which sometimes attains fifteen feet, and for a skin marked with brown spots upon a clear gray ground. The islands of the Indian Archipelago likewise contain several varieties of elephants, which experts can easily distinguish from one another. In every species are found the *albinos*, or white elephants, which receive the marked veneration of every Indian race, and particularly of those of Siam and Pegu.

The African Elephant (*Elephas Africanus*) differs from the preceding in the structure of his grinder teeth, in the length of his tusks, which are enormous, and in his ears, whose trumpet is also of great dimensions. He was formerly met with throughout all the African continent, and was much employed in war by the Carthaginians and Egyptians. From the northern regions of Africa he has now disappeared, but large herds still haunt the whole southern division, from the Senegal to the Cape, and the eastern districts, as far north as Abyssinia. He is also found in all the African interior, whose inhabitants deal in ivory as the staple of their commerce. His height is equal to that of the Asiatic elephant, and the habits of the two species are identical.

Elephants live in the forests, gathering in troops of from thirty to about one hundred individuals, and as they require a very extensive area of pasturage, it is said that they pitilessly expel from their domains all other animals which trespass therein to share the product.

Each herd marches under the guidance of an acknowledged chief. When they sally forth from their retreats to devastate a field, or to wander in quest of fresh pastures, they observe a very regular order of march; the young and the females occupying the centre, the males assemble round them in a circle. If danger threatens, the little ones take refuge under the breast of their mothers, who fold their trunks about them.

The young elephant is suckled for two years, and during that period attains the stature of four feet and a half. At the end of the

third year he is nearly six feet high. He continues to grow, but less rapidly, until twenty-two or twenty-four years old. The female adults measure generally from seven to nine feet in height, and the males from ten feet and a half to twelve. As may be inferred from the tardiness of his growth, the elephant enjoys the privilege of longevity. He has been known to live in captivity to the age of 120 or 130 years; but Cuvier was of opinion that in his free and wild condition he might well number nearly a couple of centuries.

The Africans hunt the elephant for the sake of his ivory and flesh; in India, and the isles of the Indian Ocean, to reduce them to subjection. In Africa, for many negro populations, ivory and "ebony wood" (an euphuism by which the slave-dealers designate their black slaves) are the sole articles of commerce, and the majority of the English, Dutch, and French colonists carry on a considerable traffic in elephants' teeth. The negroes excavate wide pits, which they cover over with branches; and the elephants falling into them are precipitated headlong upon sharpened stakes; or they kill them either with arrows, assegays, or musketry. Hunting them with spears is truly a ferocious pastime. The poor elephant only succumbs after receiving so great a number of projectiles that his body resembles an enormous porcupine. He rarely turns upon his aggressors; he seeks to fly; he fills the air with plaintive wailings; the female throws her huge bulk between her young ones and the enemy; the male sometimes rushes furiously upon his assailants, and woe to the latter if he overtake them; he crushes them under his hoofs, he pierces them with his tusks, or seizes them with his trunk, and dashes them upon the earth a shapeless and bleeding mass. But nimble and experienced hunters easily elude his charge, whose onset he is prevented from moderating by his weight, or from rapidly changing its direction.

But firearms, and especially the recently perfected rifles, are assuredly the best weapons to employ against the leviathan. With a Westley-Richards, for instance, a good marksman, aiming at the shoulder-joint or the ear, is certain to bring down his game; he may

HUNTING THE ELEPHANT IN AFRICA.

post himself at a distance, and avoid exposure, while the victim is saved from a cruel agony.

Ivory is not the only valuable product which the elephant yields; his hide, very thick and very tenacious, can be utilized for many purposes. The bucklers made of it by the negroes are scarcely less precious than the shield of Ajax, which was formed of a bull's hide sevenfold. The animal's flesh is also eaten, although too tough and too strongly flavoured for an European palate.

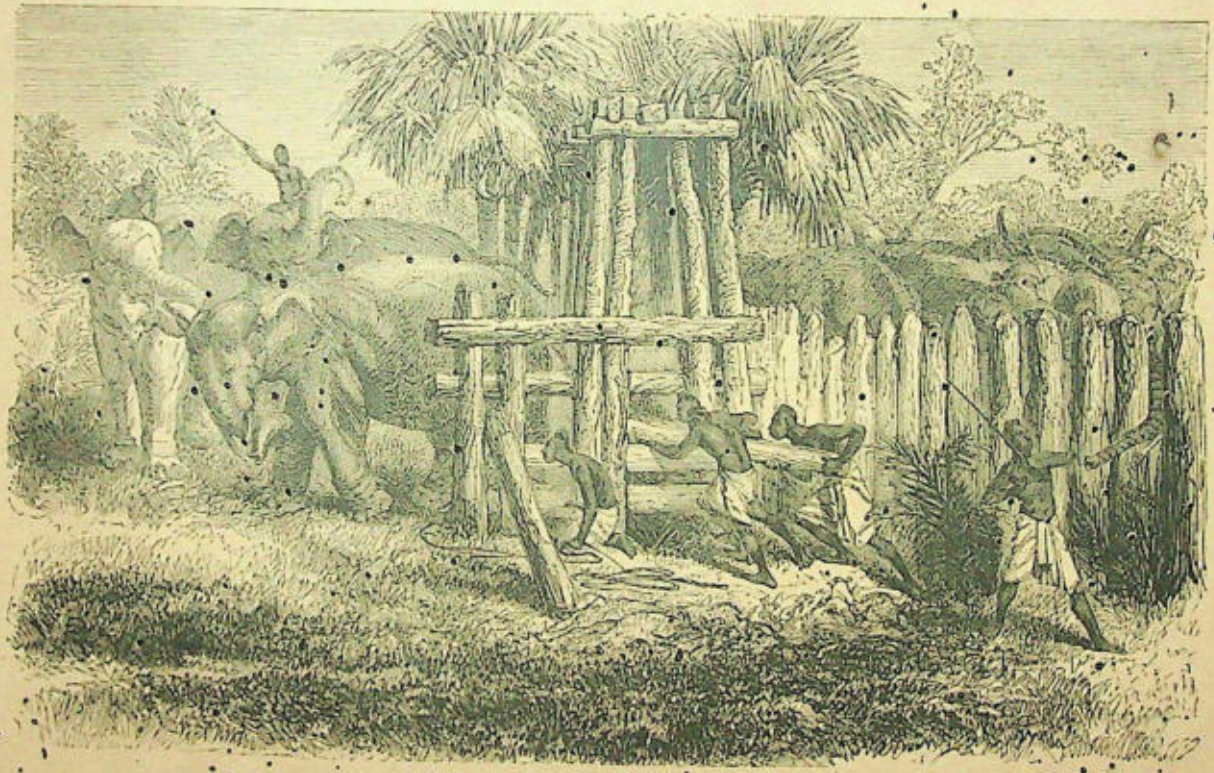
In India and the Indian islands the chase is carried on to make prisoners, and not victims. Its most remarkable feature is the important and almost indispensable assistance which the tame elephants render man against their wild brethren, zealously aiding to reduce them into slavery; now serving as baits to beguile and attract, and now as gendarmes, or rather as convict-warders, to compel their obedience. In Ceylon, elephant-hunting is almost an affair of State; it is like a national war, in which the Government appeals to the goodwill of the population generally, both Europeans and natives.

As soon as it is known that a troop or *horde* of elephants has assembled in a forest, the natives set to work, and with trunks of trees fixed in the ground and supported by transversal bars and buttresses, construct a vast palisaded enclosure, or *corral*, whose entrance forms a kind of gullet so narrow that the animals can only enter one by one, and once drawn into it are unable to return. This being accomplished, a thousand men, Europeans or Cingalese, surround the forest; they enclose the herd in a circle which incessantly contracts, and drive them before them by waving their torches, and keeping up a grand *tintamarre* of tamtams, trumpets, and musket-shots. The frightened animals can find no other avenue of escape than the entrance to the corral, where are placed, moreover, as an attraction, some females trained to act as decoys.

When all, or nearly all the herd, has been driven into the enclosure, the entrance is strongly and firmly closed with ropes and beams. The elephants, perceiving themselves caught in a trap,

naturally endeavour to effect their escape by the way they entered. A sufficient number of hunters then place themselves along each side of the avenue, and a few, mounted on the decoys, are stationed at its extremity. The moment that one of the captives has got entangled in it, his retreat is cut off by means of thick planks piled across the palisade, and he is allowed to make his way towards the entrance, which is also blocked up. There he encounters the decoys, which force him, by striking him with their trunks, to fall back against a neighbouring tree, to which he is speedily bound with ropes. This first operation accomplished, the females are led back to the corral, and the game is renewed, until all the animals have undergone the same fate, and each of them is thralled to a tree in the forest. Nothing now remains but to accustom them to a life of servitude; and this is done by depriving them of food for a short time, then administering it in small quantities, and proceeding from the articles they like the least to those they prize the most. The privation at first enfeebles them, and consequently calms their irritation, while they feel the greater gratitude afterwards for the alleviation which is so readily afforded them. This gratitude, and, still more, the dependance in which they find themselves upon man, who at his supreme pleasure grants or refuses their food, renders them in a few days docile and tractable. Thus their docility, and the important services which they render, mainly arise in the overmastering fear which man inspires in them.

"It is remarkable," says Boitard, "that the elephant is not and never has been a domestic animal, but a captive who only obeys through terror. However tame he may be, he never fails to escape into the woods to resume his savage life if an opportunity arises. The need, therefore, arises that on a long march he shall have his driver, or *mahoud*, on his back, to guide him, threaten him, and prevent him from taking to flight. His love of liberty is as great as that of the wildest animals, and in the female elephants it even overpowers maternal love; therefore, when suckling their young, they are never released from their chains, for experience has proved that



A CORRAL IN CEYLON.

they will abandon them without regret if circumstances should enable them to effect their escape."

The moral and intellectual qualities of the elephant have been greatly exaggerated. As far as his morality is concerned, we must pronounce him a cowardly, pettish, and rancorous animal, which retains a much livelier recollection of every injury done him than of the benefits he may have received. In an intellectual point of view he is certainly inferior to the ape and the dog, but he is superior to the Carnaria, as well as to most of the Herbivora. His faculties, perhaps, may be most justly compared to those of the horse, which would certainly have exhibited as much intelligence if Nature had gifted him with a trunk; for we must never forget that the development of an animal's faculties greatly depends upon the perfection of his organs. Again, the horse is susceptible of a complete domestication, while the elephant, as Boitard has remarked, is a captive, ever dreading, never loving his master, and eagerly awaiting a favourable moment to escape from him.

After the Elephant, the chief of the animals inhabiting the forests is the Rhinoceros, ranged with him by Linné in the order of *Belluæ* (or enormous beasts), by Cuvier in that of Pachyderms, and by De Blainville in that of Gravigrades.

The name *Rhinoceros* (ῥίν, nose, and κέρας, horn) indicates at once the peculiarity which at the first glance distinguishes him from the other Pachyderms. He carries, in fact, upon the arch formed by his nasal bones one or two solid, curved, and sharp-pointed horns, which serve him as very formidable weapons. His ears are upright, pointed, and moderately large; the eyes small and half closed. The coarse thick skin, knotty or granulated on its surface, is of such tenacity and impenetrability about the short thick legs and ungainly body, that it resists the claws of the lion or the tiger, the sword or the shot of the hunter. It hangs about the neck in several large plaits or folds; another fold passes from the shoulders to the fore-legs, and another from the hind part of the back to the thighs. He

has a moderately large and long head, a protruding upper lip, and a depressed skull. His manners are fierce, but not aggressive; he leads a lethargic life, and wallows on the marshy banks of lakes and rivers, where grows the vegetable food on which he exclusively feeds. He usually measures about twelve feet in length from the tip of the nose to the insertion of the tail; his height is about seven feet; and the girth of his body is nearly equal to its length!

The appearance of the Rhinoceros upon the globe was probably contemporaneous with that of the Proboscideæ. Fossil remains of the animal have been discovered in the temperate, and even the cold countries of Asia and Europe. In 1772 an entire rhinoceros, admirably preserved, was found embedded on the banks of a Siberian river, in the ancient frozen soil. Now-a-days he is exclusively confined to the tropical regions of the Old World. He lives a solitary life in the dense jungles of India, the Sunda Islands, Central and Austral Africa. Naturalists distinguish six varieties—the Rhinoceros of India, the one-horned Rhinoceros of Java, the two-horned Rhinoceros of Sumatra, the unarmed Rhinoceros, the two-horned Rhinoceros of Africa, and the Rhinoceros of Bruce.

The Indian Rhinoceros attains the height of five to six feet, and the length of seven to nine feet. He confines his wanderings in the main to the Trans-Gangetic peninsula. He has but one horn, and some dim tradition of this animal may probably have suggested the long popular fable of the mysterious Unicorn. His skin, of a dusky brown, is so singularly thick that it would have rendered all movement impossible on the part of the quadruped, if Nature had not disposed it in deep folds corresponding to the principal articulations. Thus he seems to the eye caparisoned in a body-armour of thick leather, formed in several pieces; and in truth his impervious hide constitutes a cuirass against which even musket-balls strike innocuously. Hence he dreads not the attacks of any of the Carnivora.

The Rhinoceros of Java is undoubtedly but a variety of the Indian species. That of Sumatra differs from the preceding in the possession of two horns—one, the anterior, of great length; the other, much

shorter. His skin is moderately thick, very much wrinkled, in deep folds, and garnished with a quantity of long hair.

The unarmed Rhinoceros, who inhabits the islands of the Ganges, has but one rudimentary horn.

The African Rhinoceros is the king of his race. He wears a naked, smooth, and tenacious skin. Two horns are mounted on his

KAFFIR HUNTER CARRIED OFF BY A RHINOCEROS.

upper jaw; the front one measures more than eighteen inches in length. In all Southern and Western Africa this huge ungainly quadruped is found.

The Rhinoceros of Bruce inhabits Abyssinia. His supreme idea of happiness, of the *summum bonum*, as viewed from a *Proboscidean* point of view, is to wallow luxuriously in the mud and slime, and

while abandoning himself to this anti-Sybaritic indulgence, he heaves a hoarse groan of satisfaction, which conducts the hunter to his retreat. The Abyssinians pursue him on horseback. Some attack him with arrows or with musketry; others, and these are the boldest, leap from their steeds at the moment the rhinoceros leaps upon him, and hamstring him with their sabres. The huge quadruped falls immediately, and becomes an easy prey to his aggressors.* In South Africa the Kaffirs and the Hottentots display an equal audacity in attacking this formidable foe. They dare to confront him with their sharp knives alone, and generally with success, though a weak thrust or a wrong aim would entail upon them a sudden, swift, and terrible death.

Mr. Cooper Rose, in his "Sketch of South Africa," celebrates an aged chief who had won a well-deserved renown by the most extraordinary instance of courage and presence of mind. He was out a-hunting. A rhinoceros broke abruptly from the covert of a dense thicket, and so near to him, that the Kaffir easily leaped upon his back. The furious animal immediately dashed through the jungle, beat the earth with his horn, roared with rage, and used his utmost exertions to dismount his unwelcome rider. In this he would have undoubtedly succeeded, and the negro must have perished, if happily the kross, or sheepskin mantle of the latter, had not been caught in the bushes. Mad with fury, the rhinoceros threw himself upon it, and while he was busy rending it in fragments the Kaffir leaped lightly to the ground, and saved himself in the deep recesses of the forest.

* Mansfield Parkyns, "Life in Abyssinia." See some interesting details in Major Harris's "Sport in the Western Highlands of Ethiopia."

CHAPTER VI.

ANIMAL LIFE IN THE VIRGIN FORESTS:—THE GREAT APES.

It is of their own free choice, to shelter themselves from the burning arrows of the sun, to enjoy the dense shadows and delicious coolness of the great trees, and, without doubt, to avoid the attacks of men, that the elephant and the rhinoceros are denizens of the forest. But a certain number of Mammals Nature seems to have specially designed to people the forests, and for whom their general organization, and, above all, the structure of their locomotive organs, appear to have left the selection of no other abode. Such are, in the first place, the genera, so numerous and so diverse, which compose the great order of Quadrumana ("four-handed"), indistinctly comprehended, in popular phraseology, under the denomination of Apes; such, too, are the curious arboreal animals called Sloths; and such, finally, in the order Rodentia, are the Squirrels.

In occupying ourselves, primarily, with the *Apes*, we do but conform to the scientific classifications, all of which place these Mammals immediately next to Man in the zoological series.

Linné originally proposed to designate, under the name of *Primates*—that is, the first, or chief of animals—Man, in the first place; next, the Apes; then the Galeopitheci (or Lemurs); and, finally, the Cheiroptera (or Bats). This order of Primates, established by the great Swedish naturalist, has been admitted by the majority of contemporary authors, who, however, have separated the Cheiroptera from it. Many have also separated Man, and, as I think, have more correctly placed him as a distinct genus in the order Bimana (or two-handed).

The Apes, or Quadrumana, are divided into two families—that of Apes, properly so called, and that of the Lemuridæ, or Lemurs.

Both belong exclusively to the hottest regions of the globe. The latter are found only in India, Africa, and Madagascar. The Apes, on the other hand, are also spread through South America; but it is in the Old World we encounter the most numerous, the most varied, and the most remarkable species.

Those writers who are so much addicted to tracing analogies between Man and the Ape, should explain how and why it is the latter attains his greatest development precisely in those regions where Man's intellect is dwarfed, "cribbed, cabined, and confined."

To the ancient continent especially belong the great apes without tail, or with very short and rudimentary tail—Anthropomorphes, Baboons, Macaucos, and the Cynocephali.

Apes, as well as the other Primates, are all inhabitants of tropical countries. They do not exist in Europe, in Upper Asia, or in North America.

A single genus seems able to adapt itself to the climate and conditions of the Temperate Zone, and still reigns in the Mediterranean region—in Africa, to the north of the Atlas; in Spain, on the rock and in the neighbourhood of Gibraltar—this is the genus Baboon (the *Pithecus* of the classical writers), included in the family Macaucos. It differs from other genera of the same family in being tailless. This organ is rudimentary in some species of Macaucos, properly so called—as in the Red-faced Macauco of Japan; in others, its length never exceeds that of the animal's body. It is the same with the genus Mangabey. Among the Cynocephali, the tail is usually short. These apes are remarkable, as their name indicates, for their prominent muzzle, which resembles that of a dog; and, moreover, for the naked callosities, more or less extensive and of a bluish or vivid red colour, which exist on the upper part of their thighs, immediately beneath the tail.

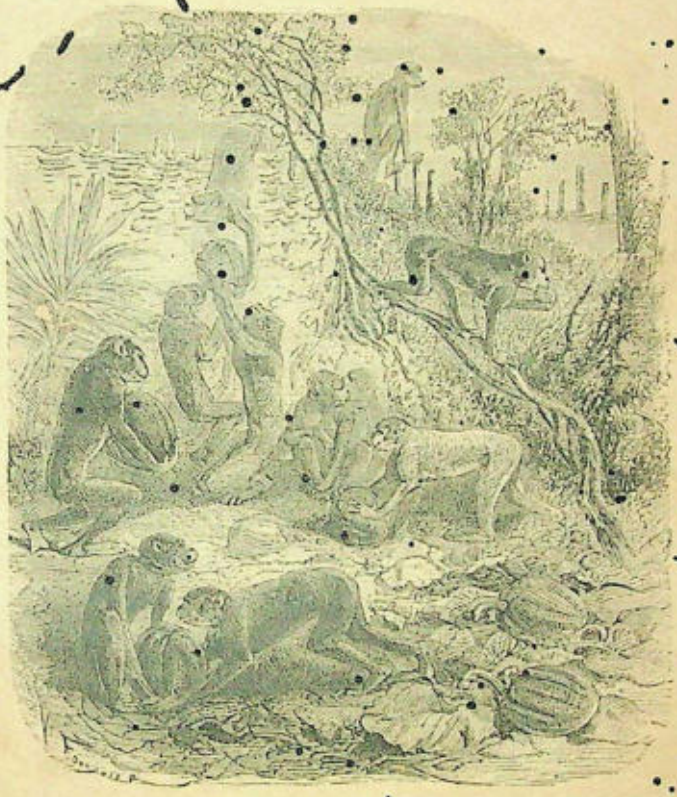
The Macaucos and the Cynocephali are, in general, of tall stature. When standing upright, they will be about two and a half to three feet in height, but this posture is not natural to them, and they rarely adopt it unless constrained. For their hinder limbs being

of nearly the same length as the fore, the quadrupedal mode of progression is easy and habitual, either when they move on the ground or traverse the horizontal branches of the trees among which they live. These apes are endowed with surpassing strength, and several, especially among the Cynocephali, render themselves formidable by their ferocity and their aggressive audacity. In captivity they show, while young, a mildness of disposition which, joined to their keen intelligence, would seem to render them capable of being greatly improved by careful training. But these good inclinations do not long endure: arrived at the adult age, the Macaucos and Cynocephali soon allow all their malignity, mischievousness, brutality, and vicious instincts to peep out, and as they grow older become completely intractable.

In the time of Desfontaines baboons were so common in the forests of the Atlas, that in the environs of Stora the trees were frequently covered with them. "They feed," says that author, "on pine apples, sweet nuts, Indian figs, melons, water-melons, and the vegetables which they pilfer from the gardens of the Arabs, whatever cares the latter may exercise to keep these ill-doing animals at a distance. While engaged in their thieving operations, two or three mount to the top of the tallest trees and loftiest rocks to keep watch, and when they perceive any person approaching, or hear any noise, they give a cry of alarm; whereupon the whole troop immediately take flight, carrying with them all they have been able to seize." Despite of these predatory habits, the baboons at Gibraltar have been fortunate enough to find powerful protectors in the officers of the British garrison, without whom they would have been destroyed. A prohibition against hunting them exists throughout the territory under British rule.

At the Cape of Good Hope, and at other points of Southern Africa, Europeans are far from displaying the same amount of good-will towards the Cynocephali. It is true that they are formidable enemies to man through their malignity, their strength, and the dangers incurred from their bite. Their mouth is armed, in fact,

with canine teeth comparable to those of the most powerful Carnivora. The wounds, therefore, says M. Paul Gervais, which they inflict, either in defence, or, as is more customary with them, in attack, are deep, and consequently very dangerous. These apes are fiercer in disposition than the Macaucos, and inspire so much fear when grown

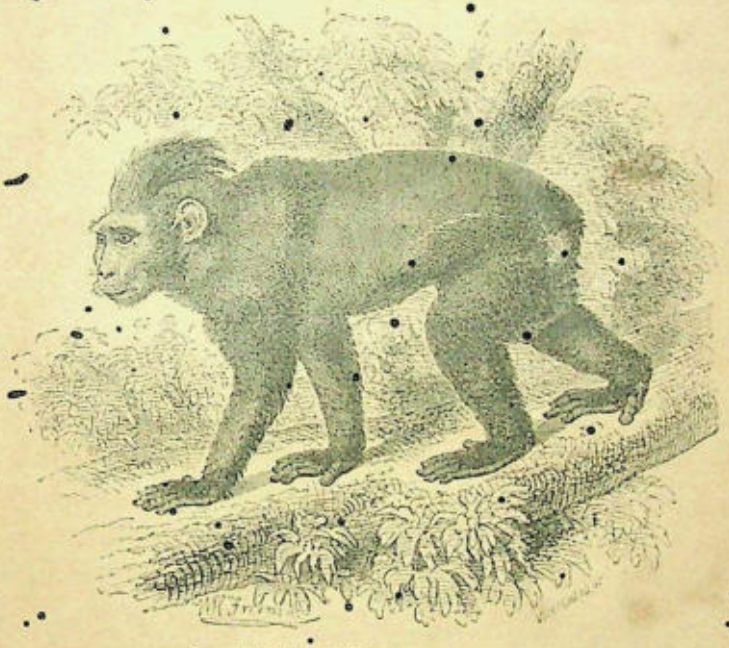


Baboons plundering a Garden.

up that one of their species is popularly known by the expressive name of the "Man-Tiger."

We must not confound the Cynocephali with the Cynopitheci, an intermediate genus between the Apes and the Macaucos, which connects both the former and the latter with the Anthropomorphes. The Cynopitheci have no tail; their face is moderately elongated; their ears are round and rimmed. The type-species of this genus

the Negro Cynopithecus, who is wholly black, and a little smaller than the Baboon. His head is crowned with a kind of head-dress raised to a point on the forehead; and his face surrounded with a fringe of long hair. His habitat is the Celebes, and some other islands situated between Borneo and Mindanaos. He possesses a mild and lively disposition. Quoy and Gaymard, naturalists on board the French exploring-ship *L'Astrolabe*, obtained an individual who was readily tamed, and played in the gayest and best-tempered manner possible with the first person he encountered.



The Black Cynopithecus.

I may here pause to indicate a few of the more remarkable varieties of the Baboon and the Monkey: premising that by a recent classification the Apes, or Simiæ, are divided into four sections—viz.: Apes, or such as are tailless; Baboons, with elongated muzzles and short tails; Monkeys, generally with long tails; and Sapajous, or Monkeys with prehensile tails. For the present, I limit my remarks to members of the second and third sections.

Among the Monkeys of the Old Continent a prominent place should be given to the Proboscis Monkey (*Nasalis larvatus*), who is endowed—I may not say, ornamented—with a nose of the most grotesque character and formidable dimensions. This specimen measures two feet from the tip of the nose to the tail, which is longer than the body. His colour is a dark chestnut, but the face is marked with blue and red. He belongs to Borneo and Cochin-China, where he assembles in large troops, and feeds wholly on fruit.

To Cochin-China also belongs the *Douc*, a very large species, remarkable for their coat of many colours. Back, belly, and sides are of a yellowish-gray; feet black; lower part of the arms and tail, white; a collar of brownish-purple encircles the neck; long yellowish hairs fringe the sides of the face, which is rather flat and of a yellowish bay hue. He measures, when standing upright, three feet and a half to four feet.

In South America are found the *Howling Monkeys*. Mr. Bates describes one species, the *Mycetes strumineus*, which measures sixteen inches in length, exclusive of the tail; the whole body is covered with rather long and shining dingy-white hair, the whiskers and beard only being of a tawny hue. "The one of which I am speaking," says Mr. Bates,* "was not quite full grown. When it first arrived, it occasionally made a gruff subdued howling noise early in the morning. The deep volume of sound in the voice of the howling monkeys, as is well known, is produced by a drum-shaped expansion of the larynx. It was curious to watch the animal whilst venting its hollow cavernous roar, and observe how small was the muscular exertion employed. When Howlers are seen in the forest, there are generally three or four of them mounted on the topmost branches of a tree. It does not appear that their harrowing roar is emitted from sudden alarm; at least, it was not so in captive individuals. It is probable, however, that the noise serves to intimidate their enemies."

Another species of Howlers is the Preacher Monkey (*Mycetes Beelzebub*), an animal about the size of a fox, with long black glossy hair, a round beard beneath the chin and throat, black glistening eyes

* H. W. Bates, "The Naturalist on the Amazons," p. 175.

short round ears, and a long tail. A native of Brazil and Guiana, he derives his name from the following circumstance: one of these creatures will climb to the summit of a lofty tree, while numbers gather about the lower branches. The monkey perched above the rest then raises a loud howl—a howl so shrill and keen that it is audible at a very great distance; after a while he pauses, and gives a signal with his hand, whereupon the entire assembly join in chorus; another signal, and the discord ceases, while the preacher or singer concludes his inharmonious exercitation.* It is said that this howling faculty is due to the peculiar conformation of the *os hyoides*, or throat-bone, which, communicating with the larynx, increases the resonance of the voice.

The Paters, or Red Monkey (*Cercopithecus ruber*), so called from the bright bay colour of his upper parts, is a native of Senegal.

In Congo and Guinea is found the frolicsome Spotted or Diana Monkey (*Cercopithecus Diana*), the upper parts of whose body are of a reddish colour, besprinkled with white spots.

The Mandrill, or Variegated Baboon (*Cynocephalus maimon*), is, undoubtedly, the most notable of his genus, for various and brilliant colours. When standing upright he measures fully five feet. His body is thick and robust, his limbs are firm and muscular; scarcely any forehead relieves the flatness of his long face; the eyes are small and deeply sunken in the large head; the projecting cheek-bones are marked with several deep furrows of purple, scarlet, and violet blue; both the abrupt muzzle and the lips are large and protuberant. The hair of the forehead and temples rises in a kind of pyramid, which gives to the head a triangular appearance; and from the chin hangs a small pointed orange-yellow beard. His strength, moroseness, and ferocity, render him a formidable opponent; and as he prowls about in large bands, it is dangerous for the natives to penetrate into the woods, unless well-armed, and in numerous companies.

* According to Humboldt, this is an exaggeration: the Howlers assemble in large numbers, morning and evening, and join in a chorus of discords, but do not obey a president or leader.

The Derrias (*Cynocephalus hamadryas*), a native of the mountains of Arabia and Abyssinia, measures upwards of four feet when standing erect, and about two feet and a half in a sitting posture. The hair of the head and neck gathers in a long mane, which falls back over the shoulders; the broad whiskers incline backwards so as to cover the ears. The long face is of a dirty flesh-colour; long, shaggy, brownish hair covers the head, neck, shoulders, and all the fore-part of the body. The tail terminates in a long tuft of brown hair.

Equal in size to, but much stronger than, an English mastiff is the Chacma, or Pig-faced Baboon (*Cynocephalus porcarius*), of the Cape of Good Hope, where he inhabits the mountains, and makes frequent forays in the gardens and plantations around Cape Town. His yells and screams make night hideous. He wears a sober livery of an uniform dark brown colour, with long shaggy mane-like hair about his neck and shoulders. His skull is contracted and flattened, his muzzle extremely prolonged, and the cheeks of both sexes are ornamented with small grayish whiskers.

We must now direct our attention to the Anthropomorphes, or Apes with a semi-human form, which, of all the Quadrumana, approach nearest to man in form, stature, internal and external conformation, manners, instinct, and development of intelligence. They have no tail, and the Gibbons (*Pithecus lar*), which occupy the lowest rank among them, possess only the rudiments of ischiatic callosities. Nor are they provided with those dilatable pouches worn by a great number of other Primates on each side of the mouth, and named by French naturalists *abajoues*. Their position, when they move along the ground, is bent rather than erect, and they assist themselves by their extraordinarily long anterior arms. These arms, in fact, are much longer than their legs; their thumbs, at the four extremities, are opposed to the other fingers; the palm of their hands and the sole of their feet are naked, as well as their face. The sternum is large and flat; the clavicles are short and well articulated.

The analogies between the Apes and Man are so striking and so

numerous and their intelligence, at least in the largest genera, is so superior to that of other animals, that, without admitting the opinion of the ancient naturalists who considered them to be degraded or abortive men, nor that of certain modern writers, who look upon Man as an improved Ape, one cannot fail to recognize between them and us a species of kinship—though it may be very difficult to distinguish the character and the degree—which imposes itself upon the understanding and the sentiment of every impartial and attentive observer. The most impassive hunters who have killed Orangs, Gibbons, Chimpanzees, and Gorillas, acknowledge that they have never been able to conquer a painful impression—almost, as it were, a feeling of remorse—when contemplating the semi-human agony of their victims. This impression, though they may have succeeded in persuading themselves to the contrary, is not the effect of an empty or ridiculous sensibility. Everything in nature has its *raison d'être*—its motive of existence; the relations between the organism and the faculties are constant and undeniable; and I find it difficult to believe that the Creator can have formed without object or purpose beings so extraordinarily similar to man, unless this physical resemblance corresponds to a more or less definite moral analogy.

The illustrious and devout Linné, whom no one will suspect either of materialism, or of forgetfulness of the dignity of man, has ranked the Anthropomorphes in his genus *Homo*, with MAN, whom he specifically distinguishes by his wholly exceptional faculties, and whom he denominates *Homo sapiens*, that is, "the wise," or more correctly speaking, the "thinking man." I must add that Linné at a later period renounced this quasi-assimilation, and that modern zoologists have unanimously rejected it.*

* In the foregoing paragraphs I have allowed the French author, M. Mangin, to express his opinions in his own language. I must guard myself, however, from being supposed to endorse them as a whole. Between the most intelligent Simiæ and Man a wide gulf exists, which I see no reason for supposing the Ape will ever cross. And I believe that his physical likeness to Man may be satisfactorily referred to that general progressiveness in creation which we may trace from the lowest to the highest types.

In the age of Linné, the apes of which we speak were but imperfectly known. Even now-a-days our information upon the subjects of their intelligence, manners, and habits, is defective and fragmentary. The individuals whom we have retained in captivity have died while very young, and it is impossible to say whether their early mildness and intelligence would have proved as transitory in them as in the Macaucos and the Cynocephali, who, as they advance in years, display the most brutal instincts. In their adult state, the Anthropomorphic Apes have not been really studied. Travellers have penetrated into their forests only to attack them with rifle-balls, and have told us but little of the manner in which they comport themselves. As for the details collected from natives inhabiting their vicinity, they are so contradictory, and mixed up with so much which is fabulous, that it is impossible to draw any conclusions from them in reference to the habits of these animals.

Four distinct genera of the Anthropomorphic Apes are now recognized by naturalists: two belonging to Southern Asia, or rather the great Indian Archipelago—viz., the Orang and the Gibbon; two to Tropical Africa—viz., the Chimpanzee and the Gorilla. I shall describe their peculiarities in my next chapter.

CHAPTER VII.

THE ANTHROPOMORPHIC APES:—ORANGS, GIBBONS, CHIMPANZEES, AND GORILLAS.

THE genus Orang-Outang (*Simia Satyrus*), or "Wild Man of the Woods," is a native of the islands of Borneo, Sumatra, and Java, and of a limited portion of the Malayan peninsula. We must dismiss as travellers' fables the exaggerated recitals which attribute to this Ape a gigantic stature (six to seven feet). The tallest specimens which

have reached Europe have not exceeded four feet in height. The Orang has short and feeble lower limbs; but his arms, on the contrary, are very robust, and of such a length that he can touch the ground while standing upright—a posture, however, which is neither natural nor convenient for him. His ordinary mode of locomotion consists in passing from one tree to another by swinging himself from branch to branch, his progress being as rapid as that of a swift horse, and his agility not less wonderful than that of our Leotards and Blondins. His body is covered with coarse reddish hair, whose shade varies according to his age. It is thick on the head, shoulders, and body, but thin about the fore-parts. The face has a bluish cast, and is partly naked; but the eyes sink under bushy, prominent eye-brows, and the upper lip, chin, and cheeks are garnished with a sort of longish beard. Naked are the exterior face and palm of the hands. Where the skin is deprived of hair, its colour is of a hodden gray.

The Orang-Outang has a large protuberant belly, a flat nose, small ears, projecting muzzle, long, thin, and very extensible lips. In youth the forehead projects; but as the creature grows older, it becomes depressed at the same time that the face lengthens; the face assumes a more decided bestial type; and the intelligence, lively and quick at first, declines into obtuseness and atrophy. The head inclines forward; the neck is short, thick, and seemingly afflicted with goître, which is due to the presence of the pouch called thyroïdian. This pouch, placed above the sternum, extends beneath the arm-holes, and communicates with the larnyx. When expanded, it is capable of receiving a great quantity of air, which, being afterwards expelled very slowly, and passing anew through the vocal organ, produces a dull and prolonged murmur.

The Orangs have now disappeared from Continental India, and even, we are assured, from Java, so that their chief habitats at present are Borneo and Sumatra; and here too they are few in number. The genus is rapidly dying out. Those which remain seek in the dense and marshy forests an asylum from the attacks of man, and a shelter against the climate. During the day, they traverse the

summits of the trees in quest of food, for they subsist exclusively upon leaves, young shoots, tender bark, and fruits. At nightfall they conceal themselves amid the foliage of some moderately tall tree, or in the great tufts of orchids which flourish about the arboreal giants. There they make for themselves a couch like an even floor or platform, garnish it with leaves and interwoven branches, and stretch themselves upon it, or sit crouching, to enjoy their slumbers. It is said that when the necessity arises they spread over themselves a similarly-fashioned canopy as a shelter from the rain.

The Orang-Outang is timid and inoffensive; he rarely engages in a combat with his enemies. At times, however, when driven to extremities, he resorts to his great muscular strength in self-defence, and if he can succeed in grappling with his antagonist, he rends him to pieces with his tenacious hands; never using his teeth, although his jaws are very powerful, and armed with canine teeth capable of inflicting dangerous wounds. In general, when he feels himself sorely stricken, he hurriedly climbs to the summit of the loftiest tree within his reach, and if he finds himself still pursued, he passes on to another. Meanwhile he utters the most dolorous cries, and vents his impotent rage upon the tree which serves him for a refuge. One after another he breaks the greatest branches; but they immediately escape from his grasp, and fall to the ground. It is this circumstance which has originated the assertions of many travellers, that the Orang defends himself by hurling boughs at his aggressors, and even by striking them heavy blows with a stick. The truth is, that far from protracting his defence by the expedient his fury prompts him to adopt, he does but expose himself the more fully to the projectiles directed at him. The stripped tree is no longer available as a shelter. The Malay hunters, therefore, take no heed of all this fracas, but patiently wait until the Orang has exposed himself, to aim their arrows or rifle-balls with the greater certainty.

Several tribes of Borneo manifest a strange partiality for the flesh of the Orangs, and eat it as a great dainty, either roasting it over a fire, or cutting it into steaks and drying it in the sun. The Indians

DEATH OF AN ORANG OUTANG.

make use of his skin for helmets and caps of fantastic device, which they don upon festival days, or to give themselves, when necessary, a formidable air.

The habitat of the Gibbons (*Hylobates*) is more extensive in range than that of the Orangs. They are found not only in Sumatra, in Borneo, in the Celebes and Philippine Islands, but in considerable portions of the two peninsulas within and beyond the Ganges. In size they are inferior to the Anthropomorphes, their stature not exceeding three feet. Their head is small and rounded, their muzzle does but slightly project, and their face wears a pleasanter expression than that of the great apes of the same group. A sort of thick black or very dark fur, with occasionally patches of white, enwraps their entire body. They have arms and hands of extraordinary length, but a slightly developed belly. They live upon the forest-trees, which they traverse without ever descending to the ground, exhibiting a marvellous agility and suppleness. They are completely frugivorous; their manners are gentle; their intelligence they retain, and even develop, after they have attained maturity. Although they should be captured after they have passed their youth, they easily become domesticated, and display a loyal affection towards their masters. Unfortunately the climate of Europe, and perhaps, in particular, the atmosphere of menageries, proves fatal to them, and those individuals placed in the Zoological Gardens of London and Paris succumb, after a brief residence, to dysentery or pulmonary disease.

The genus Gibbon comprises several species: the *Gibbon-Siamang* (*Hylobates syndactylus*) is the greatest of which we have any knowledge. Black is he as ebony, both in face and hair. His thyroïdian pouch is very large, and of great expansive powers. By means of this ungainly organ he utters the most horrible, deafening, and prolonged cries, which, it is said, can be heard for several leagues around. He is common enough in Sumatra, inhabiting the dense wild woods which lie to the north of Bencoolen. He owes his characteristic epithet of *syndactylus* to the fact that the index and middle finger of his hind-feet (or shall I say, hands?) are united (συν) by a

narrow membrane, which extends even to the base of the ungual phalange.

The Gibbon-Lar (*Hylobates* or *Pithecus Lar*) is smaller than the preceding. His skin is of a blackish-brown, with the four extremities and the framing of the face white. He ranges over the peninsula of Malacca, and, according to some travellers, the kingdom of Siam.

GIBBON-SIAMANG AND MOURNING GIBBON.

The Wou-Wou, or Silvery Gibbon (*Hylobates leuciscus*), another Malayan species, commends himself to our notice by the silvery gray of his skin on the upper parts of the body and the outer sides of the arms and legs. His name of "Wou-Wou" is intended to describe his peculiar utterance—a kind of clucking totally unlike the howlings of the other gibbons.

Ashen-gray is the colour of the skin of the Mourning Gibbon,

(*Hylobates funereus*) on the external sides of his limbs, while the belly and contour of the face, and the inner parts, are of a blackish hue.

The *Hylobates cinereus* is of an uniform cindery-gray. He inhabits the Sunda Islands, and principally Java, and numerous individuals of his species have been imported into Europe. His disposition is gentle and affectionate; he quickly familiarizes himself with the persons who approach him.

The genus Chimpanzee (*Pithecus troglodytes*) is by some later naturalists preferred to that foremost place among the Quadrumana in which Cuvier had installed the orang-outang. He certainly approaches the nearest—though *longo intervallo*—to man, of all his race. He was long confounded with other Anthropomorphous genera, under the vague name of "Man of the Woods" (*Homo sylvestris*). It would appear to have been the Chimpanzee that Buffon had in his "mind's eye" when describing his Jocko; although that ideal variety of shaggy men, with flat, oval visage, long legs, tall and erect figure, which stands before us in the great naturalist's pages, bears but little resemblance to the animal we have seen in the Zoological Gardens, or the more faithful and judicious portrait drawn by modern travellers. But the name of Jocko is evidently a corruption of that of *Enge-eko*, which the negroes of the Gaboon bestow upon the Chimpanzee, just as the latter appellation is an imperfect reproduction of that of *Quimpezé*, in use among the negroes of Angola.

Putting aside these speculations, we see that the only well-defined species of this genus is the black Chimpanzee (*Troglodytes niger* of the present nomenclature, *Pygmea* of Tyson). His home is the forests of the Gaboon, the coast of Angola, and Guinea. His face is larger and flatter than that of the orang. He has large ears, but shaped like those of men. On the head, shoulders, and back, he wears a coat of long black hair; his legs are short, and his arms very long; yet he is better able to walk like a biped than the macaucos, or even the orangs and the gibbons. Of all the Simidæ, he alone has calves to his legs. He has neither tail, ischiatic callosities, *abajoues*, nor thyroïdian

pouch. The hair of his head is parted on the summit, and falls down on either side, surrounding the ear and jaws, and mingling with that of the neck. His bare, wrinkled face is of a light copper colour; so are the palms of his hands, and his fingers, but his nails are generally black.

The highest stature to which the Chimpanzee can attain is about four and a half feet; but as he never stands absolutely erect, he appears much shorter. His small eyes, deep sunken in their orbits, are of a dark hazel colour. The cranium, even in young specimens, is depressed, and presents, in advance of a low receding forehead, a projecting superciliary ridge. As the animal advances in years, his muzzle lengthens, his jaws develop, his skull grows more depressed; at the same time his intelligence gradually disappears, his manners become fiercer, and his disposition less tractable; in a word, the instincts of the brute regain their supremacy. Such, at least, is the statement of the best accredited authorities; as for the individuals imported into Europe, they invariably die at too early an age for any one to study their habits and character in maturity.

The Chimpanzees live, it is said, in troops in the forests, or at least they congregate for the purpose of repelling the attacks made upon them by the carnaria, and to drive from their domains such other animals as may attempt to install themselves therein to their disadvantage. Their weapons are ready to their hand—stones and the branches of trees. Their diet is essentially a frugivorous one; yet they will occasionally indulge in a lizard or two, or any other reptile. Like the orangs, they construct rude beds or couches, of interwoven boughs stripped of their greenery. The negroes of Guinea, scarcely much higher in the scale of intelligence than themselves, look upon them as a *nation*, and believe that if these Men of the Woods do not speak, it is because they fear to be condemned to work or carried off into slavery, and not from incapacity.

A recent traveller, whose adventures have been the subject of much discussion, and who for a considerable period enjoyed the reputation of a Mendez Pinto or a Munchausen, asserts that he discovered

at the Gaboon two new species of Chimpanzees. One, called by the natives *Nshiégo-Mbouvé*, and to which he gave the scientific name of *Troglodytes vetus*, builds for himself some leafy screens of quite artistic construction upon isolated trees. He is smaller than the ordinary Chimpanzee, and *bald*.

The other species distinguished by M. Du Chaillu* is the *Kooloo-Kamba*. He is distinguished from all his congeners by a very peculiar cry. While offering a general resemblance to man, he approaches him more nearly in certain respects than all the other known apes. His head is very remarkable, and presents a curious analogy to that of an Esquimaux or a Chinese. His face is hairless, and wholly black. The forehead is loftier than that of any of his congeners, and the capacity of his skull is also greater in proportion to his height. A wider space occurs between his eyes than is customary with the great Simiadæ. He has a flattened nose, high projecting cheek-bones, hollow cheeks, and a well-marked orbitary arch. The muzzle is less prominent, and larger in proportion than that of other apes. Both sides of his face are ornamented with straight tufts of hair, which, joining below the chin like whiskers, communicate a strange human character to the whole countenance. His arms descend below his knees. All the body is hairy. The shoulders are broad, the hands long and narrow, and well adapted for climbing trees. Both arm and hand are exceedingly muscular; the abdomen is very prominent. The ample ears rather resemble those of a man than the ears of any other ape.

Our peregrinations now bring us to the giant of the Quadrumana, the true king of the forests of Equatorial Africa; in a word, to the *Gorilla*, whom Buffon has described under the name of *Pongo*, almost as exactly as he pictured the Chimpanzee under that of *Jacko*.

We cannot be said to have known the Gorilla for more than a quarter of a century.

It was in 1847 that Dr. Savage, an American missionary, recognized the Pongo as a species of the genus Troglodytes, distinct from

* Du Chaillu. "Travels and Adventures in Equatorial Africa" (London, 1863).

the Chimpanzee, and named him *Troglodytes Gorilla*, in allusion to the celebrated narrative of the Carthaginian Hanno relative to the pretended female Gorillas which that navigator professed to have seen in an island of the Gulf of Guinea. Since that period the Gorilla has been carefully studied by the eminent naturalist Professor Owen. Messieurs Gautier and Franquet, French naval surgeons, collected some important information upon the habits and physiology of this great ape, and M. Franquet procured for the Paris Museum the skeleton of an adult Gorilla. Other dead and preserved specimens have since been imported into England and France, and the anatomy of this African Troglodytes is accurately known. And, finally, M. Du Chaillu, in the work already quoted, has supplied numerous strange and interesting details, which, if at first discredited and contested, are now very generally accepted as strictly accurate.

The name of "Pongo," applied to the Gorilla by Battel and Buffon, is clearly a modification or corruption of that of the tribe of Mpongwéss, who dwell on the banks of the Gaboon, not far from the forests tenanted by this mysterious Quadrumane.

The Mpongwéss negroes call the Chimpanzee *Enge-èko*, and the Gorilla *Enge-ego*; whence the surname of "Gina," linked to the zoological appellation of "Gorilla"—*Gorilla-Gina*.

The Gorilla appears to be confined in the dense wooded regions of Lower Guinea, where he shuns, and, if needs be, repels the approach of man and that of the carnivorous animals, as well as of all those who attempt to penetrate into his retreats. Fierce and savage is he in his every custom; but it has never been satisfactorily demonstrated that he acts on the aggressive. He is not the less an object of extreme terror to his negro neighbours, on account of his extraordinary strength; and much more, perhaps, owing to the fantastic legends that have grown up about his name. His stature exceeds four, and sometimes attains, it is said, to upwards of six feet. The most salient characteristics of his head are the great width and elongation of the face, the development of the lower jaw, and the smallness of the osseous framework, which surrounded by a very

elevated orbitary arch, whence proceeds a second ridge dominating over all the upper part of the skull. The nose is flat, the eye deep-sunken in its orbit, the ear small, the mouth very large. The lips, especially the lower one, are long and very extensible. The expression of the face is terrible, reminding one of Coleridge's painful picture of a man-monster; and especially terrible when the animal raises the shaggy skin, and reveals the enormous fangs which bristle in his jaws.

His neck is thick, and so short, that the head seems grafted directly upon the shoulders. The latter are of formidable breadth, and his vast chest resounds like a drum when he beats it with his powerful fists, raising himself upright on his feet—an action which is with him a sign of mistrust, hatred, and indignation. He has a large expanded belly, like that of the orang and chimpanzee. His skin is of a deep black, naked on the face and on the palm of the hands, but elsewhere clothed with a rough iron-gray or brown-black hair.

The breast of the male adult is hairless, like that of the female. With the former the hair of the back is worn off, owing to his habit of sleeping on the ground supported against a tree. This peculiarity, according to M. Du Chaillu, is only seen in the female when she has attained an advanced age, in which case it would seem to be owing to the fact that, having no longer her infants to shelter among the branches, she sleeps in the same fashion as the male.

The natural walk of the Gorilla is not upon two feet, but upon four paws. In this posture, owing to the length of his arms, his head and chest are much elevated. When he runs, his hind-legs are brought up under the body. The arm and the leg on the same side move simultaneously, which gives the animal a curious and awkward gait. He runs, however, with extreme swiftness.

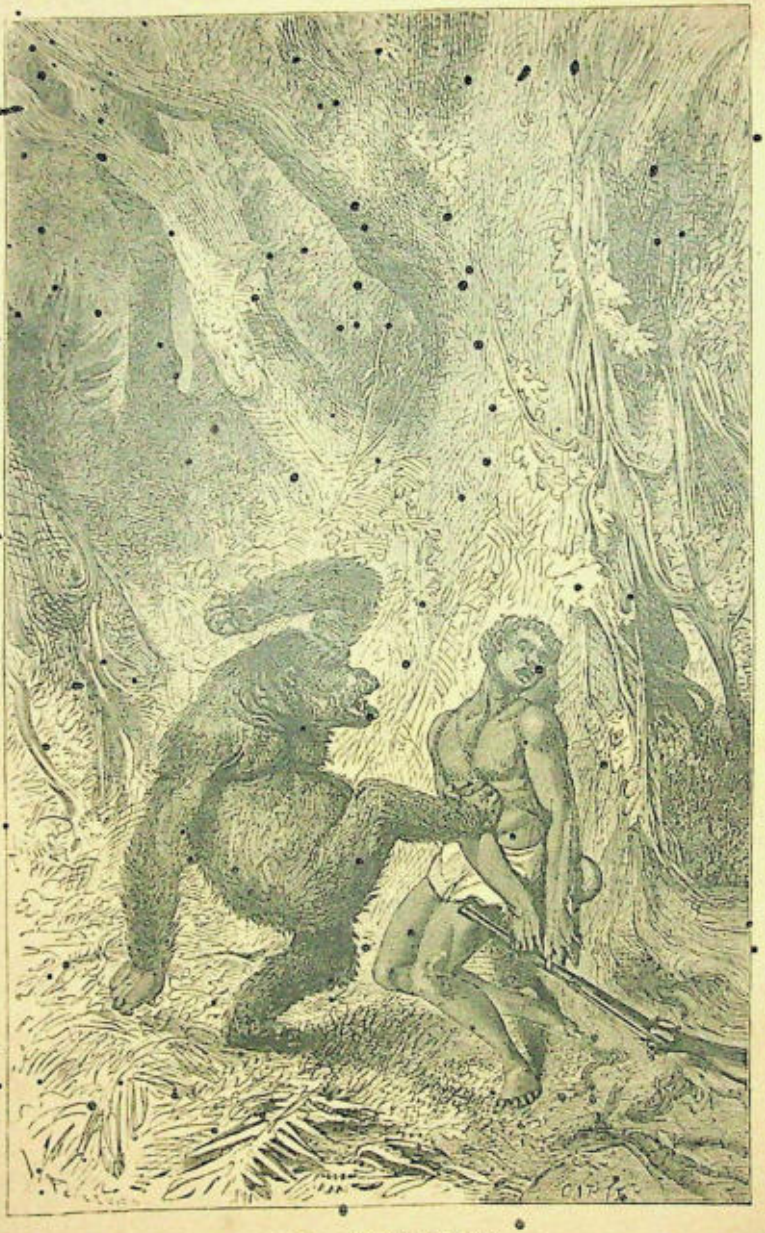
Despite the strength of his jaws, despite his enormous canine teeth, the Gorilla is exclusively frugivorous; but as he stands in need of abundant nourishment, he is compelled to change his quarters incessantly. His habits, therefore, are essentially nomadic. He is not gregarious. M. Du Chaillu affirms that he has never seen but a

couple of adults together, the male and the female; sometimes an aged male wanders about alone. Of the young, as many as five will occasionally be found in company. It is a difficult matter to approach them, for their hearing is very keen, and when alarmed they immediately take to flight, while the nature of the ground embarrasses the hunter in his pursuit.

Every hunter who understands his *métier* will reserve his fire when chasing the Gorilla, until the last moment. Whether the furious beast takes the report for a threatening defiance, or from some other unknown cause, if the hunter fires and misses, the Gorilla immediately pounces upon him, and no one can withstand the force of his attack. A single blow of his enormous foot, armed as it is with most formidable claws, eviscerates a man, smashes in his chest, or batters his skull. Negroes in a like situation have been seen, reduced to despair by terror, to turn upon the Gorilla and aim at him their discharged musket; but they have not even the time to level an inoffensive blow; the arm of their antagonist falls upon them with all its weight, shattering at once both arm and gun. I know of no animal whose attack is so fatal to man, for the reason that he dares to confront him face to face, with his arms for weapons of offence, exactly like a boxer, with the exception that he has the advantage of longer arms, and a vigour far surpassing that of any athlete who has ever claimed the suffrages of the ring. Fortunately, the Gorilla dies as easily as a man. A blow in the chest, if well-directed, immediately lays him low. He falls forward on his face, his arms widely extended, and heaving with his last breath a frightful dying cry, half roar, half wail, which though a signal of safety for the hunter, nevertheless resounds painfully in his ear, like the supreme utterance of human agony.*

The negroes of the Gaboon are generally very partial to the flesh of the Gorilla, as well as to that of the other great apes, although it is, in sooth, of a leathery character. This partiality need not surprise us on the part of a race which too frequently indulge in a horrible

* Du Chaillu, "Travels and Adventures in Equatorial Africa."



A GORILLA KILLING A NEGRO.

banquet off their own kind. It has been observed that those tribes which are not cannibal do not share the liking of their neighbours for the flesh of the Gorilla or the Chimpanzee; many even shrink from it with peculiar horror, on account of the kinship existing, as they believe, between these apes and man,—and the superstitious creed which represent these animals as supernatural beings, whose bodies are the refuge of the souls of their relatives, or of their friends, labouring for their crimes under an eternal curse!

CHAPTER VIII.

ANIMAL LIFE IN THE FORESTS:—THE CEBIDÆ, OR MONKEYS OF AMERICA—THE LEMURS—THE SLOTHS—THE SQUIRRELS.

THE Ancient Continent possesses, in addition to the great apes of which I have already spoken, the Macaucos, the Cynocephali, and the Anthropomorphes, other apes of more erect, and one might even say more elegant figures, essentially climbers, and provided with a long, but not prehensile tail. Such are the Semnopitheci and the Monkeys of the African forests, of India and Indo-China, of Japan and the Indian Archipelago. These two latter groups approximate, by their external forms, to the apes of the New World; divided by Buffon into Sagouins and Sapajous, but re-united in the new classification of naturalists under one single family, named *Cebidæ*. These —one genus, the Brachiura, excepted—have all a very long, and, generally, a prehensile tail. They differ, moreover, from the Simidæ of the Old World in the disposition of their nostrils, which are always open laterally, and separated by a thick depressed membrane; in such wise, that it might also be affirmed they were gifted with two noses! By nature they are of a gentle and placable disposition,

readily domesticate themselves with man, and do not become in their old age more impracticable or malicious than in youth."

The Cebidæ are divided into several genera, such as the *Howlers*, the *Atelæ*, the *Sajous*, the *Saïmris*, the *Nyctipitheci*, or Nocturnal Apes; to which we may add, perhaps, the tribe of the *Hapalidæ* (Ouistitis and Tamarins).

Howling Monkeys.

To the *Howling Monkeys* we have found it convenient to refer in a preceding chapter, and it is almost needless to remind the reader that they owe their distinctive name to their habit of assembling in the woods, and startling the echoes with a chorus of unearthly noises. They chiefly inhabit New Grenada, Guiana, Brazil, and

Paraguay, where, night and morning, their discordant orchestra strikes terror to the soul of the unaccustomed traveller.

I have already said that the tail of nearly all the American Cebidæ is long and prehensile; that is, endowed with a peculiar faculty of winding or clinging round any object.

In the genus *Ateles*, or "Spider Monkey," for example, it virtually forms a fifth limb, by whose agency the animal suspends himself in

ATELES CROSSING A RIVER.

the air, and darts from one tree to another with more than the agility of a Leotard. It amply compensates for the imperfection with which Nature has afflicted him by leaving his fore-paws deprived of thumbs. He owes his popular designation of the Spider Monkey to his long slender limbs and sprawling gestures. In the colour of his skin, his

methodical slowness, and the suppleness of his movements, he resembles the gibbons. Of all animals he alone has the biceps of the thigh resembling that of man. He is fond of the society of his kind, and mainly subsists on insects, small fish, and molluscs, which he catches with all the address of a practised angler. Travellers affirm that he frequently crosses the wide American rivers without descending to the ground. He and his comrades form a living chain, which hangs suspended from a lofty branch, and, by a series of more or less nimble movements, succeeds in *hooking itself on* to a tree on the other side. This chain serves at first as a flying bridge for the whole troop; then it accomplishes its own passage, by detaching itself from its point of suspension to fall back on the opposite bank. The tale, however, has an improbable air about it, which makes a large demand on the reader's belief.

It is from South America, and notably from Brazil and Guiana, that we import into Europe the apes most valued by our itinerant mountebanks and by zoological amateurs, on account of their gentleness, their domesticity, their intelligence, and their singular instinct of imitation—almost amounting to genius—which renders them wonderfully apt in the performance of all kinds of tricks and amusing exercises. Nearly all these apes belong to the very numerous genus of *Sajous*, or *Sapajous*.

Thus we have the Squirrel Monkey (*Callithrix sciurus*), not much larger than the animal whose name he bears, and infinitely more nimble and diverting. He is of a bright golden yellow colour, with feet and hands of a deeper yellow. His head is round, with a blackish nose, and hairy ears. His tail is very long, and tipped with black. The nails of his hands are flat, while those of his feet resemble claws.

The Ouistitis, which are frequently imported into Europe, are very pretty animals, clad in a soft kind of fur, and with their ears ornamented by long brush-like tufts of black or white hairs. They are very easily tamed, are mild and intelligent, and, owing to their small size, conveniently kept in apartments; but they do not acclima-

tize in Europe, and, even if they survive the voyage, die very shortly after their arrival.

Linné has given the name of *Lemurs*, which modern naturalists have also adopted, to a race of quadrumanous animals approximating in many particulars to the Monkey tribe, but forming, nevertheless, a perfectly distinct zoological family. It comprises five genera: one, that of the Galagos, belongs to Africa; two inhabit India and the neighbouring islands—namely, the Loris and the Tarsii; and, finally, two others, the Makis and the Indris, are exclusively confined to Madagascar, where they occupy the same position as the Apes properly so called on the continent.

The Galagos are distinguished by their great eyes, their large membranous ears, which double down when the animal is at rest, their extraordinary long hind limbs, and their long and tufted tail. In size they vary from that of a rat to that of a rabbit. The *Senegal Galagos*, or Gum animals of Senegal (*Galago Senegalensis*), have, at night, all the activity of birds, hopping from bough to bough on their hind limbs only. They watch the insects flitting among the leaves, listen to the fluttering moth as it darts through the air, and leap upon it with arrow-like rapidity, seldom missing their prize, which is caught by the hands. Their nests are made in the branches of the trees, and they cover a bed for their young with grass and leaves.

What shall I say of the *Loris?* Two species only are known, and both are natives of the East Indian world: the Short-limbed Loris (*Lemur tardigradus*), and the Slender Loris (*Lemur gracilis*), the latter being readily recognized by the disproportionate length of his limbs, and, especially, of his fore-arms. They live in the trees; feeding on insects, or, as a relish, on small birds and quadrupeds; and going forth at night in search of their prey. They have a short muzzle, slender body, no tail, rough tongue, and large staring eyes, placed very near each other. Their ears are short, scarcely rising through the hair in which they are embedded; the nostrils project beyond the mouth, and are surrounded by a naked muzzle; and the thumbs are widely separated from the fingers, both on the fore and hinder hands.

Of the *Tarsii* it is enough to say that they are insectivorous, like the loris, and that their hind limbs are similarly disproportionate. The tail is long and tufted; the large, fixed, glaring eyes mark them out as addicted to nocturnal habits. They leap about two feet at a spring, and by day conceal themselves under the roots of trees. Two species are distinguished: the *Tarsius fuscomanus* of Fischer, and the *Tarsius bancanus* of Horsfield.

The *Makis* approach the nearest of all the Lemuridæ to the superior Quadrumana. They have, however, like their congeners, opposite fingers on the hind feet. The Short-tailed Indri bears even some slight resemblance to man, in the shortness of his tail, the length of his legs, and his altitude. The Malagasy call him the "Man of the Woods," although he has a pointed muzzle and trumpet-shaped ears on the summit of the head. He is the largest of the Lemuridæ, attaining, when erect, the height of three feet. His skin is soft, and clothed in long, fine hair; whence naturalists have named him *Indris laniger*. Very gentle in disposition, he is easily tamed, although endowed with only moderate intelligence. It is said that he can be trained to the chase.

The Maki, like the Short-tailed Indri, has a thin elongated muzzle; otherwise, in form, he approximates more closely to the Ratans or the Coatis than to the Apes. Their ears are small and round, lateral, and almost entirely hidden in the hair; they carry a tail of notable length; their fur is thick and soft. The thumb of their anterior paws is nearly as "opposable" as that of the posterior. To sum up: they are graceful little animals, precisely because we do not find in them those grotesque features and that eccentric conformation which render the apes, even the most favoured by Nature, offensive caricatures of man. They are lively and agile; they climb, run, and leap with as much grace as nimbleness. Their habits are nocturnal, as the development of their eyes sufficiently indicates. They subsist on fruits and insects. Their manners are gentle; they accustom themselves to captivity with great readiness, and soon grow familiar; but they do not equal the apes in intelligence. This

genus comprehends several species. I shall specify the *Maki-Mocoas*, which is of a cindery-gray, with the cheeks and throat white, and the tail marked with regular black rings; the *White-Mantled Maki*, whose muzzle, shoulders, and tail are black, and the rest of the body of a pure white; the *Red Maki*, very remarkable for the brightness of his colours, for his body is of a lively red, the upper part of his neck and head white, as well as the extremities of his legs; and,

1. Maki-Mocoas. 2. White-Mantled Maki.

finally, his belly and tail are black. Other species have been distinguished, as the Red-bellied Maki, the Yellow-bellied, the Maki with the white forehead, and the like.

To the Fauna of the Madagascar forests also belongs an extremely rare animal, few specimens of which have been brought into Europe. After some hesitation our naturalists have agreed to

refer it to the order of Primates, although its general appearance and its system of dentition caused it at first to be taken for a kind of large squirrel; while, on the other hand, the form and disposition of its thin fingers, and the development of its nails, liken it to the sloths. This animal is the Aye-Aye, or *Cheiromys Madagascariensis*. The characters which have determined its annexations to the order of Primates are, principally, the presence of opposable thumbs on the hind-paws; the terminal position of the nostrils; the oblique direction of the eyes, and the absence of a vertical fissure on the upper lip. Its habits are not well known; but it is a burrowing animal, very slothful, and goes abroad at night. It has large flat ears, like a bat's, and a tail like a squirrel's; but its peculiarity is the middle toe or finger of the fore-foot, whose two last joints are very long, slender, and destitute of hair. From nose to tail it measures about eighteen inches, and its general colour is a pale ferruginous brown, mixed with gray.

Sonnerat, who discovered the aye-aye in his expedition to Madagascar, at the close of the last century, succeeded in obtaining a couple of specimens, which he kept alive for two months. "I nourished them," he says, "upon cooked rice, and they make use, in eating, of the thin fingers of their fore-feet, just as the Chinese do of their chopsticks. They seemed always drowsy, resting with the head placed between the fore-paws, and it was only by shaking them several times we could get them to move." This torpid condition, however, was it the effect of confinement or of natural apathy? If due to the latter, it would be another point of approximation between the aye-aye and the sloths, which some naturalists have also inclined to rank among the Primates.

Other authors have placed those latter quadrupeds in an order apart, under the name of "Tardigrades;" but most scientific zoologists now classify them with the Edentata, and form them into the family of Bradypes or Bradypidæ. Undoubtedly the sloth, or ai, is an animal of curious and uncouth appearance; in general conformation not unlike the bear, to which he also approaches in the form of

his head, and in deficiency of tail, while his long rough hair, coarse and shaggy, like dry withered grass, recalls the fur of the ant-eater. The most singular peculiarity of his organization is the structure of the feet, whose strong crooked claws, to the number of three or more in each limb, are so linked together that they cannot be moved separately.

The name of "Sloth" popularly bestowed on this animal is not

Chiromys, or Aye-Aye of Madagascar.

so well-deserved as some writers of Zoology made Easy have represented. It is true that his progress on the ground is made with difficulty and slowness; but in the trees, his customary sojourn, he displays considerable address, and transports himself easily from tree to tree. "He moves suspended from the branch," says Waterton; "he rests suspended from the branch, and he sleeps suspended from the branch. Hence his seemingly bungled composition is at once

accounted for; and in lieu of the sloth leading a painful life, and entailing a miserable existence upon his progeny, it is but fair to conclude that he just enjoys life as much as any other animal, and that his extraordinary formation and singular habits are but further proofs to engage us to admire the wonderful works of Omnipotence."

Dr. Lund says of the Three-toed Sloth (*Bradypus torquatus*) that he climbs with remarkable sureness and aptitude. The manner in which he moves is thus:—Lying on his belly, with all his four extremities stretched out from his body, he first presses one of his hind-feet with all its might against the ground, whereby the corresponding side of the body is slightly raised. The fore-leg on the same side thus becomes sufficiently free for the animal to move it a little in advance. He then hooks his powerful claws fast in the earth, and so drags his body a little onwards. The same manœuvre is next repeated on the opposite side; and thus the poor animal progresses in the slowest and most laborious manner. But though his organization unfits him for terrestrial locomotion, it is wonderfully adapted, as I have said, to climbing trees. With his long arms he reaches high up, and clings fast to the bough with crooked claws. The *inverted* position of the soles of his hind-feet gives him a power of *clutching* the trunk of the tree which no other mammal possesses; so that truly when we see him climbing a tree, we can scarcely believe it to be the same animal that lies so helpless on the ground. Hence we see that the sloth's organization is wholly adapted for living in trees. Compared with the slowness of his motions, he is the best climber among mammals, while he is the worst walker; or rather, he is the only mammal that can neither walk nor stand.

The Bradypes family is peculiar to South America. It includes but two genera, whose types are the *Chalypus-Unau* and the *Bradypus-Ai*. The Unau, or Two-toed Sloth, is found in the forests of Peru, Guiana, and Columbia. His length is from twenty to thirty inches. He has a large head; long and dry hair, of a grayish-brown. During the day he sees very imperfectly, and therefore passes most of his time asleep upon a tree, where he may be seen clinging by three

of his feet to a bough, and making use of the fourth to reach and convey to his mouth the food on which he lives. The Ai is more indolent in his habits than the Unau, from which he differs rather in his anatomical and osteological characteristics than in his aspect and conformation. He may, however, be recognized by his rudimentary tail, his flattened visage, and the long frizzled hair which covers certain parts of the body.

1. Ai (Two-toed Sloth). 2. Unau (Three-toed Sloth).

We have seen that the aye-aye may be considered as connecting the Quadrumana with the Bradypes, on the one hand, and the squirrels on the other. These two groups, however, exhibit a very striking contrast between their habits and disposition; and since to animals of the former the name has been given of "Sloths," the latter might justly be designated "the Active." If there exist, indeed, any animals for whom *movement* is a vital necessity, these, assuredly, are

the squirrels. They climb trees with great agility, and leap from one branch to another with a marvellous vigour and precision. On the ground, they trot rather than run. They are essentially gramini-vorous and frugivorous; nuts, fruits, seeds, the young stems of trees, forming their chief nourishment, though at times they plunder birds' nests, and regale themselves with the eggs or even the "callow brood."

Common European Squirrels.

The Squirrel (*Sciurus*) belongs to the family *Sciuridæ*, in the order Rodentia. Their special characteristics may be enumerated as a long bushy tail, generally carried curved over the body, whence the Greek name Skiouros (σκια, a shade, and ουρα, a tail), fore-paws furnished with four toes, which have curved claws, and a tubercular thumb; long hind-legs, the feet provided with five toes; two incisors in each jaw; and four molar teeth on each side of each jaw, simple, with

tuberculous crowns, and a fifth in front of the upper jaw, which soon falls out. The squirrel's fur, thick and soft, is of a bright reddish-brown colour, more or less varied with gray; with a snow-white belly and breast, and a tail brown, or almost black. The ears are ornamented with long tufts of hair. The eyes, directed laterally, are black and lively, shining with subdued mischief; the legs are short and muscular; and when on the ground the animal moves by a succession of leaps, the tail being undulating and extended. He lives constantly in the forest, selecting a particular tree, where he builds his nest, either in a hollow of the trunk or among the branches. In the latter case he builds himself a sort of cabin, with twigs and stems, artfully concealed beneath a covering of moss and fragments of bark. There he lives "by his ain fireside," in the company of his mate and their young ones, collecting an abundant magazine of nuts and acorns for their winter provision. In the spring and summer he loves to gambol among the leafy boughs, climbing up and down the forest trees, and uttering a short quick stuccato cry, like the sound which we produce by clacking the tongue against the palate. If you attempt to seize him, he bites sharply, and scratches like a cat. He is nevertheless easily tamed, and his engaging manners, his amusing gambols, and constant liveliness, make him a great favourite among our "domestic pets." He soon grows accustomed to his cage, and after a brief interval of liberty returns to it of his own accord.

The Common Squirrel (*Sciurus vulgaris*) is found all over Europe, North America, and the Northern and Temperate regions of Asia. He is about eight inches and a half in length, without the tail, which measures fully six inches long. In Lapland and Sweden his colour changes to gray in the winter season; in the snowy wastes of Siberia, he is frequently seen of a pure white.

The only other European species is the Alpine Squirrel (*Sciurus Alpinus*), a native of the Alps and Pyrenees, of a deep brown colour, speckled with yellowish-white.

To North America belongs the Gray Squirrel (*Sciurus Carolinensis*), where he enjoys his free and sportive life in the great forests of

hickory, oak, maple, and chestnut. His whole length, including the tail, is about two feet. As he forays plentifully among the corn-fields, the inhabitants regard him as a scourge, and wage deadly war against him. Like the lemming, he migrates about autumn, in immense hosts; advancing in a straight course, which no obstacle is permitted to interrupt, and spreading desolation, like the course of an invading army.

The large species of the Fox Squirrel (*Sciurus vulpinus*) belongs exclusively to the "murmurous pine-woods" of South America. The Cat Squirrel (*Sciurus cinereus*) is remarkable for the exquisite fineness of his fur. In the neighbourhood of Hudson's Bay dwells the Red or Hudson's Bay Squirrel (*Sciurus Hudsonius*), marked along the middle of the back by a ferruginous line from head to tail, with the belly of a pale ash-colour, mottled with black.

In the northern districts of Africa we meet with the Barbary Squirrel (*Sciurus getulus*), which dwells among the palm-trees, and is of a grayish-brown colour, lightly shaded with red, with two white longitudinal bands separated by a brown streak. Cross to the eastern coast, and there we find the Abyssinian Squirrel, which has a greenish-gray back, white belly, and tail ringed with black and white; on the western side, the Ivory-eating Squirrel, which nibbles the tusks of elephants killed by hunters; and the Kendo Squirrel, one of the smallest known. The two latter species were discovered and specified by M. Du Chaillu, who has named the former *Sciurus eborivorus*, and the latter *Sciurus minutus*.

Among the Indian Squirrels I may name the great Malabar Squirrel (*Sciurus maximus*), less remarkable for his size, which is more than double that of the European Squirrel, than for the variety and vivacity of his colours. On the upper part of the head, the flanks, and thighs are of a chestnut purple; the shoulders, hind-quarters, and tail of a glossy black; the belly and inner sides of the limbs, a pale yellow.

Zoologists have classified in two genera, distinct from the true Squirrels, under the names of *Pteromys* and *Sciuroptera*, the animals popularly called "Flying Squirrels." The first of these genera is

pper to Southern Asia; the second comprehends the species common to Asia and Eastern Europe, others which are exclusively Asiatic, and others which are only met with in North America.

These Sciuridæ have no wings and no capacity of flight; but their anterior and posterior limbs are connected on either side by a membrane, which is really nothing but a fold of skin, and which they extend by spreading out their paws so as to present to the air a considerable surface. By means of this kind of parachute, they can cross, by leaping from one tree to another, an extensive area. My space only permits me to allude to the Virginian Flying Squirrel (*Pteromys volucella*), and the Common Flying Squirrel (*Pteromys volans*). The former is about five inches long, with a tail four inches; of a subferruginous brown colour above, and a yellowish-white beneath; the edges of the flying membrane are of a deeper tint than the rest of the fur, contrasting with the white border of the under part. He is naturally of a gregarious disposition, and ten or twelve may be seen in company, flying from tree to tree. In case of need he can swim like other quadrupeds, and yet, on quitting the water, can resume his aërial motion. He feeds on fruits, nuts, and young leaves and twigs; is of an affectionate nature, and easily domesticated.

The Common Flying Squirrel (*Pteromys volans*) belongs to the northernmost regions, and his favourite haunt is the pine and birch woods of Siberia. On the upper parts his colour is a pale gray, on the under a milky white. Measured from the nose to the tail, his length is six inches; and the tail, which is thickly furred and slightly flattened, is somewhat shorter than the body. He flies, or rather springs, through the agency of an expansile furry membrane, reaching, as I have stated, from the fore-feet to the hind. He builds his nest of the finest mosses in the hollows of the old forest trees; is a solitary animal emerging from his retreat only at the approach of the gloaming; feeds on young buds and catkins; and springs from one tree to another with astonishing velocity.

The *Pteromys splendens* belongs to Java and Borneo: his body is clothed in fur of a warm red hue. The *Sciuroptera Polatouche*,

which inhabits the north of Europe and Asia, is of an ashen gray on the upper, and of a snowy white on the inferior parts.

Some species of *Sciuridæ* seldom ascend trees, but burrow on the ground, and are further distinguished by their possession of cheek-pouches. They form the genus *Tamias*. The best known is the Chipping Squirrel, Hacker, or Chipmuck (*Tamias Lysteri*), which abounds in the United States as far north as the fiftieth parallel, and derives his name from his peculiar *chipping* or *cheeping* cry, like that of a young chicken. He burrows near the roots of trees, and several squirrels frequently tenant one burrow, where they lay up stores of nuts and grain for winter supply. His length is fully ten inches; the general colour gray, longitudinally striped with yellowish-white and black.

CHAPTER IX.

MAN IN THE SAVANNAHS AND THE FORESTS.—ANTHROPOPHAGY.

In the Steppes and Deserts of Sand we have seen men ignorant and wild, semi-brutalized in manner and tastes, and miserable in condition: some sedentary and peaceful, cultivating with laborious care an ungrateful soil; others, and by far the greater number, nomadic and pastoral in their habits; and others, again, living partly on the product of their herds, partly on the plunder obtained by a life of piracy. But between these races and civilized nations there still exist some analogies of belief, of polity, of social economy. In the sacred codes which fill, for them, the place of our elaborate legal and political systems, lofty precepts of justice and charity, salutary rules of morality and hygiène, mingle with barbarous customs and absurd or superstitious practices. Their religions, founded, like Christianity itself, on the idea of a Divine unity, a God of mercy and punishment, they hold in common with peoples who have left their mark on the history of

the world, and to whom, moreover, they are attached by close ties of consanguinity.

Widely different is the man of the Prairies and the Forests, the Savage, who even to our own days has remained plunged in the lowest depths of social, intellectual, and moral development. Differing the one from the other, according to the country which they inhabit, the colour of the skin, the features of the countenance, and sometimes the forms and outlines of the body, savages everywhere approximate very closely in the general character of their instincts, sentiments, and ideas, and represent to us that early condition of humanity from which it has only been elevated by the Divine impulse and for the Divine purposes.

Assuredly it is not these whom Bonald has in view when he defines Man as "an intelligence served by organs;" for with them the respective parts of the mind and the body are inverted, and the first is the very humble servant of the second; its sphere of activity, accordingly, is very much restricted. War, the chase, the coarse pleasures of the banquet, the dance—and what a wild, barbarous, sensual dance it is!—the recital and glorification of the deeds of their ancestors, their nation, and themselves, mingled with marvellous improbabilities which he readily accepts for authentic histories, and finally, gambling—these are the only pleasures of the savage.

The chase is almost his sole means of existence; for he is no shepherd, and still less is he a tiller of the ground. He contents himself with gathering those alimentary substances which Nature spontaneously pours out at his feet; and as, among these, the flesh of animals is that which he prefers, he exerts all his physical faculties, and all the resources of his intelligence, to procure it. He fashions for himself arms; he learns to handle them skilfully, as well as to follow up the scent of the game, to contend with the wild beast in agility or cunning; and he displays in this exercise a courage, a patience, and an ardour augmented by the stimulus of vanity, which prompts every tribe and every individual to claim the crown of superior bravery and the prize of surpassing skill.

From emulation to rivalry, from the chase to the campaign, there is but one step. War, for the savage, is but a more dangerous and a more glorious chase; a chase more productive and more fertile in pleasures than the ordinary chase. Therein his self-love, as well as his fierce sanguinary instincts, can be amply gratified; and he feels a keener delight than in the pursuit of the lion or the tiger. He also derives from it far greater advantages, realizes far more considerable profits; the likeness is moreover all the closer, since he looks upon his vanquished enemy sometimes as a prey, sometimes as a slave or a thing for sale or barter. He may either kill him and eat him, or constrain him to labour for him; or finally sell him for money, or exchange him against other "goods and chattels." If he does not cut him down on the battle-field, and it should not suit him to let his captive live, he may enjoy the pleasure of varying and multiplying his tortures before he deals the death-blow. Among all savage races no banquet is more eagerly enjoyed than the torture of their prisoners. It is generally round the stake to which the shuddering victims are confined, or their throbbing and bleeding remains, just about to be devoured, that the conquerors execute fantastic dances, and surrender themselves to noisy manifestations of joy, making the air re-echo with their discordant songs and the not less discordant sounds of their rude musical instruments; then after the hideous banquet—accursed as that which Pelops offered to the gods—seated around the glowing embers, and in the midst of the frightful fragments of the feast, they love to recall their achievements in the battle and the chase, or beguile the time with some rude game of chance. Gambling, like war and the chase, seems to be an innate passion with savages; and, sooth to say, it is a vice worthy of them and of their brutalized nature. Rightly does the poet exclaim,—

> "What meaner vice
> Crawls there than that which no affections urge,
> And no delights refine; which from the soul
> Steals mounting impulses which might inspire
> Its noblest ventures, for the arid quest
> Of wealth 'mid ruin; changes enterprise

> To squalid greediness, makes heaven-born hope
> A shivering fever, and in vile collapse
> Leaves the exhausted heart, without one fibre
> Impelled by generous passion?"*

The "shivering fever" consumes the savage's very life-blood; he gives himself up to it with unrestrained frenzy, and stakes, upon a throw of the dice, his weapons, his possessions, his women, and even his liberty.

Scarcely less violent is the passion which plunges him into drunkenness. With the fermented juices of various plants he is skilful in compounding intoxicating liquors, though he greatly prefers to these raw preparations the subtle mixtures introduced by Europeans. There is nothing which you cannot obtain from him for a few bottles of rum, of whisky, or brandy. And it is to the shame of our merchants that they do not scruple to stimulate, for their own sordid benefit, this vile passion to the utmost, against which the efforts of all our missionaries have proved almost powerless; so that, in truth, the commerce of the savage with civilized men, far from contributing to raise the former out of their abject, slothful, and degraded condition, has, on the contrary, proved for the majority of them a new source of embrutization and depravity.

Savages have no other literature than the traditions, myths, and marvels to which I have already alluded. They have no written language; and here we are at once provided with a means of distinguishing the wholly savage from the partly civilized races. The reduction of speech to a definite system, the acknowledgment of certain laws and principles as affecting the formation of a language, is the first great step out of barbarism which a barbarous people accomplishes.

Their science is limited to some acquaintance with the properties of the plants which they make use of, either as food, medicine, or poison. Medicine, indeed, as practised by "medicine-men," priests, or "sorcerers," consists practically of superstitious formulas, whose

* T. Noon Talfourd, "Dramatic Works."

object is to expel the "evil spirit" which the savage supposes to be the cause of all his maladies.

The logical faculties are invariably those which in man are developed the most slowly and with the greatest difficulty. But they are also those which constitute the intellectual power of great nations. Without Aristotle, Plato, and Socrates, what had been ancient Hellas? Without Bacon, Locke, Newton, and Stuart Mill, what were modern England? Or Italy, without Galileo? And France, without Pascal, Descartes, Diderot, and Montesquieu? And Germany, without Fichte, Hegel, Kant, and Schlégel? The savage, however, possesses these faculties in a purely rudimentary condition. Analysis, synthesis, abstraction, generalization, are mental achievements which they cannot accomplish. They show themselves incapable, in fact, of the simplest calculations, of resolving easy arithmetical problems which are no mystery to the infants in our European infant-schools. Their numeration never goes beyond the safe and certain limit of their ten fingers; often they cannot compute above five, three, and even two. The Guarinis employ the expression "one hand" and "two hands" to designate *five* and *ten*; other American tribes say "two men" instead of *forty*, because each man has twenty toes and fingers. Among most of the African negroes, numeration is quinary; it is ternary, or even binary, among the Australian aborigines. The savage knows nothing of art, nor of that feeling for beauty which is the essence of art. If he cultivates music, it is of so discordant a character, and so incongruous a medley of sounds, that no European can listen to it with patience. The gods which they fashion out of wood or clay, and to which they frequently offer human sacrifices, are of the utmost hideousness; and it is with difficulty the spectator can recognize in their rude outlines any likeness, however imperfect, to the models in man or beast which the sculptor has pretended to imitate. The want, or rather the depravation of taste, is shown in the choice of the ornaments with which they decorate their persons; in the tatoolings with which they bespatter their bodies; in the unbecoming ornaments of every kind which they suspend to the nose, the lips, the ears,

and which render monstrous the visage already ugly enough by nature.

The savage has no "industries" in the sense which we attach to that comprehensive word; the terms "trade," "business," "profession," possess no equivalents in his language. He builds himself a hut, a cabin, or a wigwam; and he fabricates for his use a few indispensable implements, weapons and utensils. The only profession recognized among savage peoples is that of the priesthood. Priests, indeed, are everywhere found as the teachers and ministers of a religion—if we are willing to bestow that sacred word on an incongruous mass of superstitious practices and beliefs, founded upon some dim idea of the existence of a Supreme Being. And this idea exists, though very faintly and rudely, and mingled with many atrocious or absurd aberrations, among most of the red-skins of North America and the islanders of Polynesia. These races believe in the power of a superior God, whom the former denominate the "Great Spirit," *Kitchi Manitou*, and the latter *Taoroa* or *Tangara*; as well as in another life, a coarse and sensual immortality, wherein they hope to enjoy the full measure of those animal delights which constitute their ideal of perfect happiness. The conception which the savage forms of his God is, nevertheless, a very poor and imperfect one. He never connects him with his thoughts, his emotions, his moral or intellectual nature; but only with the material world—with the thunder and the lightning, the sunshine and the cloud. "Who is it," says the Indian, "that causes the rain to rise in the high mountains, and to empty itself into the ocean? Who is it that causes to blow the loud winds of winter, and that calms them again in the summer? Who is it that rears up the shade of those lofty forests, and blasts them with the quick lightning at his pleasure?" And so the Polynesian employs his priest to propitiate his God with sacrifices when the storm rages, and the African, after a prolonged drought, engages the intercession of his "rain-maker" to obtain the desired showers. It is not a moral and a spiritual, but a *material* God, of whom the savage conceives, and before whose anger he trembles.

In some regions of South America, and principally in Peru, man worships the sun as his supreme divinity, and it is easy to understand the awe and wonder with which the uncultivated mind would necessarily look upon the orb of day, the master and ruler of the year. With Southey, I find myself ready to exclaim :—

> "I marvel not, O Sun, that unto thee
> In adoration man should bow the knee,
> And pour the prayer of mingled awe and love;
> For like a god thou art, and on thy way
> Of glory sheddest, with benignant ray,
> Beauty, and life, and joyaunce from above."

We know, too, that sun-worship has prevailed among the most highly civilized races, and that it was the basis of Greek, Egyptian, Celtic, and Oriental mythologies. "Our northern natures," says Mr. Helps,* referring to the influence of this religion of the outer world, "can hardly comprehend how the sun and the moon and the stars were imaged in the heart of a Peruvian, and dwelt there; how the changes in these luminaries were combined with all his feelings and his fortunes; how the dawn was hope to him; how the fierce mid-day brightness was power to him; how the declining sun was death to him; and how the new morning was a resurrection to him: nay, more, how the sun and the moon and the stars were his personal friends, as well as his deities; how he held communion with them, and thought that they regarded every act and word; how, in his solitude, he fondly imagined that they sympathized with him; and how, with outstretched arms, he appealed to them against their own unkindness, or against the injustice of his fellow-man." But such a creed as this is indicative of some degree of advancement, of some modicum of civilization, and may not be compared with the monstrous fetichism prevailing in Melanesia, Australia, Africa, and the Polar Deserts. In these regions the savage takes for the objects of his veneration beasts and inanimate objects; or is without any definite belief, and shows himself refractory to all religious teaching. Such is the case, according

* Arthur Helps, "Spanish Conquest in America."

Sir John Ross, among the Eskimos; while the Australians, according to Latham, have not even succeeded in formulating the rudest elements of a mythology; and the negroes of Equatorial Africa indulge in horrible superstitions which are a hundredfold worse than the absence of all belief.

The individuals, therefore, who act as priests among these ignorant and stupid savages are, in reality, only miserable sorcerers, to whom they attribute the power of predicting the future, of controlling wind and rain, the sun and the moon, of curing disease, either by magic potions, incantations, or amulets; but they fear without respecting them, and never hesitate to put them to death when the effect of their juggleries or their prophecies does not respond to the hopes cherished by the worshippers.

Among these credulous and cruel peoples we find the realization of all those terrible dreams embodied by the poet in his picture of the influences and consequences of superstition. For a vivid commentary on the following lines of Pope, the reader should turn to the pages of Livingstone, Burton, Speke, Du Chaillu, William Ellis, John Williams, or Admiral Wilkes. Of superstition, the poet says:*—

"She taught the weak to bend, the proud to pray
To powers unseen, and mightier far than they:
She, from the rending earth and bursting skies,
Saw gods descend, and fiends infernal rise;
Here fixed the dreadful, there the blessed abodes;
Fear made her devils, and weak hope her gods:
Gods partial, changeful, passionate, unjust,
Whose attributes were rage, revenge, or lust;
Such as the souls of cowards might conceive,
And, formed like tyrants, tyrants would believe.
Zeal, then, not charity, became the guide;
And hell was built on spite, and heaven on pride.
Then sacred seemed the ethereal vault no more;
Altars grew marble then, and reeked with gore;
Then first the flamen tasted living food;
Next his grim idol smeared with human blood;
With heaven's own thunders shook the world below,
And played the god an engine on his foe."

* Pope, "Poetical Works"—*Essay on Man.*

The savage has only rudimentary notions of the justice, the respect, and the good-will which man owes to his fellows. Nevertheless, if in some parts of the world he appears an intractable, cruel, and perfidious being, in others his manners are gentle, inoffensive, and hospitable. And nearly everywhere he seems capable of gratitude, devotion, and even of veritable heroism. But, in general, the law of the strongest is the only law which he recognizes; the fear of an immediate and corporeal chastisement is the sole restraint upon his passions; and the material instincts are the most powerful impulses of his actions. The want or narrowness of the moral sense induces as its natural consequences among the unfortunate savages every form of debauchery—the absolute and brutal tyranny of the chief over his tribe, of man over woman, of the father over his children, of the conqueror over the conquered; murder on the slightest occasion, and with incredible refinements of cruelty; and, finally, anthropophagy—that hideous custom which lowers man below the most ferocious beasts, and which, nevertheless is not always, as might be supposed, the sign of the lowest abasement.

Anthropophagy springs from different causes, and clothes itself in various forms. Sometimes it is but the expression of a sanguinary instinct, of an atrocious sentiment of vengeance; sometimes it is the consequence of a state of misery and of famine almost permanent; often, also, it is closely connected with the usage of human sacrifices, and those who practise it consider it as a sacred duty, an act of piety, agreeable to their divinities or to the *manes* of the victims whose very flesh they devour.

Unknown to the stupid Eskimos, and in general to all hyperborean races, anthropophagy rages with intensity among peoples comparatively civilized. The Ghonds of Hindostan, peaceful and laborious cultivators, are not exactly cannibals, but every year they immolate to their divinities a multitude of children, whom they flay and cut to pieces while alive, and whose flesh they distribute in fragments over the fields they are about to sow.

In Sumatra there exists a tribe, that of the Battas, which has

AMONG THE BATTAS OF SUMATRA.

Not only a religion and a worship, but a kind of constitution, a literature and a penal code. This code condemns certain classes of criminals to be *eaten alive*. After the sentence has been pronounced by the competent tribunal, two or three days are suffered to elapse in order to give the people time to assemble. On the appointed day the criminal is led to the place of execution, and bound to a stake. The offended party, or his nearest relation, if he has been murdered, advances and chooses the choicest morsel; the others follow in their turn, and with their own hands cut off such pieces as please their fancy. Finally, the unfortunate wretch is relieved from his sufferings by the chief, who strikes off his head. The flesh is eaten on the spot, raw or cooked, according to each man's taste.

The natives of some of the Polynesian Islands consider that they render a service to their aged parents by slaying them, and that, by eating them, they provide the most honourable mode of sepulture. Others believe that a man, by devouring his enemy, infiltrates into his blood all the virtues with which the latter was endowed. A similar prejudice exists among certain tribes on the Amazon.

It is beyond doubt that, in a majority of cases, anthropophagy originates in scarcity of food, in the lack of cattle and game, while, in others, many cannibals are attracted by the delicious savour of human flesh, which they prefer to every other. Among the *Cobens* of the Uanpès, says Maury, man is considered as veritable game, and these savages declare war against the neighbouring tribes only with the object of procuring a supply of human flesh. When they have more than they require for present needs, they dry it, smoke it, and store it away as provision.

In the Viti Islands, whose natives are eulogized by Dumont-d'Urville as the most intelligent in Melanesia, great festivals are celebrated at different epochs of the year, which require a certain number of victims. Prisoners of war are the first to be immolated; then all those unfortunates who are without an asylum are hunted and collected; and if this inhuman chase should not be sufficiently productive, the purveyors eke out the supplies by adding some

wretched women, who are eaten by their own relatives. Dumont-d'Urville speaks of a chief, named Tanoa, who, for a public banquet, caused thirty women to be slain, and their kin, far from murmuring or lamenting, took part in the hideous feast.

In Africa, Captain Burton saw, on the shores of Lake Tanganyika, a cannibal people, named the Vouabembés, who feed upon carrion, vermin, larvæ, and insects, and carry their sluggishness and brutality to such an extreme as to eat raw and putrid human flesh. Although you may see on every countenance, says this adventurous traveller,* the expression of chronic hunger, the poor wretches, timid, fuliginous, stunted, degraded, seem far more dangerous enemies to the dead than to the living.

Owing to the exertions of our missionaries, this horrible practice, against which our better nature instinctively rebels, is rapidly dying out in every region where their beneficial influence extends. In Polynesia and New Zealand, for instance, cannibalism is almost extinct. And if we owed no other service to the self-denying exertions of the soldiers of the Cross, this alone would entitle them to our gratitude, for the extermination of anthropophagy is the first step towards teaching man to reverence man.

CHAPTER X.

MAN IN THE SAVANNAHS AND THE FORESTS—THE SAVAGE RACES—THE NEGROES.

"When wild in woods the untutored savage ran."

SAVAGERY is evidently the primitive condition of man. But while for certain races it has only been the first period of a more or less rapid progressive evolution, a movement in advance more or less complete, for others it seems to be a perpetual infancy, an incurable

* Capt. R. F. Burton, "Lake Regions of Equatorial Africa."

atrophy of the noble faculties which are the privilege of our species. It is not the province of the present writer to determine the causes, undoubtedly very complex, which have operated in the formation of the various races composing the human genus, to allot to each the physiological and psychological characteristics which distinguish them, and to explain their distribution in the different regions of the globe. These are problems, indeed, which science has only begun to investigate, and in whose discussion scientific men exhibit the widest discrepancies of opinion. While one authority contends for man's unity of origin, another believes that he has sprung from several independent sources. All at present is hypothesis and conjecture; nor do there apparently exist any well-approved facts on which a satisfactory theory can be erected apart from the brief and succinct details recorded in Holy Writ. Why one race has emerged from barbarism while another remains sunk in its lowest depths, we can only explain by admitting the exercise of a superhuman power. No evidence can be given that any people has achieved civilization by its own unassisted efforts. But in these pages I am not called upon to enter into any philosophical speculations. I have only to deal with facts; and with one incontestable fact, the superiority of those races which have acquired civilization over those which are incapable of so grand a work, and which show little, if any, aptitude to profit by the examples and the lessons brought within their reach.

Whether it is due to wholly external circumstances, such as climate, geographical situation, geological constitution of the soil, its nature and that of its productions, that such differences should exist between different races, that some should reign as sovereigns over the earth, while others, in their pretended liberty, are given up to all the horrors of slavery, ignorance, misery, and cannibalism, I am not called upon to determine. It seems both probable and possible. "To understand any people thoroughly," says Mr. Helps, "we must know something of the country in which they live, or at least of that part inhabited by the dominant race. The insects partake the colour of the trees they dwell upon, and man is not less affected by

the place of his habitation on the earth." We cannot pretend to undervalue the importance of race. We cannot deny that one is the ruler, the other the ruled. As Emerson says,* "It is race, is it not? that puts the hundred millions of India under the dominion of a remote island in the north of Europe. Race is a controlling influence in the Jew, who, for two millenniums, under every climate, has preserved the same character and employments." It is race that has planted the Anglo-Saxon on every shore, and that for ages has subjected the negro to the yoke of bondage. At all events, it is certain that, even in the present day, savagery is the exclusive portion of certain races, perfectly distinct in a physiological point of view from the white and yellow races (the Caucasian and Mongolian), which, either in antiquity or the modern age, have arrived at more or less advanced degrees of civilization.

The savage races may be divided into four great groups:—

The *Negro*, in Africa and North America;

The *Malayo-Polynesian*, in Polynesia and the Indian islands.

The *American*, or Red Indians; and

The *Hyperborean*, chiefly represented by the Eskimos.

The *Negro* or *Black* races are distributed over the whole of Africa, from the Cape of Good Hope to the frontiers of the Saharan region. The name of Negro is also given to the natives of Australia and Papouasia. But most anthropologists agree in considering the Australian branch wholly distinct from, and independent of, the African branch; which, nevertheless, it resembles in several organic peculiarities, and especially in the deep colour of the skin.

This characteristic, which is the most conspicuous at the first glance, is, however of secondary importance: it is extremely marked on the east African coast, among the Nubians and the Abyssinians, on the banks of the Cuzamance, not far from the Sierra Leone coast, among the Feloupas, and on the Guinea coast, among the Ammas. All these peoples are black as ebony; but their oval countenances,

* R. W. Emerson, "Essays" (Collected Works, Bell & Daldy, 2 vols.)

their regular features, the elegance of their forms and the development of their faculties, evidently connect them, some with the Semites, others with the Aryan-Hindus.

On the other hand, several varieties of Negroes properly so-called wear but a fuliginous or reddish-brown tint. It is, therefore, by less superficial peculiarities that we distinguish the true Negro. His skull is elongated, and laterally compressed. Sometimes his jaw projects, a characteristic scientifically designated by the name of prognathism; sometimes it is more vertically disposed, but then the cheek-bones (or "zygomathic arches") are extremely prominent. His teeth project; that is, they are inclined outward, and always long and white. The skeleton, whiter than our own, is also heavier and more massive. The abdomen is exceedingly narrow, and with a conical cavity; the legs are bowed. Short the neck, broad the thorax, and convex, and generally well made. The muscles, but slightly developed in proportion to the dimensions of the osseous framework, have not the vivid red colour which distinguishes the flesh of the European; the blood is black, thick, and circulates slowly. The body is always deprived of hair; there is little or no beard; the hair of the head is black, woolly, and frizzled. The eyes are of the deepest black, but inexpressive. The forehead is low, the chin short, the mouth large, the lips are long and thick. Finally, and this is the most remarkable sign of the Negro's inferiority, the type of the face, in the same race, is so uniform that it is difficult to distinguish one individual from another. To this physical uniformity corresponds a moral and intellectual uniformity, which effaces, so to speak, all individuality. In Africa we meet with numerous tribes more or less intelligent and capable of being educated, many sanguinary and fierce, others benevolent and inoffensive; but the character and dispositions of a tribe are reproduced among all the individuals who compose it with scarcely perceptible differences.

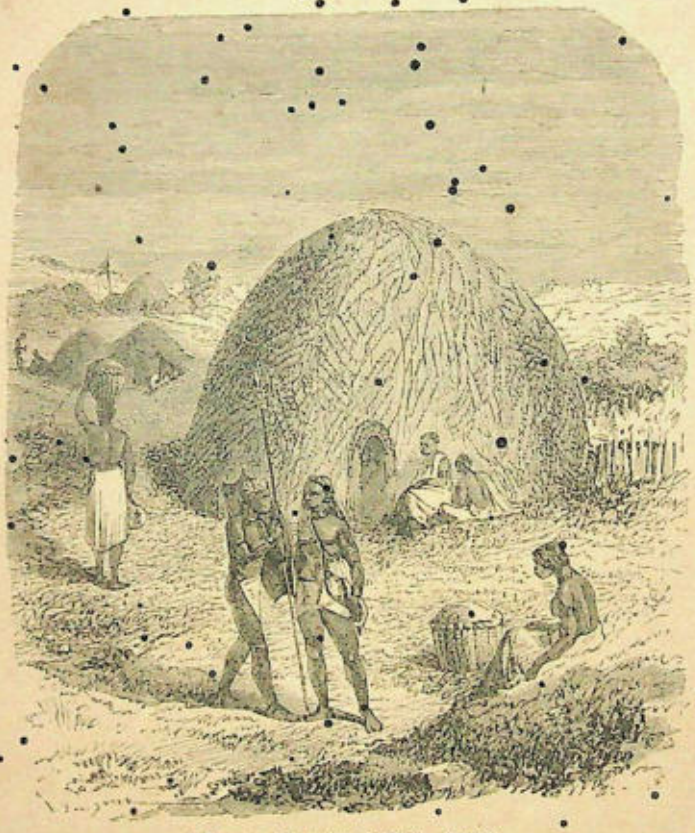
The Negroes of Africa may be divided into three principal varieties: the pure Negroes, the Kaffirs, and the Hottentots. The former comprehends all the populations of the east, centre, and west

of Africa. Its primitive stock is supposed to be the people called Mandinké or Malinké (Mandingue), formerly established at Mendé, in the delta of the Nile, but who emigrated towards the western coast, and now inhabit the mountainous countries bordering on the Upper Senegal. Between this river and the Niger are grouped some tribes in whom the Berber or Semitic blood appears mingled with the Negro blood; such are the Yolofs, the Foulahs, and the Peulas, or Fellatahs. The latter are of a sooty black, with a well-shaped head, a square frontal development, thick and woolly hair. They have founded powerful states, and are considered as the true civilizers of the Soudan, where they have introduced Islamism.

Further south, at the Gaboon, we meet with the wholly savage nations of the Mpongwes, the Shekianis, and the Fans. The Mpongwes inhabit the right bank of the Gaboon, spreading over an extent of seventy to eighty miles. They are of a medium height, and comparatively agreeable physiognomy. The men are clothed in a calico shirt, and wrap themselves in an ample piece of stuff as a mantle. Their headdress is a simple straw-hat; but the king, as a sign of his dignity, wears a hat of silk. The women have no other garment than close-fitting drawers descending to the knee; but they decorate their arms and legs with copper rings. Great amateurs are both sexes of tinsel and perfumery, and they besprinkle themselves with all kinds of essences. According to Du Chaillu, their characteristic trait is their passionate ardour for trade. Their principal wares are ivory, precious woods, and slaves. They display in their commercial manœuvres great ability jointed to the most signal bad faith.

The Shekianis occupy, between the banks of the Muni and La Mondah, and those of the Ogobay, a territory which stretches to within some two hundred miles of the sea. Their appearance is less prepossessing than that of the Mpongwes. Perfidious warriors, artful traders, bold and astute hunters; such are the salient traits of their character. As for the Fans, they are cannibals of the worst species, whose appetite for human flesh leads them even to eat individuals who have died of disease, and to disinter the dead in order to roast

or smoke them. When human flesh fails amongst them, they buy or steal it from their neighbours. They are, however, according to M. Du Chaillu, the handsomest and most gallant-looking negroes of the interior, and their horrible diet seems to fatten and strengthen them. Living in the mountains, they have that bold free air which distinguishes all mountaineers.



Negroes—Natives of Kidi, Africa

The Negro type is seen in all its purity among the populations of Congo, Nigritia, the Soudan, Dahomey, and Timbuctu, as well as among those of the eastern coast, below the tenth parallel of north latitude. In the region of the great lakes, between the coast of Zanguebar and the Lakes Victoria-Nyanza and Tanganyika, lie the kingdoms of Ugogo, Unyamezi, Unyoro, Kidi, and others, visited by

Grant and Speke in their celebrated journey to the sources of the Nile. The inhabitants of these countries are "darkly, deeply, beautifully" black, with prominent jaws, thick lips, and oblique eyes. Some of them, as, for instance, those of Unyoro, show a certain amount of taste in their accoutrements, and drape themselves in the

KAFFIR WARRIORS.

Romanesque manner with folds of cotton or calico. Those of Kidi wear no other clothing than an apron round the loins; they carry large rings on the arms, legs, and neck; and arrange their hair in sufficiently complicated tresses.

The Kaffir and Hottentot races are spread over all Southern Africa, below the fourteenth degree of south latitude; the former on the east, the latter on the west coast.

In the hierarchy of races, the Kaffirs occupy a rank superior to

that of the Negroes of Equatorial Africa. They have neither the pronounced tint nor the broad flat nose of the blacks of Guinea and the Soudan. They form great nations, build towns, cultivate the land, and work in metals. Their stock throws off four branches: the handsomest and most cultured is that of the Zulus, whose hue is not

HOTTENTOTS—A MAN AND WOMAN.

darker than that of the Arabs, and of whom the Wanikas offer the most conspicuous type. Then follow the south Kaffir branch, including the Amacondas and the Ama-Hupubas; the Sofalloa branch, whose type most nearly approaches the pure Negro race; finally, the Kaffir-Hottentot branch, which comprehends the Makololos, the Bakonis, the Basoutos, the Batouas, the Damaras, people of a clear brown hue, who have migrated from the north to the south, driving before them or subjugating the Hottentots, with whom they have intermixed.

The Hottentot race, or Quaiqua, is characteristic of Southern Africa. Its origin appears of remote antiquity; but it formerly dwelt further to the north, and has been driven back towards the south by the progress of the more warlike Kaffirs. The Hottentots are of low stature; their skin is a yellowish-brown. Their head is long, with projecting forehead and cheek-bones; flat nose, thick lips. Their women are hideous in face and deformed in body; as they grow old they grow stout, and a truly monstrous *embonpoint* invades the posterior part of their person. Morally, they are in an abject condition, which must be attributed rather to their sloth and wretchedness than to any lack of intelligence. Their sole garment is the *carross*, a kind of sheepskin mantle. They live in such low huts that they can only enter them by crawling. Some Hottentot tribes cultivate the soil, or depasture herds of cattle; such are the Bayéyés, established on the banks of Lake Ngami; the Namaquas, who are distinguished into "the great" and "the little;" and the Koranas, who roam along the Orange River. The most miserable members of this family are the *Bosjesmans*, or *Bushmen*, who inhabit the Kalahari Deserts, between the Cape Colony and Kaffraria. The total number of the Hottentot race probably does not exceed 150,000.

I have said that the Negroes of Australia and Papouasia were wholly distinct from those of Africa. And, in fact, I can hardly admit that it could ever have been possible for the latter to colonize the Australian continent and the adjacent islands. What, then, is the origin of the Australians and the Papuans? According to some anthropologists, they are descended from that strange race of savages which still exists in Hindostan, in the Nielgherries, and the Téraï, between Palmcoe Sumbhulpoor, and the sources of the Nerbudda. But whence came the latter? On this subject all historical tradition is dumb, and science knows not what to think of those black-skinned savages, with the face of an ape, a body covered with red hair, disproportionably long arms, a protuberant belly, and who live in the trees like the orangs and the gibbons.

Whatever may be its origin, the Pelagian Negro race now-a-days occupies New Holland, Tasmania, New Caledonia, New Britain, New Guinea, the Fiji Islands, and the Andaman. It comprehends the Australians, the Papuans, the Andamanese, the Alfourous, and some other secondary branches. We often, but erroneously, confound the Australians and Papuans. While both are black, they differ markedly

AUSTRALIANS.

from one another, and the latter are superior to the former. The Australians are puny and wretched in appearance. They have a protuberant belly, feeble limbs, a long but not projecting face, a depressed skull, long black frizzled hair. Their attire is remarkable for its simplicity: a kangaroo skin flung over the right shoulder! The custom of painting and tatooing the body is generally adopted among them, as well as among all savages, to whatever race they belong,

and whatever part of the world they inhabit. The tribes are distinguished by the colours they make use of, and by the number and arrangement of the incisions which the warriors make on their limbs, their chest, and their shoulders. Their arms are spears pointed with heads of jagged flint, and hatchets of the same material. The indigenous population of Australia is rapidly decreasing; it does not

PAPUANS.

exceed a total of 3000 souls. In Tasmania the aborigines are reduced to four, three aged women, and a young man, who has recently visited England.*

The Papuans have not woolly hair, like the Australians. Their hair grows in separate plaits, which twine one in another, and form,

* This was written in September 1867.

when of some length, a voluminous and characteristic *coiffure*. The Papuans of New Guinea, according to Dumont d'Urville, are men of medium stature, with elegant forms, oval countenance, and tolerably regular features. Their skin is of a dark brown colour. They appear to be of a timid and unenterprising character. Their residence they have planted on the shores of the sea, where they dwell in long wooden huts, raised upon piles which are plunged deep in the very waters of ocean. It does not seem that they acknowledge the authority of any chiefs. They know only a few words of the Malayan language, and speak the *papoua*, which differs from it essentially.

The Andamanese, or Andamans, are of a jet-black colour. Their stature rarely exceeds four and a half to five feet. Their head is large, and sunken between the shoulders; their hair woolly; most of them are disfigured by protuberant stomach and meagre lower limbs. They go about in an absolute nudeness, for we cannot regard as any species of clothing the coat of clay or yellow ochre which they plaster over their bodies to protect them against the stings of insects; the red ochre which the earth supplies them they make use of to powder their hair and paint their face. According to the latest estimates, the total population of the Andaman Islands does not exceed 2000 individuals.

The Alfourous, or Harfourous, inhabit Borneo, the Celebes, the Moluccas, Mindanao, and some other isles. Their type has no very definite peculiarity, and ethnologists seem agreed to consider them a mixed race, resulting from a cross between the Papuans and the Malays, and forming the transition between the two races.

CHAPTER XI.

MAN IN THE SAVANNAHS AND THE FORESTS:—THE MALAYO-POLYNESIANS —THE NORTH AMERICAN INDIANS.

THE Malayo-Polynesian race has also been designated, and much more felicitously, the Neptunian or Pelagian, because it peoples exclusively the peninsulas and islands of the great Southern Ocean. It is, to speak the truth, an ill-defined, heterogeneous, and composite race, presenting very diverse types. Ethnologists, however, divide it into two original branches—the Malayan and the Polynesian.

The Malays have the skull flattened in the inferior portion, the malar bones very wide apart, a flat nose, an exceedingly wide mouth, thick lips, and eyes raised in the direction of the temples; their yellow skin embrowns by exposure to the sun, but if sheltered from its rays, grows almost white, especially with the females. Generally speaking, they are corrupt, sanguinary, and perfidious, as our seamen wrecked upon their shores have too frequently experienced; but they are intelligent, and capable of a certain degree of civilization. The best marked types of this race are found in Sumatra, among the anthropophagous Battas already spoken of, the Orang-Lobous, and the Pagais. The latter tatoo the body, says Maury,* and like the Nagas of Assam, make new marks every time they have killed a foe; thus bearing about on their own persons the evidences and glorification of their prowess. Like the Michmis of Assam, they expose their dead on rudely-constructed scaffolds or platforms, where they leave them to decay; a custom which prevails amongst nearly all the Polynesian populations, as well as among the Redskins of North America. We must therefore conclude that the Malayan race was, at the outset, extremely barbarous. It owes its civilization to the influence of the

* Alfred Maury, "La Terre et l'Homme," ch. vii.

Hindus, and especially to that of the inhabitants of the Malabar coast.

This civilization, in all its conditions, the Malays appear to have transported to Madagascar, where they have formed, by intermixture with the Negroes of Africa, two new races—the Hovas, who still preserve distinctly visible affinities with the Negroes properly so called, and the Sakalaves, who approximate towards the Kaffirs.

MALAYS—MALE AND TWO FEMALES.

These two mixed races comprise in themselves several varieties, but all bear the common denomination of Malagasy or Madecassy.*

According to M. Maury, the populations of Polynesia depart the more completely from the Malayan type as we advance in an east-

* For information, as entertaining as it is valuable, respecting the history, people, and products of Madagascar, see the Rev. William Ellis's "Three Visits to Madagascar," and M. Octave Sachot's "Madagascar et les Madécasses" (Paris, 1864).

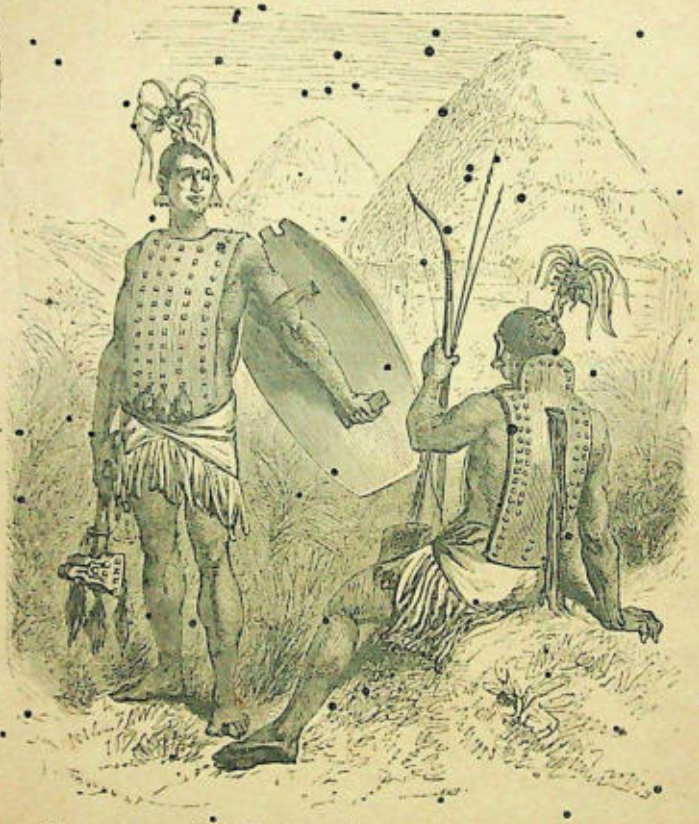
ward direction; so that, from the Caroline Islands to the Marquesas, and from the Sandwich Islands to New Zealand, they constitute a sufficiently homogeneous race, the Polynesians or *Kanaks.** This race is represented in the Sandwich Islands by an almost white variety, whose type very closely approaches the Caucasian race; in New Zealand, on the other hand, by tribes of a dark brown. In the island of Ombai, situated at the extremity of that vast archipelago which seems in some remote age to have formed an isthmus connect-

Hovas of Madagascar—Men, Woman, and Child.

ing the Australian with the Asiatic continent, the natives are of a more or less decided olive-brown. Their eyes are deep-set and brilliant, their lips thick, the mouth is large, and the nose generally flat, yet sometimes tolerably well made. They are of medium height, robust, and good figures. They wear a scanty beard, if any; but

* In the language of the Sandwich Islanders, *Kanak* or *Kanaque* signifies "a man."

their hair is long and thick; sometimes they suffer it to flow freely about their shoulders, sometimes they gather it on the top of the head with pieces of vari-coloured stuffs. These savages have a fierce and martial air, are abrupt in their manners, and rapid in their movements. They display extraordinary skill in the management of the bow, and also make use of the Malayan *kris* or crease, which



Warriors of the Island of Ombal.

they carry in their girdle. In battle they protect their persons with a breast-plate and a buckler of buffalo hide; these two pieces of armour are ornamented with shells in regular and pleasing designs. The people of Ombaï are anthropophagic.

If now we transport ourselves to the eastern extremity of Polynesia, the Marquesas Islands, occupied by France in 1842, we shall

find there the Pelagian race under one of its handsomest and most amiable types. The Kanaks of this group are not exempt from cannibalism. Nevertheless, before the commerce, civilization, and vices of Europe intruded upon their savage Eden, they lived in a condition of comparative innocence; and the corruption which has since invaded these preserves that open and simple character proper to people in whom the capacity of discerning good from evil is but imperfectly developed.

A traveller, who possesses the threefold merit of being an elegant writer, a judicious observer, and an accurate narrator, M. Max Radiguet, has embodied in an agreeable volume, entitled "The Last Savages," some lively impressions of a sojourn of several years in the Marquesas, and principally at Noukahiva. It is from his pages that I borrow the following sketch of the islanders of this group.

"If you would wish," he says, "to see the Noukahivian in all his purity, in all his native elegance, it is not among the Teës, it is among the Taïpis, and in the other less frequented islands of the group, that you must seek him.

"Of lofty stature, well-spread shoulders, swelling chest, a shapely figure, the body lightly set upon the haunches, the Noukahivian advances with proud and sometimes arrogant bearing, but always with a confident mien, a free and hardy manner. He seems fitted for the race and the escalade rather than for the struggle. He has more the character of the gymnast than of the athlete. His features are regular and handsome, his nose straight or aquiline, sometimes short or slightly flattened, never ill-shaped. The mouth is neither large nor thick-lipped; the forehead, rather low and somewhat receding, is shaved on the upper portion, whence arises the common saying that the Kanaks have a high forehead.

"We may easily portray the physical form of an inhabitant of the Marquesas; but it is more difficult to define the eccentricities of his fantastic nature. There is much of the child in his disposition; he is as insensible, or nearly so, to the emotions of gratitude, and

has the same irascible caprice. He is nervous, restless, impatient. Superstition is one of his prominent failings. He is hospitable; his first advances are warm, earnest, playful; then, at the least chill, and from motives which a stranger cannot always appreciate, an abrupt revolution takes place, and he becomes wayward and moody.

"The women are of medium stature, their contours frequently

ISLANDERS OF NOUKAHIVA.

modelled with a purity which the sculptor has revealed to us almost alone in France. . . . Few women of fashion are more graceful, if not in their movements, at least in their attitudes; and the women of the neighbouring archipelagoes, the so much eulogized Tahitians,*

* Compare the narratives of the early voyagers, especially those of De Bougainville, Cook, and Wallis.

appear awkward, unwieldy, and sunburnt peasants compared with the exquisitely elegant daughters of Noukahiva.

"The Kanaks talk but little. Frequently they convey their thoughts to one another by a play of the physiognomy which Europeans find it difficult to seize. Seated face to face, the back supported against a stone, the arms crossed beneath the head, they regard each other for whole hours without exchanging a single word. In direct contrast to the negro, they are very sparing both in words and gestures, when even their dearest interests are involved. Slow, indolent, averse to labour, not knowing how to submit themselves to any regular work, they pass the greatest part of their time stretched in the shadow of the trees on their mats, sleeping, singing, or weaving garlands. And yet, though they are sensual, gluttonous, and careless of the morrow, they are gifted with a quick wit, a sound judgment, and a very accurate conception of right and justice."

We do not remark among the numerous tribes scattered over the immense territory of the two American continents, and vaguely comprehended under the denomination of the Red or American race, differences less profound or characteristic than among the different fractions of the Negro or Malayo-Polynesian race. Just as, in speaking of the New World, we formerly made use of the expression "the West Indies," or the "Great Indies," we also call by the term "Indians" all the aboriginal peoples of this portion of the globe, and the use of this term, incorrect as it is, writers as well as readers seem indisposed to surrender. In fact, it possesses the twofold advantage of being short, and of not attributing to the peoples which it designates an unity of origin which is doubtful, or a similitude of colour which does not exist.

"From the North Pole even to Tierra del Fuego," says Maury, "there is scarcely a shade of human colouring which is not manifested, from the black to the yellow. The aborigines, according to their nation, are of a brown-olive, a dark brown, bronze, pale yellow, copper yellow, red, white, brown, &c. Their stature does not vary

less. Between the stature, not gigantic but very tall, of the Patagonians and the dwarf-like proportions of the Changos, we meet with a host of intermediary 'sizes.' The proportions of the body present the same diversity; some peoples have the bust very long, like the tribes of the Pampas; others, short and broad, like the inhabitants of the Peruvian Andes; the same is the case with the shape and

INDIANS OF NORTH AMERICA.—THE RED SKINS.

size of the head. Yet we recognize between the various American populations an air of kinship, certain general features which distinguish them from the races of the Old World. Among these features must be placed, in the front rank, the pyramidal form of the head and the narrowness of the forehead—characteristics of great antiquity among the American populations, since they belong to

skulls discovered by Mr. Lund in the caves of Brazil associated with the bones of extinct animals.

Spite of this diversity of type, we may divide the Indians of America into two races, of which one at least, the Red Skins, is remarkable for its complete homogeneity. The Red Skins were formerly distributed over all the upper portion of the American continent—that is, over the territory of Canada and the United States, and the northern districts of Mexico. In the sixteenth century they numbered a million and a half of souls. They are now reduced to a few thousand families. A few years more, and American rifles, brandy, and poverty, will have completed the extermination of this indomitable race, which has deserved at least the respect and the recognition due to honourable courage of those who have dispossessed them from the immense territories they formerly enjoyed. It is true, however, that we must not take our estimate of the Red Skins from the romantic pages of Chateaubriand or Fenimore Cooper. We must not delude ourselves into a belief that the North American tribes are or were composed of Deerskins, Hawkeyes, and Leather-stockings. Yet we cannot refuse to them a character of real grandeur and true nobility. Their contempt of death and suffering, their stoical composure under the severest tortures, their disdain of civilization, their horror of foreign supremacy, their haughtiness, and even their cold and reflective ferocity, are so many traits which place them, in a moral sense, far above the majority of the other savage races. A hundred times in romance, song, and drama have been described the manners of the Red Skins, their stratagems in war and the chase, the perseverance with which they hunt down their enemy or their prey, their cunning, their impassiveness, their vengeance. Who among us has not eagerly followed them in their long journeys across the rolling savannahs and through the primeval forests? Who has not listened eagerly, when, seated round the watch-fire, with the calumet to their lips, they have deliberated gravely on peace and war? Who has not seen them with alarm dashing to the combat on their nimble chargers, brandishing the tomahawk and scalping their

ered victims, whose scalps they hung up in their wigwams as ies to their prowess? Who has not followed them breathlessly on the trail of a flying foe, or winding serpent-like through the ick brush-wood in escape from some persistent pursuer? Assuredly se men were well worthy of study; and it is impossible to peruse r history or the narrative of their adventures without a breathless rest. There was poetry in their faith, in their customs, in their guage at once laconic and picturesque, and even in the names which they bestowed on each tribe, each chief, each warrior. One can hardly suppress a feeling of regret that so much wild romance should have been swept from the face of the earth, unless we call to mind the shadows of the picture—the Indian's cruelty, perfidiousness, and savage lust. Even then our humanity revolts from the treatment to which he has been subjected by the "white man." Tracked and hunted like wild beasts, driven back from one hunting-ground to another, embruted by misery or drunkenness, incapable of labour, the poor Indians have vainly struggled against the all-devouring influence of a civilization without bowels, ill adapted to attract and persuade them, and far less solicitous to assimilate than to destroy them. The great nations which were formerly the valued allies or dreaded enemies of the European settlers, the Hurons, Algonquins, the Iroquois, the Natchez, the Leni-Lenapes, have entirely disappeared. The wrecks of other but less important nations still exist on the shores of the great northern lakes, in the Far West, at the base of the Rocky Mountains, in California, in Texas, in Arkansas, and in the northern provinces and deserts of Mexico. Such are the Sioux, the Dacotahs, the Flatheads, the Big-Bellies, the Blackfoot, the Apaches, the Comanches. The two latter people have, above all, preserved a certain vitality. Their characteristics, it is said, are very diverse. The Comanches are of a mild, gentle nature, and eager to live on peaceable terms with the Whites. The Apaches, on the contrary, have vowed a relentless hatred against the Pale Faces; they are the terror of the *haciendéros* * and gold-

* *Hacienda*, a farm; *haciendero*, a farm-proprietor.

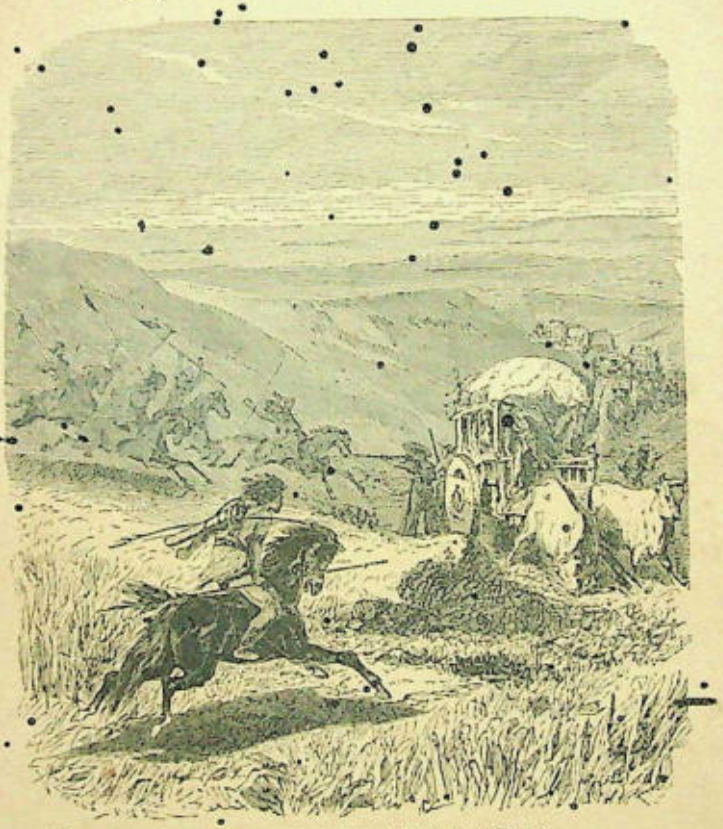
seekers of Upper Mexico, and the American journals frequentl
tain accounts of their incursions, their acts of brigandage, and cr

The most characteristic features of the Red Skin type are, in addition to the colour of the skin and the pyramidal form of t head, the prominency and arched outline of the nose, the greatn of the nasal openings, corresponding to a singular development of

INDIAN WOMEN OF NORTH AMERICA.

olfactory nerve, and the absence of beard. Several tribes subject the head of the new-born to a systematic mis-shapement by compressing it. Hence has arisen the nickname of Flat-heads, popularly bestowed on the Choctaws. The same custom existed among the Atacapas, the Creeks, the Muskogis, and the Catawhas, and is found among most tribes of the Californian stock.

he peoples who have alternately dominated in Mexico and al America, and who are now in great part destroyed—the inequas, the Toltequas, and the Aztecs—are allied to the Red n by their physical peculiarities as well as by their moral charac- stics. The comparatively advanced civilization which the Spanish uerors found established in Mexico had not effaced among the



THE APACHES ATTACKING AN EMIGRANT TRAIN.

Indians the sanguinary instincts and vindictive propensities of their savage ancestors.

The race, or rather races which people South America are very far from offering the same homogeneity as the populations of North America. These races are four in number, each of which may be subdivided into several distinct branches.

The Guarani, or Carib race, formerly occupied the Antilles on the mainland extended as far as Paraguay. It is principally tinguished by the yellow colour of its skin, by the rounded co of its visage, by the flatness of the nose, and the oblique dispositi of the eyes. It comprises three branches: that of the Caribs prope so called, that of the Guaranis, and that of the Botocoudos.

The Caribs, whose name has become in our common parlan

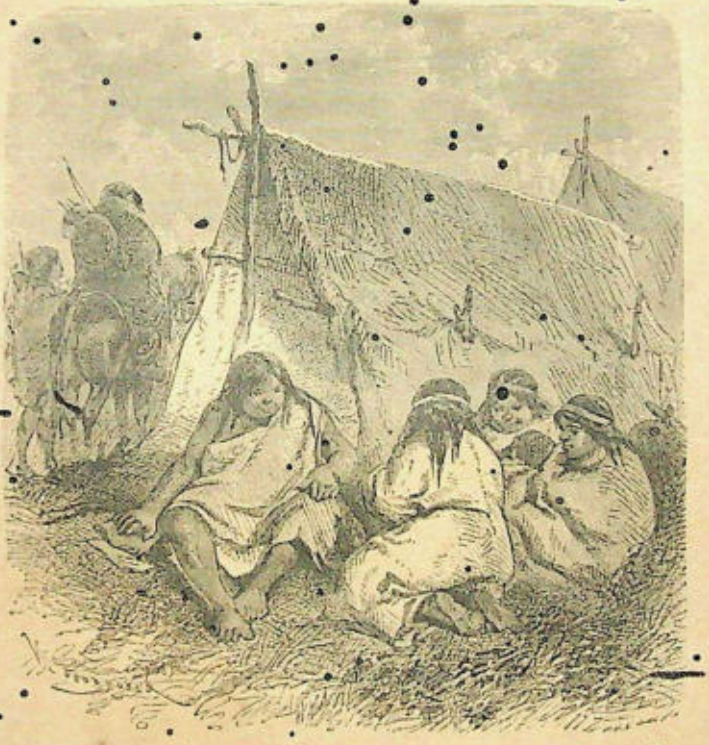
GUARANI INDIANS (SOUTH AMERICA).

synonyme with cannibal, formed at the epoch of the discovery of the New World the anthropophagic population of the islands of the Mexican Gulf. To-day, however, it is completely annihilated; but a few scattered offshoots of the same race inhabit the banks of the Orinoco. The Caribs are tall and robust, and are included among the most ferocious tribes of South America.

The Guaranis, in their physiognomy, the colour of their skin, and

anners, approximate closely to the Red Skins. They show ne love of independence and the same antipathy to the tram- of civilization. They are dispersed in the Brazilian forests, and ncipally in the province of Maranhao or Maragnan.

The Botocoudos are the least intelligent scions of the Brazilo- rani branch. So great is the resemblance between their features those of the Chinese, that Auguste St. Hilaire relates that the



PATAGONIANS.

Botocoudos, having encountered some natives of "the Celestial Empire" in a part of Brazil, joyously saluted them with all kinds of amicable demonstrations, and christened them "their *uncles*."

The Pampas Indians form a mass of tribes dwelling east of the great Cordillera range, from the river Paraguay to the extreme south of the continent. Most of these tribes are nomades; but, thanks to the persevering efforts of the Roman Catholic missionaries, they have

attained a certain degree of civilization. Their type varies ac
to the climate of the country which they inhabit, and accord
their mode of life. In general they have a large head, flat or
top, with small eyes, a big nose, large mouth, and thick lips. Th
are tall in stature, and robust-limbed. To this group belong
Patagonians, who wander, almost constantly on horseback, over
grassy Pampas of the southern extremity of the continent, w
they depasture immense herds of cattle. Former travellers rep
sented the Patagonians as giants upwards of six and seven feet high
and wonderful accounts of them figure in the pages of Drake, Caven-
dish, and the early navigators. But these are violent exaggerations.
The Patagonians are certainly tall and athletic, but their stature
does not exceed that of most Europeans, and assuredly not that of the
corps d'élite of the armies of England, France, Prussia, and Austria.
Their arms and legs are very long. Their forehead is exceedingly
low; the eyes are sunken; the nose, very thin at the root, widens
greatly at the base; the lips are very thick; the complexion is of a
reddish-brown tint. They suffer their long black rough hair to grow
unchecked, and to fall over the face in "admired disorder." Their
manners are fierce, brutal, and intractable. The Chiquitos, who
inhabit a wooded and well-watered country, lead a more sedentary
and social life; they have embraced Christianity, and dwell on
friendly terms with the Whites. The Tohas, nomades like the Pata-
gonians, form a still numerous nation. Their skin is copper-hued,
but they have straight eyes, an aquiline nose, a free and haughty
physiognomy.

The Ando-Peruvian race inhabits the forests which clothe the
plateau on the eastern slope of the Andes. It is characterized by an
olive tint, a medium height, a receding forehead, and horizontal eyes.
The Aymaras and the Quichuas are its principal representatives.
The latter, according to Orbigny, do not the least resemble the Caribs
or the Pampas Indians, and approximate much nearer to the Mexicans.
Their head is large, oblong from front to back; the forehead low and
receding, the face broad, the nose prominent and aquiline, the mouth

the chin small, but not retreating. They had attained, at the of the Spanish invasion, an elevated degree of civilization. support with difficulty the yoke of the stranger, and the melan- ly with which the remembrance of their past greatness inspires —the recollection of their vanished independence—is reflected eir grave physiognomy and the sombre and mistrustful expres- of their gaze.

The fourth South American race may be considered as a more southernly expansion of the preceding. Ethnologists designate it the Araucanian. The region which it occupies stretches from the 30th parallel of south latitude to the vicinity of Tierra del Fuego. The Araucanians properly so called form three tribes—that of the Ranquels, the Huilliches, and the Aucas. They are warriors and nomades. It was in Araucania that a French adventurer, some few years ago, was declared king under the title of Orélie Antoine I. Overthrown and captured by the Chilian Government, with whom he had embroiled himself in hostilities, he succeeded in effecting his escape and returning to Europe, where his adventures became a "nine days' wonder."

To the Araucanian branch belong the Pécherais, an ichthyophagous tribe of Tierra del Fuego.

The natives of these islands, says Admiral Wilkes,* are not more than five feet high, of a light copper colour, which is much concealed by smut and dirt, particularly on their faces, which they mark vertically with charcoal. They have short faces, narrow foreheads, and high cheek-bones. Their eyes are small and usually black, the upper lids in the inner corner overlapping the under one, and bear a strong resemblance to those of the Chinese. The nose is broad and flat, with wide-spread nostrils, mouth large, teeth white, large, and regular. The hair is long, lank, and black, hanging over the face, and is covered with white ashes, which give them a hideous appearance. The whole face is compressed. Their bodies are remarkable from the

* Admiral Wilkes, "Narrative of the U. S. Exploring Expedition."

great development of the chest, shoulders, and vertebral co their arms are long, and out of proportion; their legs small, a made. There is, in fact, little difference between the size o ankle and the leg; and, when standing, the skin at the knee ha in a large loose fold. In some individuals the muscles of the appear almost wanting, and possess very little strength. This of muscular development is owing to their constant sitting pos both in their huts and canoes. Their skin is sensibly colder t ours. It is impossible to fancy anything in human nature mo filthy. They are an ill-shapen and ugly race.

The Pecherais build their huts on the shore of boughs or small trees planted in the earth, their tops woven together, and roofed with grass or bark. Circular in form, they have generally a diameter of seven to eight feet, and measure four or five feet in height, with an oval aperture to serve for an entrance. The fire is built up in a central excavation in the clay floor. The sole, or at all events the principal, food of this people is shell-fish. They strike the fish, or defend themselves, with rudely-fashioned spears and slings. The women generally paddle the canoes.

We also encounter, in the southern provinces of America, in the midst of the copper-coloured races of whom I have already spoken, a group of Indians, almost black, whom Prichard, the illustrious ethnologist, has designated the *Mediterranean*, and whose features recall in a striking manner those of some of the Californian tribes. Is this resemblance a sign of the close relationship existing between two peoples placed, as it were, at the two extremities of the world? We can hardly admit the supposition. It seems more probable that it results from the analogy of the climates, and perhaps still more surely from that of the soils, which appear to exercise a mysterious but a powerful influence upon the modification of species and races.

BOOK V.

THE POLAR DESERTS—THE MOUNTAINS.

CHAPTER I.

THE POLAR DESERTS.

IN countries which enjoy an always elevated temperature, the excess of their fertility is not much more favourable than extreme dryness to the material and moral development of man. There can be no doubt that the exuberant vegetation is a potent cause of the insalubrity of the atmosphere. And thus it comes that civilization, commerce, industry, labour, have only been able to establish themselves and to make any considerable progress in temperate or even cold countries, where man has found a climate more healthy, but at the same time sufficiently unequal, and often sufficiently inclement, to compel him to defend himself by various means against the rigour of the atmosphere, and a soil capable of furnishing him abundantly with the products necessary for his wants, but on the condition that he gains them by intelligent and persistent toil—by the "sweat of his brow."

When we arrive under a latitude or a thermometrical mean which exceeds by some degrees that of England or France, we find the inhabitants giving way to sloth and indolence; their manners are at once softer and yet fiercer, their passions more violent and their tastes more fertile; arts and poesy occupy them to the neglect of the exact

sciences; industry and commerce languish, agriculture is de
But if, on the contrary, we proceed towards the north, we disc
greater degree of civilization, a warmer devotion to labour.
most industrious peoples of the world, the English and the I
inherit a cold, humid, and even foggy atmosphere. In Canad
the northernmost States of the American Union, the Anglo-Saxo
has lost nothing of its laborious habits and its enterprising auda
In Sweden and in Norway, in Russia, even in Siberia, the trav
meets with towns and villages in a flourishing condition up to th
60th parallel of north latitude and beyond, under a climate whose mean *annual* temperature is inferior to the mean *winter* temperature of France, and where the thermometer frequently descends in winter below — 40° R. Thus, then, we see that the warm bland tropical air enervates the mind as well as the body, while the cold of the north seems to increase their energy. It is also true that cold climates, all things considered, are healthier than hot countries, where disease is more rapid and fatal in its inroads; and that, finally, civilization furnishes man with the means of protecting himself against the injurious effects of a very low temperature, while it leaves him without defence against those of excessive heat. We shall see hereafter that the human organism modifies itself, in the Polar regions, in such a manner as to support, without too great suffering, a degree of cold which at the outset it appears to us must be absolutely intolerable.

We may place between the isothermal lines of + 5° and of 0° the limit where commences the territory which, in the northern hemisphere, merits the name of the Region of the Polar Deserts. Already, in effect, under this glacial latitude, the landscape assumes a sombre and desolate aspect, which seems to indicate the propinquity of the "funereal glaciers" of the Pole. The daring traveller who beards the Winter-king in his own realms meets no more with massive and lofty mountain-crests; a few only of the great chains of Europe and Asia —here the Scandinavian Alps, there the Oural Mountains; still further, at the easternmost extremity of Asia, some scattered summits,

we may consider as belonging to the elevation of the Altai, ng even to the Arctic shores their cantled and snow-shrouded

Everywhere, also, immense steppes, intersected by swamps lieved with woods of fir and birch, spread for leagues upon s in the dull light of a wintry sky, until they merge into those nd rocky plains, bare of all vegetation except a few lichens and es, which are almost always encrusted in glittering snow and ice, mingle in the distance with the frost-bound waters of the Arctic a.

It is in America that these icy deserts are most extensive; not only because that continent stretches much nearer the Pole than does the Old World, but because, owing to its geographical disposition and geological structure, it is much more exposed, even towards the south, to that combined action of the atmosphere, land, and water, whose effects constitute the Arctic climate.*

This climate, then, prevails over nearly the whole of Danish America, the recently-acquired possessions of the United States, the Hudson's Bay Territory, and Labrador, down to that inconsiderable watershed which separates from the tributaries of Hudson's Bay, the three basins of the St. Lawrence, the five great lakes, and the Mississippi. This line of watershed undulates between the 52nd and 49th parallel of latitude, from Belle-Isle Strait to the sources of the Saskatchewan, in the Rocky Mountains, where it inflects towards the Pacific Ocean, skirting on the north the basin of the Columbia.

"Thus circumscribed on the side of the south," say Messieurs Hervé and F. de Lanoye,† "the Arctic lands of America, including the archipelagoes of the north and north-east, cannot measure less than 560,000 square leagues. They therefore greatly exceed in superficies the mass of the European lands, estimated at about 490,000 square leagues."

* The isothermal line of 0°, which in Europe scarcely touches the North Cape of Lapland (about 72°), descends in America fully 20 degrees lower, even to the south of James Bay.

† Hervé and Lanoye, "Voyages dans les Glaces du Pôle Arctique," chap. i. (Paris, 1854).

The same authors divide the Arctic lands into three regi which one—they name it "the Province of the North-West"—b rather to those undulating Prairies described in Book III. than Polar Deserts. The two others are the "Middle or Wooded R and the "Barren Landes." The Wooded Region comprehen basins of the Upper Mackenzie, the Churchill, the Nelson, a Severn. Hudson's Bay cuts into it on the east with its deep a tuosities. The navigation of this Mediterranean of the North, to the currents and to the drift of the Polar ices, begins only in t month of June, to close in that of September; yet in this interval the obstruction of the ices is so great that it occupies a stout vessel two months to traverse the diameter of the bay. Along the littoral of this sea the soil never thaws below the surface, and it often freezes on the very surface in the middle of summer.

Like a fierce and despotic tyrant does Winter reign on these shores for from eight to nine months. From the end of September the earth, the rivers which flow into the bay, their affluents, and the chaplet of lakes which connect them with one another, all disappear under a layer of hoar-frost. "The provinces of New Wales and of Maine do not enjoy for a longer period than three months the temperature of + 11° (centigrades), necessary for the development of vegetation. The southern shores of the Great Bear and Slave Lakes possess that temperature for only two months at the most." It is not until the month of May that the thermometer rises ever so little above zero in the Wooded Region, and that a breath of life passes into the plants. Then only the reddish shoots of the willows, the poplar trees, and the birches attire themselves in their long cottony pods; the thickets grow green; the dandelion, the burdock, and the saxifrages flourish at the foot of the rocks; then the sweet-brier, the gooseberry, and the strawberry put forth their fruity burden; and above these dwarf shrubs, the pines, the larches, the thuyas display all the luxury of their sombre verdure. But at the same time the melted snows have transformed the soil, recently so hard and polished like marble, into peaty bogs, where myriads of mosquitoes swarm—an intolerable

THE DESERT OF ICE (ARCTIC POLE).

ge, which the traveller can only escape by surrounding himself louds of smoke.

he commencement of the region of "Barren Landes" is marked ne drawn from the mouth of the Churchill in Hudson's Bay to St. Elias on the Pacific coast, and passing by the southern of the Bear and the Slave Lakes. To the north of this region ses itself in the eternal ices, with the last shores of the Parry ipelago; to the east and to the north-east, the conformity of the l and the identity of the climate include within it the greatest part of Labrador and all Greenland, from which it is only separated accidentally by the breaking up of the ices which constantly solidify Baffin's Bay, and renders so difficult, in those districts, the distinction between land and water. "In these vast countries," say the writers already quoted, "the primitive crust of the globe preserves still the chaotic character which it assumed at the moment that its fluid elements congealed. Except at the bottom of the ravines and hollows, where each winter's thaw has accumulated long tracts of moss and the vegetation of dwarf willows—the embryo vegetation of the Polar clime—the slow action of the ages has nowhere oxidized this rough rude surface to the extent of clothing with a layer of mould its abrupt nakedness. There no transitionary stratum extends between the primeval granite and the erupted rocks. There, prolonged chains of trachyte, and gigantic causeways of basalt, display again their strata as regular, their ridges as keen, their rents as deep, as on the morrow of that day when they emerged from the original chaos. At a great number of points, as at the bottom of Repulse Bay and in the interior of Melville Island, whole skeletons of whales elevated from the depths of ocean, with the submarine layer wherein death had ensepulchred them, have not received in all the ages that have passed by since their exposure to the day any other shroud than the snows of successive winters, which, melting before the suns of successive summers, annually uncovers their whitened bones, irrefragable proofs of a great geological law."

In Asia, the isothermal line of 0° descends even towards the

55th parallel of latitude—that is to say, a little lower tha America; but beyond this line we meet again, as I have alread with towns of some importance, such as Tobolsk, the capit Siberia, in lat. 58° 11′ north; Irkutsk, in lat. 58° 16′ north Iakutsk, in lat. 62°. All this northern part of Siberia is onl tinguished by the greater rigour of its climate, and by a mor more scanty vegetation from the great Steppes, of which it is continuation. However, the north-eastern extremity, comprising peninsula of Kamtschatka, bristles with volcanic mountains whi still exhibit some craters in activity, notably those of Avatcha and Klioutchevskoï, or Klutschew. The latter belches forth its fires from one of the loftiest summits of the globe.

In Continental Europe, the only Polar Lands, properly so called, are Russian Lapland and the deeply-indented coast of Northern Russia. To the north of the most advanced point of that coast, and separated from the continent by a narrow arm of the sea, lie three almost contiguous islands, which form Nova Zembla (lat. 68° 50′ to 76° north); desert islands, inhabited by a few fishermen, and containing a few vegetables and animals. The western side of the group is traversed by a mountain-range 2000 feet in height. Finally, almost in the centre of the Frozen Sea, and at nearly equal distances from the Old and the New World, rises the gloomy archipelago of Spitzbergen (that is, the Peaked Mountains), first visited by Barentz in 1596, and lying between the parallels of 77° and 81°, and the meridians of 10° and 24° east of Greenwich. Their summits, I need hardly tell you, are shrouded in eternal ice and snow, and separated by narrow valleys, or rather ravines, mostly occupied with those slowly-moving ice-rivers called glaciers. The surrounding seas swarm with fish, and the frozen wastes of the islands are haunted by the Arctic fox, the reindeer, and the white bear. The walrus and the seal live upon their shores, which bristle everywhere with lofty granitic rocks, and glaciers that plunge down into the very waters. Their extremities are constantly throwing off huge masses of ice, which float out to sea, and in the shape of icebergs appal an

…n the mariner. Except during a brief interval of summer, the …to Spitzbergen is barred by a formidable barrier of ice, and the …els between the different islands are so blocked up by the same …l, that it was long doubted whether Spitzbergen was not one …sland deeply fissured and intersected by creek and gulf. It is … uninhabited, but the voyager landing at certain points of the …—in Madeleine Bay, for example—treads at every step upon …an bones thickly scattered over the snow, pell-mell with the …ones of bears and seals, and upon the ghastly memorials of empty or half-open coffins. These are the remains, the last relics, of unfortunate seamen slain by cold and hunger in these desolate regions. For want of strength to dig decent graves, on account of the thickness of the ice, the survivors load the coffins with pieces of rock to act as a rampart against the wild beasts. But "the great man in a pelisse," as the Norwegian hunters denominate the white bear, has stout arms, and, impelled by famine, he frequently succeeds in displacing the stones, and making a hideous banquet off the frozen bodies.

The very ocean which washes this gloomy coast shows us the Arctic Desert under a form which is at once more imposing, more majestic, and more terrible. On its surface float vast fields, mountains, and banks of ice, far more formidable to the mariner than the typhoons and cyclones of the Torrid Zone. These floating ice-mountains proceed, as I have said, from the terrestrial glaciers which, in these latitudes, descend to the margin of the sea, frequently project a considerable distance beyond the coast, and, loosened by their own weight or by the incessant clash and collision of the waves, splinter into enormous fragments. Hence it is that their ice, when liquefied, supplies a fresh, sweet, and wholesome water for drinking purposes. Their outlines are of the most fantastic, and often of the most beautiful character; old ruined keeps of Norman castles, long lines of frowning battlements, minarets and domes of Moorish mosques, and the tapering spires, arched roofs, and flying buttresses of mediæval cathedrals. Lit up by the radiance of an Arctic sun, they wear a

most singular and weird beauty, and probably the time may
when the artist will gain that inspiration from their sublim
graceful shapes which he now seeks in the forest, on the sea-sho
in the pine-clad mountain-glen.

Masses of ice rise every year from the bosom, so to speak,
Polar Sea, and accumulating together, and with the ruins o
dissolved icebergs, gradually develop into immense *ice-fields*,
have often an area of several thousand square yards. Their th
ness varies, but is always considerably inferior to that of the iceberg
It is not uncommon, however, for them to attain an elevation of
300 feet, and you can form an idea of their gigantic dimensions by
recollecting that the submerged portion will be from four to eight
times the height of that which rises above the waves. During the
winter, mountains and fields of ice congeal together in such wise as
to spread over the ocean a compact and impenetrable crust, an
immense desert of snow, broken up by walls and columns—I should
rather say, by monuments—of fantastic design, whose radiant glittering
surfaces reflect in changing lights of amethyst, azure, vermilion, gold,
and emerald, the wondrous fires of the northern auroras. When,
after a long absence, the sun returns to dart obliquely his rays upon
the Pole, all this crust splits up and becomes dislocated; the confu-
sion spreads; the ocean currents carry off to sea the blocks and floes
of ice which roll, and glide, and chase, and cross each other, hurtling
together in an indescribable mêlée, and with a fearful tempest of
sounds!

This is not the place to speak of the dangers which beset the
seaman who dares to penetrate into the silent recesses of the Polar
Seas. And, indeed, a tale so often told would have little interest for
the English reader, who cannot fail to be familiar with the adven-
tures of the Arctic explorers, from Hudson to M'Clure, through the
long list of honoured and immortal names—Parry, Ross, Franklin,
Scoresby, Davis, M'Clintock, and Sir Humphrey Gilbert. Too many,
alas! have fallen victims to their heroic courage, and the most fortu-
nate have not returned in safety without accomplishing prodigies of

and energy, without undergoing the severest privations and terrible sufferings.

Their efforts and their sacrifices, let us add, have not been barren. By has the great North-West Passage from the Atlantic to the been finally explored, but the discovery of an open and comely warm sea around the geographical pole of our globe—the very, too, of the magnetic pole, and of the double pole of ought to be ranked with the most brilliant scientific achievements on which our age can pride itself. Thanks to those heroes of science, the Arctic Polar region is now extensively known and very generally surveyed. It is not possible to say so much of the Antarctic Polar region. There the approach is not facilitated by any continent, or, indeed, any fraction of a continent. The "Land of Fire" (*Tierra del Fuego*), which is the nearest point, is not calculated to brighten the hopes of the explorer, and the difficulties and perils which oppose themselves to his southward progress seem insurmountable. Three illustrious travellers—sons of England, France, and America respectively—Sir James Ross, Dumont D'Urville, and Rear-Admiral Charles Wilkes, attempted, however, in the first half of the present century, to penetrate the mystery which enshrouds this extremity of our globe.

After sailing for many days amongst prodigious icebergs, which sometimes threatened to crush his ships, and sometimes to immure them in a gloomy prison, Dumont D'Urville considered himself fortunate in sighting, on the very line of the Antarctic Circle, a range of black rocky cliffs which he named Clarie Coast and Adelie Land. About the same time Rear-Admiral Wilkes discovered, in 67° 4′ south latitude, and 147° 30′ east longitude, a bay which he called the Bay of Disappointment, because he found himself there stopped short by impassable ice, and deceived in his hope of reaching the Austral Continent. The same navigator, in 65° 59′ south latitude, and 105° 18′ east longitude, saw, or thought he saw, an extent of coast which he computed at 65 miles in length and 3000 feet in elevation above the sea-level. This coast appeared to him entirely covered with

snow. Disembarking at the point mentioned, he ascertain presence, under the snow, of clay, red granite, and basalt, sign of stratification. On the beach, frequented by the Ca whale, the seal, and legions of sea-birds, were found n zoophytes and some small crustaceans.

The accuracy of the American navigator's observations ha

ADELIE LAND (ANTARCTIC OCEAN).

however, disputed by geographers, and in 1841 Sir James Ross demonstrated that the threshold of this problematical continent was, at least in certain places, much more distant than Wilkes had supposed. Sir James himself discovered, between 70° and 78° south latitude, an extensive tract of land which he named *South Victoria*

hich extends nearer the South Pole than any other yet known. ores are rendered imposing by a line of lofty and snow-crowned ains, some of which are volcanic. To two of the more majestic the English voyager gave the names of his two ships—Mount and Mount *Terror*. The former is 12,400 feet in height.* James Ross traced the continents of this desolate icy coast even hundred miles, until his progress was arrested by a solid netrable barrier of lofty ice. He reached, however, on another eridian, the latitude of 78° 4′ south, the nearest approach yet made to the Antarctic Pole.

CHAPTER II.

ANIMAL LIFE AND VEGETABLE LIFE IN THE POLAR DESERTS.

THE mantle which Flora has spread over the naked body of this earth is, says Humboldt, unequally woven. Thickest in those places where the sun soars to a great altitude in a cloudless sky, it is of thinner texture towards the poles, where Nature seems benumbed and torpid, where the precipitate return of frost leaves no time for the buds to unfold, and surprises the fruits before they have attained maturity.

The number of plants capable of withstanding the prolonged and terrible Arctic winters, and of contenting themselves with the scanty heat and light which the pale sun of those regions pours upon them during his brief stay above the horizon, is, in effect, very limited. We have seen, in the preceding chapter, how restricted is the flora of that part of the American polar lands which has received the somewhat ambitious appellation of the "Wooded Region." This flora, so poor and stunted, is nevertheless the flora of a comparatively fortunate zone. We find it, with some variations, to the north of

* Sir James C. Ross "Voyages of Discovery and Research" (London, 1847).

Sweden, Russia, and Siberia. There we encounter those u masses of foliage which have any pretensions to the title of For Pines, Firs, Elms, and Birches are the only species which c them. Further north these trees form but small woods, alternati clumps of poplars and dwarf willows. The Myrtle of our sul forests, and a small winding Honeysuckle, with rounded leav and fragrant flowers, cover in certain places considerable su Still further north the arborescent species are completely wan but vivacious plants, belonging to the families of Ranunculaceæ, Sa fragaceæ, Cruciferæ, and Gramineæ, spread out their flowers on the surface of the rocks. To the firs and birches, already so stinted, succeed, in the same localities, a few scattered shrubs; among others, the thorny Gooseberry bush, the common Strawberry, the Raspberry-pseudo-Mulberry (*Rubus Chamæmorus*)—exclusively indigenous to these regions—and the Oleander of Lapland (*Rhododendron Laponicum*). Still advancing northward, we meet, on the extreme confines of the continent, some Dravas (*Cruciferæ*), Potentillas (*Rosaceæ*), Bur-weeds and Rushes (*Cyperaceæ*), and, finally, a few Mosses and Lichens. The commonest mosses are the *Splechnum*, which resemble small umbels; and, in moist localities, the *Sphagnum*, or *Bog-Moss*, whose successive accumulation, from a very remote epoch, has formed, with the detritus of some *Cyperaceæ*, extensive breadths of peat, which might be utilized as a combustible. The lichens and the mosses are the last plants which, owing to the simplicity of their organization, are able to develop and reproduce themselves on the Arctic rocks and under the dense layer of snow which covers them. Their abundance in almost all the polar wastes, where every other nutritious plant is wanting, proves an inestimable benefit for the few inhabitants of those deserts. It will suffice to mention, as representatives of the singular family of Cryptogams, the Iceland Moss, which medical science employs in the treatment of pulmonary diseases; and the Reindeer Moss, whose foliaceous expansions frequently cover vast extents of soil, and form veritable pasture-grounds where the reindeer find almost their only nutriment.

t if the Polar Flora offers few details of interest, it is otherwise he Polar Fauna. The most important orders of the Animal m, and particularly of the class *Mammalia*, are there repre- by species not less worthy of attention than those that people ge countries of the torrid and temperate zones.

mong the *Ruminantia* we may mention the Eland and the of Canada, which range — the former in the Old and New ntinents, the latter in the New World only — to a very high latitude; but, to confine myself to the characteristic species of the Hyperborean Fauna, I shall here speak only of the Musk-Ox and the Reindeer.

The Musk-Ox, or Ovibos (*Ovibos Moschatus*), is, as its zoological name indicates, an intermediate animal between the ox and the sheep. Smaller than the former, larger than the latter, he reminds us equally of both in his form and appearance. He has an obtuse nose; horns broad at the base, covering the forehead and crown of the head, and curving downwards between the eye and ear until about the level of the mouth, where they turn upwards; the tail is short, and almost lost in the thickness of the hair, which is generally of a dark brown, and of two kinds, as with all the animals of Polar regions,—a long hair, which on some parts of the body is thick and curled, and, beneath it, a fine kind of soft, ash-coloured wool; the legs are short and thick, and furnished with narrow hoofs, resembling those of the moose. The female is smaller than the male, and has also smaller horns. Her general colour is black, except that the legs are whitish; and along the back runs an elevated ridge or mane of dusky hair.

The musk-ox, as might be inferred from his name, exhales a strong odour of musk, with which his very flesh is impregnated, and which communicates itself to the knife employed in cutting him up. Not the less is he esteemed a precious prey by the Indians and Eskimos, who hunt him actively. He wanders in small herds over the rocky prairies which stretch to the north of the great lakes of

North America. He is an irascible animal, and will fight desp in defence of the female.

The Reindeer (*Cervus Tarandus*) is about the size of our stag, but of a squatter and less graceful form. He stand four feet six inches high. His head is crowned with rem long and slender horns; and they have branched, recurve round antlers, whose summits are palmated. His colour is above and white beneath; but as the animal advances in age, changes into a grayish-white, and is sometimes almost wholly white. The nether part of the neck droops like a kind of hanging beard. His hoofs are large, long, and black; and so are the secondary hoofs behind. The latter, while the reindeer is running, make by their collision a curious clattering sound, which may be heard at a considerable distance.

This species formerly spread over Europe and Asia to a tolerably low latitude. Cæsar particularizes it among the animals of the Hercynian Forest. Even at the present day troops of wild reindeer traverse the wooded summits of the prolongation of the Ural Mountains. They advance between the Don and the Volga to the 46th parallel of latitude; and they extend their wanderings even to the foot of the Caucasus, on the banks of the Kouma. But their true habitat is that belt of ice and snow bounded by the Arctic polar circle, or, more properly, by the isothermal line of 0° centigrade. "Both the wild and the tame reindeer," says Desmoulins, "change their feeding-grounds with the seasons. In winter they descend into the plains and valleys; in summer they take refuge upon the mountains, where the wild herds gain the loftiest terraces, the more easily to escape the attacks of gadflies and other insect enemies. It is very remarkable that each species of animal has, so to speak, his insect parasite. The œstre so terrifies the reindeer that the mere appearance of one in the air will infuriate a herd of a thousand animals. As it is then the moulting season, these insects deposit their eggs in the skin, where the larvæ lodge

THE REINDEER OF LAPLAND.

and multiply *ad infinitum*, incessantly renewing centres of suppuration."

To the natives of North America, says a zoologist, the reindeer is only known as a beast of chase, but he is a most important one. There is hardly a part of the animal which is not made available to some useful purpose. Clothing made of the skin is, according to Sir John Richardson, so impervious to the cold, that, with the addition of a blanket of the same material, any one so clothed may bivouac on the snow with safety in the most intense cold of an Arctic winter's night. The venison, when in high condition, has several inches of fat on the haunches, and said to equal that of the fallow-deer in our best English parks: the tongue and some of the tripe are reckoned most delicious morsels. Pemmican is formed by pouring one-third part of melted fat over the pounded meat, and incorporating them well together. The Eskimos and Greenlanders consider the stomach or paunch, with its contents, a great delicacy; and Captain Sir James Ross says that these contents form the only vegetable food which the natives of Boothia ever taste.*

The order of *Rodents* has no other representatives in the Arctic Deserts than the Arctic Hare and the Alpine Lagomys. The former is a little larger than our European hare. His abundant fur, gray in summer, grows white in winter, and affords him protection, by a merciful provision of nature, against the carnivorous beasts of prey. It becomes impossible to discern him from the snowy mantle which covers all the earth. He is a native of Labrador and Greenland.

The Lagomys are small animals, scarcely exceeding the Guinea-pig in size, and measuring only nine inches in length. His long head is ornamented with a pair of short, broad, and rounded ears. He inhabits the Altaï Mountains, but extends even into Kamtschatka, seeking an asylum in the wooded tracts among the mossy rocks and flashing waterfalls, lodging in the fissures or burrowing in the most

* Sir J. Richardson, "Fauna Boreali Americana."

sequestered corners. During the autumn he lays up a store of winter provision by collecting the finest grass and moss and herbs. These he dries in the sun, and disposes in small heaps or hayricks, which vary in size according to the number of animals employed, and frequently furnish the sable-hunter with provender for his horse in the hour of direst emergency.

The group of Arctic Carnivora, more numerous than the reader would at the first glance suppose, includes those animals which furnish commerce with the costliest furs.

Except the Fox and the White Bear, of which I shall presently speak, all these Carnivora belong to the family which has for its type the "long-spined animal"—the common European Weasel (*Mustela*)—and which borrows from it its zoological appellation of *Mustelidæ*.

In this family the most remarkable genera are undoubtedly the Martens, the Polecats, the Gluttons, and the Otters.

The Martens of the North are cousins-german of the weasels, so justly feared by our farmers and villagers on account of the extensive depredations which they commit in the poultry-yard. The martens are not less ferocious; but in the fir and birch forests which they inhabit, it is upon the small rodents, the birds, and, when necessity prompts, upon the reptiles, that they exercise their sanguinary tyranny. They scale trees as nimbly as cats; and their flexible body enables them to introduce themselves into the smallest openings, where a cat could not pass, and into the burrows and fissures of the trees or rocks which serve as an asylum for their victims. They are, moreover, very pretty animals, with lively manners, a cunning physiognomy, and a rich furry attire. Besides the ordinary marten, which is found in all the north of Europe, zoologists distinguish in this genus several species exclusively indigenous to the coldest regions of the two continents. The most renowned for the beauty of his coat is the Zibelline, or Sable, which we must look for

in Northern Russia and Siberia. Its hairs, whose general shade is a grayish-brown, possess this singular property, which distinguishes them from every other kind of fur—they have no particular inclination, and consequently may be laid down indifferently in any direction whatever.

The genus Polecat (*Mustela putarius*) comprehends the smallest

Ermine and Sable-Marten.

of all known Carnivora—the Weasel, the Ferret, and the Ermine. The temperate countries of Europe possess one variety of the latter species; but the ermines of the extreme north have a much fuller and softer fur. These animals, like many others, change their garb according to the season. The ermine, which poets have adopted as the emblem of purity, on account of his spotless whiteness, in reality only merits that dangerous honour in the winter; it is

then only that he assumes that immaculate robe which the proudest monarchs are content to wear. In summer its colour is a clear maroon. His tail alone remains at all times of a beautiful shining black.

The Glutton (*Gulo Arcticus*) is a carnivorous quadruped of a very voracious nature, about the size of a large badger, between which and the polecat he appears to form a link. His legs are short and robust; he has a compact body, large head, and unwieldy gait. His ears are small; his tail is short and tufted. His skin is brown on the top of the head and back; a white line extends on each flank, from the shoulder to the root of the tail. The muzzle black; the remainder of the body a deep brown. Like most of the mammals of the Polar region, he has two kinds of hair—the upper long and coarse, the lower soft, fine, and of an uniform brown colour. The glutton owes his name to his extreme voracity. He does not fear to attack animals of the size of the reindeer; he leaps upon them, fastens his claws in them, rends them to pieces, until at length they fall exhausted. After having gorged himself on their flesh and blood, he hides the remainder for another repast.

The genus Otter (*Lutra vulgaris*) comprehends several species, distributed over nearly all the countries of the world. I shall here speak only of the Otter of Kamtschatka, or Sea Otter (*Enhydra lutris*), so named on account of his essentially aquatic habits. He weighs from seventy to eighty pounds. In full season his colour is perfectly black; at other times, of a dark brown. He attains the length of three feet, including his tail; has hind-feet resembling those of a seal; the upper jaw is armed with six, and the lower with four incisors. The grinders are broad, and well adapted for crunching crustaceous animals. He runs with great rapidity, and swims with astonishing ease and swiftness. Of late years, however, he has been the object of so murderous a chase on the part of the Russian and American hunters that he has almost disappeared from the Polar shores. The skins of the sea otter are much prized by the Chinese,

who pay for them from seventy to one hundred roubles a-piece. Very few ever reach the European market.

Among those Carnivora which are able to accommodate themselves to the severest climates, I may mention the Foxes. These animals attire themselves, under the Polar latitudes, in a fur of sufficient thickness to endure the intense cold they are required to support; and this fur is esteemed among the most precious varieties, under the names of Isatis skin, White Fox, Black, Blue, and Tricoloured Fox-skins. The shades vary according to Reynard's habitat, his age, and also the season; they correspond in like manner to the differences of race, but not to the differences of species. The most valuable skins are obtained from those foxes which belong to very cold countries; and it seems that as they recede from a certain latitude, they lose their value. "Some Blue Foxes were killed by our hunters," says Madame Léonie d'Aunet, "which were stunted and ugly. The Spitzbergen foxes do not in any respect resemble the foxes of Iceland or Siberia, whose fur is so beautiful and in such high repute. That they may be thoroughly protected from the cold, they do not wear upon their bodies a fur so much as several thick folds or layers of very thick hair, so intermingled and threaded that it is rather a mattress than a coat of fur. Moreover, instead of being of a somewhat tawny colour, like the Iceland foxes, they are of an ashen-gray. Their skin, nevertheless, is excellently adapted for making carpets."

I see no intermediaries between the small Carnivora we have just passed in review, and the formidable tyrant of the icy Deserts, the Polar or Marine Bear (*Ursus marinus*), popularly known as the White Bear; an improper appellation, as it confounds the Bear of the Arctic Seas with the Albino variety of the Common Bear.

The former constitutes a perfectly distinct species, whose characteristics, apart from the yellowish-white colour of his rich soft fur, are a flattened and elongated head, a long neck, high legs, and feet whose conformation is admirably adapted to the habitat and amphibious existence of the animal. In fact, the sole of each foot is gar-

nished with a thick fleece, which permits the Arctic bear to walk on the ice as on a carpet, and the toes are connected by a membrane which renders them eminently fit for natatory purposes.

The Arctic bear seldom visits the land; his favourite sojourn is the floating ice-field, and his diet the corpses of whales and seals, or even living *Phocæ*, which he fearlessly attacks at the impulse of hunger. "On seeing his intended prey," says Captain Lyon, "he gets quietly into the water, and swims until to leeward of him, from whence, by frequent short dives, he silently makes his approaches, and so arranges his distances that at the last dive he comes to the spot where the seal is lying. If the poor animal attempts to escape by rolling into the water, he falls into the bear's clutches; if, on the contrary, he lies still, his destroyer makes a powerful spring, kills him on the ice, and devours him at leisure."

In cases of urgency the bear does not scruple to make a prey of man, and he is assuredly a formidable antagonist. His dimensions are enormous; he is endowed with prodigious strength. Some individuals have been met with who measured nine to ten feet in length. Their average size is about six feet in length, and about three in height, to the top of the shoulder. Spite of their ferocity, which with them, as with nearly all the Carnivora, is a natural consequence of their appetite, the white bears are sociable in their habits: they frequently wander about in small troops, and those of a family invariably "flock together." The male, the mother, and their young are united by the ties of an affection which is capable of the most intrepid devotion. The female especially watches over her cubs with the most anxious solicitude, and defends them to the last extremity. Of this philoprogenitiveness a voyager relates what seems to me a truly pathetic example:—

A vessel belonging to a small squadron commanded by Captain Philippe was caught in the Polar ice. One morning, the look-out man signalled the approach of three bears, which were advancing rapidly towards the vessel, attracted by the odour of some seal's flesh roasted on the previous evening. The three consisted of a she bear and

her two cubs. The seamen at a suitable moment fired at the latter, and killed them. The mother was also wounded, but not mortally. It was a spectacle which drew tears from the least susceptible to see the marks of sorrow and tenderness lavished by this poor beast upon her young. She carried to them a piece of the flesh which she had taken possession of, and divided it into two portions, which she placed before them. Seeing that they did not eat, she touched them alternately with her fore-paws, and endeavoured to raise them, uttering at the same time the most lamentable groans. Then she withdrew,

The White Bear and her Cubs.

halted a few paces, and summoned her little ones by a low sad cry. As they remained insensible to her appeal, she returned to them, moved them anew, smelt them on every side, dragged them some distance, again returned, still moaning and bewailing, licked their wounds, called them; and finally, when assured that they had ceased to live, and understanding what had transpired, she stood half erect by a great effort, turned towards the ship, and gave vent to a roar of agony and rage, an unmistakable imprecation against her murderers.

The latter replied with a discharge of musketry. The poor bear fell smitten between her two little ones, and died licking their wounds.

Among other Mammiferous animals belonging to the Polar regions, my space only permits me a brief allusion to the Seal and the Walrus. The Seal (*Phoca vitulina*) seems to the eye a compound of the fish and the quadruped; having the tail of the former, the head, spine, and body of the latter. Its physiognomy is remarkable for its peculiarly mild and intelligent expression. Its elongated, conical body tapers from the shoulders to the tail. Its feet are of singular construction. They are covered with a membrane, and so united to the body that they might be mistaken for fins, but for the sharp strong claws that terminate them.

Seals swim with great rapidity, and can remain under water for a considerable period. The species are very numerous. The Greenland or Harp Seal (*Phoca Greenlandica*) measures about six feet in length. The Bearded Seal (*P. barbata*) is from seven to ten feet long. The largest known species is the Elephant Seal or Sea-Elephant (*Macrorhinus proboscideus*), whose girth at the largest part of the body is from fifteen to eighteen feet, and its length from twenty-five to thirty feet. It is a native of the Antarctic Seas. The Sea-Lion (*Platyrhynchus leoninus*), so called from its long full mane, inhabits both the northern and southern coasts of the Pacific. The Sea-Bear (*Arctocephalus ursinus*) derives its name from the fur and shape of the head.

The Walrus or Morse (*Trichecus*) is a genus of the Phocidæ, or Seal family, distinguished by its widely different cranium and teeth. In the adult lower jaw are neither incisors nor canines, while the upper bristles with two enormous tusks, which are directed downwards, and are sometimes two feet long. It chiefly feeds upon molluscs and marine vegetables, and its flesh in its turn affords a dainty repast to the inhabitants of the Polar Deserts.

CHAPTER III.

THE INHABITANTS OF THE ARCTIC WILDERNESSES:—THE LAPLANDERS—SAMOIEDES—OSTIAKS—KAMTSCHATDALES—ESKIMOS, OR ESQUIMAUX.

To the various populations which occupy the Arctic regions of both the Old and the New World, the general appellation of Hyperboreans is sometimes given. Do these populations truly form, as some ethnologists assert, a distinct and homogeneous race; or are they not rather independent offshoots of the Japhetic race in Europe, of the Mongolian in Asia, of the Redskins in America? To this question I can give no satisfactory reply. I will only say that if the different fractions of this great group exhibit among themselves external differences of a very marked character, they are drawn together, on the other hand, by no less striking resemblances. In truth, these resemblances are markedly physiological, and should, I think, be exclusively attributed to the powerful and irresistible action of external agencies. If there be, indeed, one region where the influence of climate on the constitution of man is manifest, that region is assuredly the Polar Zone. There the conditions of life differ wholly from those which prevail in all other parts of the globe, and it necessarily results that modifications take place in the organism of the men subject to those conditions, which ought to be regarded as wholly independent of the origin of races and of their ethnographic characters properly so called.

The Hyperboreans are small, squat, ugly, and deformed. Their legs are short and sufficiently straight, but so thick, says Bory de St. Vincent, that to the spectator they seem swollen and diseased. Their head is generally of large size. They have long, coarse, straight hair, a thin beard, a broad countenance, a great mouth, high cheek-bones, and half-closed eyes, of a light colour, as gray or yellowish, but never

blue. Their complexion is sometimes of a yellowish-white, as with the Laplanders; sometimes of a deep yellow or reddish-brown, as with the Eskimos and the Greenlanders. The latter peculiarity may be invoked as a very plausible argument in support of the opinion which gives to the Arctic peoples different origins. It shows also, once more, that the more or less intense colouring of the skin among the African races is not an effect of the solar heat, as was commonly supposed.

Considered from a physiological point of view, the Hyperboreans are distinguished by a remarkable uniformity of characteristics, which deserve to be specified. The sanguine temperament predominates among them. Their nervous system is but slightly developed, their sensibility blunted, their intelligence slow, their imagination feeble. Their external perspiration is almost null, and they are accustomed to suppress it entirely by anointing their bodies in oily substances. On the other hand, their organs of nutrition and respiration are endowed with an extraordinary activity; and in this lies the secret of the extreme facility with which they support for several successive months the most rigorous cold. We know, indeed, that man and the warm-blooded animals possess, in their respiratory apparatus, a positive internal furnace, where a notable part of the carbon and the hydrogen contained in their venous blood is consumed in contact with the air. But to maintain this furnace at such a degree of heat as shall always preserve the temperature of the body at its normal standard (39° C.), the inhabitants of Arctic climes need constantly feed it with fuel, that is, with substances rich in carbon and hydrogen. Hence the keen appetite of the Hyperboreans for oil, fat, and flesh; hence, too, their voracity. The inhabitants of torrid or temperate regions, while sojourning among the icy wastes of the Pole, quickly become sensible of the same necessity, and eagerly feed upon aliments which elsewhere would inspire them with insurmountable disgust.

It is a remarkable fact that most of the diseases so frequent and so murderous in civilized countries are unknown in the Polar lands. But, on the other hand, ophthalmia is endemic, and the cutaneous

affections, as well as cerebral and pulmonary congestion, are of common occurrence. To sum up: the already scattered and scanty population of the Arctic Zone is daily decreasing, and will probably be extinct in a few generations.

The manners of all the Hyperboreans present the same general features: they are peaceable, inoffensive, and reduced, if I may use the expression, to the utmost possible minimum of physical and intellectual activity. This race, or group of races, is represented on the two continents by several distinct peoples. Those most clearly defined are:—

In Europe, the Laplanders (or Lapps), and the Samoiedes;
In Asia, the Ostiaks, Yakouts, and Kamtschatdales; and,
In North America, the Eskimos (or Esquimaux).

The Laplanders inhabit the northernmost coasts of the Scandinavian peninsula. They are ignorant, uncultivated, and *torpid*, rather than savage. In spite of their frequent contact with the Russians and the Swedes, they have no industrial resources, no art, no other commerce than that which is afforded by the products of the chase, of their fisheries, or their herds of reindeer. Christianity, to which they were converted about two centuries ago, has not aroused them as yet from their moral and intellectual lethargy. All religion being reduced, so far as they are concerned, to oral tradition, the devotion of each is in proportion to his memory. Education among them has attained to this standard, that a Laplander who knows his alphabet corresponds to a young man among us who has graduated at Oxford or Cambridge.

A French traveller, M. de Saint-Blaize, furnishes some details respecting this people:—

"The race of Laplanders is constantly diminishing in numbers. It is of Asiatic origin, as may be clearly discerned in their language and the type of their physiognomy. Some are fishers, and dwell upon the coast; others are shepherds, who traverse the mountains in every direction, pasturing their reindeer on the white moss. During

the three months' summer the Laplander leads his herd into the elevated regions, to withdraw them from the excessive heats and the mosquito-plagues: in winter, he brings them near the dwellings of men, principally for the sake of protecting them more effectually from his bitter enemies, the wolves, of whom he never speaks but with a sentiment of profound hatred. The Laplander's wealth is his herd,

Lapland Fishers.

which feeds him, clothes him, and procures him, by way of barter, brandy and tobacco, the only objects of his desire.

"The independent life of this nomadic people is not without its charm. Accustomed from his infancy to privations and fatigues of every kind, the Laplander suffers little. His body acquires an extraordinary vigour, and most of our maladies are unknown to him.

If, during a journey a Lapland woman gives birth to a child, she places the new-born in a piece of hollow wood, where a hole has been cut out to receive the little one's head; then slings this cradle on her back, and resumes her journey. When she halts, she suspends her wooden chrysalid to a tree, and the wire-work protects it from the teeth of ferocious beasts. The reverse of this simple medal is an old age almost inevitably very unhappy. It is said that when a Laplander has no longer the strength to render himself useful, his children abandon him by the roadside, with just provisions enough to support him for a few days. The traveller frequently encounters in the forest the skeletons of old men who have thus perished in gloomy solitude."

The cradle to which our authority refers is described by Professor Forbes as cut out of solid wood and covered with leather, in flaps so arranged as to lace across the top with leathern thongs; the inside and the little pillow are rendered tolerably soft with reindeer moss, and the infant fits the space so exactly, that it can neither stir hand nor foot.

The Lapp hut, says Professor Forbes,* is formed interiorly of wood, by means of curved ribs uniting near the centre in a ring, which is open, and allows free escape for the smoke; the fire being lighted in the centre of the floor. The exterior is covered with turf. The door is of wood on one side. The inmates recline on skins on the floor, with their feet towards the fire; and behind them, on a row of stones near the wall of the hut, are their various utensils. Their clothing—chiefly of tanned skins and woollen stuffs—looked very dirty.

The Samoiedes (or Samoyedes) are scattered to the number of about a thousand families, along the coasts of the Frozen Sea, in the government of Archangel, and, in Siberia, in the governments of Tobolsk and Tomsk. Ethnologists generally consider them to have a common origin with the Finns of Europe. In stature they are

* Professor Forbes, "Norway and its Glaciers" (Edinburgh, 1853).

somewhat taller than the Lapps, and their colour is more of a tawny. The marked features of their countenance recall the Hindu type. The forehead is high, the hair black, the nose long, the mouth well-formed; but the sunken eye, veiled by a heavy lid, expresses a cruel and perfidious nature. The manners of the Samoiedes are brutal. In character they are wily, fierce, and cunning. They are shepherds,

A Samoiede Family.

hunters, traders, and, when opportunity serves, robbers. They clothe themselves in reindeer-skins, like the other Hyperboreans of the old continent. They shave off their hair, except a tolerably large tuft which they allow to flourish on the top of the head, and they pluck out the beard as fast as it grows. The women adorn themselves with a belt of gilded copper, and with a profusion of ornaments in glass

beads and metal. They are heathens, worshipping the sun and moon, the water and the trees; in fact, whatever object meets their eyes they convert into a deity; and, above all, they adore the bear, offering prayers and sacrifices to him before venturing on an expedition to hunt him down!

The Ostiaks and the Yakouts are established in the northernmost districts of Siberia, from the Oural Mountains to Kamtschatka. I borrow from a Polish lady, Madame Felinska, long exiled in Siberia, some curious details relative to the Ostiaks, whom, during her banishment, she had numerous opportunities of studying. Seeking one day a pathway through a wood, she encountered a couple of Ostiaks on the point of performing their religious duties. These consist in placing themselves before a tree—a larch in preference—in the wildest and densest part of the forest, and there executing a series of epileptic contortions. Such pagan demonstrations are forbidden them, says Madame Felinska; but, despite the Christianity which they have professed to accept, they are and will remain pagans.

Nearly every Ostiak carries about his person a rude image of the divinities which he adores under the name of *Schaïtan;* but this does not prevent him from wearing on his breast a small copper crucifix. The Schaïtan represents the human figure, carved in wood, or, rather, cut out of a small fragment of wood. It is of different sizes, according to the price and the various uses for which it is intended: if for carrying on the person, it is small; images for decorating the hut are much larger; but in every case the god is clothed in seven pearl-embroidered chemises, and suspended to the neck by a chaplet of silver coins. The wooden deity occupies the place of honour in the huts and cottages, and before commencing a repast, they take care to offer him the daintiest morsel, smearing his lips with fish or raw game; when this sacred duty is performed, they eat in contentment.

The priests of the Ostiaks are called *Scha-mans;* they enjoy immense influence, which they employ in furtherance of the basest superstition and in promotion of their own personal interest. Ambi-

tion and egotism dispense with knowledge and science in order to corrupt mankind.

The Ostiaks and the Samoiedes are great hunters of the white bear. It is the same with the Yakouts, a people dwelling near the Bouriats, and approaching, like them, to the Mongol type. It seems that the object of the chase is not always to kill the animal, but to catch him alive. Madame Felinska relates that she saw one day a considerable

Yakout Hunter Worried by a White Bear.

troop of bears conducted to Bérézov like a herd of tame cattle, and apparently quite as inoffensive. She neglects to inform us, however, by what means they had been reduced to this state of passive obedience. The Ostiaks and the Yakouts frequently attack the white bears body to body, without any other weapon than a hatchet or a long cutlass. They need to strike the animal with extreme skill and vigour, to slay him at the first blow, or otherwise they incur extreme peril. If he

misses his stroke, the hunter's only resource is to fling himself on the ground and lie motionless, until the bear, while smelling his body and turning him over, incautiously offers himself again to his attack.

The Yakouts are nearly of average height. They are robust and brave, honest and hospitable, but addicted to idolatry and polygamy.

KAMTSCHATDALES.

The Kamtschatdales are smaller and shorter than the Yakouts. They have a round flat face, a broad depressed nose, and prominent cheek-bones. They are of a friendly, mild, and peaceable character. They have a strong partiality for the song and the dance, and their amusements frequently degenerate into orgies. Small-pox and excessive brandy-drinking have reduced to a few hundred families a population which numbered, a century ago, fully 15,000 souls.

One sole population inhabits the immense icy plains which extend into America even beyond the Polar circle. I refer to the Eskimos, who are found—encamped in summer under tents made of reindeer or seal-skin, hidden in winter in their snow-huts—from Behring's Strait even to Cape Farewell. This race has the reddish-brown tint of the North American Indians. In its small stature and physical forms it does not differ from other Hyperboreans; but in physiognomy and the flattened skull it singularly recalls the men of lofty stature who inhabit the other extremity of the American continent, the Patagonians. The physiognomy, the character, and the manners of the Eskimos have been frequently described. The courageous navigators who have explored the Polar Sea in quest of a North-west Passage have held frequent intercourse with these poor people, and all agree in eulogizing their gentleness, their patriarchal life, their eagerness to succour strangers. An American, Captain Hall, the last adventurer who has set himself the task of discovering the wrecks of Franklin's ill-fated expedition, spent a whole year in the midst of the Eskimos, whose amiability and generosity he praises in no stinted terms. Exclusively hunters and fishers, the Eskimos have no other domestic animal than the dog; they harness it to their sledges, and also train it to chase the seal, the walrus, and the reindeer. It is in the summer only that they hunt the latter animal. In that genial season there is no lack of other game, terrestrial and marine. It is for them a season of abundance, wherein they gorge themselves with flesh, blood, and fat. During the winter they often fast several days at a time, and remain immured in their huts like hybernating animals; but at length, driven by famine and by want of oil, they go forth upon the ice in search of the seals which come up to breathe. When they have been fortunate enough to kill one, they divide it amongst them amicably, and regale themselves upon it until only the bones remain, after which they endure a new period of privation. Thus they live from day to day, in continual alternations of gluttony and abstinence, without injury to their health, and without shortening their lives. And it is worthy of notice that Europeans who once

consent to adopt this regime—to drink the warm blood and eat the raw flesh and fat of seals—soon accept of it without the slightest repugnance, and become capable of enduring, like true Hyperboreans, the terrible cold of the long Polar winters.

The inhabitants of Sagalien, one of the northerly Asiatic islands, are a race called the Ainos, the same people who form the aboriginal population of Jesso, and some tribes of whom also dwell on the opposite shores of Manchooria. They are uncultured and pagan savages, who dwell in huts built of rough logs, and live upon the proceeds of their fishery and the chase. Their women are ugly and little; the men are tall, lithe, straight, and strong, with flowing hair and unkempt beard and moustaches. Like the Samoiedes they worship the bear; feasting the living animals on the choicest dried fish, and planting young pines round the cages in which they are kept. Their graves they regard with similar feelings of veneration.

The other Hyperborean races do not widely differ in character and physical appearance from those already described.

CHAPTER IV.

THE MOUNTAINS.

"Blue, and baseless, and beautiful,
Did the boundless mountains bear
Their folded shadows into the golden air.
The comfortlessness of their chasms was filled
Of orient cloud and undulating mist,
Which, when their silver cataracts hissed,
Quivered with panting colour."

RUSKIN.

FROM the Polar deserts to the icy crests of the mountains the transition is natural. There are here, so to speak, two varieties of a single class

of deserts, which we might call the Deserts of Cold, since the coldness of the climate is the dominant cause which in both renders the soil more and more unproductive and uninhabitable. In effect, it is not only in departing from the Tropic Zone that we see the mean temperature gradually sinking even to the point whereat all liquids congeal and all terrestrial life becomes impossible. The same phenomenon occurs in proportion as we ascend in the atmosphere. It is a consequence of the properties of the gaseous medium which envelops our globe, and takes place in obedience to certain laws which science has been able to ascertain and define. We know now that the decline of the temperature is always in proportion to the elevation of places or of the atmospheric strata; but the value of the relation which exists between the two terms may be modified by various circumstances—such as the direction of the prevailing wind, the hygrometrical state of the atmosphere, the hour of the day, and particularly the climate, or, to speak more exactly, the thermic latitude. The warmer the climate, the more sensible the difference between the temperature of the air at the level of the sea and that which we observe at a certain height; greater, nevertheless, is the height to which we must rise to find the region where the thermometer never descends below 0°, and where, consequently, the snows and ices of the mountains do not melt in any season.

As a mean, we estimate every 580 feet of elevation in the Torrid Zone as equal to one thermometrical degree, and in the Temperate Zone at one degree for every 450 feet, the cooling of the air. That is, for every 580 feet in the one instance, and every 450 feet in the other, as we ascend above the sea's level, the temperature decreases one degree. In the Polar regions the decrease of temperature is insensible up to a certain height, which has not yet been ascertained. At Ingloolich, in 69° 21′ north latitude, Captain Parry flew a kite to a height of 490 feet, with an *à minima* thermometer attached. At this elevation the temperature of the air was 31° below zero, or the same as on the ice-fields of the sea. Humboldt counted one degree of declination for every 550 feet on Chimborazo. De Saussure obtained one degree for every 440 feet on Mont Blanc.

The limit of eternal snows, or perpetual snow-line, which at the Pole sinks to the very level of ocean, rises higher and higher as it approaches the lower latitudes, and attains its maximum elevation towards the Equinoctial Line. It follows, that in the countries bordering on the Arctic Circle, mountains of very moderate altitude show themselves all through the year in a shroud of radiant snow; while, under the Tropics, if we would meet with masses of eternal ice, we must mount to a height of 13,500 feet and more. The limit of the permanent snows is, however, affected by a variety of local circumstances, such as the neighbourhood of great seas or forests. The subjoined table, therefore, which shows the height of the curve of congelation in different latitudes, is founded upon the known law of the decrease of heat by elevation, and must be regarded rather as approximatively correct than strictly accurate.

TABLE OF SNOW-LINE.

LATITUDE.	MEAN TEMPERATURE AT THE LEVEL OF THE SEA.		HEIGHT OF THE SNOW-LINE.
	Degrees Centigrade.	Degrees Fahrenheit.	Feet.
°			
0	29·00	84·2	15,207
1	28·89	84·2	15,203
2	28·90	84·1	15,189
4	28·86	83·9	15,135
5	28·78	83·8	15,095
6	28·68	83·6	15,047
7	28·57	83·4	14,989
8	28·44	83·2	14,923
9	28·29	82·9	14,848
10	28·13	82·6	14,764
15	27·06	80·7	14,220
20	25·61	78·1	13,478
25	23·82	74·9	12,557
30	21·75	71·1	11,484
35	19·46	67·0	10,287
40	17·02	62·6	9,001
45	14·50	58·1	7,671
50	11·98	53·6	6,334

LATITUDE.	MEAN TEMPERATURE AT THE LEVEL OF THE SEA.		HEIGHT OF THE SNOW-LINE.
	Degrees Centigrade.	Degrees Fahrenheit.	Feet.
51½°	11·24	52·3	5,950
54	10·02	50·0	5,290
55	9·54	49·2	5,034
56	9·07	48·3	4,782
57	8·60	47·5	4,534
58	8·14	46·6	4,291
60	7·25	45·0	3,818
65	5·18	41·3	2,722
70	3·39	38·1	1,778
75	1·94	35·5	1,016
80	·87	33·6	457
85	·22	32·4	117
86	·14	32·3	76
87	·08	32·2	44
88	·04	32·1	20
89	·01	32·0	5
90	·00	32·0	0

That the foregoing table needs considerable modification in particular localities is evident from the following facts:—In the Scandinavian Alps, lat. 65° north, the snow-line occurs at an elevation of 5200 feet, instead of 2722; in the Alps of Savoy, lat. 45° north, it

* 51° 30′ north latitude, the parallel of London.

is found at 7650 feet, which is nearly that of the table. On the southern slope of the Himalayas the traveller ascends to an elevation of upwards of 15,000 feet before he enters the realms of snow and ice, and on the northern slope to 12,750 feet. Finally, in the Andes of Bolivia, according to Pentland, the curve of congelation lies between 14,400 and 14,800 feet.

Thus, then, in the arid Torrid Zone, we must accomplish a weary ascent of 13,000 to 15,000 feet before we can find ourselves transported from the calcined plains whose sands scorch and blister our feet, or the dense forests whose innermost depths teem with the most exuberant and beautiful floral life, to the heart of icy deserts and the sublime silence of the mountains. And in passing from one to the other of these extremes, we traverse in a few hours all the climates which succeed one another from the Equator to the Pole. Nevertheless, I must point out an important difference between the Polar deserts and the snowy regions of the mountains, which is wholly to the advantage of the former.

I have already shown that, under the highest latitudes, men find in the exceptional activity of their functions of nutrition, and, above all, of respiration, a powerful re-agent against the intensity of the external cold. This resource fails him on the mountain summit. In vain will he attempt, as a succedaneum against the cold, to modify his ordinary regimen, to drink warm blood, to eat fat and raw flesh; his stomach will reject such aliment, or digest it only with difficulty, and he will not suffer less from the extreme rigour of the temperature. At the Pole air pours freely into our lungs, and its pressure stoutly maintains the equilibrium of the fluids of our body. Such is not the case when we soar, Icarus like, into the higher regions of the atmosphere; in proportion as we ascend, the air rarefies, and its pressure diminishes. Consequently, respiration becomes difficult and painful; the quantity of oxygen designed to cherish animal heat by the combustion of the carbon and hydrogen of the blood becomes insufficient; at the same time, the tissues and the liquids which they enclose expand; perspiration, instead of diminishing, experiences a

relative augmentation; if the atmospheric pressure is much too weak, the blood-extravasates, and forces itself out through the nose, the ears, and the pores of the skin. In a word, that peculiar malady which has been named the *mal des montagnes*, and which is not always unattended with danger, attacks the hardiest travellers, and compels him with all speed to return to lower and securer levels.

When, therefore, we speak of "the pure and living air" of the mountains, of the vigour and health of their inhabitants—even as the poet says—

"An iron race the mountain-cliffs maintain"—

we are really to understand those lofty hills which are decorated in some places with the name of mountains, or the table-lands that form the first steps of the great chains. Such, indeed, are the only inhabited and inhabitable mountains. There only is the cultivation of a few plants still possible; there only can the wild beasts find an asylum in wood or forest, and the cattle green fields of pasture; there may man plant his feet, build his dwellings, devote himself to rearing his herds, to the chase, or to more sedentary industries. Let us remember, moreover, that the salubrity of the air of elevated districts has been greatly exaggerated, and that if we meet with many mountaineers agile, robust, and intelligent, we also meet with a great number affected by organic diseases either wholly unknown or very rare in the plains, such as goitre, scrofula, and cretinism.

The structure of the mountains, their form, and the nature of their soil, suffice, even without these meteorological conditions I have just indicated, to render them impracticable as the dwelling-place of man and of most animals. To ascend them is almost always an enterprise of the most hazardous, frequently of the most perilous character. To climb the lofty peaks of the Himalaya, to scale the majestic brow of Chimborazo, to ascend the frozen sides of the Jungfrau or Mont Blanc, is an achievement of which the boldest boast, as if they had won a Waterloo or an Inkermann! Only a keen longing after that notoriety which for some minds fills the place of renown,

or a passion for dangerous enterprise such as stimulates the pioneer or the explorer, or a powerful scientific and artistic interest, can impel the Alpine adventurer—can instigate a Saussure, a Forbes, a Pentland, or a Tyndall, to mount the scarped ramparts of primeval rocks, to tread warily along precipices which the chamois can scarcely traverse, to escalade the savage cliffs and frozen pinnacles, and to breathe

"The difficult air of the iced mountain-tops."

The annals of mountaineering are illuminated with many stirring stories of human endurance, patience, and heroism; but, alas! the page is too often robed in black, and too frequently records the death of some unhappy explorer.

It is no part of my plan to trace the geological history of mountains. We know that their formation has been attributed, according to a satisfactory theory, to the upheavals and expansions of the igneous matter which, in the primitive ages, boiled under the solid crust produced by the superficial solidification of our planet, and whose ebullition, though considerably decreased, even in our own days is frequently made known in volcanic phenomena and earthquakes. At divers epochs the crust of the globe will have been rent and dislocated, giving vent to floods of fused mineral matter; these, solidifying in their turn, will have produced those inequalities of the earth's surface which we call mountains; enormous inequalities, as they appear to us; mole-hills or grains of sand if we compare them with the volume of the terrestrial sphere.

The distribution of the mountains over the surface of the continents and islands, and the forms which they have assumed, seem, at the first glance, altogether capricious and irregular. Yet an attentive study speedily demonstrates that some higher law than that of chance presided at the violent and tumultuous production of these majestic masses. Thus, in the first place, it is evident that every mountain not a volcano connects itself of necessity to other mountains, and forms a *chain* of greater or less length, which departs a little from the straight line, or rather from the arc of the great circle.

The principal chains throw out branches, and by *mountain knots*, as they are called, unite with other secondary chains—the whole composing a *mountain system*; but the apparent irregularities of these systems may always be referred to one common direction.

If from the disposition of mountains we pass to their distribution, we perceive that all chains which have sprung from the same geological convulsion are always distinctly parallel, and the successive chains distinctly perpendicular among themselves; so that the age of a chain is known by its direction. Nor is there anything to astonish us in this species of symmetry, when we recollect that every substance previously liquefied or diluted by heat, and which, while cooling, becomes contracted by the closer compression of its atoms, splits with a certain degree of regularity, generally following lines which intersect each other at right angles. And it is through the crevices of the cooled terrestrial crust that these fused matters have escaped, according to the hypothesis generally admitted by geologists, which, by solidifying in their turn, have created the mountains. I can only indicate these considerations to the reader; their development would beguile us too far from our prescribed path.

If we direct our attention now to the configuration of mountains, we shall see that this configuration depends essentially on the nature of the rocks which constitute them. Granite, for example, is one of those which offers the most varied outlines, as the reader may see without quitting the United Kingdom, in the rugged, fantastic, broken masses of the Argyllshire Highlands, that hem in the waters of Loch Goil and Loch Long. Granite abounds in the tropical zone, and seems to prefer chains of moderate elevation. Granite heights are generally distinguished by abrupt and polished flanks, pointed or dentelated summits, scarped approaches, deeply fissured slopes, and narrow, wild, and profound valleys.

Gneiss, a felspathic and micaceous rock, of schistous structure, is found in layers sometimes horizontal or gently inclined, sometimes undulating and complicated towards the border. The contours of the gneiss mountains are less cloven than those of mountains of

granite; but numerous fissures and indentations are still discoverable.

Porphyry generally occurs in isolated peaks, with almost vertical flanks; seldom in continuous chains. Porphyritic mountains, says M. Maury, imprint on the landscape a peculiarly picturesque character. This rock sometimes appears under the form of tall pillars set in close

The Organ Mountains of Rio Janeiro.

juxtaposition—it is then known as *columnar porphyry;* and to groups of these columns have been given in some countries the name of *Orgues* or *Organs*, on account of their resemblance to the organ pipes which discourse solemn music in our cathedrals.

Thus: in Mexico two mountains occur distinguished by this ap-

pellation, *Los Organos*; one is that of Mamanchota, situated to the north of the Indian village of Actapan. The portion soaring out of the rock, says Humboldt, is three hundred feet in height; but the absolute elevation of the summit of the mountain, at the point where the Organos begin to shoot aloft, is 1385 toises (about 5310 feet). The other is the Jacal, which is nearly 9600 feet above the sea-level, and crowned with forests of pine and cedar.

But the most celebrated Organ Mountains are those which rear their glittering shafts at the extremity of the bay of Rio Janiero. "It is not only the aspect of these pointed summits," says Dr. Yvan, "that reminds the spectator of the sublime instrument of our churches; the strange sounds which escape from between these cylinders of rock render the analogy still more striking, and complete the illusion. The voice of the tempest, the lamentations of the forests bowed by the passing winds, the doleful wails of the jaguars, the cries of the howling monkeys passing between these sonorous peaks, produce a harmony before which all human instrumentation loses its grandeur. We feel that it is the universal soul which inspires the chords of the majestic keys. The *Serra dos Organos* is clothed in virgin forest over three-fourths of its extent; it is only at long intervals, and in obscure valleys, that we encounter any traces of human industry, or that we traverse some circular treeless hollows, in which an abundant herbage flourishes, and feeds the troops of horses and oxen enclosed in these natural parks."

The *Organ Mountains* of Epailly (in the department of the Haute Loire, in France) and of Bart (in the Corrèze), and the *Colonnades* of Chenavari (in the Ardèche), belong to the basaltic formation, rendered so remarkable by its frequent arrangement in prismatic columns of extreme regularity. Basalt also gives birth to chains which resemble vast walls, and sometimes appears in the form of pyramids, plateaux, or simple chamelons.

Of the columnar arrangement the Palisades, on the banks of the river Hudson, may be particularized as a noble example; but a still grander spectacle is presented on the river Columbia, west of the

Rocky Mountains, where the waters pour through a valley walled on either side with tier upon tier of pillars, to the height of fully a thousand feet.

The Trachytes, massive rocks of excessive roughness, occasionally appear in the shape of cones, at times in that of domes or enormous balloons, and at times as cupolas with spire-like points, like minarets. The chalks, the sandstones, the diorites, have all their characteristic aspect, and give to the mountains where they dominate, and to the landscapes which surround them, an easily recognizable physiognomy. And, finally, everybody knows the particular configuration affected by the volcanic mountains.

The great mountain-chains are unequally distributed in different parts of the world, and their disposition varies in a remarkable manner in the two great continents. For the most part it agrees with the direction of the principal land masses in each. Thus, in the Old World, the chief ranges assume an easterly and westerly course, following the parallels of latitude; in the New, a northerly and southerly direction, like that of the meridians of longitude.

In Europe, the mountains are numerous, but generally of very moderate elevation. In the north, we find the *Scandinavian Alps*, covering nearly the whole of Norway and some part of Sweden. From the Naze, or Cape Lindesnaes, they roll far away, like foam-crested billows, to the very shore of the Frozen Sea. The central and highest part of the mass, between latitude 62° and 63°, is called the Dover-feld; the more northerly portion, the Koelin Mountains; the more southerly, Lang-feld and Hardanger-feld. Their summits are comparatively flat,—felds, or fields, as the name indicates; on the eastern side they slope gradually to the plains bordering the Gulf of Bothnia, their sides clothed with dense forests of pine and fir; on the west they rise abruptly from the margin of the ocean, and their steep, barren, and swampy flanks are broken up by numerous inlets, or *fiords*, where the waters lie cradled in gloom and desolation. Their highest point is now known to be Skags-tölstind, in the Lang-feld range, upwards of 8000 feet. All the loftier summits rise above the snow-

line, and wear night and day, winter and summer, a shroud of frost and snow. The glaciers are often of great magnificence, and equal, if they do not transcend in sublimity, those of the Alps of Switzerland and Savoy.

The *Mountains of Scotland* seldom exceed 3500 feet in height; the principal summits, however, Ben Mac-Dhui, and Ben Nevis, are respectively, 4390 and 4368 feet. Ben Lawers, on the west side of Loch Tay, reaches 3984 feet; Ben More, in the south-west of Perthshire, 3818 feet; and Schehallion, 3514 feet. Ben Lomond, east of the famous lake of that name, has an altitude of 3191 feet. The characteristics of the Scotch mountains are their barren sides, only relieved by patches of purple heather; their originally fantastic and broken outlines; their deep, narrow, savage glens, which are often of the gloomiest and most desolate aspect; and their still deep tarns, or lakes, mirroring each lofty height in their clear and glassy surface.

The most important of the European systems is that of the *Alps*, whose majestic and glorious landscapes have been for ages the admiration of the poet and the artist. They begin, on the west, near the head of the Gulf of Savoy; sweep round the upper portion of Italy, as if to shut out that historic peninsula from the European mainland; bend to the south-east to approach the Adriatic; and throw out a spur, or prolongation, along the eastern shore of that sea, and parallel with it. That portion of the system which borders the Mediterranean is distinguished as the Maritime Alps; between Italy on the one side, and France and Savoy on the other, lie the Cottian and Graian Alps; from Mont Blanc to Monte Rosa stretch the Pennine Alps; further to the eastward extend the Lepontine, Rhetian, and Noric Alps; and south-easterly, the Carnic, the Julian, and the Dinaric Alps. The Bernese Alps form the northern barrier of the Valley of the Rhone; their direction is parallel to that of the Pennine.*

* Compare Malte Brun, ed. by Lavallée, "Géographie Universelle;" Mrs. Somerville, "Physical Geography;" and Sir J. Herschel, "Physical Geography" (Encycl. Britt., 9th edit.)

The principal Alpine summits are:—Mont Blanc, the "monarch of mountains," 15,780 feet; Monte Rosa, 15,150 feet; Finster-Aarhorn, 14,109; the Jungfrau, 13,716; and the Ortler Spits, 12,852 feet. The scenery of the Alps is always of the grandest character; its more remarkable features being its huge glaciers, or ice-rivers, with their brilliant and ever-changing hues.

"Motionless torrents! silent cataracts!
Who made you glorious as the gates of heaven
Beneath the keen full moon? Who bade the sun
Clothe you with rainbows? Who, with living flowers
Of loveliest blue, spread garlands at your feet."*

It is supposed that there are at least four hundred of the great glaciers, varying from three to thirty miles in length, from a hundred to six or seven hundred feet in thickness, and from a few yards to a couple of miles in breadth. The total superficial area of the glaciers in Switzerland, Savoy, Piedmont, and the Tyrol, has been estimated at 1400 square miles.

The *Apennines* must be considered a subsidiary portion of the Alps, rather than as an independent system. They branch off from the Maritime Alps, and traverse the entire length of Italy. Several peaks rise to an elevation of between 7000 and 8000 feet; but the average height scarcely exceeds 3000 feet. Monte Corna, the culminating point, is 9528 feet.

The south of Italy is occupied by a remarkable volcanic region, where the subterranean fires still give awful signs of their intense activity. *Mount Vesuvius*, which raises its conical mass, girdled with vines and chestnuts, above the fair city of Naples, is 3978 feet above the sea-level. Its sister volcano, *Mount Etna*, in the island of Sicily, attains a far loftier elevation (10,872 feet),† and exhibits a charming variety of picturesque scenery. The forest region on the lower slopes is rich in glowing effects of colour, while near the summit

* Coleridge, *Hymn in the Valley of Chamouni*. For a glowing account of these phenomena, see Professor Tyndall's "Glaciers of the Alps."

† Admiral Smyth, "The Mediterranean."

the landscapes wear a grander aspect. Mr. Matthew Arnold has painted an Etnean picture with marvellous force in the following beautiful passage.*

"'Tis the last
Of all the woody, high, well watered dells
On Etna; and the beam
Of noon is broken here by chestnut boughs
Down its steep verdant sides; the air
Is freshened by the leaping stream, which throws
Eternal showers of spray on the mossed roots
Of trees, and vines of turf, and long dark shoots
Of ivy-plants, and fragrant hanging bells
Of hyacinths, and on late anemones,
That muffle its wet banks; but glade,
And stream, and sward, and chestnut trees,
End here; Etna beyond, in the broad glare
Of the hot noon, without a shade,
Slope behind slope, up to the peak, lies bare;
The peak, round which the white clouds play."

Between France and Spain lies the great system of the *Pyrenees*, whose topmost peaks exceed 11,000 feet in altitude. Their entire breadth averages between forty and fifty miles; the southern slope is exceedingly rugged and abrupt, and the passes or defiles exhibit a character of exceeding savageness. The two loftiest crests are Mount Maladetta, 11,426 feet, and Mont Perdu, 11,275 feet. The interior of Spain consists of an elevated table-land, bordered by the wild mountain-ranges of the *Sierra Nevada* and the *Sierra Morena*. The average height of the snowy chain of the Nevada is 6900 feet, but the Peak of Mulharen soars to the noble elevation of 11,678 feet.

In France, we meet with the chains of the *Cevennes* and the *Vosges*, the former extending along the right bank of the Rhone, with an average altitude of 3000 feet; the latter stretching from north to south along the right bank of the Rhine. The vine-clad slopes of the latter offer many a romantic picture to the wayfarer in Rhineland. Very curious in geological interest are the extinct volcanic mountains of Auvergne; so black, charred, scathed, and desolate, that one might

* Matthew Arnold, "New Poems" (1867)—*Empedocles on Etna.*

suppose them to have been the scene of some old-world battle between the Titans and the Olympian gods. Here the Puy de Sancy exceeds 6000 feet (6215), and the now silent cone of the Puy de Dôme, 4500 feet in height.

The *Hungarian Mountains*, or Mountains of Germany, occupy the country between the Rhine and the eighteenth meridian of east longitude. Here we meet with the dark and densely wooded crests of the Schwarz Wald, or Black Forest; the Erz-Gebirge, on the borders of Saxony and Bohemia; and the rich metalliferous masses of the legend-haunted Harz. Continuing our survey to the eastward, our glances rest on the bold and many-peaked groups of the *Carpathians*, which, commencing near the sources of the Oder and the Vistula, describe a semicircle round the fertile Hungarian plain for between seven and eight hundred miles. Striking down to the Danube, it faces on the opposite side the lofty wall of the Balkan, and through the gorge thus formed, the famous "Iron Gates" of ancient story, the river rolls its waters with impetuous rapidity. The more elevated summits of the Carpathians possess an average height of 5000 feet, but Mount Lomnitz reaches the loftier level of 7962 feet.

On the borders of Asia lies the long and narrow chain, or rather chains, of the *Ural Mountains*, with an average altitude of from 2000 to 2500 feet, sinking in about latitude 57° to a rocky ridge of little more than 1100 feet. The loftiest crest is Mount Yaman, in latitude 54° 13′, 5387 feet. The Ural Mountains possess abundant mineral treasures, both gold and platinum occurring in extensive abundance.

The chain of *Mount Caucasus* stretches for about 700 miles between the Black and Caspian Seas, in the direction of north-west and south-east. It exceeds 150 miles in breadth, throwing out from the central mass numerous branches and parallel ridges, and enclosing a network of valleys, plains, and ravines. The culminating point appears to be the group or mountain-knot of Elburz, in the meridian of 42° 25′ E., which attains the stupendous elevation of 18,498 feet. Kasbek, which is really in Asia, reaches 16,500 feet.

In the Asiatic continent the grandest mountain-system is that of the *Himalayds* (or "Snowy Mountains"), which limit the Thibetan table-land on the south, and divide it from the hot plains of northern India. They extend in an east and west direction for about 1580 miles, with a breadth of from 200 to 250; and consist of a number of parallel ranges, divided by transverse valleys, and rising one above another like a series of gigantic terraces. The slopes are clothed with an exceedingly rich and beautiful flora, and far up to the very snow-line extend magnificent breadths of forest foliage.* On the southern slope this snow-line is about 15,000 feet high; on the northern, 18,000 feet. The loftiest summit of the Himalayas, and probably the very apex of our globe, is *Mount Everest* (latitude 27° 59'), 29,002 feet in altitude. *Kunchin-jinga* is 28,156 feet; *Dhawalgiri*, 28,000 feet; and *Javaher*, 25,746 feet above the ocean-level.

"As we ascend the exterior face of these mountains,"† says Captain Strachey, "tropical vegetation prevails to a height of about 4000 feet, though even from 3000 feet a few of the forms of colder climates begin to appear; the vegetation, however, is, on the whole, scanty on this declivity. Far different is it when we follow the same zone of elevation into the interior of the mountains, along the courses of the larger rivers, which, owing to the great depths of their valleys, carry a tropical flora into the very heart of the mountain region. The sheltered and confined beds of these rivers, where the two great requisites for tropical vegetation, heat and humidity, are at their maximum, often afford the finest specimens of forest scenery, varied by an admixture of the temperate forms of vegetable life, which here descend to their lowest level. Thus the traveller's eye may rest on palms and acacias intermingled with pines; on oaks or maples covered with epiphytal orchideæ; while pothos and clematis, bamboos and ivy, fill up the strangely contrasted picture.

"Above 4000 feet oaks and rhododendrons greatly increase in

* Dr. J. Hooker. "Himalayan Journals."

† Captain Strachey. "Journal of Royal Geographical Society" (vol. xxi.)

number, and these trees, with andromeda (*Pieris*), form the great mass of the forest from 6000 to 8000 feet. Species of the deciduous trees of the temperate zone are gradually introduced as we rise, and these again, with the addition of other pines, prevail in the upper regions of forest—that is, from 8000 to 11,500 feet."

Glaciers abound in the loftier Himalayas. The lowest elevation

THE HIMALAYAS.—MOUNT GAURISANKER (28,000 feet).

to which they descend is about 11,500 feet above the level of the sea.

The *Altai Mountains* lie north of Mongolia, with an average elevation of from 5000 to 7000 feet. Eternal snow crowns their loftiest summit, Mount Bielukha, 11,063 feet. In Central Asia we

find the chains of the *Thian-shan*, partly volcanic, and the *Kuen-lun*, which are little known, but probably lift their towering heads to an altitude of fully 20,000 feet. China is traversed from west to east by two mountain-ranges, the Peling and Nan-ling, or "Northern" and "Southern," which prolong their rocky heights to the very shores of the Pacific. West of the table-land of Pamer the eye rests upon the formidable chain of the *Beloor-tagh*, from 18,000 to 20,000 feet in elevation; and on the borders of Central Asia the Himalaya, the Beloor-tagh and other chains unite in the colossal knot or group of the *Hindoo-Koosh*. Thence, with a westerly course, extend the *Paropamisan* and *Caspian Mountains*, the latter culminating in Mount Demavend, 14,300 feet, near the Caspian Sea. The *Soleiman Mountains* border on the rugged plateau of Afghanistan; in Armenia rises the fable-haunted crest of Agri-dagh, or *Mount Ararat*, 17,260 feet; while, in Asia Minor, the Taurus chain, which so often beheld the banners and glancing spears of the Romans, attains its loftiest in *Mount Argæus*, or Arjish-dagh, 13,100 feet; and along the coast of Syria rolls the undulating range of *Lebanon*, with Mount Hermon soaring to 9600 feet. Arabia is occupied by a branch of the Lebanon, which runs southward into the Sinaitic peninsula. The highest of the Sinai Mountains is 9300 feet above the sea.

The average altitude of the *Ghauts*, which line the east and west coasts of Hindostan, is 3000 feet; but some of their summits aspire to 8000 feet.

A range of high mountains traverses the dreary peninsula of Kamtschatka, and appears to be a continuation of the volcanic chain which forms the Kurile Islands, and extends even to Japan and the great islands of the Eastern Archipelago. Many of the Kamtschatkan volcanoes are still active, such as Avatsha, Klutchevsky, and Assachnish, and though shrouded in snow and ice project from their seething caldrons vast showers of ashes, stones, boiling water, and lava. Avatsha is 9600 feet high.

The Indian islands contain many colossal mountains, mostly, if

not all, of a volcanic character, and the same generalization is true of the beautiful Polynesian archipelagos:—

"Summer-isles of Eden lying in dark purple spheres of sea."

Mount Ophir, in Sumatra, is 13,840 feet high; Stamat, in Java, 12,300 feet; Indiapura, in Sumatra, 12,140 feet; Tomboro, in the island of Sumbawa, 7600 feet; and Kilauea, in the Sandwich Islands, 3970 feet. Kina-balu, in Borneo, is a magnificent mass, 13,968 feet in height. "Its grand precipices," says a traveller,* "its polished granite surfaces glittering under the bright tropical rays, the dashing cascades, which fall from so great a height as to dissolve in spray before being lost in the dark valleys below, have a magical effect upon the imagination."

My rapid survey of the mountain-systems of the globe now brings both writer and reader to the African Continent, which contains, however, an unusually large proportion of plain and low level. The northern mountain-ranges, which extend from east to west parallel to the Mediterranean, are known to geographers under the general appellation of *Mount Atlas*, whose culminating point occurs in the peak of Miltoin, 11,400 feet, to the south-east of the city of Morocco.

In the north-eastern part of the continent lie the *Mountains of Abyssinia*, the highest pinnacle being that of Geesh, which towers at an elevation of 15,000 feet above the sea. Many other summits are also crowned with "snows eternal," feeding a succession of streams which pour their waters into the White Nile.

Detached masses and mountain-groups spread along the western coast, between the 12th and 18th parallels of north and south latitude respectively. To the north of the Equator lie the *Kong Mountains;* and near the coast of the Bight of Biafra rises the semi-extinct volcano of the *Camaroons*, 13,189 feet high. This elevation is far exceeded by that of the colossal summits, which on the eastern

* Spencer St. John, "Life in the Forests of the Far East" (London, 1863).

coast are situated within a few degrees of the equinoctial line, and wear a crown of snow which is indissoluble. One of these, *Kilimandjaro*, has an altitude of 22,814 feet, while *Kenia* cannot be less than 20,000 feet. Others are probably equal, or little inferior, to these in height.

In South Africa are three ranges of mountains, or rather terraces, the northernmost of which is called the *Nieuweld*, and runs in a general course of east and west. Towards its eastern extremity it bears the name of the *Sneeuberg*, or Snowy Mountain, and its summits are frequently 1000 feet high. The *Compassberg* group is 7000 feet in elevation. Immediately to the south of Cape Town rises the curious flat-topped *Table Mountain*, 3582 feet in height. The *Peak of Teneriffe*, in the Canary Isles, off the north-west coast, is volcanic; it rises 12,236 feet above the sea.

Asia possesses, as we have seen, the loftiest mountain-peaks, but it is on the American continent we meet with the grandest mountain-systems. We remark, in the first place, that they are all directed from north to south; in the second, that they are grouped along the western and eastern coasts in two unequal systems, converging towards each other as they run southward. In North America these two systems are the *Rocky Mountains* on the west; and the *Apalachian*, or *Alleghany*, on the east. The former consists of a mountain-region, diversified with valleys, terraces, and plateaus, varying in breadth from 40 to 100 miles, and raising several summits to a very conspicuous elevation, as in Mount Brown, 15,900 feet, and the volcanic peak of Mount Elias, in California, 17,500 feet.

The *Apalachian* range extends from the Gulf of St. Lawrence to the parallel of 34°, a course of 1500 miles. It is intersected by Lake Champlain and the valley of the Hudson. Its average height does not exceed 3000 feet; but it culminates in Mount Washington to an altitude of 6284 feet.

In South America the chain of the Rocky Mountains is prolonged in the magnificent system of the *Cordilleras de los Andes*, or the

Andes, which commences immediately to the southward of the Isthmus of Panama, extends along the whole stretch of the western coast, and finally terminates in the rocky archipelago of Tierra del Fuego. This chain is locally distinguished into the Columbian, Peruvian, Bolivian, Chilian, and Patagonian Andes. Its widest extension occurs between the 20th and 25th parallels, where it measures upwards of 400 miles across. Throughout its entire course it attains a very considerable elevation. Its volcanic character is very marked. Thus, in the Columbian Andes, *Antisana* and *Cotopaxi* are still active; in the Chilian, *Aconcagua* is the loftiest volcano on the globe; in the Patagonian, four active volcanoes occur. The region at the base of the Chilian Andes suffers more from volcanic convulsion than any other part of the world, and its towns are repeatedly destroyed by earthquakes.

The principal summits are:—Aconcagua, 23,944 feet; Chimborazo, 21,415 feet; Sahama, 22,350 feet; Cotopaxi, 18,867; Antisana, 19,136 feet; Sorata, 21,286 feet; and Illimanni, 21,149 feet.

On the eastern coast we meet with the Mountains of Guiana and the Mountains of Brazil, never reaching a higher level than 5000 feet. *Mount Sarmiento*, in Tierra del Fuego, is 6900 feet above the sea. In the West Indies the loftiest point is found in the *Blue Mountains* of Jamaica, 7278 feet.

CHAPTER V.

VEGETABLE LIFE AND ANIMAL LIFE IN THE MOUNTAINS.

THE same changes that we observe in the characters of vegetable life as we advance towards the Pole reproduce themselves, the reader will easily understand, as we ascend the mountain-sides. Only, in the former case the gradation is slow and scarcely perceptible; in the

latter, it displays itself rapidly; in such wise that a distance of a few hundred yards in height is equivalent to a journey of several degrees in latitude. It is scarcely necessary to add that the warmer the climate, the higher we must rise to reach the belt or zone where flourish the species peculiar to Arctic countries.

In every land the flora of the lowest region of the mountains is virtually the same as that of the adjacent plains, and it is only at an elevation of 300 feet that we discern a positive change of aspect. In temperate Europe, the Normandy fir and the *Epicea* begin to form, at that altitude, forests of considerable extent. These trees are from 120 to 150 feet in height, with a pyramidal configuration, sombre foliage, and drooping boughs, and whose bark takes to itself a clothing of various lichens (notably *Usneas*), the long filaments, branchy and yellowish, clinging to the branches of the most aged individuals. In the shadow of these resinous trees thrive the honeysuckle, the rose, the wild raspberry. At the base of the senile trunks are developed the crawling or climbing stems, ever verdurous, of various lycopodiums. In rocky localities the great yellow gentian unfolds its long spikes of golden flowers, in company with the elegant martagon, whose yellow-spotted red corollas are rolled up turban-wise. At a higher level, between 4500 and 6000 feet, the cembro pine, rare enough in France and England, more common in the mountains of Central Europe, and the larch, whose leaves fall every winter, are the last representatives of the true arborescent Flora.

Still continuing our ascent, we meet now with nothing but an herbaceous vegetation. Here and there only, in turfy places and abrupt ravines, a few birches and some dwarf willows display themselves, scarcely taller than the herbs which surround them. It is in the rocky hollows also that the oleanders or ferruginous rhododendrons vegetate, sole representatives in Europe of a genus which among the Asiatic mountains numbers several species. The Flora of the Alpine prairies is, moreover, extremely varied. The Gramineæ dominate therein, but associated with other families which enamel with

the most brilliant colours the bright green carpet of those cold regions; the bright yellow or orange of the Compositæ; the blue of the Phyteumas, of the Larkspurs, and the Campanulas; the rose of the Carnations and the Centaureas; the intense purple of the Ranunculuses (*Nigritella*). In the most arid localities we admire the azure

1. Fir, withbearded Usnea. 2. Great Yellow Gentian. 3. Martagon, or Turk's Cap Lily.

flowers of the little Gentianellas and the white blossoms of the Saxifrages; their presence, under such conditions, filling our souls with wonder, and stimulating our hearts to praise their divine Creator.

"And with childlike, credulous affection,
We behold their tender buds expand—
Emblems of our own great resurrection,
Emblems of the bright and better land."*

* Longfellow, Poetical Works.

Some of the plants which enrich the lofty slopes of the European mountains are endowed with an agreeable aromatic odour, and with keen stimulating properties. Such are the *Artemisias* and the *Achilleæ*. To the former of these families belongs the *Artemisia glacialis*, which the mountaineers consider an universal panacea, and which enters into the composition of the famous liqueur of the Chartreux.

On the threshold of the eternal snows, under the influence of the icy breezes, vegetation grows rarer and yet rarer, until it is reduced to a few species which compensate for their insignificance by their beauty. Such are the Campanula of Allioni, with its graceful bells of blue; the delicate Saxifraga, whose rosy flowers also expose their beauties on the frost-bound shores of Spitzbergen; the Soldanella of the Alps; the Ranunculus of the Glaciers; numerous Androsellæ, some of which do not exceed a third of an inch in height; finally, on the extreme border, and straggling even on the moraines of the Glaciers, where no other plant can live, the little Myosotis, which grows in small tufts covered with white down, and starred with delicate blue flowers. At a still higher level we find only a few lichens relieving the monotonous surface of the rocks; and sometimes, flourishing under unknown circumstances, the *Protococcus nivalis*, whose red globules communicate to the snow a blood-red tint.

The Mountain Flora will offer us, in other parts of the globe, the same series of diminution, commencing with the groups which people the low lands of each geographical zone, and terminating with those which, at the level of the sea, are met with only in the Frozen Zone. Some mountain-chains, however, possess genera or species exclusively belonging to them. It is on the ridges of Atlas and Lebanon, at an elevation of 3500 or 5400 feet, that the majestic cedars spread their umbrageous branches. The cedars of Atlas attain a stature of 120 to 140 feet, and their trunk measures, at the base, from a yard to a yard and a half in diameter. "When young," says M. Charles Martins,* "they have a pyramidal form; but when they

* Charles Martins, "Du Spitzberg au Sahara."

soar above their neighbours, or above the rock which protects them, there comes a sudden storm, a flash of lightning, or an insect pierces their terminal shoot, and deprives them of their shapely spire; the tree is discrowned; then the branches spread horizontally in terraces or layers of verdure, one upon another, screening the sky from the gaze of the traveller, who presses forward in a sort of

CEDAR OF LEBANON.

twilight under these vaults impenetrable to the solar rays. From an elevated point of the mountain still more majestic is the spectacle. The horizontal surfaces resemble lawns of the deepest green, or of a glaucous colour like that of water, upon which are sprinkled cones of a violet hue; the eye plunges into an abyss of greenery in whose depth mutters an invisible torrent."

The cedar of Atlas constitutes, if not a species, at least a distinct variety from the cedar of Lebanon. The latter is now very rare on the mountain which is regarded as its native habitat. The prophet Ezekiel describes it in all its glory: "A cedar with fair branches, and with a shadowing shroud, and of a high stature . . . his height was exalted above all the trees of the field, and his boughs were multiplied, and his branches became long, because of the multitude of waters, when he shot forth" (Ezek. xxxi. 3, 5). But those immense green forests which once stood out in dark deep shadow against the radiant sky are now reduced to a single scanty grove —a grove containing, according to Dr. Hooker, but four hundred trees, and of these four hundred only twelve of the ancient majestic race. They are situated high up on the western slope of the mountain-range, two hours south-east from Tripoli, and at an elevation above the sea-level of 6172 feet. Most of the Lebanon patriarchs are about 50 feet in height, and of nearly the same girth. One, however, measures 63 feet in circumference.

The cedar was introduced into England towards the close of the seventeenth century, and has become permanently naturalized. It is even found in a flourishing condition as far north as Inverness. It does not, however, attain such gigantic dimensions here as on the slopes of Lebanon. There is one at Goodwood, in Sussex, 25 feet in circumference; and another at Peperharrow, in Surrey, 15 feet. In the Jardin des Plantes a celebrated tree, whose terminal shoot was struck by a chance shot during the siege of the Bastile, boasts of the following proportions:—Ten feet girth at three feet from the ground, and ten feet and a half on a level with the soil. Its horizontal branches extend fully forty-five to fifty feet in length, and cover, consequently, a surface of upwards of 300 feet in circuit.

If we would now pass in review the complete series of Zones of Vegetation, it is to the north of Hindostan, in the Himalaya, or to South America and the Cordillera of the Andes, that we must transport ourselves. On the first steps, or lowest terraces, of these immense chains, we shall see the tropical Flora, revealing all its wealth and its

puissance; there, between 3500 and 6900 feet above the sea-level, we meet with nearly all the plants peculiar to temperate climes, and those which only belong to the northern lands. On the Himalayan slopes, the pine and the cedar flourish at an elevation of 7500 feet. Advancing from this limit, we soon encounter a great variety of Rhododendrons, a shrub now well known in our European gardens,

RHODODENDRONS OF THE HIMALAYA.
1. Rhododendron Pendulum. 2. Rhododendron Dalhousie. 3. Rhododendron Nivale.

and highly prized for its ever green foliage and rich full bloom. It thrives at the height of 12,000 feet; a few species even battle with the elements at an altitude of 15,000 feet, but they are then only stunted and crawling plants. With these are associated, at about 10,000 feet, the alder, the birch, and the willow. The plains are covered, at the same time, with a prodigious host of Ranunculaceæ, Compositæ, Saxifrages, and Pinnalaceæ, to which succeeds all the army of Lichens. Thus, then, it appears that the same laws deter-

mine always and everywhere the orographic distribution of plants. Only the influence of elevation is counterbalanced here by that of climate; whence it results that the arborescent species endure at a far greater height than on our European mountains.

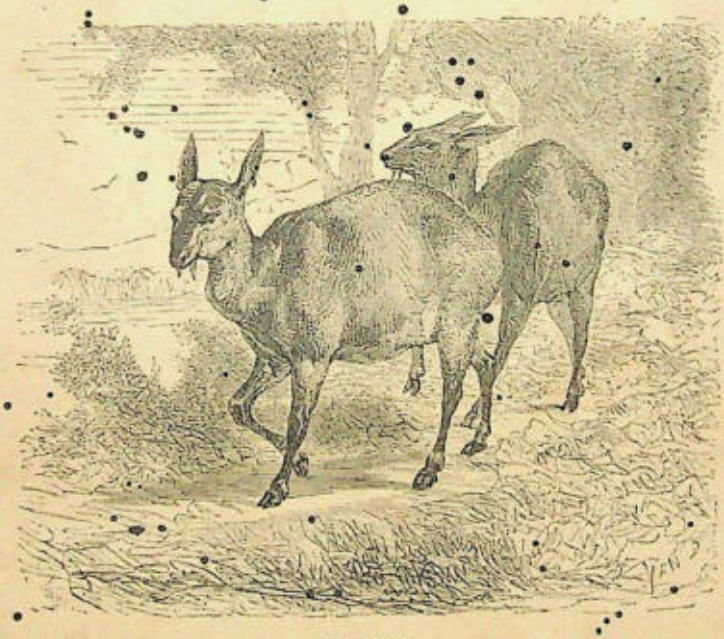
In the same manner that the Himalaya "resumes," so to speak, the Flora of all the climates of the Old World, does the Cordillera of the Andes, and, notably, that portion of the chain situated between Peru and Venezuela, present all the vegetable types of the New World, disposed upon its plateaux and its slopes as upon a gigantic flight of steps. In the lower region, the plants of Tropical America, favoured by a marshy soil, deck themselves out in their most gorgeous attire. At an elevation of between 1800 and 3500 feet, the vegetation is neither so brilliant nor so varied, but it has not yet thrown off its original character. We remark here a constant abundance of Myrtaceæ, Laurenaciæ, and Bignoniaceæ, as well as numerous epiphytous plants—Orchidaceæ, Ferns, Bromeliaceæ. From 3500 to 9000 feet we mark the successive appearance of plants belonging to the colder countries of North America: Escallionæ, Magnoliaceæ, Vacciniaceæ, and Solanaceæ. Here and there a few Bromeliaceæ and some other epiphytes display themselves. We encounter also in this zone a small number of Palmaceæ; among others, the Ceroxylon and the Diplothemium. But soon the arborescent vegetation almost wholly disappears, and only a few stunted bushes remain, similar to those which, in the Alps, succeed the larch. Then come meadows almost entirely formed of Compositæ, Umbelliferæ, and Saxifrages; and, finally, the Lichens, the last plants—the last forms of vegetable life—lingering on the frontiers of the region of eternal snow.

If the law which presides over the orographic distribution of plants were applicable to the animal kingdom, we should meet on the frozen crests of the mountains with the same species as, or, at least, with analogous species to, those we have seen in the vicinity of the Pole. But it is not so. Plants flourish wherever they can find, with an endurable climate, a soil in which their roots can develop themselves and imbibe the juices needful for their support; but the condi-

tions which render a country inhabitable for animals—I mean the higher animals more particularly—are wholly different and more complex. A facility for removing from place to place in search of food is one of these conditions, and assuredly one of the most essential. But the number of terrestrial animals capable of climbing the scarped flanks, of traversing the narrow ridges, and leaping across the precipitous chasms of the mountains, is extremely limited. However, a few Herbivora excel in these perilous exercises. They are Ruminants of small size, with tiny limbs, and small ungulated hoofs; Moufflons, wild Goats, Chamois, Kids, which seek on inaccessible heights a refuge against the attacks of man and the Carnaria, and bound, with marvellous agility and precision, from rock to rock, from icy crag to crag, over the most formidable gulfs, and up the most precipitous steeps.

The Moufflons, or Wild Sheep, erroneously regarded by some naturalists as the ancestors of our domestic sheep, form a genus whose species are distributed in Asia, America, and Northern Africa, and in the mountainous islands of the Mediterranean. The Musmon Moufflon, which inhabits the mountains of Corsica, of Sardinia, of Cyprus, and of Candia, is nearly the size of a sheep, but far more robust. His hair, which is only wool properly so called, is a reddish-brown over nearly the whole of his body, and whitish under the belly and the legs. His horns are of great size, transversely crumpled, with a simple curve, and a sharp extremity. Among the Asiatic species the largest is the *Musimon argali*, which inhabits the Altaï and the mountains of Kamtschatka, and approaches the ass in size. His skin is a yellowish-brown, with some white on the fore-feet. His horns describe an almost complete circle. The American species is the *Musimon montanus*, which we find in the Rocky Mountains. Finally, the region of the Atlas and of the Aurès Mountains is the country of the Ruffled Moufflon (*Moufflon à Manchettes*), so named on account of his long hairs, which fall from his shoulders upon the extremity of his anterior legs. His neck is also supplied with a thick mane.

The Wild Goats and Bouquetins probably form, as the best authorities represent, but one and the same genus. In any case the latter are much better known than the former. They closely resemble our domestic goats, from which they chiefly differ in the prodigious development of their horns, the said horns being generally knotty, slightly divergent, and supported by osseous axes. Their name, according to Gervais, comes from two words, *Bouc-estain*, signifying the Goat of the Rocks. They belong exclu-



Musk-Deer.

sively to the Old Continent. These animals are very wild. The precipitousness and lofty elevation of their pasture-grounds render their chase a matter of peril. The same may be said of the Chamois, or Isard, which inhabits the loftiest ridges of the Alps, the Pyrenees, and the mountains of Greece. Dogs are of no avail in hunting these animals. In Asia the falcon is employed in capturing the bouquetin. In Europe the chamois-hunters are excellent marksmen—indefatigable, fearless, capable of great endurance, keen, and vigilant. It is at morn

and eve that they venture forth on their hazardous enterprise. The chamois wander in small troops. Their voice is a kind of low bleating; but when one of them descries approaching danger, he immediately raises a sharp cry, which is the signal of flight. Driven together and closely packed, the poor animals stand at bay, and dash themselves upon the daring hunter with an impetuosity which often proves fatal to him.

The Musk-Deer form a distinct family in the order *Ruminantia*. In their external conformation they resemble both the stag and the antelope, but they have neither horns nor antlers; their stomach is deficient in the part named the *feuillet*, which exists in all the other Ruminantia; finally, their upper jaw is provided with two long canines, which among the males project from the mouth, and which serve at one and the same time as defensive arms and as instruments to dig out of the soil the roots upon which these animals feed. All the species of this genus are Asiatic, except one, which is a native of Guinea. I can only particularize here the Musk-Deer of Thibet and Nepaul, which furnishes commerce with the curious product, so useful in medicine and perfumery, known as *musk*. This product is an extremely odorous and unctuous substance, contained in a special organ situated under the belly of the male. The high price which it commands would make the chase of the musk-deer very profitable, were not these animals so rare and so difficult to get at. They lead a solitary life among the scarped rocks and in the thorny bushes bordering on the glaciers. In winter they descend towards more temperate localities. They are caught either in snares or with nooses, or slain with arrows. The Tongusian hunters, to attract the musk-deer, imitate the cry of their young by applying the mouth to a fragment of bark. The chase is only pursued in winter and autumn. In Thibet the hunters require a special license from the government.

We may pass over the species of Rodents which burrow among the mountains, with a word of allusion to the traditional companion of the poor wandering Savoyard, the Alpine Marmot. This gentle

and interesting animal is so well known to my readers that I need not pause to describe him.

In the deep gorges and dense forests which break up the monotony of the lofty table-lands, live in fierce solitude the congeners of the "Man in the White Cloak" of the Polar deserts—Bears with a thick fur and of a sombre hue. While these animals seem designed by their organization to feed upon flesh, and while their strength enables them to seize upon the largest game—which, indeed, they occasionally do—their diet is omnivorous, and they even exhibit, in general, a marked predilection for the aliment of a vegetable nature. The reader, moreover, will remember with what eagerness the bears of our menageries and zoological gardens devour the bread, cakes, or fruit which their visitors press upon them. In their native mountain homes they will rather fly from man than attack him; but if assailed and closely pressed, they defend themselves bravely, rearing upon their hind-feet, and endeavouring to suffocate their aggressor with their muscular arms. If caught in their youth they are easily tamed, and display a greater intelligence than any of the other carnivora.

The genus *Ursidæ*, or Bears, is wholly wanting in Africa, but has its representatives in Europe, Asia, and America. The European species are: the great Brown Bear, formerly distributed over all the mountains and through all the forests of Western and Northern Europe, and which is still sufficiently common in the Alps, the Pyrenees, and some wooded highland districts of Russia; and the Bear of Asturias, found only in the sierras of the Iberian peninsula. The latter is of smaller dimensions than the former. His hide is tawny.

Asia possesses: the Syrian Bear and Bear of Lebanon, two varieties of the same species, distinguished by Horsfield under the name of *Ursus isabella*, in allusion to the dirty brown colour of his skin; the Bear of Thibet, which is found in the Himalayan chain and the islands of Japan—in size and appearance he approximates to our European bear, but differs in the blacker shades of his hair; the

Malay Bear (*Prochilus Malayanus*), which is jet black, climbs trees with agility, and lives on a vegetable diet; and the Juggler, or Jungle Bear of India (*Prochilus ursinus*), originally named the "Five-fingered Sloth,"—a great favourite with the Indian jugglers on account of his adaptability and mildness.

To North America belong the Black Bear (*Ursus Americanus*) and the Grisly Bear (*Ursus ferox*). The former has a long head, a pointed nose, small eyes, and short round ears; his limbs are strong,

1. Black Bear of Canada. 2. Gray Bear of North America.

unwieldy, and thick; his tail is short; feet large; and the hair on the body smooth, glossy, and black. The Grisly Bear is about nine feet long, a narrow and flattened muzzle, sunken eyes, and formidable teeth; he ranges over not only the entire chain of the Rocky Mountains, but in the prairies and forests which occupy the centre and west of the great continent, where his sanguinary instincts and prodigious strength render him a formidable antagonist. The Black

THE CONDOR OF THE ANDES.

Bear of Canada, on the contrary, is the least ferocious and least carnivorous of his genus. His chief food is of a vegetable nature—grain, fruits, and roots—but he does not disdain an occasional regale of pork. He commits great depredations on the maize-fields, and is also exceedingly partial to honey. From the nature of his food, his flesh is exceedingly succulent, and much relished by the Canadian settlers.

Ascend the wildest and most barren mountains, even to the limit where all life ceases to exist; or the flank of a perpendicular rock, in a crevasse, in some chink or fissure where the foot of man or quadruped may never rest; and there, were you able to approach sufficiently near, you would see some interlaced branches and stems, and within it a few fragments, a few gnawed and polished bones, while a strong odour scented the surrounding air. Regard it more attentively—some tiny creatures are astir upon that unclean couch. Yes: your gaze now rests on the eyry of one of those aërial tyrants, Eagles or Vultures, which alone can dwell on the cloud-crowned, wind-swept heights. I must confine myself here to mentioning the largest and most formidable species, which surpasses all the others in sweep and speed and power of flight—the Condor of the Andes. This bird possesses the habits and voracity of other vultures, and, as if conscious of his enormous strength, shows himself the most audacious. He frequently pounces upon living animals; but his non-retractile talons, blunted by their attrition upon the rocks, do not permit him to carry off his prey; he contents himself with fixing it against the ground with one of his claws, while he rends it to pieces with his powerful beak. Gorged with food, he becomes incapable of flight. You may then approach him; but should you attempt to seize him, he opposes a desperate resistance, and as he enjoys an extraordinary tenacity of life, the victory will probably cause you a prolonged struggle and many cruel wounds.

A story is told of a Chili miner, of more than ordinary physical force, who attacked—hand-to-hand, as it were—a condor while digesting his greedy banquet, and unable to make his escape. The

engagement was long and desperate. The man was compelled to put forth all his strength. At length, exhausted, torn, and bleeding, he left his enemy on the field of battle, and carried off for a trophy a few feathers, which he showed to his comrades, affirming that he had never fought a harder fight. The other miners went in search of the corpse of this terrible bird. They found him standing erect, and flapping his wings in order to fly away. They only killed him by crushing in his head with a hatchet.

The condor enjoys the privilege of an exceptional longevity. The Indians of the Andean plains assert that he lives nearly a hundred years. He builds no regular nest; the female is satisfied with a hollow in the rocky cliff of sufficient size to shelter her while hatching her eggs. Both parents busy themselves very attentively in bringing up their young, disgorging in their beaks the food which they have themselves taken. The young birds grow slowly; it is not until they are six weeks old that they begin to flutter round their parents. Their training, however, lasts but a few months; after which they separate of their own accord from the male and female birds, and seek their own nourishment.

The condor has the loftiest flight of all the winged race. He has been seen towering in the "blue serene," on a level with the snow-crowned summit of Illimani, 23,000 feet above the sea, in a region where man cannot endure the excessive rarefaction of the air. When, in the fulness of time, civilization shall have conquered to itself the South American continent, the condor, flying for refuge to these brain-wildering heights among the icy peaks of the Cordillera, shall be, perhaps, in that quarter of the globe, the latest denizen of the Desert—the last representative of THE SAVAGE WORLD.

Index.

Abbya-Singh, the tiger-killer, 310.
Abyssinia, its physical features, 248; flora, 248-9; mountains, 506.—See also Shoa, Tigre.
Abyssinian meadow-grass, 242.
Acacia detinens, 257.
Acacia doratoxylon, 279.
Acacias, family of, their characteristics, 411.
Acrostichon grande, 277.
Actæas described, 261.
Adansonia digitata (the Baobab), 409.
Adour, the, valley of, 27.
Africa, interior of, described, 186, 187; southern plateau, 187, 194, 195; its general physical features, 187, 188; *Karroos* of Southern Africa, 188, 191.—See Cape Colony, Central Africa, Equatorial Africa, Kaffraria, Kalihari, Natal, Senegambia.
African elephant, characteristics of, 451.
Agami, the, described, 354.
Agouti, the, described, 342.
Agua, the, described, 380.
Ahu, the, described, 65.
Akhaf, the desert of, 106, 109.
Albert N'yanza, the, discovered by Sir S. Baker, 202.
Alfa, the, described, 150.
Alfourous, the, their manners, 525.
Alleghany Mountains, the, character of, 216.
Alligator, the, its natural history, 357, 358.
Alligator lucius, 357.
Aloe socotrina, 249.
Aloes, various species of, described, 254.
Alpaca, the, characteristics of, 334, 335.—See Huanacu.
Alpine Squirrel, the, 499.
Alps, the, referred to, 14; described, 589, 590.
Alps, the Scandinavian, described, 588.
Altai Mountains, the, description of, 594.
Amazon, forests of the river, their characteristics, 386, 387.
Amboyna, island of, its species, 421.
America, progressive civilization of, 205, 206; Spanish conquests in, 206, 209; probable future of, 209; character of its fauna, 281-283.—See North America, South America.
Amentatica hierochuntica, 149.
Andamanese, the, character of, 525.
Andes, the, description of, 507, 508; Condor of, 686, 614; vegetation and character of the Pampas of, 228, 229.
Androsellæ, the, described, 601.
Annona (ox-heart), the, described, 246.
Ant-eater, habits of the great, 346, 347.
Anthropomorphic apes, natural history of, 470-487.
Antilope Dorcas, the, account of, 169.
Apache Indians, the, described, 335.
Apalachian Mountains, the, features of, 597.
Ape, the, natural history of, 463; habitat, 464.—See Baboon, Chimpanzee, Cynocephali, Cynopitheci, Gorilla, Monkey, Orang-Outang.
Apennines, the, their character and aspect, 590.
Apios tuberosa, 260.
Aponogeton distachyum, 256.
Apteryx *Australis*, its natural history, 377, 378.
Aquila bifasciata, 75.
Arabian Deserts, the, description of, 106.
Arabs, the, their origin, 176; physique, 176; history, 176, 177; religion, 177; attachment to polygamy, 177; love of rapine, 177; religious zeal, 178; general characteristics, 178, 179; household wealth, 178, 180.—See Bedouins.
Aralia crassifolia, 277.
Ararat, Mount, its physical aspect, 595.
Araucanians, the, their habits and manners, 541.
Arctic discovery, reference to, and account of, 552-555.
Arctic regions, the, described, 548.—See Polar Regions.
Ardea alba, 72.—See Heron.
Areca saccharifera, 418.
Argæus, Mount, description of, 595.
Ariel Gazelle, the, natural history of, 169.
Aristida pungens, 148.
Armadillo, the, natural history of, 345, 346.
Arnee Buffalo, the, description of, 297, 308.
Arnold, Matthew, quoted, 393, 591.
Aroideæ, the, family of, 438.
Artemisia alba, 151.
Artemisia glacialis, 601.
Artesian wells, 161.
Artocarpus incisa, 414.
Arundo conspicua, 275.
Asiatic elephant, the, its natural history, 450, 451.
Asimina triloba, 259.
Asinus Quagga, the, natural history of, 291, 292.
Ass, the, its habits and peculiarities, 56.
Ass, Wild, the.—See Onagra.
Astelia Banksii, 276.
Asturias, bear of, described, 609.
Atacama, the Pampas of, 219.
Ateles, the, their natural history, 489, 490.
Atkinson, T. W., quoted, 58, 77, 79, 88.
Atlas Mountains, the, their situation and physical aspect, 124, 506.
Atmosphere of mountain-regions, 582, 583.
Aurelhan, lake of, 30.
Australia, discovery of, 231, 232; its deserts, 232; rivers, 232; mountains, 235; adventure and exploration in, 235, 236; wilderness of, 237; expedition by Burke and Wills, 237-240; its flora, 273-282; its fauna, 366-378; its characteristic vegetation, 422-424; its aboriginal population, 522, 523.
Auvergne, its extinct volcanoes, 591, 592.
Avatsha, mount, 595.
Aye-Aye, the, its natural history, 494.

Baboon of the Atlas, the, described, 465.

Babiouda, desert of, described, 122, 123.
Baker, Sir S., quoted, 202, 287, 288.
Balenicepa, the, account of, 321.
Balsams, the yellow, described, 261.
Bamboo, the, its physiology and uses, 402.
Banhunguatos Mountains, the, chain of, 196.
Banana, the, its physiology and uses, 246, 249, 402, 403.
Banyan, the, account of, 404, 405.
Baobab, the, characteristics and discovery of, 409, 410.
Barth, Dr., quoted, 294.
Barbary Squirrel, the, account of, 500.
Barren landes, the, described, 549.
Bassia butyracea, 410.
Batata, the, account of, 242.
Bates, H. W., quoted, 341, 347, 358, 386, 387, 388, 395, 396, 397, 434, 435, 446, 468.
Batta, account of, 127.
Baudouin, lake, description of, 114, 117.
Bauhinias, the, characteristics of, 439.
Bear, the Arctic, natural history of, 565, 566; adventures with, 567, 568; bear of Europe and Asia, 609, 619; of North America, 610, 613.
Bear, the White, account of, 551, 566.
Beaver, the, natural history of, 342; dams built by, 343, 344; mode of hunting, 345; gradual disappearance of, 345.
Bechuana country, the, dryness of, 191.
Bedford, Earls of, their works in the Fen country, 44.
Bedouins, the, their manners, habits, religion, and warlike disposition, 179, 180.
Beloor-tagh, mountains of, described, 495.
Benguela, description of, 193; flora of, 251.
Benin, climate and aspect of, 193.
Berbers, the, their characteristics, 182.
Betel-nut tree, the, account of, 422.
Biafra described, 193.
Bielukha, mount, described, 594.
Biscarosse, lake, 50; forest, 38.
Bisons, the, natural history of, 338; mode of hunting, 339; food, migrations, uses, 339.
Bittern, the great, account of, 72.
Black Bear, the, account of, 610.
Black mosquito grass, 263.
Black Mountains, the, 18, 212, 215.
Black pepper, whence procured, 245.
Black Swan, the, account of, 376.
Boa-Constrictor, the, natural history of, 358, 359.
Boars of America, account of, 330.
Boitard, quoted, 456.
Bolas, Indian, a mode of hunting with, 336, 337.
Bonald, quoted, 503.
Borassus flabelliformis, 401, 402.
Bos arni, 297.
Bos bubalus, 297.
Boswellia serrata, 407.
Botaurus stellaris, 72.—See Bittern.
Botocoudos, the, described, 533.
Bradypus torquatus, 496.
Brande, W. T., quoted, 60, 251, 252, 408.
Bray, Mrs., quoted, 41.
Brayera anthelmintica, 249.
Brazil, Campos of, physical aspects, 270, 271.
Bread-fruit tree, its character and properties, 414, 415.
Brittany, physical history of, 18-20; geology 18, 19; its Druidic monuments, 19; its landes, 20, 21; its inhabitants, 23; its *dunes*, or sand-hills, 32, 35.
Brown Bear, the, account of, 609.
Brun, Malte, quoted, 589.
Brush-tailed Rock Wallaby, described, 375.
Bryant, W. C., quoted, 216.
Bubalus, the, described, 294.
Bucephalus viridis, 327.
Buckland, Dr., quoted, 447.
Buckland, Frank, quoted, 328.
Buenos Ayres, Pampas of, 226, 228.
Buffalo, the, natural history of, 296; mode of hunting, 297; of Kaffraria, 295, 296.
Buffon, quoted, 58, 71, 448, 479.
Bull-frog, the, described, 363, 364.
Burliits, the, account of, 91, 92.
Burke and Wills, Australian expedition of, 236-240.
Burnett, quoted, 310, 313.
Burton, Captain R. F., quoted, 514.
Bustard, the, natural history of, 75.
Butter-tree, the, natural account of, 411.
Byron, quoted, 14, 136, 136, 201.

Cæsalpineæ, the, account of, 445.
Caimans.—See Alligator.
Caladium seguinum, 240.
Calebash nutmeg, the, account of, 246.
California, giant trees of, 430, 431.
Calla, the, account of, 256.
Callistomon salignum, 277.
Callithrix sciurea, 490.
Calomys lizzacha, 342.
Camaroon Mountains, the, account of, 502.
Camel, the, natural history of, 59-64; docility and usefulness, 58, 59; physiology, 59, 60; habits, 60-62; moral qualities, 62, 63; story of, 63, 64.—See Dromedary.
Camel-herd, the, described, 318.
Campanula of Allioni, the, 256.
Campos of Brazil, vegetable life of, 272, 273.
Canada, future prospects of, 20.
Cannes, Keltic memorials at, 19.
Cannibalism in Hindostan, 510; in Polynesia, 513; in Africa, 514; in Ombai, 519.
Caoutchouc, nature and properties of, 441, 442.
Cape Colony, account of, 188, 191.
Cape Eland, the, 295.
Cape Negro, 193.
Capim Gordura, described, 271.
Capybara, account of the, 341.
Caracara, the, account of, 355.
Caracas, the Llanos of, 268.
Carinas, the, account of, 354.
Caribs, the, their manners and customs, 538, 539.
Carnivora, the, habitat and history of, 167-169.
Carolinea insignis, 457.
Carpathian Mountains, the, account of, 592.
Carrette, M., quoted, 166, 167.
Carrion plant, the, described, 254.
Caspian Mountains, the, 595.
Cassanga, flora of, 258.
Cassava bread, described, 242.
Cassia, the, account of, 241.
Casso, the, described, 249.
Cassowary, the, natural history of, 368, 369.
Castor fiber, 343.—See Beaver.
Casuarina equisetifolia, 277.
Cathartes, Urubu, the, described, 56.
Catoblepus Gnu, the, described, 295.
Caucasus, mountain-range of, described, 592.
Cazau, lake of, 29, 30.
Cebidæ, the, natural history of, 487, 488.
Cedar-trees, in the Atlas region, 601, 602; in England, 603; in the Lebanon, 603.
Celastrus edulis, 249.
Central Africa, physical features of, 196-198.
Cerastes, the, natural history of, 171, 172.
Cercopithecus Diana, 466.
Cercopithecus ruber, 469.
Cereopsis, the, account of, 376, 377.
Cervus Peruvianus, 293.
Cervus Mexicanus, the, account of, 340.
Cevennes, the, natural features of, 14, 501.
Ceylon, reference to, 415.
Ceza, Pierre de, quoted, 438.
Chacma, the, described, 470.
Chambers, William, quoted, 3.
Chamois, the, natural history of, 607, 608.
Characeæ, the, described, 259.
Cheetah, the, natural history of, 310, 313.
Chelromys Madagascariensis, 494.
Chilason, the, described, 68.
Chiquitos, the, account of, 540.
Chulon, the, described, 68.
Ciconia, the, natural history of, 320.

Civets, the, natural history of, 316.
Citronelli, the, 257.
Climate, influence of, 543, 544.
Cloquet, M., quoted, 110.
Cluytia rosea, 437.
Cobra, the, physiology of, 327, 328.
Cocoa-nut palm, the, description of, 245.
Cocos oleracea, 245.
Coffæa Arabica, 245.
Coffee-tree, description of, 245.
Coleridge, S. T., quoted, 119, 120, 590.
Colocasia macrorrhizus, 255.
Colonial millet, account of, 242.
Comanche Indians, the, habits of, 553.
Common Buffalo, the, physiology of, 297.
Common Squirrel, the, 329.
Compass Berg, the, account of, 188.
Compositæ, the, in botany, 253.
Condor of the Andes, account of, 615, 614.
Coniferæ, the, family of, 423, 424.
Convolvuli, American, described, 459.
Convolvulus Batatas, 242.
Cook, Captain, voyages of, 232.
Cooper's Creek, in Australia, 236, 258.
Copal-tree, the, properties of, 428.
Corncan, the, account of, 242.
Corchorus olitorius, 245.
Cordilleras, the, physical features of, 267.
Corral in Ceylon, the, 269.
Corypha Australis, 281.
Corypha taccrnia, 208.
Cossack-life, manners and customs of, 81, 82.
Cotton-plant, the, in the Sahara, 158.
Cow-tree, the, properties of, 388.
Crawford, quoted, 466.
Crocodile, the, natural history of, 322; mode of trapping, 323.
Cryptolus horridus, 359.
Cotton sebiferum, 407, 408.
Cucamis, the, described, 257.
Cucurbitaceæ, the, the account of, 246.
Cuon Bansu, the, described, 315.
Curlew, the, natural history of, 72, 73.
Cuvier, quoted, 286, 345.
Cycadaceæ, the, properties and nature of, 286.
Cycas circinnalis, 421.
Cygnus atratus, 376.
Cynocephali, the, natural history of, 464; habits and propensities, 466.
Cynopithici, the, natural history of, 466, 467.

Dante, quoted, 148.
Darling, the river, in Australia, 235.
Dartmoor, physical history of, 39; its *tors*, or granite hills, 40; morasses, 40; ancient forests, 40.
Darwin, Dr., quoted, 341.
Date-palm, the, its character, fruit and uses, 154–156.
Date-tree, the, thorny, properties of, 412.
Daumas, General, quoted, 132, 164.
D'Arbet, Madame Leonie, quoted, 563.
Dave, the, natural history of, 292.
Dead Sea, description of, 99; its phenomena and desolation, 100; its basin, 101; probable origin, exploration of, 102; constituents and character of its waters, 105, 106.
Deane, quoted, 20.
Delegorgue, quoted, 301, 302.
Delta, the, of the Nile, 109.
Derrias, the, account of, 470.
Deserts, the, of France, 13–38; England, 39–48; of Europe and Asia, 46–50; animal life in, 51–77; inhabitants of, 78–91; deserts of sand, 95, 96, 131, 132, 133; rainless deserts, 96, 97, 123; of salt, 97, 98, 110; of Persia, 97, 98; of Arabia, 106–117; of Africa, 108–134; phenomena of the Deserts, 139–148; vegetation in, 149–162; animal life in, 163–173; fauna of, 173, 174; inhabitants of, 174–185; of Africa, 186–205, *et passim*.
Desfontaines, quoted, 405.
Desmoulins, quoted, 558.
Desplobado, Desert of, 229.
De St. Blaize, M., quoted, 571–573.
De St. Vincent, M. Bory, 569.
Diard, quoted, 288, 289.
Dima, the, account of, 240.
Dinotherium, the, described, 447.
Dioscorea alata, 242.
Djemel, or Common Camel, the, 163–165.
Dog-headed Opossum, the, described, 372.
Dogs, the Prairie, so-called, 350–352; wild dogs, 313.
Dolmens of Brittany, the, 20.
Doranthes excelsa, 280, 281.
Dove, the, account of, 468.
Dracæna terminalis, 422.
Dromedary, the, natural history of, 162, 163.
Dryandra, the, nature and properties of, 280.
Dryobalanops camphora, 418.
Dseren, the, described, 67.
Du Chaillu, quoted, 323, 481, 489.
Duck-billed Platypus, the, characters of, 374, 375.
Dunes, or Sand-hills.—See Sand-hills.
D'Urville, Dumont, explorations of, 553.
Dutch discoveries in Australia, 232.
Dyer, quoted, 44

Eagles, adventure with, 75–77.
Echidna, the, natural history of, 373–374.
Eccacaria purpurea, 261.
Egagra, the reference to, 67.
Egypt, desert of, described, 120; soil, 152; vegetable life of, 152–154; inhabitants of, 183, 184.
Elæis Guineensis, 412.
Eland, the, natural history of, 65, 66.
Elburz, Mount, 592.
Eleusine Coracana, 242.
Eleusine Tocussa, 242.
Electric Eel, the, its nature and phenomena, 364; mode of catching them, 365, 366.
Elephant, the, natural history of, 286, 450; various species, habitat, mode of march, 451; treatment of the young, 451, 452; mode of entrapping, 452–455; elephant hunts in Hindostan and Ceylon, 455, 456; general characteristics, 456–459.
Elephant Seal, the, 568.
El-Kantara, Oases of, described, 158, 159.
Ellis, Rev. William, quoted, 427, 527.
Emerson, R. W., quoted, 516.
Emu, the, natural history of, 375, 376; the "Wingless," 377.
England, colonial empire of, 209.
Epacridæ, the, natural history of, 277.
Ephedra, 264.
Ephedra alata, 148.
Epicea, the, described, 599.
Equatorial Africa, expedition in, by Burton and Speke, 201; Barth and Denham, 203, 204.
Erica Carcudishiana, 255.
Eriocaulons, the, description of, 262.
Eriodendron Samaima, 388.
Erosion, Desert of, its physical features, 128, 131.
Eskimos, or Esquimaux, the, in Arctic America, their appearance, character, habits, and manners, 578.
Etna, mount, description of, 590; physical character of, 591.
Eucalyptic, or gum-trees of Australia, described, 279, 280.
Euhydra tribus, 564, 565.
Euphorbiaceæ, the, description of, 248, 254.
Europe, invasions of, by Asiatic tribes, 79.

Falls of the Zambesi, described, 198, 201.
Felinska, Madame, quoted, 575.
Fen country of England, the, described, 41; extent of, 42; ancient aspect, 42; modern landscapes, oases, drainage, 43, 44; present productiveness, 44; general character, 45.
Fennec, the, characteristics of, 314, 315.
Ficus Indica, or Banyan-tree, 404, 405; of the Indian Archipelago, 412.
Fish Hawk, the, described, 356.
Fishing Eagle, the described, 355, 356.
Flamingo, the, description of, 329; habits of, 321; varieties of, 353.
Flax, Australian, its properties, 276.

Fletcher, quoted, 24.
Flying Squirrel, the, natural history of, 500, 501.
Fontainebleau, forest of, described, 17.
Forbes, Professor, quoted, 573.
Forest, a petrified, account of, 117.
Forests, their general features, 379, 380; botany of, 380; influence of, on temperature, and properties, 383, 384; in Europe and Asia, 384; in America, 385–389; flora of, 389–394.—See Woods.
Forgues, M., quoted, 98, 99.
Fox squirrel, the, natural history of, 500.
Foxes, the Polar, characteristics of, 565.
France, deserts of, described, 13, 14; mountains of, 14–17; forests of, 17; marshes, 17, 18.
Fromentin, M., quoted, 132.

Galago, the, account of, 491.
Gamboge, Indian, its uses, 415, 416.
Gangeticus Crocodilus, 323.
Gariep river, the, in South Africa, 191.
Gascony, characteristics of the Llandes of, 24, 27–29; its sand-hills, 35, 36.
Gavial, the, natural history of, 323.
Gazella Soemmeringii, 169.
Gazelles of the Steppes, description of the, 169.
Genets, the, natural history of, 316.
Gentian, the yellow, described, 599.
Gervais, M. Paul, quoted, 371–373, 466.
Ghauts, mountain-range of the, in Hindostan, 595.
Ghonds, cannibalism amongst the, 511.
Gibbon, the historian, quoted, 178, 179.
Gibbon-Lar, the, 478.
Gibbon Monkey, the, character of, 470; habitat, and natural history of, 477; various species of, 477–479.
Gibbon-Siamang, the, 477.
Gipsies, the, their habitats, 84; their various names, and immigration into Europe, 85; peculiarities of, 86; in Russia, 87.
Giraffe, the, natural history of, 293, 294.
Glutton, the Arctic, described, 563.
Gneiss mountains, characteristics of, 585, 586.
Gnu, the, natural history of, 294, 295.
Goat, the Wild, described, 67, 497.
Goats' Serpent, the, account of, 326, 327.
Gobi, desert of, its physical features, 97; plateau of, 47.
Goethe, quoted, 190.
Goose, the Cerefaced, described, 376.
Gorilla, the, natural history of, 481–486; its appearance and habits, 482, 483; mode of hunting, 484.
Gossypium, the, account of, 407.
Gould, quoted, 371.
Grallatores, the African, characters of, 321.
Graminese, the, family of, 437.
Granite, structure of, 583.
Grasses of the American Steppes, 267.
Gray, Dr., quoted, 291.
Gray Squirrel, the, account of, 499, 500.
Great Karoo, the, described, 188.
Green Climber, the, account of, 327.
Grey, Sir George, quoted, 376.
Grisly Bear, the, habits and physiology of, 610.
Guacho of the Pampas, the, 230, 231.
Guaiacum, its properties, 264.
Guaranis, the, manners and customs of, 538, 539.
Guatemala, flora of, 266.
Guépard, the, natural history of, 310.
Guiana, savannahs of, 245, 246.
Guinea corn, its properties, 242.
Guinea palm, the, character of, 413.
Guinea pepper, nature of, 246.
Gulo Arcticus, 563.
Gymnoti, the, 364.—See Electric Eel.
Gynerium saccharoides, 273.

Haliaëtus Leucocephalus, 355.
Hare, the Arctic, 561.
Hare, the Varying, 67.
Harpy Eagle, the, natural history of, 355.
Harris, Major, quoted, 472.
Heather-cock, the, described, 75.
Hectia Pitcairniæfolia, 279.
Helichrysum fruticosum, 255.
Hell, Madame Hommaire de, quoted, 50, 58, 61, 62, 63, 81, 84.
Helps, Arthur, quoted, 508, 515, 516.
Hemionus, or Wild Horse, the, natural history of, 290, 291.
Hemippus, or Wild Mare, the, natural history of, 291.
Henna plant, the, properties of, 410.
Heron of the Steppes, the, described, 72; species of, 72.
Herschell, Sir John, quoted, 589.
Hervé and Lanoye, MM., quoted, 543, 549.
Himalaya Mountains, configuration, structure, and vegetation of, 593; glaciers of, 594; cedars and rhododendrons of, 604, 605; flora of, 605.
Hindostan, flora of, 398–401.
Hindu reverence for the banyan, 405.
Hippopotamus, the, natural history of, 286, 287; adventure with, 288.
Homer, quoted, 49, 146.
Honey-guide, the, why so called, 317.
Honeysuckle, the Arctic, described, 556.
Hooker, Dr. Joseph, quoted, 592, 603.
Hops, the African, description of, 298, 299.
Horace, quoted, 493.
Horeb, Mount, description of, 112.
Horse, the, in America, 359.
Horse, the Wild, description of, 290.
Hottentots, the, character of, 521.
Howling Monkey, physiology of the, 488, 489.
Huanaco, the, uses of, 335.
Huc, the Abbé, quoted, 69, 70, 75, 76, 77.
Hudson's Bay, account of, 543.
Humboldt, A. von, quoted, 48, 49, 78, 226, 268, 350, 359, 382, 439, 469, 555.
Hungary, mountain system of, 592.
Hurricane in the Steppes, account of, 230.
Hyæna of the Cape, the, natural history of, 313.
Hyæna villosa, 313.
Hydrochærus capybara, 341.
Hydrophis, the, account of, 378.
Hylobates concreus, 479.
Hylobates leuciscus, 478.
Hylobates syndactylus, 477, 478.
Hyperborean races, the, their manners, customs, and characteristics, 570, 571.

Ibis, the, natural history of, 321.
Ice-fields, their aspect, 552.
Ice-mountains, features of, 551.
Ichneumon, the, natural history of, 316.
Ignatia amara, 440.
Immortelle, the, characteristics of, 255.
India, palms of, their physiology, 401, 402.
Indian millet, uses of, 242.
Indian oak, its properties, 406.
Indians of North America, their history and character, 532–534.
Indigo, nature and properties of, 246–7.
Indigofera tinctoria, 245.
Ipo-antiar, the, its nature and properties, 416, 417.
Iron Bark Tree, the, uses of, 279, 280.
Iron Mountains, the, vegetation of, 260, 262.
Isonandra-Percha, the, its nature, 418.

Jacana, the, characteristics of, 321.
Jaguar, the, natural history of, 350.
Jalapa officinalis, 439.
Janin, Jules, quoted, 518.
Jatropha manihot, 242.
Java, vegetable life in, 418, 421.
Jebel-Gaouss, reference to the, 128.
Jebel-Tougour, reference to the, 127.
Jephson, quoted, 20.
Jerbilla, the, natural history of, 170, 171.
Jerboa, the, natural history of, 170.
Jocko, the, of Buffon, 479.
Jomard, M., quoted, 147.
Jordan, valley of the, its physical features, 101, 102.

Kabara, the port of, 204.
Kabyle, the, character of, 520, 521.
Kafirtan, physical features of, 191; flora of, 252–256.
Kalihari Desert, physical features of, 191–193; flora of, 256, 257.
Kalmüks, the, ethnology, religion, character, customs of, 83, 84.
Kamtschatdales, the, physical features of, 577.
Kamtschatka, mountains of, 585.
Kanaks, the, 532.
Kandahar valley, the, account of, 196, 197.
Kangaroo, the Great, physical characters, habits, and manners of, 308, 309.
Karroos of South Africa, the, 188, 190.
Keats, quoted, 190.
Kenia, Mount, in Equatorial Africa, 597.
Kerman, Desert of, 97, 98.
Khaya Senegalensis, 410.
Kibirgiz, the, races of, 87, 88; customs, dwellings, attire, 89, 90, 91; character and mode of life, 91.
Kilimandjaro, Mount, in Equatorial Africa, 597.
Kina-balu, Mount, in Africa, 596.
Kingsley, Rev. Charles, quoted, 42.
Kite, the Black, reference to, 75.
Kong Mountains, the, in Africa, 596.
Kooloo-Kamba, the, 481.
Koragum, the, described, 71.
Koran, reference to the, 177.
Kordofan, physical features of, 247.
Korosko, Desert of, its physical features, 121, 122.
Korsak, the, described, 71.
Kuen-lun Mountains, the, in Asia, 595.

Lacerta crocodilus, 322.
Lagomys, the, natural history of, 561, 562.
Landor, W. S., quoted, 282.
Lanoye, F. de, quoted, 398, 401.
Laorty-Haoji, Father, quoted, 191, 192.
Laplanders, the, their character, occupation, mode of life, cradles, huts, and general characters, 571–573.
Latham, Dr., quoted, 93.
Lauraceæ, the, family of, described, 407.
Laurus cinnamomum, 414.
Lautuke, Comte Escayrac de, quoted, 146, 147.
Lavatera plebeia, 276.
Lawsonia inermis, 410.
Lebanon, mountains of, 595.
Lecythis ollaria, 434.
Leeba river, the, 197, 198; flora of, 257, 258.
Leguminosæ, the, family of, described, 277.
Leopard, the, natural history and anecdotes of, 303–305.
Lepus variabilis, 67.
Liana tieuté, described, 417.
Lichen esculentus, 173, 174.
Lignum vitæ, 264.
Limoniastrum Guyanianum, 140.
Linnæus (Linné), quoted, 428, 466, 471, 491.
Linum marginale, 276.
Lion, the, natural history of, 300; old fables respecting, 300; habits of, 301; general characters of, 303.
Livingstone, Dr., quoted, 192, 195, 198, 255, 257, 298, 299, 302, 303, 325, 326.
Llama, the, natural history of, 333; anecdotes respecting, 337.
Llaneros, the, account of, 220.
Llano-Estacado, the, 219.
Llanos, flora of, 266, 267.
Llanos, the.—See Pampas.
Lobata, plains of, 197.
Loganiaceæ, the, family of, described, 417.
Longfellow, quoted, 42, 128, 335, 600.
Lorinthaceæ, family of, described, 251.
Loris, the, natural history of, 491.
Lucan, quoted, 165.
Lund, Dr., quoted, 490.
Lupata Mountains, in Africa, 191.
Lyon, Captain, quoted, 566.

Maca, the, account of, 229.
Macropus giganteus, 308, 309.
Madagascar, flora of, 424–428.
Mahari, the, natural history of, 163, 164.
Mahogany Tree, the, account of, 410.
Mais del Agua, 270.
Makis, the, habits of, 492, 493.
Malabar Squirrel, the, natural history of, 500.
Malays, the, character and habits of, 526, 527.
Mamanchota, Organ Mountain of, 587.
Mammoth, the, natural history of, 448–450.
Man, supposed analogy between the Ape and, 471; early history of, 515.
Manchineal, the, nature and qualities of, 427, 440.
Mandinkê, the, tribe of, 518.
Mandrill, the, described, 469.
Mangrove tree, the, physiology of, 411, 412, 442.
Manioc, the, properties of, 242.
Manna plant, particulars of, 273.
Mant, Bishop, quoted, 72–75.
Mara, the, reference to, 342.
Marmot, the Alpine, account of, 608, 609.
Marquesas Islands, the, inhabitants of, 529, 530.
Marsupials, their physiology and characteristics, 367.—See Kangaroo, Phalanga, Phascolarctos, Thylacyni.
Martagon, the, described, 599.
Martens of the North, the, account of, 562, 563.
Martin, Sir Roger, his exploits as a tiger-killer, 310.
Martins, M. Charles, quoted, 124, 127, 131, 132, 133, 136, 138, 154, 601, 602.
Massarandulba, the, described, 388, 435.
Mastodon, the, particulars of, 447, 448.
Mauritia Palm, the, uses and importance of, 268.
Maury, Captain, quoted, 526, 532, 533, 536, 586.
Mauvaises Terres, in Nebraska, description of the, 212.
Mediterranean, the, 542.
Mekran, Desert of, 98.
Melantha punctata, 150, 154, 161, 601, 602.
Mesembryanthema described, 253, 257.
Mexico, Pampas of, 219; Savage Man in, 537.
Michelet, quoted, 321, 322.
Milton, the poet, quoted, 100, 197, 265, 303.
Milton, Lord, and Dr. Cheadle, quoted, 385, 386.
Milvus ater, 75.—See Kite.
Minican, destruction of, 38.
Minos, the, account of, 208.
Mint, Australian, described, 276.
Mirage, the, description of, 143; its effects and origin, 144, 145; explanation of, 146; characteristics of, 147, 148.
Mohammed, reference to, 178.
Mollugo cerviana, 253.
Moluccas, Flora of the, 421.
Mongolia, its position, history, present condition, ruined cities, 92; religion, races, and physical characteristics, 93, 94.
Mongolian family, the, offshoots of, 175.—See Arabs, Shemites.
Monkey, the, of the Old World, 468; of South America, 468, 488.—See Chacma, Derbias, Douc, Mandrill, Howling Monkey, Preacher Monkey, Red Monkey, Spotted Monkey.
Monodora myristica, 246.
Monostremata, the, natural history of, 373–376.—See Echidna.
Montoir, marshes of, 17, 18.
Moore, quoted, 93, 130, 143, 155, 156.
Morin, quoted, 203.
Mosques, Arctic, properties of, 556.
Mouflon, the, description of, 606.
Mount Despair, 238.
Mountains, the, atmosphere of, 582, 583; distribution and configuration of, 585; constituents of, 585, 586; of Europe, 588, 592, 597, 598; of Asia, 593–596; of Africa, 596, 597; vegetable and animal life of, 598–614.
Mourad, Desert of, 127.

Mpongwes, the, account of, 518.
Mulhacen, Peak of, in the Pyrenees, 591.
Muller, Max, quoted, 79, 88, 92.
Murray, C. A., quoted, 351, 352, 360.
Murray, the river, 235.
Musa cavite, 249.
Muscimon argali, 606.
Muscimon montanus, 606.
Musk-deer, the, 608.
Musk-ox, the, 557, 558.
Mustelidæ, the, natural history of, 317.
Myctes Beelzebub, 468, 469.
Myctes strumigenus, 468.
Myosotis, the, 691.
Myrmecophaga pilleata, 346–348.
Myrsine variabilis, 277.

Nadjed, table-land of, 111.
Nandan, the, account of, 353.
Nanguer (Gazelle), the, described, 109.
Narsilia macropus, 276, 277.
Nasalis larvatus, 468.
Natal, coast of, 191.
Nature, the study of, 428, 429.
Negro Cynopithecus, the, described, 467.
Negro, the, habitat of, 516, 517; his physical peculiarities, 517; in Africa, 517–521; in Australia, 522.
Nelumbium calophyllum, 259, 262.
Nepenthes distillatoria (or Pitcher Plant), the, described, 421.
New Holland, rivers of, 232.
Ngami, Lake, in Central Africa, 194; flora of, 257.
Nieuveld Bergen, in South Africa, 187, 597.
Niger, the, delta of, 193; valley of, 204.
Nigritia, vegetation of, 246, 247.
Nile, river, fecundity of, 118, 152; struggle between it and the Desert, 118; mountains of, 119; scenery of the valley of, 120; sources of the, 203; valley of, 152.
Nipa fruticans, 418.
North America, superiority of, over South America, 209; Deserts of, 210.—See Prairies.
Noukahiva, islanders of, 530–532.
Nova Zembla, described, 550.
Nshiégo-Mbouvé, the, account of, 481.
Nubia, women of, 184, 185.
Nuphar lutea, 263.
Nutmeg, the Calebash, account of, 249.
Nux Vomica, its properties, 417.
N'yanyizi-Nyassa, lake in Central Africa, 201.
Nylghau, the, description of, 295.

Oases of the Sahara, 128; their formation, 154; vegetable life of the, 155–157; of El-Kantara, described, 158, 159; of Ouargla, 159, 160; springs of, 161; precarious conditions of the existence of 161, 162.
Œnothera macrocarpa, 261.
Œstre, the, 558, 561.
Ombai, Inhabitants of, 528, 529.
Onagra, the, natural history of, 291; description of, 56; properties and uses, 56–58.
Ophidia, the, physiology and characteristics of, 324, 325.
Ophiomanus colonus, 242.
Opuntia frutescens, 266.
Orang-Outang, habitat of, 472; description of, 473; habits of, 473, 474; general details, 474–476.
Organ Mountains of Brazil, described, 587.
Orinoco, the river, 220, 223.
Oriza sativa, its properties, 242.
Ostiaks, the, described, 575; priests and worship of, 575; mode of hunting of, 576.
Ostrich, the, natural history of, 317; anecdotes of, 318; American species of, 353.
Otter of Kamtschatka, the, described, 564.
Ouaregla oasis of, described, 150, 160.
Ouistitis, the, account of, 490, 491.
Ourmiah, or Urumiyeh, Salt Lake of, 111.
Ox, the, in America, 350.

Paca, the, natural history of, 341, 342.
Pachydermata, the, characteristics of, 285, 286.
Palisades of the Hudson, 587; of the Rocky Mountains, 588.
Palliser, Captain, his expedition of discovery, 385.
Palmaceæ, the, physiology of the family of, 408.
Palm Moriche, the, described, 268, 269.
Palm tree, in Egypt, 152; growth of, in oases, 156; properties and uses of the fruit, 157; general details, 401, 402.
Pampas, the, description of, 219, 220; inhabitants, 226; area and physical aspects, 220–231.
Pampas grass, the, uses of, 273.
Pampas Indians, the, characteristics of, 539, 540.
Pampero, the, phenomenon of, 230.
Pandanus candelabrum, 245.
Panther, the, natural history of, 303.
Papaw tree, the, character of, 442.
Papuans, the, their manners and customs, 524, 525.
Paraloxures, the, described, 316, 317.
Paraguay river, the, 201.
Pariah Dog of India, described, 315.
Parkyns, Mansfield, quoted, 249, 462.
Parry, Captain, expeditions of, 580.
Partus picta, 295.
Pashiûba tree, the, account of, 388, 389, 446.
Pasom, the, described, 295.
Passiflora, the, order of, 439.
Patagonia, Pampas of, their physical aspect, 227, 228, 273; vegetable life in the, 258–2[illegible]
Patagonians, character of the, 540.
Pavillinia pinnata, 439.
Peccary of America, its natural history, 339.
Pechorals, the, their habits, 542.
Pelican, the, natural history of, 74, 75.
Pennant, quoted, 307.
Pennicillaria spicata, 242.
Pennisetum fasciculare, 275.
Pernambuco, Pampas of, described, 219, 220.
Perris, M., quoted, 37.
Peru, conquest of, 206, 209; plains of, 207, 208.
Petrogale brachiotis, 375.
Petrogale penicillata, 375.
Phacocœrus, the, natural history of, 289, 290.
Phalanga, the, account of, 371.
Phascolarctos, the, described, 370.
Phascolomys (or Wombat), the, introduced into Europe, 368; discovery of, 370; description of, 371.
Philippine Islands, the, vegetable life in, 423.
Phlox, the, character of, 261.
Picakolou, the, natural history of, 325, 326.
Pinelia axiflora, 277.
Pine Barrens of Mexico, the, description of, 215, 216.
Pine of New Caledonia, the, 424.
Pipa, the, account of, 363.
Piper nigrum, 245.
Pirates of the Desert, 175.
Pistacia lentiscus, 148.
Pistacia terebinthus, 148.
Pistia spatulata, 264.
Poa Abyssinica, 142.
Polar Regions, the, extent and area of, 544, 545; of America described, 545; of Asia, 549, 550; of Europe, 550, 551; discoveries in, 551–555; animal and vegetable life in, 555–568; character of the inhabitants of, 569–579.
Polecat, the Arctic, described, 562.
Polynesia, cannibalism in, 513; inhabitants of, their manners and customs, 528–532.
Pope, the poet, quoted, 151, 569.
Porcupine Ant-Eater, the, natural history of, 373, 374.
Porphyry, mountains of, 586.
Portuguese, discoveries of the, in the Terra Australis, 231, 232.
Pott, Professor, quoted, 86.
Prairies of North America, description of the, 211–215; of Central America, 216–219; vegetable life in the, 258–266.
Preacher Monkey, the, described, 468.
Primeval Forests, the, character of, 385, 386.
Prichle, quoted, 194.
Proboscideæ, the, physiology of, 447, 448.

Protaceæ, the, account of, 256
Protea Lalandii, 313, 314.
Proteaceæ nitidæ, 691.
Pæmma arenaria, 31.
Pteris caudata, 275.
Pteromys splendens, 501.
Pteromys volans, 501.
Pteromys volucella, 501.
PTOLEMÆUS, reference to, 151.
Pudenta gigas, 345.
Puff Adder, the, characters of, 326, 327.
Puma, the, natural history of, 342, 343.
Pyrenees, the, description of, 591.
Pythaeus ear, 478.
Python Molase, the, described, 325.
Python of Sunda, the, described, [illegible]

Quagga, the, natural history of, 291, 292.
Quango, the, valley of, 258.
QUARTERLY REVIEW, quoted, 188.
Quichuas, the, manners and habits of, 540, 541.
Quicksands in Arabia, described, 110, 111.
Quinquina, the, properties of, 441.

Race, influence of, on the world's history, 515, 516.
Races of the Desert, their characteristics, 174-185.
RADIQUET, M. MAX, quoted, 530, 531.
Rafflesia Arnoldi, discovery of, 417; description of, 418.
Rain in the Sahara, 155.
Rafelius mellivorus, 317.
Rattlesnake, the, physiology of, 350-361.
Ravenala Madagascariensis, the, account of, 427.
REACH, ANGUS, quoted, 29, 35.
Red Monkey, the, peculiarities of, 459.
Red Skins, the, ancient distribution of, 534; false romance with which they have been invested, 534, 536; various races of, 535, 536; physical peculiarities of, 536.
Reinsondaban, the, account of, 210.
Reindeer, the, natural history of, 558-561.
RENAN, M., quoted, 176.
RENNIE, JOHN, reference to, 44.
Retama Duriæi, 185.
Rhinoceros, the, physiology of, 459, 460; its habitats, 460; the Indian species of, 460; Javanese, 460, 461; African, 461, 462; adventure with a, 462.
Rhizophora mangle, 411.
Rhus toxicodendron, 229.
RICHARDSON, SIR J., quoted, 211, 561.
Rocelle, the, nature and properties of, 251.
Rocky Mountains of North America, the, 210, 211.
Rodentia, family of the, described, 169.
Roebuck of Tartary, the, described, 60.
Roggeveld Bergen, the, in South Africa, 187.
ROSS, COCPER, quoted, 462.
Rose of Jericho, the, described, 149.
Ross, Sir JAMES, quoted, 556, 561; Arctic discoveries of, 554, 555.
ROWE, Rev. J., quoted, 40.
ROWE, NATHANIEL, quoted, 300.
RUSKIN, J., quoted, 388, 389, 579.

Saccharum officinarum, 295.
SACHOT, M. OCTAVE, quoted, 527.
Sagalien, inhabitants of, described, 579.
Sago-palms, the, properties of, 421.
Sahara, the African, its physical aspects, 123, 124; mountains, 127; oases, described, 128, 154; its peculiarity of aspect, 151; area, 151, 152; climate of, 153.
Saiga, the, natural history of, 66, 67.
Salsolaceæ, the, properties of, 148.
Salt Desert, the, character of.—See DESERTS.
Salt-wort, described, 148.
Samoiedes, the, history and character of, 573-575.
Sand, Deserts of.—See DESERTS.
Sand-hills of Brittany, the, 32; their mode of formation, 35; of Gascony, 35; density and configuration, 36, 37; inland encroachments, 37, 38; their peculiar influence, 38; of Africa, 133, 134.
Santalum acuminatum, 279.
Sapucaya, or Monkey's Nut, the, described, 434.
Sarcoramphus Papa, the, account of, 354.
Sarkha, Desert of, 97.
Sarmiento, Mount, California, 598.
Sarracenia, the, characters of, 262.
Sassafras laurel, the, described, 261, 262.
Savacou, the, described, 354.
Savage Man, his abasement and mean pleasures, 503; his sanguinary instincts, 504, 505; his love of intoxicating drinks, want of a literature and of science, 505; his intellectual deficiencies as compared with Civilized Man, 506; his neglect of trade and commerce, imperfect conceptions of the Supreme Being, 507; sun-worship, 508; his priestcraft and superstition, 509; his low moral standard and cannibal tastes, 510.—For SAVAGE RACES, see pp. 516-542, and 569-679.
Savage Islands of Guinea, their features, 215.
Savanay, marshes of, described, 17, 18.
Saxifragas, the, properties and uses of, 261.
SCHOMBURGK, Sir R., quoted, 417, 430.
Sciadopeus verticillata, 421.
Sciurus Alpinus, account of, 499; *Caroliniensis*, 499, 500; *gebulus*, 500; *maximus*, 500; *vulgaris*, 499; *vulpinus*, 500.
Sea-Bear, the, natural history of, 568.
Sea-Lion, the, natural history of, 568.
Sea-shore Wolf, the, natural history of, 313.
Seal, the, habitats, manners, and physiology of, 568.
Sechura, pampa of, described, 219.
Senegal, serpent-worship of, 323; serpents of, described, 324.
Senegambia, physical features of, 240, 241; flora of, 241; cereal growth of, 241, 242.
Sennaar, physical features of, 247.
Sensitive plant, the, described, 268.
Serpent-Bird the, of the Cape, natural history of, 321.
Serpents of the Steppes, the, described, 77; of Asia and Africa, 323-328.—See OPHIDIA; VIPER.
SHAKSPEARE, quoted, 322.
Shekanis, the, account of, 518, 519.
SHELLEY, the poet, quoted, 43, 165, 329.
Shemites, the, characteristics of, 175, 176.—See ARABS, TIBBOOS, TOUKAREGS.
Shepherd races of Asia, their history, manners, customs, and character, 78, 79.
Shirwa, Lake, in Africa, 201.
Shoa, vegetable life in, 249.
Short-eared Rock Kangaroo, the, natural history of, 375.
Silk-cotton tree, the, properties of, 388.
Silphium laciniatum, 260.
Silphium terebinthinaceum, 260.
Simoom, the, phenomena and effects of, 135-138.
Sinai, Mount, physical aspect and associations of, 112, 113, 114, 597.
Sioux Indians, cemeteries of the, 215.
Sivas, quicksands of, described, 110, 111.
Skags-tol-tind, Mount, referred to, 588.
Sloth, natural history, habits, and manners of the, 494-496.—See THREE-TOED SLOTH, TWO-TOED SLOTH.
Smilax rotundifolia, 259.
SMITH, SYDNEY, quoted, 274.
SMYTH, Admiral, quoted, 590.
Sneeberger, mountain-range so called, 187, 597.
Snow, perpetual, limit of, 581.
Socotrine aloes, value of, 249.
Solidungulæ, the, order of, 290, 291.
SOMERVILLE, Mrs., quoted, 97, 98, 211, 223, 589.
SONNERAT, M., quoted, 494.
Sorgho grass, properties of, 248.

Southey, quoted, 404, 405, 508.
South America, inferiority of, to North, 209; its deserts, 210.—See Pampas, Virgin Forests.
Spain, its conquests in America, 206, 209.
Spenser, quoted, 356.
Sphagnum, the, properties of, 556.
Spider Monkey, the, described, 489, 490.
Spitzbergen, description of, 550, 551.
Spotted Monkey, the, described, 469.
Squirrel, the, natural history, habits, and characteristics of, 497–499.—See Alpine Squirrel, Barbary Squirrel, Common Squirrel, Flying Squirrel, Gray Squirrel, Malabar Squirrel.
Squirrel Monkey, the, 490.
Stag, the Spotted, described, 340; Yellow, described, 57.
Staghorn, the, described, 277.
Stanley, Dean, quoted, 99, 100, 101, 137.
Stapelia hirsuta, 251.
Steppes, the, in Europe and Asia, their extent, 46, 47; their plateaux, 47; their vegetable life, 47–49; phenomena connected with, 49, 50; animal life of, 51; ornithology, 71–77; erpetology, 78; inhabitants, 78.
Steppes of South America, the, surface of, 220; vegetation, swamps, and conflagrations of, 221–224; a night on, 225; inundations of, 226; solitude of, 227; Steppes of Patagonia, 227, 228; Buenos Ayres and the Andes, 228, 229; of Desplobado, 229; hurricanes of, 230; animal life of, 230, 231.
Sterculia acuminata, 445.
Sterculiaceæ, the, family of, 411.
St. Hilaire, Augustus, quoted, 539.
St. John, Spenser, quoted, 596.
Stipa crinita, 279.
Stipa tenacissima, 150.
Stocqueler, quoted, 209.
Stork, the, description of, 320.
Strachey, Captain, quoted, 593.
Strelitzia regina, described, 256.
Struthio camelus, 318.—See Ostrich.
Strychnine, nature and properties of, 417.
Styraceæ, family of, their characteristics, 406.
Sugar cane, history of, 246.
Sugar palm, the, described, 418.
Sumatra, vegetable life in, 416, 417; cannibalism in, 511, 513.
Sun, worship of, once prevalent, 508.
Surinam toad, the, described, 363.
Swamp oak, the, qualities of, 277.
Swan's Marsh, the, reference to, 259.
Swietenia Mahogani, its uses, 410.
Table Mountains, the, geography of, 597.
Talfourd, Sir T. N., quoted, 504, 505.
Tallow tree, the, properties and uses of, 408.
Tamanoir, the, described, 340.
Tamarind, the, characteristics of, 411.
Tamias, the, account of, 502.
Tanganyika, Lake, in Central Africa, 291, 292.
Tanguen, or Tanghin, the, properties of, 427.
Tapioca, commercial value of, 242.
Tapir, the, 338, 339; natural history of the American, 338; mode of defence, and peculiarities of, 339, 340.
Tarpan, the, natural history of, 51–55; reference to, 291.
Tartar-Nogais, the, their territories, customs, and religion, 80, 81.
Taro, the, account of, 245.
Tarsi, the, description of, 492.
Taylor, Henry, quoted, 210.
Taylor, Tom, professor, quoted, 20.
Tchad, Lake, discovery of, 293, 294; description of, 294.
Teak, the, properties and commercial value of, 406.
Tegeter, Mount, referred to, 247.
Telfaria pedata, the, described, 246.
Temperature, laws affecting, 580.
Teneriffe, peak of, described, 597.
Tennyson, quoted, 14, 28, 44, 151, 231, 596.
Tété, flora of, 258.
Texas, vegetable life of, 262–266.
Theobroma cacao, properties of, 245.
Thibet, bear of, 600.
Thomson, quoted, 119.
Thrasectus, 355.
Three-toed Sloth, the, natural history of, 496.
Thylacyni, the, natural history of, 371–373.
Ti, the, described, 277.
Tibboos, the, of Africa, their habits and character, 181–183.
Tierra-del-Fuego, inhabitants of, 541.
Tiger, the, natural history of, 305; described by Buffon, 306; by Daubenton, 306; characteristics, habits, swiftness of, 307, 308; mode of hunting, 309, 310.
Tiger-cats, the, description of, 423.
Tigré, geological features of, 248; flora of, 248, 249.
Tillandsia usneoides, 264, 265.
Tip, desert of, 211.
Toads.—See Agua, Bull-Frog, Surinam Toad.
Tocusra, the, 242.
Todea Africana, 256.
Toothache-tree, the, described, 264.
Topaz, the, account of, 540.
Touaregs, the, of Africa, their manners, habits, and characteristics, 181–183.
Trachytic rocks, character of, 588.
Traveller's tree, the, described, 279, 427.
Trecul, M., quoted, 254, 263, 264, 266.
Tree-ferns, their character, 436, 437.
Trees, colossal, of Peru, 387–389.
Tremaux, M., quoted, 129, 137, 184, 185.
Tremblet, M., quoted, 183.
Trichecus, 568.
Trigonocephalus, the, description of, 361.
Tristegis glutinosa, 271.
Tristram, Rev. H. B., quoted, 96, 97, 128.
Trumpet-Bird, the, description of, 354.
Tumbon, the, physiology of, 251, 252.
Tupinambis, the, described, 172.
Two-toed Sloth, the, natural history of, 496, 497.

Unau, the, described, 496, 497.
Uncaria gambir speciosa, 265.
Upas-tree, the properties of, 417; fables relating to, 417.
Upper Guinea.—See Senegambia.
Ural Mountains, the, geology of, 592.
Urceola elastica, 418.
Uvaria Æthiopica, 246.

Vaquois, the, character of, 421, 428.
Varan of the Nile, the, described, 173.
Varans of the Desert, the, natural history of, 171–173.
Variegated Baboon, the, account of, 469.
Venezuela, pampas of, 220–226.
Vesuvius, Mount, description of, 590.
Vibro, the genus, 429.
Victoria Nyanza, Lake, discovery and account of, 292.
Victoria regia, the, history and description of, 269, 270.
Vicuña, the, natural history of, 335–337.
Vine, the, account of, 246.
Viper, the camel-headed, description of, 361–363.
Viperæ cerastes, the, natural history of, 171, 172.
Vipers, the, of the Desert, 160, 171, 172; of South Africa, 325, 326.
Virgin Forests, their extent and characteristics, 385–392; vegetable life in, 390, 391; a day in, 395–397.
Vistula, the river, 592.
Vitis vinifera, 246.
Viverridæ, the, natural history of, 316, 317.
Vizcacha, the, described, 342.
Vouabembés, the, cannibalism among, 514.
Von Martius, the traveller, quoted, 387.
Von Tschudi, quoted, 220, 333, 334, 337.
Vosges, the, mountain-range of, 14, 591.

Wallace, Mr., quoted, 329, 330.
Walrus, the, natural history of, 568.
Water-lily, yellow, the, described, 263.
Water snake, the, habits of, 398.
Waterton, the naturalist, quoted, 195, 496.
Wells in the Sahara, 161.
Welwitsch, Dr., quoted, 231.
Welwitschia, the, described, 231, 232.
Whirlwinds of sand, description of, 141, 142.
White, Walter, quoted, 45.
White wormwood, the, properties of, 150, 151.
Whydah, serpents at, 324.
Wilkes, Admiral, quoted, 541, 542; Arctic discoveries of, 553, 554.
Wills, W. J., quoted, 230, 238.
Wilson, Alexander, quoted, 355, 356.
Wistman's Wood, description of, 40, 41.
Wolf of Tartary, description of, 67; his ravages, 68–70.
Wombat, the, 570.—See Phascolomys.
Wood, Rev. J. G., quoted, 343, 344.
Woods of Europe, their aspect and characteristics, 397, 398.
Wordsworth, quoted, 177, 209, 247.
Wourali, the poison, deadly nature of, 439.
Wou-wou, the, natural history of, 478.
Wrede, Baron de, quoted, 107, 110.
Xanthorrhœa arborea, 278, 279.
Yakoutes, the, their habits and mode of hunting, 576, 577.
Yucca tréculeana, 266.
Yvan, Dr., quoted, 587.
Zambesi, the, course of, 195, 196; delta and cascades of, 198, 201; vegetation of, 258.
Zana, Lake, vegetation on the shores of, 247, 248.
Zebra, the, natural history of, 292.
Zebra Wolf, the, natural history of, 372.
Zibeth, the, described, 316.
Zopelotes, the, described, 354.
Zorga, the, account of, 194.

List of Illustrations.

WHOLE PAGE ENGRAVINGS.

		Page
1.	A Pyrenean Landscape,	15
2.	Celtic Memorials in Brittany,	21
3.	The Shepherds of the Landes,	25
4.	A Flood in Brittany,	33
5.	Wild Horses terrified by a Storm,	53
6.	The Dead Sea,	103
7.	Caravan in the Desert,	107
8.	Lake Baudouin (a Salt Lake),	115
9.	Landscape in the Atlas (Region of Table-lands),	125
10.	The Sahara (Desert of Erosion),	129
11.	French Column surprised by the Simoom,	139
12.	Night-Scene in the African Interior,	189
13.	Victoria Falls, River Zambesi,	199
14.	Prairies of North America,	207
15.	View of the "Mauvaises-Terres," Nebraska,	213
16.	A Prairie on Fire in Central America,	227
17.	Pampas of South America,	221
18.	Australian Landscape,	233
19.	Vegetable Life in the African Plains,	253
20.	Tiger-hunting in the Indo-Chinese Peninsula,	311
21.	Hunter pursued by Peccaries,	331
22.	The Virgin Forest of the Gaboon,	381
23.	The Virgin Forest in Brazil,	391
24.	Tropical Vegetation,	399
25.	Flora of the East Indian Islands,	419
26.	A Forest in Madagascar,	425
27.	Flora of the New World,	443
28.	Hunting the Elephant in Africa,	453
29.	A Corral in Ceylon,	457
30.	Death of an Orang-Outang,	475
31.	A Gorilla killing a Negro,	485
32.	A Cannibal Feast among the Battas of Sumatra,	511
33.	The Desert of Ice (Arctic Pole),	547
34.	The Reindeer of Lapland,	559
35.	The Condor of the Andes,	611

VIGNETTES.

1.	The Tarpan, or Wild Horse,	51
2.	Onagra, or Wild Ass,	57
3.	Bactrian Camel,	60
4.	The Eland,	65
5.	Capture of a Wolf by a Kirghiz Horseman,	69
6.	Great Bittern—White Heron—Curlew,	73
7.	The Eagle of the Steppes, and the Antelope Saiga,	76
8.	Cossack Horsemen in the Steppes,	83
9.	Night Encampment of Gipsies in the Steppes,	87
10.	Khirgiz Aoul or Village,	90
11.	Mount Sinai,	113
12.	Ravines of Kokosko,	122
13.	Whirlwinds of Sand,	141
14.	A Mirage in the Desert,	145
15.	Jujube Tree—Lentiscus—Tamarisk,	150
16.	Doum-Palm—Date-Palm—Alfa,	153
17.	A Street in Ouargla,	159
18.	The Mahari—The Djemel,	163
19.	Striped Hyænas of the Sahara,	165
20.	Jackals disinterring Dead Bodies,	166
21.	Gypaëtos—Soudable Vulture—Cathartes Percnopterus,	167
22.	Gazelles—Antelope—Nanguer,	169
23.	Gazelles of Arabia opposing a Panther,	470

Page

24. Jerboas attacked by a Horned Viper, .. 171
25. Varan of the Nile—Varan of the Desert, 172
26. Bedouin Shepherds and Bedouin Nomades, 180
27. Touaregs, ... 181
28. Attack upon a Q'sour, ... 182
29. Nubian Women, ... 184
30. Burke, Wills, and King in the Deserts of Central Australia, ... 239
31. Vegetable Life in South Africa, ... 250
32. Vegetable Life of Cape Colony, ... 253
33. Vegetable Life of Cape Colony, ... 254
34. Vegetable Life of Cape Colony, ... 255
35. Vegetable Life in the American Prairies, 261
36. Vegetable Life in Texas, ... 263
37. Vegetable Life in the Texan Prairies, .. 265
38. Vegetable Life in the Plains of the Meta, 269
39. Aquatic plants of Guiana, ... 271
40. Vegetable Life in the Pampas, ... 272
41. Vegetable Life in Victoria, ... 276
42. Vegetable Life on the Australian Plains, .. 278
43. Vegetable Life on the Australian Plains, .. 280
44. Hippopotamus and Crocodile of the River Nile, ... 286
45. Rhinoceros, ... 289
46. The Daw and the Quagga, ... 290
47. Zebras, ... 293
48. A Lion rending a Giraffe, ... 294
49. Antelope Gnu—Oreas Lanna—Striped or Banded Gnu, ... 296
50. An African Hopo, ... 298
51. The African Leopard, ... 304
52. Spotted Hyænas, ... 314
53. Zibeth and Indian Genet, ... 315
54. Striped Paradoxure devouring a Crested Goura, ... 316
55. Ostriches, ... 319
56. Rose Flamingoes, ... 324
57. Python Molure—Echidna—Fennec, .. 326
58. American Tapir, ... 329
59. Guanaco—Llama—Vicuña, ... 337
60. Agouti—Capybara, ... 340
61. Armadillo Loricata—Ant-Eater, ... 347
62. Cougouars, or Pumas, ... 349
63. Bison attacked by Jaguar, ... 350
64. Prairie Wolves, ... 351
65. Cathartes-Urubu—King of the Vultures, 355
66. Alligators, or Caimans, ... 357
67. Crotalus, and Boa-Constrictor, ... 360
68. Trigonocephalus pursued by Birds, .. 362
69. Bufo Agua—Pipa Surinamensis, ... 364
70. Fishing for Gymnoti, ... 365
71. Large-Browed Wombat, ... 369
72. Thylacynus Cynocephalus, ... 372
73. Ornithorhynchus—Echidna, ... 374
74. Apteryx Australis, ... 377

Page

75. The Banyan Tree, ... 404
76. Baobab—Guinea Palm—Acacia-verek, .. 409
77. Bread-fruit Tree of Ceylon, ... 414
78. Nipa fruticans—Sugar Palm—Ipé Antiar, 416
79. Ravenala [illegible] Madagascariensis—Horitiera argentea—Tanghin, A 424
80. Large-leaved Magnolia—Virginian Catalpa—Pinus Sabiniana, ... 431
81. Bicchamia Brasiliense—Alsophila horrida—Pandanus plicatum—Maranta—Caladium violaceum, ... 435
82. Liriana—Carolinea insignis—Clusia rosea, 438
83. Kaffir Hunter carried off by a Rhinoceros, 461
84. Baboons plundering a Garden, ... 466
85. The Black Cynopithecus, ... 467
86. Gibbon-Siamang, and Mourning Gibbon, 471
87. Howling Monkeys, ... 488
88. Ateles crossing a River, ... 492
89. Maki-Mococs—White-Mantled Maki, .. 493
90. Cheiromys, or Aye-Aye of Madagascar, .. 495
91. Ai—Unau, ... 497
92. Common European Squirrels, ... 498
93. Negroes: Natives of Kidi, Africa, ... 5
94. Kaffir Warriors, ... 5
95. Hottentots: A Man and Woman, ... 521
96. Australians, ... 3
97. Papuans, ... 3
98. Malays: Male and Two Females, .. 527
99. Hovas of Madagascar: Men, Woman, and Child, ... 528
100. Warriors of the Island of Ombai, .. 529
101. Islanders of Noukahiva, ... 531
102. Indians of North America. The Red Skins, ... 533
103. Indian Women of North America, .. 536
104. The Apaches attacking an Emigrant Train, ... 537
105. Guarani Indians (South America), .. 538
106. Patagonians, ... 539
107. Adelie Land (Antarctic Ocean), ... 541
108. Ermine and Sable-Marten, ... 5
109. The White Bear and her Cubs, ... 567
110. Lapland Fishers, ... 572
111. A Samoiede Family, ... 574
112. Yakout Warrior worried by a White Bear, 576
113. Kamtschatdales, ... 5
114. The Organ Mountains of Rio Janeiro, .. 586
115. The Himalayas: Mount Guarisankar, .. 594
116. Fir, with Bearded Usnea—Great Yellow Gentian—Martagon, ... 600
117. Cedar of Lebanon, ... 602
118. Rhododendrons of the Himalaya, .. 604
119. Musk Deer, ... 607
120. Black Bear of Canada—Gray Bear of North America, ... 610

LIBRARY