

XXIII. *A Journey in 1867 from Monte Video to San Jorge, in the centre of Uruguay, with Remarks on the Vegetation of the Country.* Plate VI. By Dr DAVID CHRISTISON.

(Read March 1878.)

The republic of Uruguay, better known in South America as the Banda Oriental,* has been less investigated by naturalists than might have been expected, particularly in recent times, when the ease of communication between Monte Video and Europe is considered. The ordinary traveller, in search of health, amusement, or adventure, has treated it with equal neglect, insomuch that only the southern portion of the republic, comprising not more than a sixth part of its extent, has hitherto been described; and and it is to the admirable accounts by D'Orbigny and Darwin of their investigations in these southern districts, early in the century, that we must still turn for nearly all the information, whether of a general or scientific nature, that is to be found about the country. The uniformity of configuration which is known in a general way to be characteristic of Uruguay may partially account for this neglect, as when a portion of such a country has been in-

* The accented syllable has been marked in this and other local words in which the accent is not evident, or is commonly misplaced in this country.



D. Christison, del.

THE OMBU. (*Phytolacca dioica*)

M. Farlane & Erskine, Lithrs Edin.

vestigated there is some excuse for thinking that the sample may stand for the whole; but probably a more powerful reason may be found in the frequent wars and revolutions which, in common with all its sister Spanish republics, have sorely afflicted the Banda Oriental. These, with the legacies of chronic violence and disorder left behind by them, have in all probability checked the ardour of European travellers, as they have apparently crushed every effort at scientific research on the part of the natives. Revolutionary disturbances, however, have undoubtedly been less frequent and less serious of late years; and although even in ordinary times homicide is perhaps more common in the rural districts of Uruguay than in any other country with pretensions to civilisation, travelling is by no means so hazardous as might be supposed, because the deeds of violence committed by the half-civilised Gauchos do not, in the great majority of instances, depend on greed or the love of plunder, but on old political or family feuds and hasty quarrels among themselves, with all which the English stranger has no concern, and from which it is generally easy to keep himself clear by the exercise of ordinary prudence.

Having made a voyage on account of my health to Buenos Ayres, and while residing there, in the autumn of 1867, I received an invitation from my friend Dr George Fair, to accompany him to the Estancia of San Jorge, owned by his brothers and himself, and situated in the centre of the Banda Oriental. I gladly availed myself of the opportunity to visit a district so entirely new to me, and under such favourable conditions. But the expedition was designed to be a short one, and without any scientific object. It was only when detained at the Estancia much longer than originally intended, by an attack of dysentery, that my thoughts were directed, by way of pastime, to the natural history of the district. Although feeble health and the want of a special training in the natural sciences combined to restrict my ambition within very moderate limits, I hoped at all events, among other things, to have made a tolerably complete collection of the flora of the district. My strength, however, proved unequal to the task. I was unable to gather the spring flora, and the meagre result of my efforts was a small

collection of the autumn plants, which I should have hesitated to exhibit to the Society, and still more to offer as a contribution to the University Herbarium, were it not that the district from which they come has not hitherto, I believe, been ransacked by botanists, and that the Herbarium is almost entirely destitute of specimens from the countries which border the River Plate.

Passing over without remark the voyage from Buenos Ayres to Monte Video, and these two great cities being now so well known that it would be quite out of place to give any account of them, I proceed to describe the appearance of the country, and the general character of its vegetation, as the traveller goes northwards from Monte Video. Before reaching the true "Campos," which constitute the great characteristic mass of the country, two cultivated zones must be traversed, which deserve a passing notice. The first, extending a few miles into the country, includes the "Quintas," or country seats and gardens of the wealthier inhabitants of Monte Video, and the market gardens which supply the city with fruits and vegetables; the second, three or four leagues in width, is mainly devoted to agriculture.

In the first of these zones a great variety of fruits and vegetables are cultivated, but the stranger will look in vain for much that is new or peculiar to America. Nearly everything is familiar, and of European origin. The fruits which attain the greatest perfection are pears,—rivalling in size and flavour the very finest grown in France or Jersey,—peaches, melons, and figs. Peaches are so abundant as to be a staple article of diet with the masses. The fruit is large and has a fine aroma, but I always found it hard and deficient in flavour as compared with our own. However, all true patriots in the regions of the River Plate vehemently maintain the superiority of their peaches, and it is only now, when safe at home, that I venture to express my preference for a raw turnip. It is not for its fruit alone that the peach is valued in South America. On the south side of the Plate at least it is much used as fuel. In former years the naked plains of Buenos Ayres furnished no better substitutes for firewood than the dung of animals or some of the more fibrous weeds of the country, but now nearly every house in that province has its grove

of peaches, grown not so much for the sake of the fruit as to provide fuel for the inhabitants. Soil and climate in the temperate parts of South America seem singularly favourable to the growth of the peach-tree, both when planted in the open plains, where in three years it attains sufficient size to be cut for firewood, and in the woods, where it shows a great tendency to spread spontaneously. D'Orbigny found whole woods of it growing in lat. 27° near the old Jesuit mission stations, and as far south as lat. 40° he saw it flourishing in the valley of the Rio Negro; while on the western side of the continent, in Chili, and the temperate parts of Peru and Bolivia, it was equally common.

The orange, although rarely producing good fruit, perhaps from carelessness and want of attention in its cultivation, shows the same disposition to run wild and become naturalised. The Spanish traveller Azara noticed nearly a century ago its strong tendency to spread in the woods; he describes the orange groves as very dense, and allowing nothing but young oranges to spring anew from the soil beneath them, although the large trees of the original forest were still mingled here and there with the groves. D'Orbigny, speaking of both the orange and the peach, remarks that it is difficult to form an idea of the rapidity with which they have multiplied, without the least aid from cultivation, in the islands of the Parana which are not subject to inundation.

The gardens and fields near Monte Video are generally fenced with hedges of Cactus, Agave, or Ñapindai (*Acacia bonariensis*, Gill), a plant with rather showy, white or buff coloured tufts of flowers, which from the resemblance of its strong recurved thorns to the claws of a cat, has earned the popular name of "Uña de gato." Some of the Agave hedges continue for upwards of a mile without a break, and grow to such a height as to shut out the view on both sides of the road, presenting a stiff and monotonous aspect, not much relieved by the flowering stems which rise every here and there to a height of from 12 to 20 or even 24 feet. Yet single specimens, standing freely in old neglected hedges, are exceedingly handsome. The elegant flowering stem, which in the course of a few weeks shoots up to a height of upwards of 20 feet, is sure to attract admiration; but equally interesting, although less con-

spicuous, is the central solid mass of young leaves, moulded into the shape of a perfectly symmetrical horn, 6 feet in length, as thick as a man's thigh at the base, and tapering in a beautifully regular curve to a hard, sharp, purple point. While retaining its bulk and form, this horn is nevertheless continually unrolling from itself leaf after leaf of an exquisite green colour, fringed with sparse but strong, dark purple, recurved thorns, and bearing perfect impressions of the edges and thorns of the leaves, against which they had been pressed while still attached to the horn. I do not know the species to which this *Agave* belongs. The flowering stem closely resembles that of the *Agave americana*, figured in Lindley's "Vegetable Kingdom," but the leaves differ in being much longer in proportion to their width, in having sparse recurved prickles instead of an almost serrated edge, and in growing much more upright, although with a tendency to curve outwards about half way up and even to bend completely over as they grow old.

In the quintas of the wealthy inhabitants of the suburbs of Monte Video a great variety of ornamental trees and shrubs have been introduced from many parts of the world. I noticed particularly Australian *Eucalypti* (which in four years had grown to a height of 30 feet), the *Araucaria imbricata*, the Deodar, a species of *Robinia*, and the Paraiso, which with many others seemed to thrive admirably, and appeared more vigorous than those of the same species near Buenos Ayres; few of them indeed were of great magnitude, but this may have been because they have not been very long introduced.

The second or agricultural zone consists of an almost treeless and unfenced country, with numerous small agricultural and dairy farms. Maize is the grain chiefly cultivated; in the unripe state it is a favourite vegetable. While the grains are still tender it is boiled, and eaten by holding the cob in both hands and stripping the grains off with the teeth. It is related of a newly arrived Irishman, that after stripping his cob he handed it back, saying, "If ye plaize, put some more paise on me stick!" When ripe it is chiefly used as food for horses. The uncertainty of the rainfall checks the cultivation of wheat to some extent in all the districts of the River Plate; nevertheless, in

favourable seasons, splendid crops are obtained, and its cultivation is yearly extending and becoming more important. Guinea corn is also grown, but I was informed it was only used for feeding poultry. I also saw immense fields of water-melons, sometimes cultivated in rows alternately with maize.

A few leagues beyond the city cultivation ceases entirely, and we enter on the "Campo" or open country. The Indian word "Pampas" or plains is not used here, as there are no true extensive plains in the country, although to a new comer, accustomed to mountains, it seems sadly too level. First impressions of a new country depend much upon contrast with the one which we have been familiar with immediately before. A traveller coming from Rio Janeiro is painfully impressed with the general flatness of the country near Monte Video, but after some months residence in the true pampas, he hails with delight the humble undulations of Uruguay, and in his enthusiasm feels almost tempted to call them hills.

Uruguay, although geographically it may perhaps be considered as most intimately connected with the southern province of Brazil, is in other respects a portion of the vast region, partly covered with Gramineæ,—but in the southern and western directions becoming little better than a desert,—which stretches for more than 2000 miles southwards to the Straits of Magellan, and in its northern portion nearly 1000 westwards to the Andes; a country, crossed by a few unimportant ranges of hills, but generally almost level; for the most part entirely destitute of trees, except on the margins of some of the rivers, and on the plains near the Andes; uncultivated and unfenced, except in the neighbourhood of the few large towns. Of this enormous region Uruguay occupies but a corner, yet it is equal in extent to England and the lowlands of Scotland; while its scanty rural population, scattered in isolated habitations over its surface, and entirely devoted to the rearing of sheep and cattle, is probably less than 200,000.

Any one looking at the maps of Uruguay in our ordinary atlases must pick up a very erroneous idea of the nature of the country. Mountain ranges, some of them almost rivalling in darkness of shade the mighty Andes them-

selves, are represented as crossing it in various directions, so as to convey the impression of an extremely mountainous and difficult country. But in reality these ranges are nothing more than gently swelling ridges, and I doubt if the highest of them is much more than 100 feet above the neighbouring valleys, although they occasionally rise into much-flattened cones, called Cerros, of somewhat greater elevation.

Two of the most considerable of these ridges, bearing the imposing name of "Cuchillo grande," we trotted over in our diligencia without being in the least aware of their relative consequence; and perhaps no better idea of the insignificance of the hills can be given than this, that a line of coaches traverses the country from north to south, and others eastward and westward, without the aid of a single road, and meeting with no other obstacles than those caused by heavy rains or swollen rivers.

From information given by friends who had visited other parts of Uruguay, my journey of 160 miles to San Jorge probably gave me a fair idea of the general character of the whole country. Our diligencia trundled along over ridge after ridge, all bearing a surprising resemblance to each other. Estimates of height by the eye are not much to be relied on; my impression was that these ridges rarely exceeded 40 to 60 feet in height, but no doubt the tendency is to under-estimate them, as almost all are very gentle in contour, being often several miles in width. From this very fact, and as they every here and there fall away into gently sloping plains, a considerable extent of country is sometimes displayed to view, giving to Uruguay a more cheerful aspect than the pampas of Buenos Ayres, where the horizon is often more limited than that seen from the deck of a ship at sea. For all that, so great is the uniformity of the country, that not till after a long residence does the European begin to recognise slight differences in the sky outline or general disposition of the ridges, so as to find his way without a guide; although the eye of the Gaucho, trained from childhood to observe natural objects, detects minute characteristics which guide him unerringly, by what seems a blind instinct, over the pathless campos.

Travelling by public conveyance is not at all favourable

to botanical investigations ; hence I was somewhat reconciled to the long drought, which had so completely checked the autumn inflorescence that, although it was the first week of April, I did not see a single conspicuous flower in the course of my journey. The grass which covers this swelling wave-like country, although at this time much dried up, forms for the most part a true if somewhat coarse turf, but with a tendency to become bunchy in the lower levels. It seems completely to protect the slopes from the erosive action of water, for they are not cut into by ravines or gullies ; and even in the broad shallow valleys or mere depressions which separate the ridges, water-courses are not at once formed ; the rain in the upper part of these valleys seems merely to soak down into them, without forming marshes however, till at last a little gully makes its appearance, sunk some feet below the level, with very steep sides, the beginning of the water-courses which everywhere admirably supply the country with running streams. In the protection of the ridges from erosion wood has no share, for it is a rule almost without exception * that on the campos not a tree, not even a shrub, is to be found. Generally speaking, there is a great deficiency of rocks, stones, or pebbles on the surface of the campos ; but to this rule in some districts there are remarkable exceptions.

Taking a general view of the vegetation of Uruguay as it presented itself to me on the journey to San Jorge, and during a subsequent residence there of nearly a year, undoubtedly the most striking fact is the almost total absence of native trees and shrubs on the campos, and we are naturally led to inquire what is the cause of it. But before attempting to find an answer to this question, it must be observed that a similar extraordinary deficiency of timber extends far beyond the limits of Uruguay. Northwards it probably reaches into the neighbouring province of Brazil, and southwards it exists over the whole eastern half of the continent as far as the Straits of Magellan. The whole extent of country, therefore, entirely or nearly devoid of

* Darwin, in his excursion northwards from Maldonado, saw some rocky hills partly covered with thickets ; and eastern Uruguay is believed to be richer in wood than the other parts, but I have not been able to meet with any account of it.

trees or bushes,—confining our attention to the campos and plains as distinguished from the river banks,—measures probably not much less than 2000 miles in length, with a breadth which is inconsiderable in the south, but rapidly increases northwards, and in the latitude of Uruguay cannot be estimated at less than 500 miles. It may be well, therefore, to include the whole of this region in our inquiry, and in the first place to ascertain what is its precise condition as regards the growth of trees and shrubs on its vast surface. Our knowledge of the eastern side of the southern or Patagonian portion is far from being complete. A country so desert and forbidding, still so much in the hands of fierce and warlike Indians, has naturally been very imperfectly explored, and is likely long to remain so, first curiosity about it having been satisfied by the thorough investigations of some parts by D'Orbigny and Darwin. But, as far as is known, it is little exaggeration to say that it produces only one individual tree, the "Gualichu," which grows between the Rios Negro and Colorado, about lat. 40°. Regarded with superstitious awe by the Indians, on account of its solitary position and unusual size, its dimensions nevertheless are quite insignificant. Darwin gives its diameter just above the root as about 3 feet; and D'Orbigny, who gives a full description of it, says it is between 20 and 30 feet in height, with a large rounded form, the trunk half corroded with age and hollow in the centre: he adds, that it is a species of *Acacia*, classed by the Spaniards with the *Algorrobos*, as its pod yields a sweet pulp. Such is the description of the largest known tree in eastern Patagonia! But few others of the same kind were seen by Darwin; and D'Orbigny passed in the same district some miniature forests of thorny shrubs, not one of which exceeded 12 feet in height. These with a few other species of still humbler thorny shrubs, more common, but only two or three feet above the ground, exhaust the list of trees and shrubs mentioned by D'Orbigny and Darwin as occurring on the plains of Patagonia. Proceeding northwards to the campos of Buenos Ayres, which are far better known, and where the climate and soil are greatly superior, we might expect to find a richer growth; but it is precisely the reverse, for it seems

well established that there are absolutely no native trees and shrubs there at all. Finally, returning once more to the Uruguayan campos, it seems probable that they are nearly as unfortunate in this respect.

How then can we account for this extraordinary poverty of wood in temperate latitudes which correspond with those of England, France, Spain, and Morocco in the northern hemisphere? In Patagonia the barrenness of the soil and the violence of the winds which sweep over its level plains are so extreme, that probably no other reason need be sought to account for the scantiness and wretched nature of the wood which grows upon it. The soil is everywhere so barren as almost to justify the classification of Patagonia among the great deserts of the earth; and the violence and constancy of the wind is so great, at least at Carmen, in lat. 41° , that D'Orbigny, when residing there, was frequently obliged to abandon excursions from the fear of being blown clean out of his saddle, and during eight months he only had two or three days of calm weather.

But in the campos of Buenos Ayres and Uruguay the problem is much more difficult of solution. They have a comparatively rich alluvial soil, in many parts well suited for the cultivation of cereals, and the healthy winds that blow over them, although pretty constant, have not the reputation of being remarkable for violence. From rough observations that I kept of the strength of the wind at San Jorge for nine months, I find that on 87 days it was recorded as gentle, on 126 as moderate, on 35 as strong, and on 7 as having the strength of a gale, while 18 days were calm. I may add, that nowhere in Uruguay had the introduced trees that blown aspect, with the branches streaming in one direction, which is such a familiar spectacle in Scotland. Deficiency of moisture has been suggested as a reason, but from all the evidence I can gather, the climates of Buenos Ayres and Uruguay do not seem to be remarkably dry. I have no access to scientific observations on the subject, but the neighbourhood of the city of Buenos Ayres certainly has the reputation of having a decidedly moist atmosphere, and the abundance of running streams in Uruguay indicates that the amount of rain there must be considerable. During my residence of

a year at San Jorge, rain fell on 60 days, and it was tolerably regularly distributed through the seasons; in no month was it altogether absent. Mists and fogs at night or in the early morning occurred no less than thirty times, and some of them were exceedingly damp. I also noticed a great tendency to the formation of rust on guns and other iron articles, and of mould on boots and trunks in the houses even in the hot season. Moreover, as we have already seen, the campos are everywhere covered with a grassy turf, which protects the slopes from the action of water, and which even during the four hot months of an unusually dry season, although quite parched, was nowhere destroyed to any appreciable extent. All these facts seem inconsistent with the idea of a very dry climate, and certainly as regards moisture Uruguay appears to contrast very favourably with the pastoral districts of Australia, in many parts of which nevertheless trees and shrubs are very abundant.

At San Jorge there is indeed one deadly foe to trees, sufficiently powerful, perhaps, to prevent the growth of certain species, and that is the leaf-cutting ant. The country may be said to be entirely occupied by communities of these industrious little creatures, as their nests occur at tolerably regular intervals of about 100 yards, and each community commands the land around its nest by means of four or five beaten tracks, which radiate outwards till they almost meet the corresponding tracks of their neighbours. Thus the whole country is under their constant inspection, and no plant, for which they have a liking, has any chance of escaping their attacks. Their industry is marvellous. During July, August, September, and October, when I was able to watch them daily, they never ceased streaming along their paths, one column marching empty-handed into the country, the other returning loaded with spoil, each ant carrying upright in its scissor-like mandibles a circular bit of leaf or flower, or a blade of grass. I believe they even worked all night, as I sometimes sallied out with a light in pitchy darkness and found them as busy as during the day. Fortunately they only attack certain kinds of garden produce, but I believe all the trees grown at San Jorge had to be protected till they attained the height of 20 or 30 feet, or they would certainly have been destroyed. Great, how-

ever, as the power of these insects undoubtedly is at San Jorge, it would be extravagant to ascribe the general nakedness of the country to their ravages, and had their influence been very extended it could not have escaped the notice of Azara, D'Orbigny, and Darwin.

On the whole, then, it seems that, while the deficiency of trees and shrubs in Patagonia is easily enough explained, no satisfactory reason has been found for their absence on the campos further north; and it must surely be admitted that Nature has overcome much greater difficulties in clothing with wood many other parts of the earth, than she seems to have had to encounter in Buenos Ayres and Uruguay.

But the mystery becomes still more inexplicable when we consider, in the first place, that wood does thrive on the campos when artificially introduced by man; and, secondly, that although the campos of Uruguay themselves are bare, native trees and shrubs in considerable variety grow in close proximity to them on the margins of all the larger streams. We have already seen that there is no want of ornamental plantations and shrubberies near Monte Video; and I may now make special mention of the quinta of M. Buschenthal in that neighbourhood, which at the time of my visit would have compared favourably with any Botanic Garden of its size for the variety and healthiness of its young trees. In the interior, attempts at horticulture and arboriculture have as yet been few and far between; but at San Jorge no difficulty has been experienced in growing Poplars, Paraisos, Robinias, Peaches, Oranges, Figs, Pomegranates, and other trees. It is true it seemed to me that their foliage had a somewhat parched and scanty aspect when compared with that of the trees near Monte Video, but they had grown rapidly, and were healthy, well shaped, and free from every appearance of dwarfing or distortion in the stems and branches.

The occurrence of natural wood on the margins of the streams in Uruguay, in immediate proximity to the naked campos, is not to be explained by greater shelter being afforded in the former situations. The rivers do not flow in deep ravines, but in extremely shallow valleys, so shallow that as far as shelter is concerned they may simply be regarded as plains. The only difference between the two

situations is that the river margins are liable to occasional inundation. This is quite sufficient to account for the trees which grow in the one not being able to thrive in the other, but brings us no nearer to an explanation of the apparent neglect on the part of Nature to supply trees suitable to the soil of the campos.

Leaving this question unsolved, I proceed to give a general description of these native woods, or "Montes" as they are called, apparently on the same principle as some Highland mountains at the present day are called forests; for just as the latter contain no trees, so the former have not so much as a mound, much less a mountain to boast of. In the possession of montes Uruguay differs, much to her advantage, from the whole territory to the south, between the Plata and the Straits of Magellan. The rivers which reach the sea in this latter region are rare, have few tributaries, and some of them are quite destitute of timber. Thus Darwin, in his boat ascent of 140 miles up the Santa Cruz, saw nothing but thorny shrubs on its banks; and on the great Rios Negro and Colorado, although the monotony of Patagonian scenery is relieved by handsome trees, yet they are all willows, and probably of one species. But in Uruguay it is very different. Rivers, which in England at least would be called large, are numerous; they have many small tributaries with permanent water, and all the more considerable streams are fringed with a considerable variety of trees and shrubs.

If we trace one of these streams from its source we find that as long as it is a mere brook, dried up perhaps during the heat of summer, its edges are bare, but as it gathers strength solitary willows or other trees make their appearance. Still lower, especially where the stream expands into lagunas of permanent deep water, the edge is entirely fringed with trees and shrubs; and as we descend still further with the growing river these fringes swell into montes, which attain in some places a width of several hundred yards, even high up in the course of the larger rivers. Every here and there the montes thin out, disappear, and leave free access to the stream, forming "Pasos" where the rivers are fordable.

The only place where I had the opportunity of examin-

ing with care the larger montes was on the banks of the Rio Negro, some leagues from the Estancia of San Jorge. This fine river, which in a course of 400 miles drains the whole centre of the Republic westwards into the Uruguay, has cut for itself at the place indicated a deep channel, many feet below the level of the montes, which closely fringe its edges. Every here and there the mouths of nullahs may be seen, opening on the eroded, steeply sloping banks, but too high up, in the ordinary state of the stream, to admit its waters. A moderate flood, however, freely irrigates the montes by filling these nullahs, and I have been able to pass by means of a boat into an expansion of one of them which formed a charming temporary miniature lake, completely buried in the wood, delightfully shaded by overhanging trees, and silent, save for the occasional chatter of a colony of parrots in a tree at no great distance. Should the river continue to rise it finally reaches the top of the bank and completely overflows the montes.

Entering the denser parts of the montes from the open river, or still more from the glare of the campos, the effect is most startling. The wood in some places is so thick and dark that until the eye gets accustomed to the change we might almost imagine that night had suddenly descended; and nearly everywhere progress is impeded by the muddy nullahs and the dense growth of thorny trees, shrubs, and creepers. Other parts are more open and cheerful; and after a long residence on the bare plains, a visit to the montes is at first very pleasing; but soon the silent gloom, well suited to the murderers and outcasts who find shelter there, begins to weigh on the spirits, and we are glad to return to the freedom of the campos. The timber is mostly rather stunted and crooked, and its general deficiency in height is often shown by the pale foliage of the willows towering above the other trees and marking out the precise course of the river through the monte. The tangled masses of vegetation have neither the grandeur of tropical forests, nor the fine forms and cheerful play of light and shade of our own open woods, and perhaps the scattered trees of the smaller rivers contribute more to the picturesqueness of Uruguayan scenery than the dense montes of the larger ones.

The number of species of trees and shrubs in the montes must be considerable, as I was familiar with the Indian or Spanish names of twenty in the San Jorge district alone. The timber in general seemed to me too crooked and stunted for purposes of construction, although it is invaluable to the present inhabitants for making "Corrál" posts and as fire-wood. I was informed, however, that much finer trees grew in other parts of the montes, which I could not visit. With any considerable increase of the population it is to be feared the natural woods will rapidly disappear.

The strict limitation of the montes to the river margins is very remarkable. When seen from a distant elevation, the continuous woods of the Rio Negro, while completely hiding the bed of the stream, mark out its course with perfect accuracy, and themselves seem to form a green river, which differs in hue more or less according to the season from that of the meadows through which it appears to meander; and on a near approach the line of demarcation between the montes and campos is found to be so strictly defined that usually not a single tree is able to straggle from the former into the domain of the latter.

The limitation of trees and shrubs to the close proximity of the rivers is no doubt mainly due to the liability of the montes to inundation; but the strictness of the line of demarcation, so generally seen between the ground entirely destitute of trees and that which is densely covered with them, is not so easily explained, because the trifling difference of level between the campos and montes, altogether inappreciable to the eye, forbids the notion that the floods can have a regular limit. The existence of nullahs permeating the montes, such as I observed on the Rio Negro at San Jorge, would supply an amply sufficient reason for the strict limitation of wood to the soil thus supplied with a natural system of irrigation, but I have no reason to believe that such a conformation of the ground prevails generally in the montes of Uruguay. Perhaps one of the most inexplicable of the puzzles connected with the limitation of trees and shrubs to the montes is this,—that some of the thorny shrubs, when introduced as hedges, thrive as well on the campos as in their native soil, although they have nowhere spontaneously overlept their natural boundary.

It might be expected that in an uncultivated country like Uruguay, so thinly inhabited that off the main routes one may travel for a whole day without meeting a human being, the vegetation would be much in its primitive condition; but in point of fact the campos have undergone great modification from two causes,—the introduction of grazing, and the extraordinary diffusion of certain European plants. In its primitive condition the vegetation of the pampas and campos was stronger, coarser, and loftier than it is now. Gramineæ grew over extensive tracts so thickly and with such strength that it was difficult to force one's way through them, but partly from burning followed by grazing, partly from grazing alone, the country has put on the appearance of ordinary pasture land. This change must have greatly modified the growth not only of the grasses, but also of all the flowering plants which adorn the campos. Old inhabitants of San Jorge remember very well when the ostriches and deer were completely hidden by the growth of grass and flowers in spring, and when even from horseback it was difficult to get a clear view around. Now the general height of the spring vegetation does not exceed a couple of feet, and a dense tall growth is entirely confined to the "Pajonales" or fields of reeds, which are so comparatively rare that I never happened to see them.

A very small amount of grazing seems to be sufficient to produce these results. Whether, in addition to this modification of the vegetation, grazing may have caused the extinction of certain plants is a question not easily answered; but undoubtedly the movements of cattle and sheep from one place to another must have contributed powerfully to that diffusion of the seeds of foreign plants which constitutes the second great cause of change on the primitive state of the campos.

Of these foreign intruders European thistles are by far the most important, whether we consider the vast extent of country over which they have spread, or the complete conquest of the soil they have made in certain districts. In Uruguay they occur in scattered patches as far north as San Jorge at least; but in the south-western corner of the Republic Darwin found several hundred square miles

entirely covered with them, and impenetrable to man or beast. Extending our observation to the neighbouring countries, we find D'Orbigny recounting that of seven hundred square leagues in Buenos Ayres, between the Plata, Salado, Paraná, and Recife, one-half were covered with the wild artichoke; and further west enormous endless fields of thistles were passed by Sir F. Head in his ride across the pampas. In these regions thistles held an almost exclusive sway; but D'Orbigny found them again in straggling detachments, as far as 400 miles south of the Rio Salado, at Bahia Blanca, wherever man had settled, or even in the neighbourhood of temporary Indian encampments, forming new centres of diffusion; and Darwin met with them in the far west on both sides of the Andes. We have no accurate information as to the progress the thistles may have made in the forty years that have elapsed since the travels of these great observers, but taking as the known limits the Rio Negro of Uruguay on the north, Bahia Blanca on the south, and the two oceans on the east and west, the territory over which they have extended measures about 1100 miles by 550; some parts, however, like the western pampas being comparatively or entirely free from them.

In the accounts of these thistles that I have met with there is some difference as to the species or even the number of species to which they belong. Unfortunately, taking it for granted that plants which one meets at every turn as a common pest all over the country must be perfectly well known, I neglected the subject myself. Although several other members of the Tribe Cynareæ (all European intruders) occur, D'Orbigny, who writes so fully on the natural objects of these countries, mentions only two kinds as growing in great fields, and this agrees with Darwin's observations and my own imperfect recollections. One, a perennial with deeply cut leaves, is known in the country as the Cardo Castilla (*Cynara cardunculus*) called by various English authors the Cardoon or Artichoke thistle; the other, an annual with sinuous variegated leaves, is called in some parts of the country the Cardo Asnál, and according to D'Orbigny is identical with the Chardon Marie (*Carduus Marianus*) of France. Probably

it is the giant thistle of Darwin and Head. Sometimes one species appears to occupy immense tracts of country to the entire exclusion of the other, although statements on this point are not always quite clear. Thus the Cardoon is believed to have exclusive possession of the neighbourhood of the city of Buenos Ayres and the southern part of the province of the same name as far as the Rio Salado. South of this, where thistles are less common, Darwin saw only the giant kind; but according to D'Orbigny, a long way further south, at Bahia Blanca, the Cardoon again appears. To the westward, stretching into the pampas, the giant thistle apparently flourishes alone; but in the far west, on both sides of the Andes, the Cardoon again is met with, and is the only one mentioned by Darwin. In south-western Uruguay both are found, but always in separate fields.

There is something almost startling in the suddenness with which these thistles appear and disappear on the campos, and in the entire change they make in the scenery. During the autumn, when they throw out merely root leaves, their appearance is humble enough, and has been not inaptly compared to that of fields of turnips; but in spring they shoot up into flower, shutting out the view, concealing all natural landmarks, and forming dense forests. Towards midsummer they gradually decay, but often continue standing for a long time after they are completely rotten, until a storm comes and in an instant levels them with the ground, or sweeps them before its fury, in a moment bringing the whole country once more into view. Then a rich crop of grass or clover takes their place, and the face of the country is completely changed. The height of these thistle fields is often very great. Near Cháscomus, in Buenos Ayres, I have passed miles of them, averaging from 6 to 8 and sometimes reaching 11 feet in height, so that even on horseback it was impossible to see over them. Nor was their density of growth less remarkable; it is scarcely any exaggeration to say that it was scarcely possible to pass the arm among them without encountering prickles. These natural thistle fields or forests often terminate very abruptly, so as to be sharply defined from the portions of campo that are free

from them. Natural passages also exist through them, the formation of which is difficult to explain.

At San Jorge the thistles did not attain a greater height than from two to three feet. Perhaps the season was unfavourable for them, or possibly they were dwarfed because they were approaching their northern limit there.

The thistle beds, besides appropriating a great extent of soil, afford a secure shelter to robbers and outlaws during the summer; hence they are not regarded with any great favour by the Estancieros, yet it is possible to say a good word even for them now and then. Thus an English farmer told me that during a long "Seca" or drought he had kept his horses alive with no other food than the lower part of the stem of the Cardoon, which is thick, succulent, and sweet; sheep, too, have been saved under the same circumstances by eating the thistle seeds which are scattered in immense numbers over the ground after the decay of the plant, and they will also eat the dried leaves when nothing better is to be had; then in a summer seca the thistles, by protecting the ground under them from the sun's rays, enable the grass which succeeds them to spring up, while on the open campos it may altogether fail. Moreover, in treeless districts the stems, particularly of the Cardoon, which are more fibrous than those of the Cardo Asuál, are by no means to be despised as a substitute for firewood. Lastly, the young flower stem and the midrib of the leaf of the Cardoon are esteemed a good boiled vegetable in the campos.

Next to the thistles the most common foreign intruders are several bur-producing weeds, which have followed the sheep farmer wherever he has settled, and are so generally distributed that it is impossible to point out with any certainty their original birthplace. Of these the *Xanthium spinosum*, L., a well-known enemy of the sheep farmer at the Cape and in Queensland, generally distributed in Europe (Dr R. Brown, "Geog. Mag." i. p. 324) and, as I am informed by Dr Cleghorn, found also in India, has made itself quite at home on the pastoral lands of Buenos Ayres and Uruguay, where its colloquial name is the "Cepa caballo." The specimens which I gathered belonged to

the variety "*brachyacanthum*." Its very oblong bur attains a length of about a third of an inch, and the tripartite spines are twice as long. Dr R. Brown states (p. 321) that this pestilent weed has been naturalised on the banks of the Tweed along with forty other species of plants introduced in wool at Galashiels, and on the authority of Shaw that it is probably of Chilian origin. Its burs, however, are not nearly so formidable-looking as those of the *Xanthium macrocarpum*, a plant which is very common in the wool-producing countries of the River Plate, where it is known as the "Abrojo grande." Attaining a height of two or three feet, it often grows in great fields called "Abrojales"; and I have been assured by several Estancieros that its bur, which is about an inch long, covered with strong, straight prickles curved at the point, and furnished with two short hard horns at the apex, is a more formidable enemy to them than that of the *Cepa cavallo*. More insignificant than either in aspect, but from its very minuteness and great abundance even more objectionable, is the prickly spiral legume of the cosmopolitan *Medicago maculata*, L., which goes by the name of "Carretilla." On the San Jorge pastures it has not yet spread so universally as in some other districts, and is chiefly found in masses near the "Puestos" or sheep stations. An umbelliferous intruder, the "Visnaga" (*Ammi Visnaga*, Lam.), very common on the campos of Buenos Ayres, where on account of its woody stem it is sometimes stored for fuel, I did not see at San Jorge. The *Anagallis arvensis* was the only European weed I saw in the garden there.

The climate of Uruguay is one of the healthiest in the world. There are no malarious fevers, and sunstroke is of very rare occurrence. I met with not a few European "poitrinaires," who in a few years had become perfectly hardy in the campos. Spring generally begins early in September, but in 1867 a drought commencing in the end of winter was prolonged into spring, the grass began to vanish in some places, and not a flower was to be seen till after a heavy rainfall in the first week of October. Moreover, as the rain during spring was on the whole deficient, the flowers did not come out in their usual profusion. As

already explained, I was unable to botanise at this time, but during occasional drives over the campos I noticed that their chief ornament in October and early November was the Verbena, of which there were three kinds—white, scarlet, and dark red. The only other conspicuous flowers were a number of Compositæ and two species of Leguminosæ. The average temperature of spring was 59° , ranging from 33° observed early in September, when hoar frost was not uncommon at night, to upwards of 90° in the last fortnight of November, when, in fact, summer had already set in.

All the beautiful flowers withered away before the summer months began. The grasses coming into flower, for a time adorned the campos with their silvery white heads waving in the wind, but soon they also withered, assuming a dull greyish white colour, and the country contrasted sadly with its green appearance in the other seasons. Nevertheless, the grass did not die and leave the country bare, it simply got more and more dessicated till it became a kind of living hay. The only flowers to be seen were those of the ubiquitous foreigners, the thistles, chiefly the Cardo Asnål, and they also withered about midsummer, although the blackened stems continued standing for weeks afterwards. The temperature of summer averaged 73° , ranging from 59° to 96° ; too hot generally for northern European labour, yet very healthy, and seldom oppressive when one was at rest, as the heat of the day was generally tempered by pleasant breezes, and at night a decided fall of temperature made sleep easy and refreshing. Some days there were, however, when all nature seemed paralysed by the intense heat. The leaves of trees and melons drooped and shrivelled as if dying; sheep stood motionless in close clusters, with their heads down to protect them from the rays of the sun in the shade formed by each other's bodies; wild cattle refused to run, and horses to chase them; and little birds would come flying into the scanty shade of a solitary puesto, and sit beside me with their beaks wide open gasping for breath. But this almost intolerable heat was always soon remedied by one of the tremendous thunderstorms for which the regions of the River Plate are so celebrated, thirty-five of which I saw in eleven months, and which

would be well worthy of description were this the proper place.

The complete dearth of flowers in summer was carried well into the autumn. Towards the end of March the *Xanthiums* showed their inconspicuous flowers, but it was not till the middle of April that an autumnal inflorescence, gayer even than that of spring, ushered in a second season of beauty, which lasted in full splendour for six weeks, and lingered on through the greater part of winter. The climate of autumn, after the middle of March, was delightfully cool. In April and May there was frost occasionally at night.

The greatest ornaments of the campos at this season were several species of *Oxalis*, an *Oenothera*, and a variety of Liliaceous plants. Of these the first mentioned are unquestionably the most characteristic of the country, from their universal diffusion, the length of time during which they continue in flower, and the dense extensive masses of colour which they display. From all I could learn, they prevail not only at San Jorge, but over a great part of Uruguay, so that in the middle of autumn to a bird's eye view the whole country must appear one blaze of yellow.

There is of course little to be said of the vegetation in winter, except that the campos retained much of their green colour; and as the yellow and purple sorrels and a pretty sweet scented *Milla* came into bloom occasionally in great abundance, winter presented to European eyes a much more summer-like aspect than the parched, dull-tinted, flowerless, actual summer. The climate, too, was delightfully bracing, with an average temperature of 47°, and a range from 27° to 73°. Frost was not uncommon at night, the mercury having fallen below the freezing-point seventeen times, and hoar frost having been noted on nine other occasions. Ice sometimes formed on shallow water at night, but soon disappeared after sunrise. On the coldest day of the year the temperature at midday was 42°.

Taking a general view of the inflorescence of the San Jorge campos, it would seem—provided that 1867 was an average specimen of a year—that there are two distinct

periods of flowering, separated by about four months of hot weather, during which not a single conspicuous flower is to be seen. In both autumn and spring the Compositæ are much more numerous represented than any other family. Verbenas are the great ornaments of spring; while autumn, besides an occasional visit from the scarlet Verbena, claims the yellow and purple Oxalis, the Enothera, and several beautiful species of Liliaceous plants.

Although I gathered specimens of all the flowering plants that I saw during the autumn in the San Jorge district, yet the extent of country explored was very limited, and my collection cannot be regarded therefore as at all complete. Of fifty-three herbaceous phanerogamous plants gathered, thirty-nine were found on the campos, seven in the open parts of the montes, and seven in the San Jorge quinta. Twigs and leaves of nine trees and shrubs were also preserved, but I only succeeded in getting the flowers of two of them.

Identification of the plants proved no easy task in Edinburgh, from the want of specimens for comparison, and the inadequacy of the Botanical Library. Dr Cleghorn, to whom I am indebted for much assistance and encouragement in preparing this paper, indicated the probable genera of many of them; and by the zealous efforts and skill of Mr Frederick Webb, a considerable number of the species were identified. Dr Isaac Balfour, with the aid of friends at Kew, determined several of the remaining Dicotyledons, and to Mr Baker I owe the identification of all the Monocotyledons. A guide to the trees and shrubs was obtained from the native names in M. Ernest Gibert's catalogue of about 1300 Uruguayan plants, published at Monte Video in 1873, and brought to Edinburgh lately by Dr Fair.

The following list is accompanied by remarks on the more interesting species:—

MALVACEÆ.—*Sida purpurascens*, *S. erosa*. Neither in Gibert's list.

OXALIDACEÆ.—Three species of this most important Uruguayan order adorned the San Jorge campos. The earliest to appear in autumn is closely allied to an unnamed

species, now at Kew, in Gibert's list. It began to flower early in April, and by the 1st of May the whole country was carpeted with its large buttercup-yellow flowers; its root was bulbous, consisting of white hardish scales, surrounded by a dry soft cottony tissue of a fine rust-red colour, separated into two or three layers by sparse, long, tough, black fibres. In a few examples the bulb gave off a white semi-transparent fleshy root, like a small parsnip, sweet and pleasant to the taste. A second species, which has not been identified, appeared also in great abundance about the middle of May. It differed from the first, most prominently, in the light lemon-colour and larger size of its flowers, and in the general absence of acidity in the leaves; the bulb also was not in general surrounded by the rust-coloured dry tissue, which is so remarkable in the other species, although I think I found it indistinctly in a few specimens. There is, however, considerable variety in the roots of both species. Later in the season some examples of each were found with fleshy, semi-succulent roots, reddish in colour, and intensely astringent; others had fibrous roots, frequently bearing large oblong cylindrical nodes or tubers, with the same characters. The two species flourished together for some weeks; but after the middle of June the first kind became comparatively rare, while the second was still abundant, bursting out again in midwinter in continuous carpets of colour. Although after this no longer flowering in masses, specimens of the lemon-coloured *Oxalis* were always to be found, often abundantly, during the remainder of winter and the first two months of spring. Thus for eight months of the year these two species enlivened the San Jorge campos. A third, with beautiful purple flowers (*O. martiana*, Zucc.), was generally to be found in their company, but not growing like them in continuous masses of colour. Its root was astringent and fleshy, or fibrous with the kind of astringent tubers described as occurring in the other species.

RHAMNACEÆ.—The tree most prized at San Jorge is the "Coronillo." It is of slow growth, very hard, and so durable in the earth that it is preferred to all others for corral posts, almost the only use which the natives make of their timber. The twigs have remarkable thorns, two

inches long, straight, opposite, and at right angles to the stem, each pair being also set at right angles to the pairs next it above and below. The leaves resemble those of the boxwood. It is probably the *Scutia buxifolia*, Lam. A near relation, the "Espina de la Cruz," with a similar arrangement of formidable thorns, also inhabits the San Jorge montes. It is probably the *Colletia cruciata*, Gill.

LEGUMINOSÆ.—In spring I saw several species on the campos, but not one in autumn. The montes, however, were adorned at the latter season by the splendid yellow clusters, two feet in length, of the *Cassia corymbosa*, Lam., the "Rama negra" of the natives. The few specimens I saw of this shrub grew under the shelter of a small thorny tree, the *Celtis Tala*, Walp. The straight slender stem of the former is quite detached from that of the latter, and passing among its branches ramifies there, but the shrub does not develop leaves or flowers till it has reached the outer surface of the foliage of its protector. The *Acacia bonariensis*, Gill., "Ñapindai," or "Uña de gato," I have usually met with at the landward edge of the montes, forming with the next mentioned an outer fringe of spiny brushwood. Although not existing naturally on the campos, it thrives admirably there, when planted as a hedge. The latter remark applies also to the "Espinillo," a shrub or small tree, which I did not see either in flower or fruit, but which is very common in the outer brushwood of the montes. It is probably either the *A. macracantha*, H. & B., or the *A. Farnesiana*, Willd. As both the Ñapindai and the Espinillo are of slow growth, the "Sina sin" (*Parkinsonia*) is frequently preferred for fences. It is not, however, a native of Uruguay.

ROSACEÆ.—The only member of this Order found, and it was far from common, was the *Margyricarpus setosus*, R. & P., the "Yerba de la Perdiz" of Gibert's list. It is a low heath-like shrub, producing a berry something like a white currant, and is almost the only plant that I found on the campos with a woody stem.

LYTHRACEÆ.—*Cuphea glutinosa*, Ch. & Sch. *Nesaea salicifolia*, Link.

ONAGRACEÆ.—*Oenothera af. albicaulis*, Mitt. One of

the handsomest flowers of the campos. Not in Gibert's list.

PASSIFLORACEÆ.—*Passiflora* sp.

TURNERACEÆ.—*Turnera trioniflora*.

PORTULACACEÆ.—*Portulacca grandiflora*, Hook. Neither of the two last are in Gibert's list. They are low plants, with red flowers of great beauty.

LORANTHACEÆ.—*Loranthus cuneifolius*, R. & P. This splendid parasite, with its beautiful masses of scarlet and sometimes yellow flowers, I only saw growing from the Tala tree (*Celtis Tala*).

CAPRIFOLIACEÆ?—An unidentified species.

CINCHONACEÆ.—*Spermacoce*, sp. af. pl. Gibert, *Kew Herb.* *Spermacoce*, sp. af. pl. Saunders, *Mexico*.

COMPOSITÆ.—*Lieberkuhnia bracteata*, Cass. This is perhaps the most beautiful of the numerous species of the Order on the San Jorge campos, and the only one which somewhat resembles our daisy in general habit. The *Mikania scandens*, Willd., is a very slender creeper, with heads of flowers which, at a little distance, resemble mignonette both in form and colour. It twines among the low plants at the margins of lagunas. The flowers in all the specimens I examined had invariably four scales of the involucre and four florets. *Stevia satureifolia* var. *laxa*. All the specimens examined had five scales of the involucre and five florets. *Vernonia* sp., *Onoseris* sp., *Erigeron Montevidense*, DC., *Solidago Microglossa*, DC.

In addition to these, I gathered five other species of Compositæ, which, however, have not been identified.

Of European species fairly naturalised, I noticed the *Xanthium spinosum*, L., and *X. macrocarpum*, DC., the "Cepa caballo" and "Abrojo" of the country, and two species of thistle.

AQUIFOLIACEÆ.—*Ilex cuneifolia* var. *bonariensis*, L. I found this holly in flower towards the end of winter in the montes of the Chileno chico, a tributary of the Rio Negro. The leaves vary much in shape on the same tree. It is the "Sombra de Toro" of the Gauchos, and all the specimens I saw grew in precisely the same way as the *Cassia corymbosa*, mingling their branches with those of the

sturdy Tala, although robust and apparently quite able to shift for themselves.

SAPOTACEÆ.—*Lucuma Sellowii* Alp., DC. The “Mataojo” of the natives, so called because of the acrid smoke which it gives off when burned, is a large handsome shrub with pendant flowers, which grows on the edge of the lagunas.

CUSCUTACEÆ.—*Cuscuta af. umbellata*, H. & B.

SOLANACEÆ.—*Solanum Commersoni*, Dun.

SCROPHULARIACEÆ.—*Gerardia communis*, Ch. & Sch.

LABIATÆ.—One unidentified species.

VERBENACEÆ.—*Verbena chamædrifolia*, Juss. A few stray specimens flowered in autumn. Along with a white and a dark red species, it is the chief ornament of the campos in spring.

PRIMULACEÆ.—*Anagallis arvensis*, L. In the San Jorge garden.

AMARANTACEÆ.—*Amarantus paniculatus*. *Teleianthera* (*Mogiphanes*) *brasiliensis*. *Gomphrena decumbens*, Juss. *Iresine polymorpha*, Mart. The first two are not in Gibert's list.

POLYGONACEÆ.—*Polygonum acre*, Kunth.

MYRTACEÆ.—*Oreodaphne acutifolia*, Nees. The “Laurél” of the natives.

ULMACEÆ.—*Celtis Tala*, Walp. The “Tala,” a small tree, somewhat of the size and general aspect of our hawthorn, is very common in Central Uruguay, and is I believe widely distributed over the whole Republic. It is frequent in the open parts of the montes, or, mingled with the Acacias, in their outer fringes of brushwood. It is the only tree that I have observed growing beyond the reach of inundation, generally on dry stony slopes, but not far from water. Mr Allan Watson, lately of the Estancia del Guayabo, San Jorge, assures me, however, that he has seen it not unfrequently on the true campos, and that it springs up readily in young hedges, the seeds being brought thither probably by birds, which are very partial to its berries. I have observed it higher up the water-courses than any other tree, excepting the willow. Hence, to the perplexity of the geographer, many of the smaller streams bear its name. The Tala is a sturdy tree, much branched, with zigzagged twigs, bearing a leaf and thorn at every projecting angle. I did not

see the flower or the fruit, but the latter is described by Mr Watson as a small red berry, eagerly devoured both by birds and children. I have seen on the banks of the Rio Negro an extraordinary nest, 4 feet in length, suspended from the branch of a Tala, and entirely composed of its thorny twigs. The entrance, which was from below, was just large enough to admit the hand, but not without danger of laceration from the thorns. The architects of this remarkable structure, I was assured, were a single pair of birds no larger than our thrush. The Tala, as already noticed, is preferred by the *Loranthus* for the display of its beautiful masses of scarlet flowers, and it is often adorned by the no less splendid clusters of the *Cassia corymbosa*, to which, as well as to the *Ilex cuneifolia*, it so frequently lends a friendly aid and shelter.

IRIDACEÆ.—*Cypella Herberti*, Herb. *Calydorea nuda*, Baker. *Herbertia*, sp.

AMARYLLIDACEÆ.—*Habranthus bifidus*, Herb. *H. versicolor*, B.M. 2485. *Zephyranthes candida*, Herb.

LILIACEÆ.—*Milla uniflora*, Grah. *M. Sellowiana*, Baker. *M. macrostemon*, Baker, *M. aurea*, Baker. *Nothoscordum striatum*, Kunth.

The *Herbertia*, *Calydorea nuda*, *Zephyranthes candida*, and *Nothoscordum striatum*, I do not recognise in Gibert's list.

All these beautiful monocotyledons I found on the dry campos, with the single exception of the *Zephyranthes candida*, which grew in the muddy lagunas of the Rio Negro. The *Milla aurea* scented the air of the campos with the sweet perfume of its pretty white flowers in midwinter, when it bloomed in great abundance along with the lemon-yellow *Oxalis*, conferring on that season a gay and summer-like character. The *Habranthus bifidus* is distinguished for the uncommon colour of its handsome very dark brownish purple flowers; and the *Calydorea nuda* for its linear stem, delicate lovely blue petals, and general aspect of fragility.

FILICES.—The *Adiantum cuneatum*, L. & F., was the only fern I found in the montes, although, as I am informed by Mr Watson, several handsome species grow there. On the San Jorge campos there are none. D'Orbigny mentions

that a species of *Osmunda*, strongly resembling the *regalis*, abounds on the campos near Monte Video.

Some of the common trees and shrubs of the San Jorge montes, specimens of which I did not bring home, deserve a passing mention. The well-known *Erythrina Crista-galli*, L., the "Seybo" of the natives, with its splendid scarlet flowers, is one of the greatest ornaments of the montes. The willow (*Salix Humboldtiana*, Willd.)? indicates the precise course of the streams through the montes by towering above the other foliage. It is also common in scattered specimens, sometimes where all other trees are absent, along the edges of the upper streams, to many of which it gives its Spanish name of "Sauce." The "Sarandí blanco," and "Sarandí negro" are very common shrubs, growing in or close to water, with numerous wand-like stems, resembling osiers. The wands of the former species grow to a considerable height, and furnish "Picanas" or ox goads to the waggon-drivers. Many of the smaller streams bear the name of "Sarandí." According to Gibert's list, the Sarandí blanco is the *Phyllanthus ziziphoides*, Bail. MS., and his Sarandí colorado, probably the same as the S. negro of San Jorge, is the *Cephalanthus Sarandí*, Ch. & Sch. Lastly may be mentioned the "Guayabo," which produces an edible fruit. In Gibert's list the "Guayabo del pais" is the *Feijoa Sellowiana*, Berg.

One plant of the campos I must not omit to mention, although, owing to my illness in spring, I did not get a specimen of it. It is called the "Mio mio," (*Baccharis* sp. *Herb. Kew*, Gibert 65) and has the reputation of being the most poisonous plant of the Uruguayan pastures.* Mr Allan Watson has kindly given me the following account of it:—"The Mio mio is generally found on good camps, and sometimes covering hundreds of acres, the plants being three or four yards apart. It grows to a height of from twelve to eighteen inches, four or five unbranched stalks springing directly from each root. The lower half of the stalks is bare, and the upper of a heathery aspect, pale green, somewhat resembling a bottle brush. The

* This, there can be little doubt, is the plant called "Min min," in a note by Mr W. J. Haig, Dollarfield, in vol. 8, p. 111 of the Society's Transactions. Probably his correspondent wrote it "Miu min," without distinguishing more than is usual in MS. between the letters u and n.

San Jorge camps are much infested with the *Mio mio*. Great care had always to be taken with English sheep imported into the country; but even native sheep are not uncommonly poisoned by it, particularly in spring, when the plant is coming up with the young grass. At that season I have lost many lambs and young sheep from eating *Mio mio*. Mares also are sometimes poisoned. They crop the grass very close to the roots, and thus, I think, eat the *Mio mio* when it is young and not easily detected. I do not recollect of having lost any cattle by it. As a rule, most animals soon learn to avoid it. The animals affected show symptoms of inflammation; and the stomach and intestines after death are found dreadfully inflamed. You will not be surprised at this when I tell you that *Mio mio* makes one of the strongest blisters I know. I have often used it, simply mixing the green of the plant with grease, for blistering my horses' legs. I believe the root is even more powerful."

One tree still remains to be noticed, the "*Ombú*" (*Picrura* or *Phytolacca dioica*), which, if not native, has at all events made itself thoroughly at home in Uruguay. It forms a striking exception to the herbs and under shrubs of which its family otherwise consists, for it is a large and stately tree, with a trunk which sometimes attains a girth of 20 or even 30 feet. In one respect, however, its exceptional character is more apparent than real, for, as M. Bory St Vincent remarks, its stem retains so much herbaceous softness that it may be cut like an enormous carrot. He adds,—writing of an avenue of *Ombús* in the public promenade at Seville,—that, from the form of the leaves and the height of several specimens, they might be taken for poplars. But this is certainly not the character of the tree in Uruguay and Buenos Ayres, where, although attaining a considerable height, it tends rather to breadth than length, and the dense rounded masses of its foliage are more suggestive of the sycamore than the poplar among European trees. Perhaps the tree which it most resembles, as Sir Joseph Hooker remarks of the specimens he saw at Gibraltar, is the Mango. The *Ombú* seems expressly designed to adorn public parks and avenues in warm climates, for while its soft spongy tissue is quite unfit for burning

or the ordinary utilitarian purposes of a tree, it not only casts a dense and wide shade, but throws out to a distance of several yards buttresses, which are only a foot or two in height and flattened on the upper surface, thus forming natural benches inviting the weary to sit down and rest. Notwithstanding the softness of its wood, it stands wind well, and it is far from being a delicate tree, as in the Banda Oriental it is frequently exposed at night in winter to a temperature several degrees below the freezing-point.

The native locality of the Ombú is not well ascertained. Buenos Ayres was long supposed to be so, probably because of its introduction thence to Europe; but the fact that it is never found in the open campos of that province, but only near the capital, points to the conclusion that it owes its presence there to the Spaniards, who, it might be expected, would readily promote the cultivation of so shady a tree in those parts of their dominions which, like Buenos Ayres, were naturally destitute of wood. Gaudichaud seems to have thought that it was native near Monte Video, but this also is a locality long in possession of the Spaniards; and it is surely unlikely that such competent observers as D'Orbigny and Darwin should have failed to notice so conspicuous a phenomenon as the occurrence of these splendid trees, as natives, in a locality noted for its poverty of natural wood. Unlike Buenos Ayres, Uruguay can undoubtedly boast of possessing Ombús in the open country, but they are extremely rare. D'Orbigny, Darwin, and Dr Bauermeister do not seem to have met with them at all, and in my journey of 160 miles to San Jorge I saw only two or three groups on unenclosed ground. Each group consisted of two or three trees, apparently of the same age, standing in a formal manner on the top of a conspicuous ridge, so that there could hardly be a doubt that they had been planted, perhaps to serve as landmarks in these monotonous regions. I may add, that all my English friends, from various parts of Uruguay, agreed in saying that they had never seen the Ombú growing in natural groves. It may, however, be native in the north of Uruguay, as we really know almost nothing of that district, and this is the more probable, inasmuch as the province of

Rio Grande in Brazil, which is contiguous with it, is mentioned by Gaudichaud as a native locality of the Ombú. Other, but probably not native, South American localities where it has been met with, are near Rio Janeiro, in Corrientes, where D'Orbigny mentions having seen two very large trees at an Estancia in lat. 28°, and in New Granada (cultivated). In the hotter parts of Europe it seems to thrive, but it is not nearly so common even in Spain as the long-continued intercourse with its South American colonies would lead us to expect. Azara at the beginning of the century saw only one specimen at Cadiz; and the instance of Seville, already referred to, is the only one I have met with mentioned in books, of its cultivation by the Spaniards as an avenue tree. It is common in the gardens at Gibraltar. Sir Joseph Hooker describes the Ombús there as very handsome, leafy, rounded, and massy looking trees, having the general aspect of the Mango; and Mr Archer, in a paper read to this Society, says that many of their great gouty stems are 6 feet in diameter at the base, but rapidly diminish to a third of that size at 3 or 4 feet from the ground.

Dr Cleghorn informs me that he has seen this beautiful tree growing at Malta, and that it is also cultivated at Bombay and Calcutta.

A good figure of the leaves, flower, and fruit of the *Phytolacca dioica* is given in L'Heritier's "Stirpes." The illustration accompanying this paper shows mainly the character of the stem in trees of considerable age. It is taken from a sketch of one of the finest specimens I saw in South America, measuring no less than 32 feet in girth at its narrowest part, 3 feet from the ground, clear of the projecting buttresses, and below its division into branches of very various sizes,—a common but not invariable habit of the Ombú. This noble tree grows on an elevated plateau at Belgrano, near Buenos Ayres. Many others are to be seen in its neighbourhood, and in order to show their general form I have represented two or three, which stand on the edge of the plateau, overlooking the alluvial plain of the Rio de la Plata. In the distance is shown a fringe of poplars and other trees, beyond which lies the river, here not less than 20 miles in width.