CHAPTER XII.

Valparaiso—Excursion to the foot of the Andes—Structure of the land—Ascend the Bell of Quillota—Shattered masses of greenstone—Immense valleys—Mines—State of miners—Santiago—Hot-baths of Cauquenes—Gold-mines—Grinding-mills—Perforated stones—Habits of the Puma—El Turco and Tapacolo—Humming-birds.

CENTRAL CHILE.

July 23rd.—The Beagle anchored late at night in the bay of Valparaiso, the chief seaport of Chile. When morning came, everything appeared delightful. After Tierra del Fuego, the climate felt quite delicious—the atmosphere so dry, and the heavens so clear and blue with the sun shining brightly, that all nature seemed sparkling with life. The view from the anchorage is very pretty. The town is built at the very foot of a range of hills, about 1600 feet high, and rather steep. From its position, it consists of one long, straggling street, which runs parallel to the beach, and wherever a ravine comes down, the houses are piled up on each side of it. The rounded hills, being only partially protected by a very scanty vegetation, are worn into numberless little gullies, which expose a singularly bright red soil. From this cause, and from the low whitewashed houses with tile roofs, the view reminded me of St. Cruz in Teneriffe. In a north-easterly direction there are some fine glimpses of the Andes: but these mountains appear much grander when viewed from the neighbouring hills; the great distance at which they are situated, can then more readily be perceived. The volcano of Aconcagua is particularly magnificent. This huge and irregularly conical mass has an elevation greater than that of Chimborazo; for, from measurements made by the officers in the Beagle, its height is no less than 23,000 feet. The Cordillera, however, viewed from this point, owe the greater part of their beauty to the atmosphere through which they are seen. When the sun was setting in the Pacific, it was admirable to watch how clearly their rugged outlines could be distinguished, yet how varied and how delicate were the shades of their colour.

I had the good fortune to find living here Mr. Richard Corfield, an old schoolfellow and friend, to whose hospitality and kindness I was greatly indebted, in having afforded me a most pleasant residence during the Beagle's stay in Chile. The immediate neighbourhood of Valparaiso is not very productive to the naturalist. During the long summer the wind blows steadily from the southward, and a little off shore, so that rain never falls; during the three winter months, however, it is sufficiently abundant. The vegetation in consequence is very scanty: except in some deep valleys, there are no trees, and only a little grass and a few low bushes are scattered over the less steep parts of the hills. When we reflect, that at the distance of 350 miles to the south, this side of the Andes is completely hidden by one impenetrable forest, the contrast is very remarkable. I took several long walks while collecting objects of natural history. The country is pleasant for exercise. There are many very beautiful flowers; and, as in most other dry climates, the plants and shrubs possess strong and peculiar odours—even one's clothes by brushing through them became scented. I did not cease from wonder at finding each succeeding day as fine as the foregoing. What a difference does climate make in the enjoyment of life! How opposite are the sensations when viewing black mountains half-enveloped in clouds, and seeing another range through the light blue haze of a fine day! The one for a time may be very sublime; the other is all gaiety and happy life.

August 14th.—I set out on a riding excursion, for the purpose of geologising the basal parts of the Andes, which alone at this time of the year are not shut up by the winter snow. Our first day's ride was northward along the sea-coast. After dark we reached the Hacienda of Quintero, the estate which formerly belonged to Lord Cochrane. My object in coming here was to see the great beds of shells, which stand some yards above the level of the sea, and are burnt for lime. The proofs of the elevation of this whole line of coast are unequivocal: at the height of a few hundred feet old-looking shells are numerous, and I found some at 1300 feet. These shells either lie loose on the surface, or are embedded in a reddish-black vegetable mould. I was much surprised to find under the microscope that this vegetable mould is really marine mud, full of minute particles of organic bodies.

15th.—We returned towards the valley of Quillota. The country was exceedingly pleasant; just such as poets would call pastoral: green open lawns, separated by small valleys with rivulets, and the cottages, we may suppose of the shepherds, scattered on the hill-sides. We were obliged to cross the ridge of the Chilicauquen. At its base there were many fine evergreen forest-trees, but these flourished only in the ravines, where there was running water. Any person who had seen only the country near Valparaiso, would never have imagined that there had been such picturesque spots in Chile. As soon as we reached the brow of the Sierra, the valley of Quillota was immediately under our feet. The prospect was one of remarkable artificial luxuriance. The valley is very broad and quite flat, and is thus easily irrigated in all parts. The little square gardens are crowded with orange and olive trees, and every sort of vegetable. On each side huge bare mountains rise, and this from the contrast renders the patchwork valley the more pleasing. Whoever called "Valparaiso" the "Valley of Paradise," must have been thinking of Quillota. We crossed over to the Hacienda de San Isidro, situated at the very foot of the Bell Mountain.

Chile, as may be seen in the maps, is a narrow strip of land between the Cordillera and the Pacific; and this strip is itself traversed by several mountain-lines, which in this part run parallel to the great range. Between these outer lines and the main Cordillera, a succession of level basins, generally opening into each other by narrow passages, extend far to the southward: in these, the principal towns are situated, as San Felipe, Santiago, San Fernando. These basins or plains, together with the transverse flat valleys (like that of Quillota) which connect them with the coast, I have no doubt are the bottoms of ancient inlets and deep bays, such as at the present day intersect every part of Tierra del Fuego and the western coast. Chile must formerly have resembled the latter country in the configuration of its land and water. The resemblance was occasionally shown strikingly when a level fog-bank covered, as with a mantle, all the lower parts of the country: the white vapour curling into the ravines, beautifully represented little coves and bays; and here and there a solitary hillock peeping up, showed that it had formerly stood there as an islet. The contrast of these flat valleys and basins with the irregular mountains, gave the scenery a character which to me was new and very interesting.

From the natural slope to seaward of these plains, they are very easily irrigated, and in consequence singularly fertile. Without this process the land would produce scarcely anything, for during the whole summer the sky is cloudless. The mountains and hills are dotted over with bushes and low trees, and excepting these the vegetation is very scanty. Each landowner in the valley possesses a certain portion of hill-country, where his half-wild cattle, in considerable numbers, manage to find sufficient pasture. Once every year there is a grand "rodeo," when all the cattle are driven down, counted, and marked, and a certain number separated to be fattened in the irrigated fields. Wheat is extensively cultivated, and a good deal of Indian corn: a kind of bean is, however, the staple article of food for the common labourers. The orchards produce an overflowing abundance of peaches, figs, and grapes. With all these advantages, the inhabitants of the country ought to be much more prosperous than they are.

16th.—The mayor-domo of the Hacienda was good enough to give me a guide and fresh horses; and in the morning we set out to ascend the Campana, or Bell Mountain, which is 6400 feet high. The paths were very bad, but both the geology and scenery amply repaid the trouble. We reached, by the evening, a spring called the Agua del Guanaco, which is situated at a great height. This must be an old name, for it is very many years since a guanaco drank its waters. During the ascent I noticed that nothing but bushes grew on the northern slope, whilst on the southern slope there was a bamboo about fifteen feet high. In a few places there were palms, and I was surprised to see one at an elevation of at least 4500 feet. These palms are, for their family, ugly trees. Their stem is very large, and of a curious form, being thicker in the middle than at the base or top. They are excessively numerous in some parts of Chile, and valuable on account of a sort of treacle made from the sap. On one estate near Petorca they tried to count them, but failed, after having numbered several hundred thousand. Every year in the early spring, in August, very many are cut down, and when the trunk is lying on the ground, the crown of leaves is lopped off. The sap then immediately begins to flow from the upper end, and continues so doing for some months: it is, however, necessary that a thin slice should be shaved off from that end every morning, so as to expose a fresh surface. A good tree will give ninety gallons, and all this must have been contained in the

vessels of the apparently dry trunk. It is said that the sap flows much more quickly on those days when the sun is powerful; and likewise, that it is absolutely necessary to take care, in cutting down the tree, that it should fall with its head upwards on the side of the hill; for if it falls down the slope, scarcely any sap will flow; although in that case one would have thought that the action would have been aided, instead of checked, by the force of gravity. The sap is concentrated by boiling, and is then called treacle, which it very much resembles in taste.

We unsaddled our horses near the spring, and prepared to pass the night. The evening was fine, and the atmosphere so clear, that the masts of the vessels at anchor in the bay of Valparaiso, although no less than twenty-six geographical miles distant, could be distinguished clearly as little black streaks. A ship doubling the point under sail, appeared as a bright white speck. Anson expresses much surprise, in his voyage, at the distance at which his vessels were discovered from the coast; but he did not sufficiently allow for the height of the land, and the great transparency of the air.

The setting of the sun was glorious; the valleys being black, whilst the snowy peaks of the Andes yet retained a ruby tint. When it was dark, we made a fire beneath a little arbour of bamboos, fried our charqui (or dried slips of beef), took our maté, and were quite comfortable. There is an inexpressible charm in thus living in the open air. The evening was calm and still;—the shrill noise of the mountain bizcacha, and the faint cry of a goatsucker, were occasionally to be heard. Besides these, few birds, or even insects, frequent these dry, parched mountains.

August 17th.—In the morning we climbed up the rough mass of greenstone which crowns the summit. This rock, as frequently happens, was much shattered and broken into huge angular fragments. I observed, however, one remarkable circumstance, namely, that many of the surfaces presented every degree of freshness—some appearing as if broken the day before, whilst on others lichens had either just become, or had long grown, attached. I so fully believed that this was owing to the frequent earthquakes, that I felt inclined to hurry from below each loose pile. As one might very easily be deceived in a fact of this kind, I doubted its accuracy, until ascending Mount Wellington, in Van Diemen's Land, where earthquakes do not occur;

and there I saw the summit of the mountain similarly composed and similarly shattered, but all the blocks appeared as if they had been hurled into their present position thousands of years ago.

We spent the day on the summit, and I never enjoyed one more thoroughly. Chile, bounded by the Andes and the Pacific, was seen as in a map. The pleasure from the scenery, in itself beautiful, was heightened by the many reflections which arose from the mere view of the Campana range with its lesser parallel ones, and of the broad valley of Quillota directly intersecting them. Who can avoid wondering at the force which has upheaved these mountains, and even more so at the countless ages which it must have required, to have broken through, removed, and levelled whole masses of them? It is well in this case, to call to mind the vast shingle and sedimentary beds of Patagonia, which, if heaped on the Cordillera, would increase its height by so many thousand feet. When in that country, I wondered how any mountain-chain could have supplied such masses, and not have been utterly obliterated. We must not now reverse the wonder, and doubt whether all-powerful time can grind down mountains—even the gigantic Cordillera—into gravel and mud.

The appearance of the Andes was different from that which I had expected. The lower line of the snow was of course horizontal, and to this line the even summits of the range seemed quite parallel. Only at long intervals, a group of points or a single cone, showed where a volcano had existed, or does now exist. Hence the range resembled a great solid wall, surmounted here and there by a tower, and making a most perfect barrier to the country.

Almost every part of the hill had been drilled by attempts to open gold-mines: the rage for mining has left scarcely a spot in Chile unexamined. I spent the evening as before, talking round the fire with my two companions. The Guasos of Chile, who correspond to the Gauchos of the Pampas, are, however, a very different set of beings. Chile is the more civilized of the two countries, and the inhabitants, in consequence, have lost much individual character. Gradations in rank are much more strongly marked: the Guaso does not by any means consider every man his equal; and I was quite surprised to find that my companions did not like to eat at the same time with myself. This feeling of inequality is a necessary consequence of the existence of an aristocracy of wealth. It is said that some few of the

greater landowners possess from five to ten thousand pounds sterling per annum: an inequality of riches which I believe is not met with, in any of the cattle-breeding countries eastward of the Andes. A traveller does not here meet that unbounded hospitality which refuses all payment, but yet is so kindly offered that no scruples can be raised in accepting it. Almost every house in Chile will receive you for the night, but a trifle is expected to be given in the morning; even a rich man will accept two or three shillings. The Gaucho, although he may be a cut-throat, is a gentleman; the Guaso is in few respects better, but at the same time a vulgar, ordinary fellow. The two men, although employed much in the same manner, are different in their habits and attire; and the peculiarities of each are universal in their respective countries. The Gaucho seems part of his horse, and scorns to exert himself excepting when on its back; the Guaso may be hired to work as a labourer in the fields. The former lives entirely on animal food; the latter almost wholly on vegetable. We do not here see the white boots, the broad drawers, and scarlet chilipa; the picturesque costume of the Pampas. Here, common trowsers are protected by black and green worsted leggings. The poncho, however, is common to both. The chief pride of the Guaso lies in his spurs; which are absurdly large. I measured one which was six inches in the *diameter* of the rowel, and the rowel itself contained upwards of thirty points. The stirrups are on the same scale, each consisting of a square, carved block of wood, hollowed out, yet weighing three or four pounds. The Guaso is perhaps more expert with the lazo than the Gaucho; but, from the nature of the country, he does not know the use of the bolas.

August 18th.—We descended the mountain, and passed some beautiful little spots, with rivulets and fine trees. Having slept at the same hacienda as before, we rode during the two succeeding days up the valley, and passed through Quillota, which is more like a collection of nursery-gardens than a town. The orchards were beautiful, presenting one mass of peach-blossoms. I saw, also, in one or two places the date-palm; it is a most stately tree; and I should think a group of them in their native Asiatic or African deserts must be superb. We passed likewise San Felipe, a pretty straggling town like Quillota. The valley in this part expands into one of those great bays or plains, reaching to the foot of the Cordillera, which have been

mentioned as forming so curious a part of the scenery of Chile. In the evening we reached the mines of Jajuel, situated in a ravine at the flank of the great chain. I stayed here five days. My host, the superintendent of the mine, was a shrewd but rather ignorant Cornish miner. He had married a Spanish woman, and did not mean to return home; but his admiration for the mines of Cornwall remained unbounded. Amongst many other questions, he asked me, "Now that George Rex is dead, how many more of the family of Rexes are yet alive?" This Rex certainly must be a relation of the great author Finis, who wrote all books!

These mines are of copper, and the ore is all shipped to Swansea, to be smelted. Hence the mines have an aspect singularly quiet, as compared to those in England: here no smoke, furnaces, or great steam-engines, disturb the solitude of the surrounding mountains.

The Chilian government, or rather the old Spanish law, encourages by every method the searching for mines. The discoverer may work a mine on any ground, by paying five shillings; and before paying this he may try, even in the garden of another man, for twenty days.

It is now well known that the Chilian method of mining is the cheapest. My host says that the two principal improvements introduced by foreigners have been, first, reducing by previous roasting the copper pyrites—which, being the common ore in Cornwall, the English miners were astounded on their arrival to find thrown away as useless: secondly, stamping and washing the scoriae from the old furnaces—by which process particles of metal are recovered in abundance. I have actually seen mules carrying to the coast, for transportation to England, a cargo of such cinders. But the first case is much the most curious. The Chilian miners were so convinced that copper pyrites contained not a particle of copper, that they laughed at the Englishmen for their ignorance, who laughed in turn, and bought their richest veins for a few dollars. It is very odd that, in a country where mining had been extensively carried on for many years, so simple a process as gently roasting the ore to expel the sulphur previous to smelting it, had never been discovered. A few improvements have likewise been introduced in some of the simple machinery; but even to the present day, water is removed from some mines by men carrying it up the shaft in leathern bags!

The labouring men work very hard. They have little time allowed for their meals, and during summer and winter they begin when it is light, and leave off at dark. They are paid one pound sterling a month, and their food is given them: this for breakfast consists of sixteen figs and two small loaves of bread; for dinner, boiled beans; for supper, broken roasted wheat grain. They scarcely ever taste meat; as, with the twelve pounds per annum, they have to clothe themselves, and support their families. The miners who work in the mine itself have twenty-five shillings per month, and are allowed a little charqui. But these men come down from their bleak habitations only once in every fortnight or three weeks.

During my stay here I thoroughly enjoyed scrambling about these huge mountains. The geology, as might have been expected, was very interesting. The shattered and baked rocks, traversed by innumerable dykes of greenstone, showed what commotions had formerly taken place. The scenery was much the same as that near the Bell of Quillota—dry barren mountains, dotted at intervals by bushes with a scanty foliage. The cactuses, or rather opuntias, were here very numerous. I measured one of a spherical figure, which, including the spines, was six feet and four inches in circumference. The height of the common cylindrical, branching kind, is from twelve to fifteen feet, and the girth (with spines) of the branches between three and four feet.

A heavy fall of snow on the mountains prevented me, during the last two days, from making some interesting excursions. I attempted to reach a lake which the inhabitants, from some unaccountable reason, believe to be an arm of the sea. During a very dry season, it was proposed to attempt cutting a channel from it for the sake of the water, but the padre, after a consultation, declared it was too dangerous, as all Chile would be inundated, if, as generally supposed, the lake was connected with the Pacific. We ascended to a great height, but becoming involved in the snow-drifts failed in reaching this wonderful lake, and had some difficulty in returning. I thought we should have lost our horses; for there was no means of guessing how deep the drifts were, and the animals, when led, could only move by jumping. The black sky showed that a fresh snow-storm was gathering, and we therefore were not a little glad when we escaped. By the

time we reached the base the storm commenced, and it was lucky for us that this did not happen three hours earlier in the day.

August 26th.—We left Jajuel and again crossed the basin of S. Felipe. The day was truly Chilian: glaringly bright, and the atmosphere quite clear. The thick and uniform covering of newly-fallen snow rendered the view of the volcano of Aconcagua and the main chain quite glorious. We were now on the road to Santiago, the capital of Chile. We crossed the Cerro del Talguen, and slept at a little rancho. The host, talking about the state of Chile as compared to other countries, was very humble: "Some see with two eyes and some with one, but for my part I do not think that Chile sees with any."

August 27th.—After crossing many low hills we descended into the small land-locked plain of Guitron. In the basins, such as this one, which are elevated from one thousand to two thousand feet above the sea, two species of acacia, which are stunted in their forms, and stand wide apart from each other, grow in large numbers. These trees are never found near the sea-coast; and this gives another characteristic feature to the scenery of these basins. We crossed a low ridge which separates Guitron from the great plain on which Santiago stands. The view was here pre-eminently striking: the dead level surface, covered in parts by woods of acacia, and with the city in the distance, abutting horizontally against the base of the Andes, whose snowy peaks were bright with the evening sun. At the first glance of this view, it was quite evident that the plain represented the extent of a former inland sea. As soon as we gained the level road we pushed our horses into a gallop, and reached the city before it was dark.

I stayed a week in Santiago and enjoyed myself very much. In the morning I rode to various places on the plain, and in the evening dined with several of the English merchants, whose hospitality at this place is well known. A never-failing source of pleasure was to ascend the little hillock of rock (St. Lucia) which projects in the middle of the city. The scenery certainly is most striking, and, as I have said, very peculiar. I am informed that this same character is common to the cities on the great Mexican platform. Of the town I have nothing to say in detail: it is not so fine or so large as Buenos Ayres, but is built after the same model. I arrived here by a circuit to the north; so I resolved to return to Valparaiso by a rather longer excursion to the south of the direct road.

September 5th.—By the middle of the day we arrived at one of the suspension bridges made of hide, which crosses the Maypu, a large turbulent river a few leagues southward of Santiago. These bridges are very poor affairs. The road, following the curvature of the suspending ropes, is made of bundles of sticks placed close together. It was full of holes, and oscillated rather fearfully, even with the weight of a man leading his horse. In the evening we reached a comfortable farm-house, where there were several very pretty señoritas. They were much horrified at my having entered one of their churches out of mere curiosity. They asked me, "Why do you not become a Christian—for our religion is certain?" I assured them I was a sort of Christian; but they would not hear of it—appealing to my own words, "Do not your padres, your very bishops, marry?" The absurdity of a bishop having a wife particularly struck them: they scarcely knew whether to be most amused or horror-struck at such an enormity.

6th.—We proceeded due south, and slept at Rancagua. The road passed over the level but narrow plain, bounded on one side by lofty hills, and on the other by the Cordillera. The next day we turned up the valley of the Rio Cachapual, in which the hotbaths of Cauquenes, long celebrated for their medicinal properties, are situated. The suspension bridges, in the less frequented parts, are generally taken down during the winter when the rivers are low. Such was the case in this valley, and we were therefore obliged to cross the stream on horseback. This is rather disagreeable, for the foaming water, though not deep, rushes so quickly over the bed of large rounded stones, that one's head becomes quite confused, and it is difficult even to perceive whether the horse is moving onward or standing still. In summer, when the snow melts, the torrents, are quite impassable; their strength and fury is then extremely great, as might be plainly seen by the marks which they had left. We reached the baths in the evening, and stayed there five days, being confined the two last by heavy rain. The buildings consist of a square of miserable little hovels, each with a single table and bench. They are situated in a narrow deep valley just without the central Cordillera. It is a quiet, solitary spot, with a good deal of wild beauty.

The mineral springs of Cauquenes burst forth on a line of dislocation, crossing a mass of stratified rock, the whole of which betrays

the action of heat. A considerable quantity of gas is continually escaping from the same orifices with the water. Though the springs are only a few yards apart, they have very different temperatures; and this appears to be the result of an unequal mixture of cold water: for those with the lowest temperature have scarcely any mineral taste. After the great earthquake of 1822 the springs ceased, and the water did not return for nearly a year. They were also much affected by the earthquake of 1835; the temperature being suddenly changed from 118° to 92°.* It seems probable that mineral waters rising deep from the bowels of the earth, would always be more deranged by subterranean disturbances than those nearer the surface. The man who had charge of the baths, assured me that in summer the water is hotter and more plentiful than in winter. The former circumstance I should have expected, from the less mixture, during the dry season, of cold water; but the latter statement appears very strange and contradictory. The periodical increase during the summer, when rain never falls, can, I think, only be accounted for by the melting of the snow: yet the mountains which are covered by snow during that season, are three or four leagues distant from the springs. I have no reason to doubt the accuracy of my informer, who, having lived on the spot for several years, ought to be well acquainted with the circumstance,—which, if true, certainly is very curious: for, we must suppose that the snow-water, being conducted through porous strata to the regions of heat, is again thrown up to the surface by the line of dislocated and injected rocks at Cauquenes; and the regularity of the phenomenon would seem to indicate, that in this district heated rock occurred at a depth not very great.

One day I rode up the valley to the farthest inhabited spot. Shortly above that point, the Cachapual divides into two deep tremendous ravines, which penetrate directly into the great range. I scrambled up a peaked mountain, probably more than six thousand feet high. Here, as indeed everywhere else, scenes of the highest interest presented themselves. It was by one of these ravines, that Pincheira entered Chile and ravaged the neighbouring country. This is the same man whose attack on an estancia at the Rio Negro I have described. He was a renegade half-cast Spaniard, who collected a great body of Indians together and established himself by a stream in the Pampas,

* Caldcleugh, in Philosoph. Transact. for 1836.

which place none of the forces sent after him could ever discover. From this point he used to sally forth, and crossing the Cordillera by passes hitherto unattempted, he ravaged the farm-houses and drove the cattle to his secret rendezvous. Pincheira was a capital horseman, and he made all around him equally good, for he invariably shot any one who hesitated to follow him. It was against this man, and other wandering Indian tribes, that Rosas waged the war of extermination.

September 13th.—We left the baths of Cauquenes, and rejoining the main road slept at the Rio Claro. From this place we rode to the town of S. Fernando. Before arriving there, the last land-locked basin had expanded into a great plain, which extended so far to the south, that the snowy summits of the more distant Andes were seen as if above the horizon of the sea. S. Fernando is forty leagues from Santiago; and it was my farthest point southward; for we here turned at right angles towards the coast. We slept at the gold-mines of Yaquil, which are worked by Mr. Nixon, an American gentleman, to whose kindness I was much indebted during the four days I stayed at his house. The next morning we rode to the mines, which are situated at the distance of some leagues, near the summit of a lofty hill. On the way we had a glimpse of the lake Tagua-tagua, celebrated for its floating islands, which have been described by M. Gay.* They are composed of the stalks of various dead plants intertwined together, and on the surface of which other living ones take root. Their form is generally circular, and their thickness from four to six feet, of which the greater part is immersed in the water. As the wind blows, they pass from one side of the lake to the other, and often carry cattle and horses as passengers.

When we arrived at the mine, I was struck by the pale appearance of many of the men, and inquired from Mr. Nixon respecting their condition. The mine is 450 feet deep, and each man brings up about 200 pounds weight of stone. With this load they have to climb up the alternate notches cut in the trunks of trees, placed in a zigzag line up the shaft. Even beardless young men, eighteen and twenty years old, with little muscular development of their bodies (they are quite naked excepting drawers) ascend with this great load from

* Annales des Sciences Naturelles, March, 1833. M. Gay, a zealous and able naturalist, was then occupied in studying every branch of natural history throughout the kingdom of Chile.

nearly the same depth. A strong man, who is not accustomed to this labour, perspires most profusely, with merely carrying up his own body. With this very severe labour, they live entirely on boiled beans and bread. They would prefer having bread alone; but their masters, finding that they cannot work so hard upon this, treat them like horses, and make them eat the beans. Their pay is here rather more than at the mines of Jajuel, being from 24 to 28 shillings per month. They leave the mine only once in three weeks; when they stay with their families for two days. One of the rules in this mine sounds very harsh, but answers pretty well for the master. The only method of stealing gold is to secrete pieces of the ore, and take them out as occasion may offer. Whenever the major-domo finds a lump thus hidden, its full value is stopped out of the wages of all the men; who thus, without they all combine, are obliged to keep watch over each other.

When the ore is brought to the mill, it is ground into an impalpable powder; the process of washing removes all the lighter particles, and amalgamation finally secures the gold-dust. The washing, when described, sounds a very simple process; but it is beautiful to see how the exact adaptation of the current of water to the specific gravity of the gold, so easily separates the powdered matrix from the metal. The mud which passes from the mills is collected into pools, where it subsides, and every now and then is cleared out, and thrown into a common heap. A great deal of chemical action then commences, salts of various kinds effloresce on the surface, and the mass becomes hard. After having been left for a year or two, and then rewashed, it yields gold; and this process may be repeated even six or seven times; but the gold each time becomes less in quantity, and the intervals required (as the inhabitants say, to generate the metal) are longer. There can be no doubt that the chemical action, already mentioned, each time liberates fresh gold from some combination. The discovery of a method to effect this before the first grinding, would without doubt raise the value of gold-ores many fold. It is curious to find how the minute particles of gold, being scattered about and not corroding, at last accumulate in some quantity. A short time since a few miners, being out of work, obtained permission to scrape the ground round the house and mill: they washed the earth thus got together, and so procured thirty dollars' worth of gold. This is an exact counterpart of what takes place in nature. Mountains suffer degradation

and wear away, and with them the metallic veins which they contain. The hardest rock is worn into impalpable mud, the ordinary metals oxidate, and both are removed; but gold, platina, and a few others are nearly indestructible, and from their weight, sinking to the bottom, are left behind. After whole mountains have passed through this grinding-mill, and have been washed by the hand of nature, the residue becomes metalliferous, and man finds it worth his while to complete the task of separation.

Bad as the above treatment of the miners appears, it is gladly accepted of by them; for the condition of the labouring agriculturists is much worse. Their wages are lower, and they live almost exclusively on beans. This poverty must be chiefly owing to the feudal-like system on which the land is tilled: the landowner gives a small plot of ground to the labourer, for building on and cultivating, and in return has his services (or those of a proxy) for every day of his life, without any wages. Until a father has a grown-up son, who can by his labour pay the rent, there is no one, except on occasional days, to take care of his own patch of ground. Hence extreme poverty is very common among the labouring classes in this country.

There are some old Indian ruins in this neighbourhood, and I was shown one of the perforated stones, which Molina mentions as being found in many places in considerable numbers. They are of a circular flattened form, from five to six inches in diameter, with a hole passing quite through the centre. It has generally been supposed that they were used as heads to clubs, although their form does not appear at all well adapted for that purpose. Burchell* states that some of the tribes in Southern Africa dig up roots, by the aid of a stick pointed at one end, the force and weight of which is increased by a round stone with a hole in it, into which the other end is firmly wedged. It appears probable, that the Indians of Chile formerly used some such rude agricultural instrument.

One day, a German collector in natural history, of the name of Renous, called, and nearly at the same time an old Spanish lawyer. I was amused at being told the conversation which took place between them. Renous speaks Spanish so well, that the old lawyer mistook him for a Chilian. Renous, alluding to me, asked him what he thought of the King of England sending out a collector to their

* Burchell's Travels, vol. ii. p. 45.

country, to pick up lizards and beetles, and to break stones? The old gentleman thought seriously for some time, and then said, "It is not well,—*hay un gato encerrado aqui* (there is a cat shut up here). No man is so rich as to send out people to pick up such rubbish. I do not like it: if one of us were to go and do such things in England, do not you think the King of England would very soon send us out of his country?" And this old gentleman, from his profession, belongs to the better informed and more intelligent classes! Renous himself, two or three years before, left in a house at S. Fernando some caterpillars, under charge of a girl to feed, that they might turn into butterflies. This was rumoured through the town, and at last the Padres and Governor consulted together, and agreed it must be some heresy. Accordingly, when Renous returned, he was arrested.

September 19th.—We left Yaquil, and followed the flat valley, formed like that of Quillota, in which the Rio Tinderidica flows. Even at these few miles south of Santiago the climate is much damper; in consequence there were fine tracts of pasturage, which were not irrigated. (20th.) We followed this valley till it expanded into a great plain, which reaches from the sea to the mountains west of Rancagua. We shortly lost all trees and even bushes; so that the inhabitants are nearly as badly off for firewood as those in the Pampas. Never having heard of these plains, I was much surprised at meeting with such scenery in Chile. The plains belong to more than one series of different elevations, and they are traversed by broad flat-bottomed valleys; both of which circumstances, as in Patagonia, bespeak the action of the sea on gently rising land. In the steep cliffs bordering these valleys, there are some large caves, which no doubt were originally formed by the waves: one of these is celebrated under the name of Cueva del Obispo; having formerly been consecrated. During the day I felt very unwell, and from that time till the end of October did not recover.

September 22nd.—We continued to pass over green plains without a tree. The next day we arrived at a house near Navedad, on the sea-coast, where a rich Haciendero gave us lodgings. I stayed here the two ensuing days, and although very unwell, managed to collect from the tertiary formation some marine shells.

24th.—Our course was now directed towards Valparaiso, which with great difficulty I reached on the 27th, and was there confined

to my bed till the end of October. During this time I was an inmate in Mr. Corfield's house, whose kindness to me I do not know how to express.

I will here add a few observations on some of the animals and birds of Chile. The Puma, or South American Lion, is not uncommon. This animal has a wide geographical range; being found from the equatorial forests, throughout the deserts of Patagonia, as far south as the damp and cold latitudes (53° to 54°) of Tierra del Fuego. I have seen its footsteps in the Cordillera of central Chile, at an elevation of at least 10,000 feet. In La Plata the puma preys chiefly on deer, ostriches, bizcacha, and other small quadrupeds; it there seldom attacks cattle or horses, and most rarely man. In Chile, however, it destroys many young horses and cattle, owing probably to the scarcity of other quadrupeds: I heard, likewise, of two men and a woman who had been thus killed. It is asserted that the puma always kills its prey by springing on the shoulders, and then drawing back the head with one of its paws, until the vertebræ break: I have seen in Patagonia, the skeletons of guanacos, with their necks thus dislocated.

The puma, after eating its fill, covers the carcass with many large bushes, and lies down to watch it. This habit is often the cause of its being discovered; for the condors wheeling in the air, every now and then descend to partake of the feast, and being angrily driven away, rise all together on the wing. The Chileno Guaso then knows there is a lion watching his prey—the word is given—and men and dogs hurry to the chase. Sir F. Head says that a Gaucho in the Pampas, upon merely seeing some condors wheeling in the air, cried "A lion!" I could never myself meet with any one who pretended to such powers of discrimination. It is asserted, that if a puma has once been betrayed by thus watching the carcass, and has then been hunted, it never resumes this habit; but that having gorged itself, it wanders far away. The puma is easily killed. In an open country, it is first entangled with the bolas, then lazoed, and dragged along the ground till rendered insensible. At Tandeel (south of the Plata) I was told that within three months one hundred were thus destroyed. In Chile they are generally driven up bushes or trees, and are then either shot, or baited to death by dogs. The dogs employed in this chase belong to a particular breed, called Leoneros: they are weak, slight animals, like

long-legged terriers, but are born with a particular instinct for this sport. The puma is described as being very crafty: when pursued, it often returns on its former track, and then suddenly making a spring on one side, waits there till the dogs have passed by. It is a very silent animal, uttering no cry even when wounded, and only rarely during the breeding season.

Of birds, two species of the genus Pteroptochos (megapodius and albicollis of Kittlitz) are perhaps the most conspicuous. The former, called by the Chilenos "el Turco," is as large as a fieldfare, to which bird it has some alliance; but its legs are much longer, tail shorter, and beak stronger: its colour is a reddish brown. The Turco is not uncommon. It lives on the ground, sheltered among the thickets which are scattered over the dry and sterile hills. With its tail erect, and stilt-like legs, it may be seen every now and then popping from one bush to another with uncommon quickness. It really requires little imagination to believe that the bird is ashamed of itself, and is aware of its most ridiculous figure. On first seeing it, one is tempted to exclaim, 'A vilely stuffed specimen has escaped from some museum, and has come to life again!' It cannot be made to take flight without the greatest trouble, nor does it run, but only hops. The various loud cries which it utters when concealed amongst the bushes, are as strange as its appearance. It is said to build its nest in a deep hole beneath the ground. I dissected several specimens: the gizzard, which was very muscular, contained beetles, vegetable fibres, and pebbles. From this character, from the length of its legs, scratching feet, membranous covering to the nostrils, short and arched wings, this bird seems in a certain degree to connect the thrushes with the gallinaceous order.

The second species (or P. albicollis) is allied to the first in its general form. It is called Tapacolo, or "cover your posterior;" and well does the shameless little bird deserve its name; for it carries its tail more than erect, that is, inclined backwards towards its head. It is very common, and frequents the bottoms of hedge-rows, and the bushes scattered over the barren hills, where scarcely another bird can exist. In its general manner of feeding, of quickly hopping out of the thickets and back again, in its desire of concealment, unwillingness to take flight, and nidification, it bears a close resemblance to the Turco; but its appearance is not quite so ridiculous. The Tapacolo is

very crafty: when frightened by any person, it will remain motionless at the bottom of a bush, and will then, after a little while, try with much address to crawl away on the opposite side. It is also an active bird, and continually making a noise: these noises are various and strangely odd; some are like the cooing of doves, others like the bubbling of water, and many defy all similes. The country people say it changes its cry five times in the year—according to some change of season, I suppose.*

Two species of humming-birds are common; Trochilus forficatus is found over a space of 2500 miles on the west coast, from the hot dry country of Lima, to the forests of Tierra del Fuego—where it may be seen flitting about in snow-storms. In the wooded island of Chiloe, which has an extremely humid climate, this little bird, skipping from side to side amidst the dripping foliage, is perhaps more abundant than almost any other kind. I opened the stomachs of several specimens, shot in different parts of the continent, and in all, remains of insects were as numerous as in the stomach of a creeper. When this species migrates in the summer southward, it is replaced by the arrival of another species coming from the north. This second kind (Trochilus gigas) is a very large bird for the delicate family to which it belongs: when on the wing its appearance is singular. Like others of the genus, it moves from place to place with a rapidity which may be compared to that of Syrphus amongst flies, and Sphinx among moths; but whilst hovering over a flower, it flaps its wings with a very slow and powerful movement, totally different from that vibratory one common to most of the species, which produces the humming noise. I never saw any other bird, where the force of its wings appeared (as in a butterfly) so powerful in proportion to the weight of its body. When hovering by a flower, its tail is constantly expanded and shut like a fan, the body being kept in a nearly vertical position. This action appears to steady and support the bird, between the slow movements of its wings. Although flying from flower to flower in

* It is a remarkable fact, that Molina, though describing in detail all the birds and animals of Chile, never once mentions this genus, the species of which are so common, and so remarkable in their habits. Was he at a loss how to classify them, and did he consequently think that silence was the more prudent course? It is one more instance of the frequency of omissions by authors, on those very subjects where it might have been least expected.

search of food, its stomach generally contained abundant remains of insects, which I suspect are much more the object of its search than honey. The note of this species, like that of nearly the whole family, is extremely shrill.