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A visit to the Galapagos Islands in 1880. 1880

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The Royal Geographical Society

THE GALAPAGOS ISLANDS

A. H. Markham

1880

that march, phoenix-like, the subsequent expeditions had arisen. If the results of Dr. Livingstone's explorations had been lost to the world, he doubted very much whether this enthusiasm for discovery would have got its head fairly above water, so great was the dread of going into the interior of Africa. James Chuma, after this, came to England, and was present at one of the meetings of the Society. He was glad to hear Mr. Thomson acknowledge the great value of Chuma's services, and he no doubt would be ready to admit that, left alone as he was, mourning over the loss of his English leader, a very great deal of his success did depend on the pluck he found in James Chuma. He (Mr. Waller) suggested that while travellers setting forth from England were rewarded with medals and stars, it should also be seen that the Society would always recognise merit, whether it was under a white skin or a black one. A few pounds spent in rewarding these men would be rightly and properly bestowed, and would be beneficial in its results to future travellers.

The PRESIDENT said he was sure the suggestion thrown out by Mr. Waller would not be lost sight of by the Council. Mr. Thomson had received his meed of praise from the person, of all others, best fitted to give it to him—Sir Rutherford Alcock. He would only add that Mr. Thomson had proved himself a worthy fellow-countryman of those two illustrious Scotchmen who, from the north and from the south, had added most to our knowledge of Africa, namely, James Bruce and Dr. Livingstone. Englishmen would feel nothing but an honourable rivalry in the great work done by Scotchmen, and they would be very glad if to this glorious list of explorers they might soon be able to add the names of Africans themselves, encouraged, as Mr. Waller had suggested, by rewards and acknowledgments proceeding from this country.

A Visit to the Galapagos Islands in 1880.

By Captain A. H. MARKHAM, R.N., F.R.G.S.

THE Galapagos Islands, I may begin by stating, are situated in the broad Pacific Ocean, almost on the Equator, at a distance of 600 miles from the west coast of South America. They were discovered by a Spanish vessel, early in the sixteenth century, and took their name from the word "galapago," which in Spanish signifies a fresh-water or land tortoise, the islands having abounded in these animals. The Archipelago consists of seven principal islands, and about half a dozen of lesser size and importance, besides innumerable small islets and rocks, which together occupy an area of about 180 square miles.

Albemarle Island is by far the largest in the group, being some 60 miles in length by about 15 miles in breadth. It possesses noble mountains which tower up to an altitude of nearly 5000 feet above the sea-level. Being of purely volcanic formation, the hills in all the islands are nearly all conical.

The islets and rocks that fringe the coasts of the larger islands appear to be composed of a dark basaltic lava; the majority of them are totally devoid of vegetation, sterile and barren in appearance, inhabited only by birds. Some of the higher ones, however—those that are from 300 to 600 feet in height—appear to be covered with a scanty

vegetation, just sufficient to give them a slight greenish tinge. Even this had a refreshing appearance to us, who had for so long been accustomed to gaze on the arid shores of Peru. The action of the sea has, by continuous attrition, so perforated some of these rocks as to cause the formation of perfect arches; this was more particularly the case in Watson Island, which exhibited two of these natural architectural features.

The majority of the hills on the different islands are the craters of extinct volcanoes, which, doubtless, at some probably not very remote period in the geological history of our planet, were belching forth sulphurous smoke and masses of incandescent lava—in short, in full volcanic activity. Darwin, who visited the Galapagos in 1836, whilst serving in the capacity of naturalist on board the surveying ship *Beagle*, under the command of Captain FitzRoy, affirms that there are no less than two thousand craters in the Archipelago.

Our stay in the group was of too brief a duration to enable us in any way to verify this statement; besides, our visit was limited to one island only. But from the appearance of the other islands, as we passed them at a distance, I should certainly hesitate to express an opinion contrary to that of such an accurate observer.

The same authority is under the impression that these craters were originally formed in the sea, and in support of this hypothesis he says that the southern sides, or lips, of the craters were invariably much lower than the remaining portion of the mouth. This he attributes to the prevailing southerly winds, which dashing the waves up against the sides exposed to their influence, gradually washed away the gaps that are now to be seen.

To the prevailing winds also may be ascribed the different aspects of the sides of the islands, the lee sides being comparatively bare and sterile in appearance, whilst to windward the islands were clothed with a dense vegetation. This can only be accounted for by the fact that the weather side first receives the moisture of the atmosphere, as it is wafted up by the trade wind, and its thirsty soil absorbs it all, before it can reach the opposite side. Hence the extra luxuriance of the verdure on the south-western sides, and the great contrast it offers to the sterility of the north-eastern shores.

So far as my limited knowledge of the group goes, I am of opinion that there are no active volcanoes in any of the islands at the present time, nor can I find any reliable information that would lead me to suppose that they have been in a state of activity since they were first discovered.* But with such an excitable neighbour as South America, distant only 600 miles, whose dormant volcanoes are only too prone

* Lord Byron, H.M.S. *Blonde*, speaks of an eruption of one of the volcanoes of Albemarle Island, when his vessel was in Banks's Bay in 1825. An eruption in Narborough Island is mentioned by Captain Morell.—[Ed.]

to burst forth into a state of violent commotion on the slightest possible provocation, it would not be at all surprising to hear, at any moment, that some of the craters had resumed activity.

The Archipelago belongs, politically, to the Republic of Ecuador. By the government of that country, one or more of the islands was leased to a Señor Valdizan, who appears to have attempted the cultivation of cotton, tobacco, and different kinds of fruits on Charles Island, but with what success we were unable to ascertain, for on our arrival the island was found to be uninhabited, and in undisturbed possession of the so-called wild cattle (of whom more hereafter), donkeys, dogs, pigs, and other animals that had been left to run wild on the abandonment of the island by the former inhabitants. The gardens we found overrun with weeds and wild flowers, and the huts forming the settlement were rapidly falling into decay. Barely eighteen months, however, had elapsed since those gardens were carefully tended, and since those huts were the happy homes of many families, as was only too surely but silently testified by the inscription on the head-board of a grave, a sad but truthful record of the recent history of the island.

The other islands in the group are supposed to be uninhabited, but at the time of Darwin's visit, forty-four years ago, he states that there were no less than three hundred living on Charles Island, the majority being people of colour who had been banished from Ecuador for political crimes. On James Island, Darwin found a party of Spaniards who had been sent there from Charles Island for the purpose of drying fish and salting tortoise-meat.

With regard to the discovery of the Galapagos Islands, the first really authentic information that I have been able to gather is where they appear, with the present name of the group, on a map of South America and the South Sea, that accompanied a book published by Ortelius in 1570; but I have not the slightest doubt that they were discovered many years anterior to that work.

It is a curious fact that the individual names which the several islands now possess are all of English origin. How long they have been thus known, or by whom the names were conferred, it is difficult to ascertain; but I am inclined to think that the majority of the names were bestowed by the buccaneers who, during the seventeenth century, frequented the islands, and made them a sort of head-quarters or base of operations where they established large depots of provisions, and where they would go to careen their ships after a predatory descent on the Spanish towns situated along the coast of South America; indeed, these raids were frequently extended as far north as the Gulf of California.

Charles and James Islands are unquestionably called after the kings of that name of the Stuart dynasty. Indeed, in an old chart of the Archipelago, described in 1684 by one Ambrose Cowley, a buccaneer, they appear as King James and King Charles Islands.

Narborough must have been called after the celebrated navigator of that name, who, in the year 1669, was despatched by the Admiralty in his Majesty's ship *Sweepstakes*, on a voyage to the South Sea, partly commercial and partly for discovery.

The remaining islands of the group, namely, Chatham, Hood, and Indefatigable, appear to have been named at a more recent date. In Cowley's chart the last-named island bears the name of the Duke of Norfolk's Island. I cannot find out when or by whom the name was changed, but it is a very reprehensible act for anybody to alter the name of a place that has once been conferred upon it by its original discoverer. Cowley ignores the existence of Chatham and Hood Islands altogether, but he has a mysterious island situated due south of Albemarle and James, which bears the name of Sta. Maria de l'Aguada. This, I think, can be none other than Charles Island, which was probably reported by some inaccurate and obscure navigator to be in the position here assigned, and without further questioning it was inserted by Cowley in his chart.

The positions of the islands on this old and rather quaint specimen of cartography are, with regard to latitude, very fairly correct; but they are placed no less than 7° of longitude, equivalent to about 420 geographical miles, too far to the eastward. This appears to be a very egregious error, but due allowance must be made on account of the very primitive description of instruments in use in those days for taking astronomical observations whereby positions were determined.

The only reliable chart that we now have of the Archipelago is the Admiralty one compiled from the survey of Captain FitzRoy in 1836. Even on this we found our anchorage in Post Office Bay (so called from a custom the whalers had of depositing their letters in a hut on the beach for the first homeward bound ship to convey to their destination), differed no less than seven miles in longitude from the position as determined by us!

Captain FitzRoy, be it observed, was one of the most accurate and trustworthy surveyors in the Royal Navy, but then it must not be lost sight of that his chronometers in the *Beagle* were, in all probability, much inferior to those supplied to ships of the present day, and also that the *Beagle* had been a long time at sea, and therefore a considerable interval had elapsed since her chronometers had been rated. Whereas we had obtained rates for our timepieces at Payta, not more than two weeks prior to our arrival at the Galapagos, and we also had the advantage of benefiting by comparisons taken with no less than nine separate chronometers. The position, therefore, as now determined by Staff-Commander Covey of the *Triumph*, may, with confidence, be accepted as a true and reliable one.

Captain FitzRoy's survey of this extensive group of islands, although conducted in a sailing ship, subject to the irregular winds, calms, and

uncertain currents for which the neighbourhood of the Equator is proverbially famous, was completed in the marvellously short space of time of five weeks. It is therefore not surprising that the relative positions of the islands, as shown in the chart, are slightly inaccurate. To me it is a wonder that so much was accomplished, so many harbours not only explored but surveyed, and so many miles of coast-line delineated in so short an interval of time. Our visit to the islands was, unfortunately, too brief to enable us to rectify any of these inaccuracies.

The first mention of these islands having been visited, of which I have any knowledge, is when a party of buccaneers, under the command of one John Cook, anchored off them on the 31st of May, 1684. During the seventeenth century, the Pacific Ocean was infested by bands of lawless men who, under the name of buccaneers, preyed upon the Spanish commerce along the coast, and even attacked large cities, on which exorbitant sums would be levied to save them from destruction.

Darwin's interesting work, entitled a 'Naturalist's Voyage round the World,' contains undoubtedly the most comprehensive account of the Galapagos Islands that, to my knowledge, has ever been published. During his stay in the group, extending over a period of five weeks, whilst the *Beagle* under Captain FitzRoy was engaged in making a survey of the Archipelago, he had ample opportunities for studying the natural history of this remote part of the world, which, we may be quite assured, were fully taken advantage of by such an energetic and vigorous labourer in the field of scientific research.

Darwin's description of Chatham Island bears a strong resemblance to the account given of one of the islands by De Villefort, who accompanied De Beauchesne. Darwin says, "The entire surface of this part of the island seems to have been permeated, like a sieve, by the subterranean vapours; here and there the lava, whilst soft, has been blown into great bubbles; and in other parts the tops of caverns similarly formed have fallen in, leaving circular pits with steep sides."

There are few places in the world so remarkable and interesting as the Galapagos Islands, forming, as they do, a little separate universe by themselves, possessing their own distinct and peculiar fauna and flora. Most of the former are aboriginal creatures found in no other part of the world, whilst with regard to the latter, there are over one hundred species of plants that have never been seen anywhere else. There is even a marked difference between the different species of the animal world that inhabit the various islands comprising the group. The same birds do not frequent the whole archipelago; tortoises are found in numbers on some of the islands, whilst on others they have never been known to exist, and even the sea-fish caught in the waters by which the shores of the islands are washed, differ from those found elsewhere.

As Darwin very rightly and justly says, "the Galapagos Archipelago might be called a satellite attached to America, or rather a group

of satellites physically similar, organically distinct, yet intimately related to each other, and all related in a marked though much lesser degree to the great American continent."

The only way in which this great philosopher and naturalist can account for the remarkable difference in the individuality of the inhabitants of the several islands, and the way in which this individuality has been so strictly confined to the group, is by the fact of the strong north-westerly currents which prevail in the neighbourhood, which necessarily tend to make transportal by sea exceedingly difficult; and as the islands are, to a wonderful extent, free from gales of wind, birds, insects, or seeds could not well be blown from one island to the other. The profound depth of the ocean between the islands renders it extremely unlikely that they were ever united, and from their appearance it is reasonable to suppose that they were formed by volcanic upheaval from the bed of the ocean.

The Galapagos Islands are now but rarely visited (being out of the track of merchant ships) except perhaps by a stray whaler, or occasionally by an English man-of-war. It was therefore with a great deal of pleasure that I received Admiral Stirling's orders to shape a course in H.M.S. *Triumph* to this interesting group, and although our visit was but of brief duration, and confined to one island only, still in the short time that we remained in Post Office Bay, Charles Island, we had ample opportunities of exploring the island, and adding slightly to our limited knowledge of its natural history. The onerous duties on which we were engaged prevented a longer stay in the group, otherwise a more valuable collection would undoubtedly have been obtained, for the majority of the officers showed a praiseworthy zeal and energy in collecting specimens, whilst a great deal of interesting information would also have been gained in connection with these remarkable islands. A large ironclad, however, like the *Triumph*, drawing 27 feet of water, is hardly the kind of vessel that should be selected to cruise amongst a group of islands only partially surveyed.

The climate of the Galapagos Islands, considering their situation, is far from being uncomfortably hot, and there is generally, during the day, a cool, refreshing sea breeze. During our short stay in the group, in the month of February, in the very height of what is called the rainy season, but little rain fell, and that principally at night-time. Two days before we reached the islands, and when we were some 200 miles to the eastward, we experienced an unusually heavy fall of rain, lasting in one continual down-pour for many hours.

On approaching the group, and also during our sojourn at Charles Island, we saw an immense number of turtles lying on the surface of the water, but all attempts to capture them were futile. Either they were too wary or we too stupid, or perhaps a combination of both, but they invariably raised their heads out of the water, looked curiously

and inquisitively at their approaching enemies, and then paddled off below the surface long before the boat could get within striking distance. It is customary to spear or harpoon them whilst floating asleep on the water, but they were always too wide awake for us. We never saw any on shore.

On account of the heavy rollers that set in, and wash with an angry and dangerous surf the western coast of Charles Island, landing in a boat, except at a few sheltered places, is almost impracticable. The best anchorage is, undoubtedly, in Post Office Bay, in about seven fathoms. It is open and exposed to the westward, but is protected from the prevailing wind by Daylight Point.

Off some of the headlands, especially those with precipitous terminations, hundreds of sea birds were congregated. As we passed in our boats, close to the rocks on which they were assembled, the larger birds regarded us with dull apathetic wonder, seeming to care but little for our presence. The terns, however, showed an unmistakable exception to the indifference displayed by the larger fraternity, for they resented with fierce, harsh cries our intrusion, and kept swooping down upon us in our boat, so that we were compelled to use sticks to keep them off, whereby several fell victims to their own rashness.

In the bay there was no dearth of fish, principally a kind of cod, weighing from 15 to 25 lbs. each. These were easily caught with hook and line, as they were so voracious that they would frequently rush at, and swallow, the bare hook, before even a piece of bait had been attached to it. The chief annoyance from which our fishermen suffered was the number of small sharks, who, apparently bent upon self-destruction, would seize the bait intended for their brethren of the finny tribe, and thus immolate themselves through their own rapacious appetite.

Darwin reports that the tortoises on Charles Island, during the time of the *Beagle's* visit, were so numerous that they were regarded as the chief staple of food by the inhabitants, who considered that they could generally collect in a couple of days sufficient to keep the community (who mustered about 300) in provisions for a week. It is also reported that some men landing from a frigate, a few years ago, brought down to the beach in one day no less than 200 tortoises. These reptiles, either from drought or some other cause, must have decreased in an astonishing manner during the last few years, for now they may almost be said to have ceased to exist on Charles Island. During our stay on the island, although different parties from the ship were wandering about in various directions, the only sign of a tortoise that was observed was the shell of a dead one in the vicinity of the settlement.

Lizards also, were exceedingly scarce, a few only were seen, and not more than two, I think, were captured. These reptiles belong to a remarkable genus met with nowhere else in the world, being entirely confined to the Galapagos Islands. I was fortunate enough to secure

one of the marine kind, the *Amblyrhynchus cristatus*, which measured 31 inches in length. The terrestrial one, the *Amblyrhynchus Dumerilii*, has never, I believe, been found in Charles Island, though common enough in other islands of the group. Its habitat appears to be confined to the central portion of the Archipelago. My specimen has a short, broad head, and is of a dark brownish colour, striped with yellow across the back; its feet are partially webbed and are furnished with five long claws; the tail is long and flattened at the sides. It bears no resemblance to its ally the iguana, either in appearance or habits, for it is of a very sluggish nature, and may be caught with ease.

The shores of Charles Island, and I presume they form a very good illustration of what the coasts of the other islands are like, are a mass of rugged lava, heaped together in chaotic confusion. I can think of no better simile than that they resemble a newly ploughed field which had suddenly become solidified, except, perhaps, that I should feel inclined to say that the clods in the Galapagos were larger and the furrows and crevices deeper.

Some idea may be gathered of the roughness of the beach when it is known that a party of explorers started to walk from the ship along the coast to the settlement, a distance of about four miles. After abandoning the greater part of the provisions and stores with which they were laden, and cast off all superfluous clothing, they succeeded in accomplishing the distance in about ten hours. But at the end of this time their boots and shoes were completely worn through, some even being sole-less, their scant clothing was torn into shreds, whilst they themselves were exhausted.

In order to reach the settlement on Charles Island, without undergoing a repetition of the experiences of the energetic pedestrians just alluded to, it is advisable to land in a boat at a place called Black Rock Beach on the western side of the island. The best landing will be found on the beach, in front of a dilapidated hut in a snug little bay protected by outlying rocks. Beyond is thick, dense scrub, through which paths radiate in various directions. These paths were simply cattle-tracks, unpleasantly narrow, and in some places almost undistinguishable, from the exceeding density of the bush. The latter, on account of its prickly and thorny nature, was terribly fatal to clothing.

These thickets have been described by former visitors as being "leafless." We, on the contrary, found them clothed with a luxuriant verdure; but this apparent discrepancy between our experiences and that of those whom we followed, may possibly be due to the time of year that we visited the islands, the rain, in all probability, having materially assisted in developing the growth of the plants. The bush consisted chiefly of a species of *Euphorbiaceæ*, but acacias and other trees were abundant. These were probably indigenous to the island, but we also saw a vine, fig, and orange trees, besides lime and lemon trees,

which I think must owe their introduction to the recent inhabitants. Grasses were exceedingly scarce, which appeared surprising, considering the vast amount of wild cattle that flourished on the island. This was subsequently partially accounted for, for on examining the contents of the stomachs of some of these animals that were shot, I was unable to detect any traces of grass, and came to the conclusion that these beasts lived entirely on the rank weed which grows profusely all over the island.

Gradually ascending from the beach and journeying over loose scoria, a walk of about a mile and a half brought us to the settlement; but it was only so in name, for no settlers, or even traces of any very recent occupation, could be found. There stood the huts, but tenantless, and as still and silent as the tomb, a silence that was only disturbed by the birds which fluttered around us fearless and confiding. So tame were these, that they even alighted on our gun-barrels as we walked along with them over our shoulders.

The settlement consisted of about half a dozen small huts, built of thin strips of split bamboo, connected together with long narrow pieces of raw hide. The majority of the houses were roofed with thatch, but one, more pretentious than its neighbours, possessed a roof of corrugated iron. A small stream trickling from a spring in close proximity to the settlement relieved our anxieties regarding water, and afforded us a pleasant and refreshing, though slightly warm, drink, which, however, served to allay the excessive thirst produced by our hot and dusty walk. When the island was visited by Darwin in 1836, the settlement was situated about two miles from the site of the one now existing, and the ground was reported to be well cultivated with sweet potatoes and bananas. Of this latter plant we saw no signs, nor did I observe any palms, or other vegetation peculiar, exclusively, to a tropical climate.

I must not omit to mention the existence of another kind of fruit-bearing tree which, in all probability, was introduced by the former inhabitants. It was a description of plum, and is, I think, called by the Spaniards "*Ciruela*." I am inclined to think it is the same as Darwin's *Guayavita*. It bore a rich yellow-coloured fruit, which becomes dark-red on its maturity. It possesses a very large kernel, is very juicy, and has a slightly tart, but by no means unpleasant, flavour. Our men ate great quantities of this fruit when they came on shore.

The interior of the island was covered with the same dense scrub that we had encountered on landing, and which we soon found, to our cost, was quite impenetrable if we ventured to wander off the cattle tracks. Although some of our party ascended the highest hill on the island, which was over 1700 feet above the level of the sea, whilst others explored the interior, we failed to discover the "beautiful park-like country," or to see "the rich grass under our feet"; nor were our eyes greeted with the many "varieties of flowers," as described by a former

visitor in a graphically written work depicting sporting adventures in the Pacific. Perhaps, as I have already hinted, Charles Island is clothed in different garbs at different seasons of the year.

During our excursions we found the heat, in the middle of the day, to be intense, whilst we invariably suffered from an intolerable thirst, which we were only occasionally able to allay when we were fortunate enough to come across a few dirty pools of stagnant water, in which the cattle had been wallowing, that existed in a valley separating the two highest hills on the island. In one of these ponds a teal and a curlew were shot. They were, apparently, the *Querquedula Crecca* and the *Numenius arquata*. A duck was also seen, but at too great a distance to be properly distinguished.

Having walked about five miles into the interior, we observed what appeared to be a succession of caves, symmetrically dug out, at the base of a hill. On approaching, a truly wonderful sight presented itself to our eyes. The cavities we found to be natural excavations in the lava similar to those seen and described by Darwin on one of the other islands of the group, and formed, as he supposes, by the subterranean vapours permeating through the soft lava whilst yet in a state of fusion, and producing gigantic bubbles, which, bursting, formed the caves we saw.

These dens, which is the most appropriate term I can use for them, had evidently been utilised by the former inhabitants both as residences and cooking places, traces of fire being still plainly discernible. In some, the half-consumed ashes were visible. Some of these excavations took the form of roads, having natural walls on either side from 8 to 10 feet in height. I never in my life saw a place so admirably adapted by nature for defensive purposes. A small party of resolute men in possession could with ease defy and keep at bay more than twenty times their number.

In the vicinity of this weird-looking place was a secluded and shaded grotto, around which grew in luxuriant profusion clusters of various kinds of ferns, whose graceful fronds waved over a bright, sparkling stream of pure pellucid water, which trickled down with a musical murmuring from the rocks above. It was a sight to soothe and delight the eye, as we approached nearer to inspect this beautiful glen, and to moisten our parched throats with a draught from the glittering rivulet.

Two or three large orange trees, fully 20 feet in height, were growing in the neighbourhood, their well-laden branches affording an excellent protection from the sweltering rays of the fierce tropical sun to which we had been exposed. So fruitful were these trees that it caused one of my companions to observe, very truthfully, that their boughs contained more oranges than leaves. But what attracted our attention, even more than the natural beauties of the scene, and rendered the

picture almost offensive and repugnant, was the accumulation of vast numbers of skeletons and carcasses of oxen, in different stages of decomposition and decay, that lay heaped about in all directions, and filled the air with a loathsome and nauseous odour. In a small plot of ground, barely a square acre in extent, there could not have been less than 300 carcasses. My impression is that the locality was where the wild cattle were accustomed to assemble daily for water, and that, at some no very distant date, the stream which had afforded us such a refreshing draught had in all probability dried up, and the unfortunate beasts, unable to find water elsewhere, had accumulated at the place where they had been in the habit of alleviating their thirst, and finding nothing but a dry bed of a watercourse, had perished miserably.

Whilst meditating over the scene, we were disagreeably aroused from our reverie by the sudden onslaught of a couple of large black boars, whose jaws were furnished with extremely ferocious-looking tusks. They rushed out from a cave alongside of us. So sudden and unexpected was the charge, that although they passed within a couple of feet of us, they, as well as ourselves, who nimbly stepped on one side so as not to interfere with their headlong career, escaped unharmed, the only rifle that we had pertinaciously refusing to go off at the critical moment, although levelled with deadly intent at both animals.

Darwin refers to the existence of pigs and goats on Charles Island, but we saw no indications of the presence of the latter animals.

Shortly after the "pig scare" we disturbed a litter of about six or seven yellow-coloured puppies, which, emerging from another cave, slunk away up the hill with their tails between their legs, resembling more a lot of well-thrashed, and therefore well-cowed domestic animals, than the offspring of wild parents. Although at times during the day we fancied we heard the older dogs barking, we never succeeded in seeing them.

The dogs were no sooner disposed of than we suddenly found ourselves face to face with two of the famous wild cattle of the island, the savage ferocity of which had been the topic of many discussions on the subject amongst my shipmates during our passage across from South America. They were a couple of noble looking bulls that faced us, but, unfortunately for them, the rifle this time was more true than when aimed at the pigs, and they both fell victims. During our stay in the Galapagos, although a great many of these animals were seen, only five fell to the prowess of our hunters.

I have been unable to ascertain satisfactorily the date of the introduction of these cattle on the island. I am inclined to think that it was during the present century, and probably within the last thirty years. There were certainly none in the islands during the days of the buccaneers, or else some mention would undoubtedly be made regarding the existence of such a staple commodity of food; nor were there any in

1836 when the *Beagle* visited the group, for according to Darwin the tortoises furnished the inhabitants with food.

I am almost disposed to attribute their introduction to the late tenant, Señor Valdizan, who appears to have been an enterprising man, and whose remains lie interred in the neighbourhood of the settlement of which he was the originator and proprietor. Although they appeared, as a rule, in rather poor condition, some that we saw were splendid looking animals of great size. They were of all colours, black, brown, white, red, and brindled, which in a measure tends to prove their recent domestication.

There are also a great number of donkeys on the island, which were probably allowed to run wild in order to preserve their own lives when the place was deserted about eighteen months ago.

The bush during the day was alive with little birds, mostly of a dull and sombre-coloured plumage, with two exceptions, namely a beautiful little scarlet-tufted fly-catcher, with a richly coloured breast of the same bright hue, and a lovely little yellow wren, the male of which possessed an orange-coloured head. Indeed, animal life in the Galapagos Islands appeared to assimilate itself as much as possible to the dull and rather dismal colouring of the lava of which those volcanic islands are composed.

On account of the excessive heat, the difficulty of preserving specimens was greatly enhanced. Birds had to be operated upon almost immediately they were killed, whilst plants and flowers withered and faded a few hours after they were culled. Our natural history collection was in consequence not so large, or so valuable, as it would otherwise have been.

The breeding season for the birds in the Galapagos does not appear to be confined to any particular period, but seems to extend over the whole year. Our visit to the islands must naturally be inferred as having taken place in mid-winter, for we arrived there in the middle of the rainy season. Yet we found nests, apparently just formed, others containing eggs in different stages of incubation, and others with the small unfledged birds inside, whilst young birds just able to fly were frequently observed. In fact, all the various gradations, from the immature egg to the mature bird, were observed at the same time.

A large peculiar kind of locust, of a highly variegated colour, abounds in the island. These insects were about four inches in length and were quite as large as some of the small birds that flitted about in the bush, for which they were not unfrequently mistaken. We obtained a large description of humble bee, several kinds of beetles and cockroaches, some dragon flies and other insects. Of butterflies we only saw three distinct kinds, but moths were very numerous, and of several different descriptions. The latter were seen flying about just as much

during the day as at night time. A number of shells, both marine and terrestrial, were also collected.

We failed to see any of the flamingoes which are reported to be, more or less, common to the group; nor did we observe any of the buzzards alluded to by Darwin, and which, if indigenous to Charles Island, we should most certainly have found gorging themselves on the carcases of the oxen. Nor did we observe any of the skuas and gulls said to frequent the group by Mr. Howard Saunders, in his interesting pamphlet on the geographical distribution of those birds, published in the 'Transactions' of the Linnean Society.

One of the most interesting natural history specimens that we obtained was a fresh-water lobster, which was found in a small pool fed by the spring that has been mentioned as being in close proximity to the settlement. The creature was of a greenish colour, and its body was about six inches in length. It was in possession of six legs, and had four feelers or antennæ, besides two enormously long, thin claws fully 18 inches long. The claw itself was furnished with two or three sharp teeth. Unfortunately during the transit of this specimen to the ship, and before it could be placed in spirit, it was in such an advanced state of decomposition that it was thrown overboard. This odd-looking crustacean was found in a small and shallow pool, not more than three feet in diameter, and only two or three inches in depth. It was secreted under a stone, and would have remained undiscovered, and consequently unmolested, had it not been for its pugnacious disposition in attempting to seize with its claw the hand of one of the men who had gone to the stream for ablutionary purposes. The pool of water in which its capture was made was fully a mile and a half from the beach, and 450 feet above the level of the sea.

The finding of this creature would cause us to draw the inference that in spite of the insignificance of the stream, for it was only an exceedingly small rivulet, water is to be obtained all the year round; in other words, that the stream never dries. This is of the utmost importance to those who are desirous of residing on the island.

The currents in the vicinity of the group are strong and very uncertain; necessitating extra caution on the part of the mariner navigating those waters. To the southward of Hood Island we experienced a strong westerly set of no less than $2\frac{1}{2}$ knots per hour in the space of three hours, whilst during the four succeeding hours the strength had diminished to 1.4 knot per hour in the same direction. Previous to making the islands we had experienced strong north-westerly and north-easterly currents, and the same was the case after we had left them, the ship being set in one day as much as 66 miles to the north-west.

When about 100 miles to the eastward of Chatham Island, several temperatures were obtained at a depth of 300 fathoms. We found a difference of nearly 10° of temperature between the surface water east

and west of the group, the latter being the coolest. FitzRoy, in the *Beagle*, found even a greater difference. Whilst cruising amongst the islands he observed the temperature of the water, as we did, to be at or about 80°, but directly he went to the westward of Albemarle Island, it suddenly fell to 60°. The time of the year was October. This cold stratum must be a branch of the South Polar current which had not had time to be heated by its diffusion with the equatorial stream.

Off Charles Island a haul with the dredge in 45 fathoms was obtained, but with unimportant results, by which we concluded that there was a great paucity of organic life at the bottom.

The Archipelago is still far from being well known; a visit to its unfrequented shores of a few months' duration would amply repay any naturalist, by the rich harvest he would reap in the collecting of specimens, both animal and vegetable, that are totally unknown in any other part of the world.

Notes on Captain Markham's "Visit to the Galapagos Islands."

By OSBERT SALVIN, F.R.S., F.L.S., &c.

SOME of Captain Markham's collections having been placed in my hands for determination, I gladly return to a subject in which I was actively interested a few years ago, and take the opportunity here afforded me of adding a few words to the foregoing paper, on the subject of the gradual increase of our knowledge of the fauna of the Galapagos Archipelago since Mr. Darwin's memorable visit.

Of indigenous terrestrial mammals none are known to exist in any of the islands, but before passing to the birds it seems desirable to recall the fact that a species of sea lion (*Otaria*) was once common in the Galapagos. In the accounts of various visitors to the islands at the end of the last and beginning of the present century, allusion is not unfrequently made to the numbers of *Otaria*, but I have seen none in recent records. It seems therefore most probable that these animals were exterminated by the crews of the whaling ships which thronged these seas prior to Mr. Darwin's visit. The Galapagos *Otaria* is usually supposed to be the same as that found on the coast of California; but this point has, I believe, never been satisfactorily determined, and specimens of this animal and bones of it, especially crania, should be carefully sought for by future explorers.

The birds of these islands have always received a large share of attention, and hardly any expedition has failed to add some species to the list. After the visit of H.M.S. *Beagle*, the French ship *Vénus* touched here, and the surgeon, Néboux, obtained two species of sea birds, a gull and a petrel, both of which proved to be new to science and peculiar to the islands. Captain Kellett and Lieutenant Wood in H.M.S. *Pandora*, also secured some sea birds near Chatham Island, one of which I long

afterwards described as a new and peculiar petrel, and another was a second, and to this day only other known, specimen of Néboux's gull. After the *Pandora* the Swedish vessel *Eugenie* spent nine days amongst the islands, during which time twenty-six species of birds were procured, and amongst them a new heron and a new penguin, the latter having been seen and incidentally mentioned by Colnett, who observed it at James's Island, when there in H.M.S. *Rattler*, in 1794. In 1868, Dr. Habel, an American, spent about six months in the Archipelago, having joined a party of "ochilla" pickers. During this time he made by far the largest collection of bird-skins ever got together in these islands. His chief attention was devoted to Indefatigable, Bindloe, and Abingdon Islands, none of which had previously been visited by a naturalist. This collection fell to my lot to work out, and I took the opportunity of collecting all the previous information relating to the birds that I could obtain, and incorporated it with Dr. Habel's notes in a paper, published in the 'Transactions of the Zoological Society.'* The number of species there shown to inhabit the islands, was fifty-seven. Since then I am not aware that any additions have been made to the number of birds, but the few specimens obtained by Commander Cookson in H.M.S. *Peterel*, added to our knowledge of their distribution. Captain Markham's collection, which contains fifteen specimens of ten species, adds another petrel (*Puffinus obscurus*) to the list. *Pelecanus fuscus* and *Sula cyanops* are traced to Charles Island, though both are probably found throughout the Archipelago. A single mutilated specimen of an *Anous*, allied to *A. stolidus*, is much darker than is usual in specimens of that bird, and the few feathers remaining on a fragment of the head show that the crown is not light grey, but coloured like the back. Mr. Sharpe separated the Galapagos bird as a species distinct from the well-known "Noddy," and this specimen tends to show that he was right in so doing.

From these notes it will be at once seen that even in the comparatively well-worked field of the birds, we have reason to believe that much remains to be done before they can be said to be at all completely known. Not only are the important islands of Hood, Tower, and Albemarle almost untouched, but outlying rocks such as Wenman and Culpepper ought not to be wholly neglected, as it is impossible to surmise what they may contain or what novelties may be in store to reward a diligent explorer. Then, too, the sea birds are perhaps more interesting than those of almost any part of the world. For, with several common and widely ranging species we find no less than four or five which are peculiar. Two gulls, both very rare in collections, especially merit attention; even more so the two petrels, which are peculiar to the islands, and amongst the rarest of their kind. The doubtful distinctness of the Noddy tern also requires further investigation, and more specimens are required to determine its position.

* Vol. ix., part ix.

Our knowledge of the reptiles has been greatly extended in recent years, chiefly through the exertions of Commander Cookson who, at Dr. Günther's request, paid great attention to the remarkable tortoises which in these islands have ever attracted notice. These materials Dr. Günther incorporated with all the previous information he could obtain in a valuable memoir, published by the Trustees of the British Museum, 'The Gigantic Land-Tortoises (living and extinct) in the collection of the British Museum.' From this it would appear that the tortoise of Charles Island (*Testudo ephippium*) is extinct.

Abingdon Island has a peculiar species in *T. Abingdoni*, and in Albemarle two species are found, one in the north (*T. microphyes*) and another in the south (*T. vicina*), but the latter point is somewhat doubtful. Besides these, another species exists (*T. nigrita*), but which has not yet been satisfactorily traced to any one island. Nor is the exact origin of *T. elephantopus* known, though supposed to be James Island. On the other hand, Chatham Island, Hood Island and Indefatigable Island, though all known formerly to have possessed tortoises, now probably contain nothing but their remains, but even of these not even fragments have reached our museums. With the exception of Albemarle Island, where tortoises are still numerous, and Abingdon Island, where a few may be found with tolerable certainty, nowhere else throughout the Archipelago have we any recent accounts of their survival. What is required of future explorers is the search in each island not only for the few lingering individuals that may still survive, but for any remains, such as bones, especially crania and carapaces, that are sure to be lying about, and probably will continue to do so for some years to come. But no time is to be lost, for, after the extinction of these animals which must ensue in a short time, all traces of them must follow at no distant period.

Of the five known species of lizards, Dr. Steindachner has recently given an excellent account in the 'Festschrift der Zool.-bot. Gesellsch., Wien,' for 1876.

Of fish, the most recent additions are given by Dr. Günther* from Commander Cookson's collection, that officer having obtained twelve species during his visit in H.M.S. *Peterel*, five of which were new to the fauna of the islands.

The only recent collected notes on the Invertebrates that I am acquainted with are those prepared for Dr. Günther's paper on Commander Cookson's collections,† and with them are incorporated descriptions of many of Mr. Darwin's specimens here formally noticed for the first time. Of Mollusca, 22 species are mentioned; of Crustacea, 4; of Myriopoda, 1; of Arachnida, 7; of Neuroptera, 2; of Lepidoptera, 2 (both Heterocera); of Orthoptera, 6; of Hemiptera and Homoptera, 18; and of Echinodermata, 5. Captain Markham now adds nine species of

* 'Proc. Zool. Soc.,' 1877, p. 64, et seq.

† Ibid.

Lepidoptera (three butterflies and six moths). Of these I have prepared a short paper for the Zoological Society. The butterflies are : an *Agraulis* closely allied to the common American *A. vanillæ*, but dwarfed in size and slightly modified in colour ; a true *Lycæna* or *Polyommatus* which seems peculiar, though a closely allied species is found in Peru ; the third is a dwarfed race of the common American *Callidryas eubule*. Of the moths, five of the six species are Sphingidæ, three being barely separable from widely ranging American species, differing only in their smaller size, the other two are apparently distinct species to which I have not yet been able to find near allies. The sixth species is an obscure Geometrid.

As regards the general relationship of the fauna of the Galapagos to that of the Continent of America, to which it bears so strong a resemblance, it seems only necessary for me to refer to Mr. A. R. Wallace's recently published volume on 'Island Life,' in which Chapter XIII. is especially devoted to this subject. Captain Markham's collections in no way tend to modify the conclusions there arrived at and so carefully worked out : that the Galapagos are strictly "Oceanic Islands," and owe their fauna and flora to the gradual immigration of species from Continental America. This immigration has been going on from the time when these volcanic islands first emerged from the ocean, and the disintegration of the rocks provided soil for the growth of plants which in their turn nourished insects, seeds, birds, &c. With the lapse of time, and the altered conditions amid which surviving species have found themselves, modifications in their form and colour have been accumulated at a comparatively rapid rate, and this result has been fostered by the peculiarly calm climatic conditions of the islands, and the strong ocean currents which set through them, serving not only to isolate the Archipelago from the mainland, but even, to some extent, the islands from one another.

Lest it be thought that in introducing so much on zoological subjects into a geographical journal I have trespassed too much upon more legitimate matter, I will in conclusion again turn to Mr. Wallace's most instructive volume, and quote from his final paragraph, where he speaks of the conviction, that ever presses upon him, of the complete interdependence of organic and inorganic nature, and adds "not only does the marvellous structure of each organised being involve the whole past history of the earth, but such apparently unimportant facts as the presence of certain types of plants or animals in one island rather than in another, are now shown to be dependent on the long series of past geological changes—on those marvellous astronomical revolutions which cause a periodic variation of terrestrial climates—on the apparently fortuitous action of storms and currents in the conveyance of germs—and on the endlessly varied actions and reactions of organised beings on each other."

