NOTES of a VISIT to MADEIRA and the CANARY ISLANDS.

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During the spring of the year just expired, in company with my friend Mr. W. S. McMillan, F.L.S., I visited Madeira and the Canary Islands, with the object of examining and collecting specimens of their marine fauna. We were provided with dredge, tow-nets, microscope, and all the necessary apparatus and material for preserving the specimens obtained. We took passage in the ill-fated "Senegal," a steamer belonging to the British and African Mail Steamship Company, afterwards wrecked and plundered by the natives on the African coast on the return voyage. There being no ladies on board, we were fortunate in securing the ladies' cabin, with a good table and room to work with the microscope, wind and weather permitting.

Steaming at ten miles an hour over the prolific waters, how were its minute living denizens to be captured? Our genial commander, Captain Brown, thought more of his duty to the mails than to biological science, and did not appreciate the idea of allowing the engines a few minutes' pause in mid-ocean. We constructed a long, narrow, strong canvas bag, weighted, and with a bottle secured round the neck at lower end, and threw it over; but after a short pull it was found that everything was washed out as fast as it went in, so that had to be abandoned. On the fourth day out, however, the funeral of a poor fireman necessitated a pause of a few minutes, during which we were able to throw over our "Challenger" tow-

net, and succeeded in obtaining a quantity of surface life, affording ample employment for the rest of the voyage. The haul consisted almost entirely of Copepoda: *Calanus finmarchicus*, *Centropages typicus* and *C. brachiatus*, *Dias longiremis*, and some other species, nearly all found on our British coasts. These, like all subsequent tow-nettings, were at once transferred to a preservative solution of glycerine, alcohol and water, from which they could at any time be mounted in glycerine jelly or Farrant's medium. By this treatment the varied colours of small crustacea remain for the most part intact for an indefinite period.

On the early morning of the eighth day out, we passed the wild headlands of Porto Santo; and soon after, the precipitous barren heights of the Desertas came in sight on our left, the mountains of Madeira rising above the clouds that obscured the horizon on our right. On the afternoon before sighting land, we passed near two good-sized whales, and amongst the several birds that were noticed was the beautiful crested hocpoo, which flew about the vessel for a short time when we were not less than 150 miles from any land.

Rounding the rocky coast of Madeira, we anchored in Funchal Bay, and spent most of our few hours' stay tow-netting in the deep clear waters. Multitudes of the beautiful *Physalia* (Portuguese men-of-war), glittering with iridescent colours in the sunshine, were elegantly floating about the surface, and occasionally their long purple tentacles would get entangled or attached to the rope, when as we pulled up the net we were painfully made aware of the presence of innumerable microscopic lasso threads loosened from their tiny coils by the slightest touch. We found the *Physalia* plentiful wherever we went further south, and brought home some dried specimens measuring not less than eight inches in length.

In some places the high-water line was strewn with multitudes of them.

Funchal has no proper landing place, and as there is often a heavy surf beating over the precipitous beach, it is somewhat of a feat to reach terra firma. As the boat nears the shore the rowers wait for a good wave, which, with a spurt on their part, lands the boat high and dry on the beach. It was near the middle of April, and the heat was very intense. Vegetation was everywhere most luxurious, the gardens being masses of exquisite flowers and shrubs. Amaryllis, Banana, Bougainvillæa, Cactus, Camelia, Clematis, Eucalyptus, Fig, Geranium, Heliotrope, Hibiscus, Lupin, Magnolia, Maple, Orange, Palm, Petunia, Tree-fern, Wisteria, and many others, we noticed very abundant.

Returning to the "Senegal," after a too hasty walk of a few hours about the environs of Funchal, haunted by a troupe of beggars and importunate guides, we again brought the tow-net into requisition with good results in the Bay, and soon after sundown left Madeira for Teneriffe.

At ordinary speed it is about a twenty-four hours' voyage, but as it would be useless to arrive before day-break, we "slowed" all the way, and were able to admire the beauty of the "life on the ocean wave," both in the colours of the innumerable *Physalia*, here seen in thousands, and the elegance of the flying-fish skimming near the surface, of which we observed a considerable number. About noon we passed at a distance the bleak, rugged Salvages Islands, uninhabited by man, there being no fresh water anywhere about them; and rabbits and wild fowl are said to hold undisputed sway. Going up on deck in the early morning, we were greeted with one of those sights which for ever leave their impress on the memory. A summer haze covered the dark volcanic buttresses of

Teneriffe, and high up in the heavens rose the majestic snow-covered Peak 12,180 feet, with the sunlight glistening upon its pointed crest.

Santa Cruz, the capital of the island, is a picturesque little town, with bright many-coloured houses, and memorable as the scene of Nelson's capitulation. His flags are carefully preserved in the Church of the Conception, and are shown with pride to the passing visitor. We townetted in the harbour during our few hours' stay, and obtained a large variety of Copepoda. It was a gorgeous morning, but scorching hot, as we left Teneriffe for Grand Canary, about sixty miles distant, but plainly visible in the clear atmosphere. The Peak is much more imposing when seen from a distance than from near its base, and as we neared Grand Canary its majestic appearance was very striking, and again and again excited our admiration whilst staying there.

The lofty, precipitous, rocky cliffs of Grand Canary, especially on its north-west side, are very grand as viewed from the sea; but on rounding a dark volcanic promontary called the Isleta, a long stretch of flat sandy shore is before us, with the town of Las Palmas at the water's edge some three miles distant. There are several fine buildings, including the cathedral, museum, market, and a few open spaces planted with trees and fragrant flowers. Here the native green canary is conspicuous by its happy song; and here the Canary belles sometimes promenade, but always chaperoned by the prudent mamma or aunt. Canary courting is indeed a somewhat tame business, and has to be conducted in public; so as you walk the streets at intervals may be seen a sentimental Romeo straining his neck upwards, and whispering sweet loud breathings to Juliet, who is stationed at the upper window, looking sweetly down at her adorable.

Parrots, canaries and love-birds are in open cages outside many of the houses, and with a ring attached to the foot by a thin cord enjoy a good measure of freedom. Even here the canaries turn yellow by confinement.

Las Palmas has a remarkably Moorish appearance, with its irregular flat-roofed houses and high palm trees; and a few camels near the landing place help the resemblance. Never was there a more atrociously planned town. A long street, the main thoroughfare, composed of poor houses with their backs close to the sea, obstructs any view or promenade; but as the upper part is on a steep declivity, fine views are obtained from the roofs, which are all accessible from the houses, and all being white, the glare is very trying. A secluded spot on the roof of our hotel made an excellent drying ground, and there our daily captures of Echinoderms, Physalia, &c. were spread out to bake in the sunshine.

We paid several visits to Confital Bay, at the other side of the Isleta, wading about amongst the rocky pools, and found it a capital hunting ground. Physalia, with their long spreading tentacles, were left high and dry all about, but with bare feet had to be carefully avoided. We found five species of Nudibranchs, some of them very large, several Ascidians, a few species star-fish and sea urchins, actinia, &c. We were not so fortunate as to find the *Stellaria webbiana* or *Asteria canariense*, two large species of star-fish sometimes found in this locality, measuring about a foot from the ray tips across. The little cowrie shell was very abundant in all the pools, as was also the beautiful iridescent *Haliotis tuberculata*, and many spiral shells. Strewed along the sandy shore were thousands of the elegant little white *Spirula peronii*, and rarer was the very fragile blue ocean snail *Ianthina fragilis*, which secretes a float of numerous air bladders.

Cuttle-fish are very abundant in the rock pools at low water, and in one deep pool we found a good-sized Octopus coiled up in some loose rock crevices, which it adhered to by its suckers with so tenacious a grip that it was with great difficulty we were able to dislodge the animal and effect a capture.

The indigenous land mammals and reptiles are not numerous. The large breed of dogs, from which the Canaries are supposed to have derived their name, is long ago extinct, though their remains have been found. Lizards are very abundant, but all are included in three species. We found mosquitoes very troublesome, and were victimized by them in spite of mosquito curtains with which most of the beds are furnished. Large black flying-cockroaches too are common, even about the bedrooms in Grand Canary, and although we found them on two successive nights, our male chambermaid said that each was the first he had ever seen, and evidently hinted as politely as possible that we had imported them.

There is much to be seen in Grand Canary, but it is like the Lotus country,

> "In which it seemed always afternoon.
> All round the coast the languid air did swoon,
> Breathing like one that hath a weary dream,"

and there is not much inclination for any exertion. We found sea dredging attended with difficulties. There is usually a considerable surf and swell on, and we had to take eight Spanish sailors to manage the boat. The rocky bottom is very deep, except very near the shore, and with thirty fathoms of rope to the dredge we felt it scraping the surface of hard rock, frequently catching in crevices or jutting edges, and seldom fetching up much except a few Echinoderms, broken bits of coral, &c. The steepness of the coast appears to prevent the growth of much Algæ,

and may thus possibly account for a paucity of marine life near to the land. Once the dredge brought up an Echinus, with very long black spines, at which the sailors all looked aghast and entreated us not to touch it as the long moving spines were considered very venomous. The spines were about eight inches in length when fresh, but contracted very much in drying. Coral is found round the Islands, but not at the accessible parts where we dredged, though our boatmen always vaguely said that "to-morrow" they could take us to places where we could get any quantity. But the Spanish to-morrow is a symbol of procrastination not to be seriously taken in a literal sense, and to-morrow's corals were never found. The tow-net at Grand Canary from whatever cause yielded much smaller results than at Madeira and Teneriffe, nor did we find any surface organisms peculiar to the locality not found in the other islands.

Taking a sun-protected carriage, we made a long day's excursion into the interior of Grand Canary, to visit the famous crater the Caldera, and the very interesting cave dwellings of Atalaya, inhabited by the descendants of the ancient Guanches. A winding well-made road led us to a considerable ascent, commanding extensive views, with Teneriffe and its superb Peak on one side, and on the other a distant view of the Island of Fuerteventura and its two rounded heights, this island being only about sixty miles from the African coast.

Banana orchards and orange groves we passed in plenty, and fig trees grew at the road sides everywhere. Prickly Pears, Aloes, and Cacti are used in place of hedges, as a border to the roads, answering the purpose admirably. When steaming across to Grand Canary, at many miles distance, we were struck with what looked like long rows of white tents at various places. They proved to be large

plantations of prickly pear, for the growth of cochineal, still an important industry, though greatly lessened since the discovery of aniline dyes. The cochineal insects with their larvæ are protected upon the fleshy fronds of the prickly pear by white canvas coverings, which are fixed to the plant by means of fish bones, until the insects are ready for gathering.

Leaving the carriage at the foot, a steep climb took us to the verge of the Caldera crater, one of the most perfect volcanic craters in existence. It is just a mile across, almost a circle, and with a nearly level rim all round the upper part, being 1450 feet above the sea. It looks like a huge well, the sides being very perpendicular of black volcanic rock. At the foot, 700 feet deep, is a large green plateau, with a solitary farm-house surrounded by orange trees, and said to be a very healthy locality. At a short distance from the Caldera, and a few hundred feet higher, are the cave dwellings of Atalaya, honeycombing the sides of a hill in terraces. We were soon surrounded by their remarkable, swarthy, half-clad inhabitants, begging and entreating us to buy specimens of their industry. What the social life of these curious people can be it is difficult to imagine. The cave opening admits the only light or ingress to their one or two chambers, and here the women and children sit about on the ground, making pottery ware of a plain description, and just the same in character and process as that of their ancestors the Guanches. No other pottery is used in the country, and the women and girls may be constantly seen with their large jars at the public fountain, evidently the gossiping rendezvous of the place, or carrying them on their heads full of water; for Canary has been truly called a "rainless paradise," rain only usually occurring in about three months in the year.

In England we are not prone to grumble over the

monotony of sunshine, but in Canary one positively grows weary with the continual brightness, and feels that,

"Hateful is the dark blue sky,
Vaulted o'er the dark blue sea:"

sometimes almost longing for the invigorating influence of a refreshing November fog. The arrangements for the conduct of water in the country are excellent, but nevertheless it often has to be carried by the women in the broiling sun for long distances, as at the Isleta, where there is no spring or supply of any sort.

The Natural History Museum in Las Palmas is well worth a visit, as it has a fine collection of objects found about the Islands, including a large number of Guanche remains, skulls, bones, &c. It is a remarkable fact that a large proportion of the skulls found have indentations on the right side and above the forehead, so deep as to be almost holes, and yet clearly showing that the wound had healed up. From these holes occurring in the same place, it would appear that the weapon with which they fought was of one kind and handled in one way. We noticed precisely the same appearance in Guanche skulls turned up during our subsequent visit to Teneriffe.

On proceeding to use our note-books at the museum we perceived an extraordinary flutter of excitement among the officials, and presently a small procession approached us, headed by Señor Dr. Don Gregorio Chil y Naranjo, who most courteously insisted on unlocking the cases, offering to aid in our examination of the specimens. The distinguished doctor seemed to be most kindly disposed towards us, and we ventured to hint how gladly a spare Guanche skull would be accepted by his foreign visitors. He at once fell in with our wish, and in triumph we carried off one that might have been the skull of an illustrious Guanche lawyer, but to us was simply a curious ana-

tomical specimen, which is now the property of the Zoological Museum of Liverpool University College.

Space will not admit of more than a mention of a visit to Telde, a little picturesque town remarkable for its many tall palm trees and a large garden open to visitors full of gorgeous shrubs and flowers.

The Canaries have been aptly likened to a rat-trap, being very easy to reach but not so easy of escape from, for the return steamers arrive with little warning, and are usually well laden with passengers from the various African ports, as experience taught us.

After a week at Grand Canary we returned to Teneriffe, in order to visit Orotava, on the north side of the island. A seven hours' coach drive led us thither from Santa Cruz, via Laguna, a cool summer resort 2000 feet above the sea. The Puerto or port of Orotava, distinct from the Villa or old town of Orotava which is two miles inland, is grandly situated almost under the shadow of the Peak. But the view of it from here is disappointing, on account of the long dark stretch of Mount Tigayga which fills up the foreground, cutting off the bottom of the Peak, and leaving only a conical hill in the centre. The ascent can be made on horse-back to within 1500 feet of the summit, the highest point being a small cluster of rocks at the edge of a crater which constantly emits hot sulphurous fumes, as though to remind the adjacent dwellers that it may yet again burst out with renewed activity. It is I believe exactly a hundred years since its last effort, and it might afford a grand centenary exhibition. The Cañadas, the bed of the old crater, is a long flat surface 7750 feet above the sea, and is covered with yellow pumice. Professor James Geikie, the advantage of whose company we had during most of our journey, thinks it probable that at some former period the Peak was very much higher than

now, and the many craters around it give some idea of its former magnitude.

On a broiling hot day we climbed up to one of the lower cinder craters, now covered with vines and other vegetation. A large species of Dodder (*Cuscuta*) grew in profusion over some leguminous shrubs, completely destroying many of them.

A little way out of the town are the Botanical Gardens, wherein we found the Dragon tree, and a fine collection of native trees, shrubs and flowers; amongst them the *Pinus canariensis*, *Euphorbia canariensis*, *E. balsamifera*, Eucalyptus, Magnolia, yellow Bignonia, Cobæa, Oleander (white, yellow and red), Amaryllis of varied hues, Hibiscus, Poinsettia, Pampas-grass, Bougainvillæa, &c. Humboldt mentions an immense dragon tree in Teneriffe, near to here, which was supposed to be between 6000 and 10,000 years old; it was from 50 to 60 feet in height, and had a circumference of 45 feet. Piazzi Smith saw it in 1856, and it was destroyed by a storm in 1867. No other specimen approaching it in size is, I believe, known to exist, though several good sized ones are still to be seen.

In a sunny part of the gardens, adjacent to a fountain, we noticed the leafy branches of some of the smaller trees, and especially of the lower palms, covered with little tree frogs of a brilliant grass green and golden yellow colour, but so exactly resembling the foliage that unless carefully looked for they might most easily be passed unobserved. They are from one inch to one and a half inches in length, and at night croak loudly. They are evidently very common. I brought several to England, and have placed a few in a hot-house; they are, however, most difficult to find, from their colour, but continue to proclaim their existence at dusk. Lizards were very common, but we saw none of the green species so common in Italy.

We spent the chief part of our stay at Orotava tow-netting and shore collecting. The waters seemed much more prolific in surface life than at Grand Canary, and we collected a large amount of material, chiefly Copepoda, the results of which I have recorded, along with those of the other Islands, in a paper recently communicated to the Linnæan Society. It enumerates sixty-five species of Copepoda in all, six of which are new to science, three of them requiring new genera. Of the sixty-five species, twenty-three are known to British waters, and these mostly belong to the Harpacticidæ.

The number of species in each family are as follows:—

Calanidæ	30	species.
Cyclopidæ	4	,,
Harpacticidæ	17	,,
Corycœidæ	11	,,
Artotrogidæ	3	,,

The new species are:—

Candace brevicornis.
C. nigrocincta.
Acontiophorus angulatus.
Mecynocera clausii.
Machairopus santa-crucis.
Cymbasoma rigidum.

From a pretty thorough examination of the material collected, I am of opinion that the Copepodan fauna of the respective Islands, though they are separated by considerable distances, varies in quantity rather than specifically. For excepting several cases in which only one or two of a species were found, and which probably indicated rareness of that species, their geographical distribution appears to be general amongst the Islands.

In the deeper pools, at low water, Holothurians were common, as also *Aplysia* (sea-hare) of very large size, some measuring nearly one foot in length. Some were of a dark purple, others a light grey marked with black. When disturbed they emitted a deep purplish fluid staining everything around. One of our nets was indelibly dyed by it. Darwin, in "The Voyage of the Beagle," describes this large species, and states that it has "an acrid secretion spread over the body, which causes a sharp, stinging sensation, similar to that produced by the *Physalia*, or Portuguese man-of-war." Several which we handled freely certainly did not exhibit this power.

About the rocks, above high water mark, we noticed quantities of moderately sized, flat, black crabs, very active in movement, and in the pools an extremely fragile white crab, beautifully marked with red, and which broke almost with a touch. At high water mark all along the beach we found quantities of pumice stone.

The sunsets here were wonderfully gorgeous, and the varied hues of light over the Peak singularly beautiful; while in the distance, sixty miles off, was clearly visible the dark outlines of the Island of Palma. The twilight is very short, and at midsummer it is dark about six p.m., when the frogs at once commence their innings and keep it up vigorously. On one occasion we tow-netted after dark, about a mile out, and brought up a quantity of phosphorescent schizopods, some of which Mr. A. O. Walker, F.L.S., has kindly undertaken to examine and report upon.