NOTES FROM THE "CHALLENGER"

VI.

WE left Bermudas on Thursday, June 12, for the Azores. His Excellency Gen. Lefroy, C.B., F.R.S., Governor of the Island, with his private secretary, Capt. Trench and Capt. Aplin, R.N., Captain Superintendent of the Dockyard, and a party of ladies, came on board in the afternoon, and we bade farewell, with great regret, to the friends from whom we had received such unvaried kindness during our stay. At half-past five we steamed out of the Camber and passed among the reefs to Murray's Anchorage, on the north-east side of the island, where we anchored for the night. Next morning we proceeded through the narrows, and early in the forenoon, having seen the last of the treacherous and beautiful purple shadows in the bright green waters of Bermudas, we set all plain sail and stood on our course to Fayal. In the afternoon we got up steam and sounded, lat. 32° 37′ N., long. 64° 21′ W., in 1,500 fathoms, with the usual grey-white chalky bottom which surrounds the reefs.

Our position, at noon of the 15th, was lat. 33° 41′ N., long. 61° 28′ W., 1,610 miles from Fayal.

On the morning of the 16th we sounded in 2,575 fathoms, the bottom a reddish ooze, containing a large number of foraminifera. The bottom temperature was 1°·5 C. A small, rather heavy trawl, with a beam 11½ feet long, was put over in the morning, but when it was hauled in, about five in the afternoon, it was found that it had not reached the bottom. This was the first case of failure with the trawl. It was probably caused by the drift of the ship being somewhat greater than was supposed. The net contained a specimen of one of the singular and beautiful fishes belonging to the Sternoptychidæ, an aberrant family of the Physostomi, distinguished by having on some part of the body ranges of spots or glands producing a phosphorescent secretion. The surface of the body is, in most of the species, devoid of scales, but, in lieu of them, the surface of the skin is broken up into hexagonal or rectangular areæ, or separated from one another by dark lines, and covered with a brilliant silvery pigment, dashed with various shades of green or steel blue. We have taken, in all, four or five species of these fishes, all in the net, when dredging or trawling, at great depths. I do not think they come from the bottom, however. It seems more probable that they are caught in the net on its passage to the surface, possibly at a depth of two or three hundred fathoms, where there is reason to believe there is a considerable development of a peculiar pelagic fauna.

On Tuesday, the 17th, the trawl was lowered at seven in the morning, and in the forenoon a sounding was taken in 2,850 fathoms.

Several examples of a large and handsome species of the genus *Scalpellum* came up in the trawl, a few still adhering to some singular-looking concretionary masses which they brought up along with them. One of these lumps, to which a large example of the barnacle was attached, was irregular in form, about three centimetres in length, and two in width. The surface was mammellated and finely granulated, and of a dark-brown colour, almost black. A fracture showed a semi-crystalline structure, the same dark-brown material arranged in an obscurely radiating manner from the centre, and mixed with a small quantity of a fragment of greyish-white clayey matter. This nodule was examined by Mr. Buchanan, and found to consist, like the nodules dredged in 2,435 fathoms at Station 16, 700 miles to the east of Sombrero, almost entirely of peroxide of manganese. Some other concretionary lumps were of a grey colour, but all of them contained a certain proportion of pyrolusite, and they seemed to be gradually changing into nodules of pyrolusite by some process of alteration or substitution. This is undoubtedly very singular, and it is difficult to conceive what can be the source of so widespread a formation of manganese. It is, of course, a matter of great difficulty to make anything like accurate analyses on ship-board. Mr. Buchanan is giving his careful attention to the whole subject of the chemical composition of the sea-bed, and I hope that the determination of the composition of a number of samples, when a favourable opportunity occurs, will throw additional light upon this and a number of other obscure points connected with the chemistry of modern geological formations.

Scalpellum regium, n. sp. (Fig. 1), is by far the largest of the known living species of the genus. The extreme length of a full-sized specimen of the female is 60 mm., of which 40 mm. are occupied by the capitulum, and 20 mm. by the peduncle. The capitulum is much compressed, 25 mm. in width from the occludent margin of the scutum to the back of the carina. The valves are 14 in number; they are thick and strong, with the lines of growth strongly marked, and they fit very closely to one another,

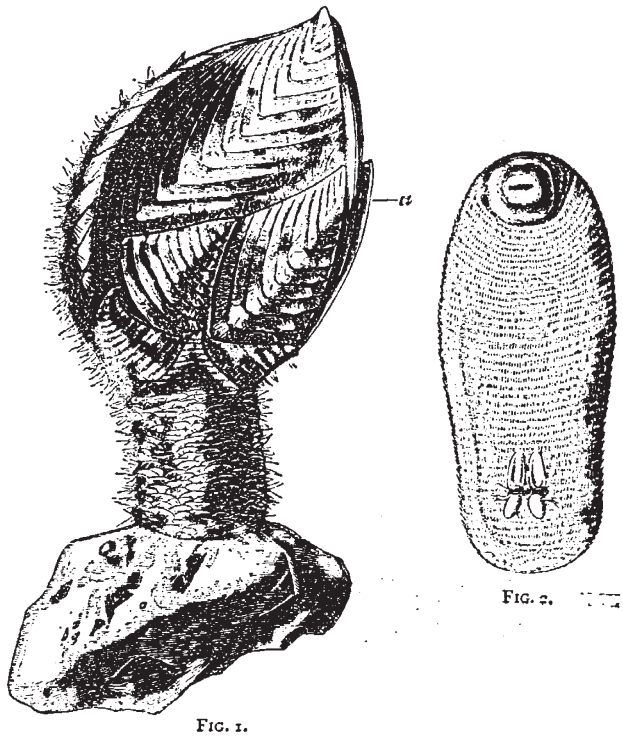

FIG. 1.

FIG. 1.—Scalpellum regium, Wy. Thomson. *a*, Males lodged within the edge of the scutum. FIG. 2.—Male of Scalpellum regium.

in most cases slightly overlapping. When living, the capitulum is covered with a pale-brown epidermis, with scattered hairs of the same colour.

The scuta are slightly convex, nearly once and a half as long as broad. The upper angle is considerably prolonged upwards, and, as in most fossil species, the centre of calcification is at the apex. A defined line runs downwards and backwards from the apex to the angle between the lateral and nasal margins. The occludent margin is almost straight. There is no depression for the adductor muscle, and there is no trace of notches or grooves along the occludent margin for the reception of the males; the interior of this valve is quite smooth. The terga are large, almost elliptical in shape, the centre of calcification at the upper angle. The carina is a handsome plate, very uniformly arched, with the umbo placed at the apex. Two lateral ridges, and a slight median ridge run from the umbo to the basal margin. The lower part of the valve widens out rapidly, and the whole is deeply concave. The rostrum, as in *Scalpellum vulgare*, is very minute, entirely

hidden during life by the investing membrane. The upper latera are triangular, the upper angle curving rather gracefully forwards; the umbo of growth is apical.

The rostral latera are long transverse plates lying beneath the basal margins of the scuta. The carinal latera are large and triangular, with the apex curved forwards very much like the upper latera, and the infra-median latera are very small, but in form and direction of growth nearly the same.

The peduncle is round in section and strong, and covered with a felting of light-brown hair. The scales of the peduncle are imbricated and remarkably large, somewhat as in *S. ornatum* Darwin. About three, or at most four scales, pass entirely round the peduncle. The base of attachment is very small, the lower part of the peduncle contracting rapidly. Some of the specimens taken were attached to the lumps of clay and manganese concretions, but rather feebly, and several of them were free, and showed no appearance of having been attached. There is no doubt, however, that they had all been more or less securely fixed, and had been pulled from their places of attachment by the trawl. On one lump of clay there were one mature specimen and two or three young ones, some of these only lately attached. The detailed anatomy of this species will be given hereafter, but the structure of the soft parts is much the same as in *Scalpellum vulgare*.

In two specimens dissected there was no trace of a testis or of an intromittent organ, while the ovaries were well developed; I conclude, therefore, that the large attached examples are females, corresponding, in this respect, with the species otherwise also most nearly allied, *S. ornatum*.

In almost all the specimens which were procured by us, several males, in number varying from five to nine, were attached within the occludent margins of the scuta, not imbedded in the chitinous border of the valve, or even in any way in contact with the shell, but in a fold of the body-sac quite free from the valve. They were ranged in rows, sometimes stretching—as in one case where there were seven males on one side—along the whole of the middle two-thirds of the edge of the tergum.

The male of *Scalpellum regium* (Fig. 2) is the simplest in structure of these parasitic males which has yet been observed. It is oval and sac-like, about 2 mm. in length by ·9 mm. in extreme width. There is an opening at the upper extremity which usually appears narrow, like a slit, and this is surrounded by a dark, well-defined, slightly raised ring. The antennæ are placed near the posterior extremity of the sac, and resemble closely in form those of *S. vulgare*. The whole of this sac, with the exception of a small bald patch near the point of attachment, is covered with fine chitinous hairs arranged in transverse rings. There is not the slightest rudiment of a valve, and I could detect no trace of a jointed thorax, although several specimens were rendered very transparent by boiling in caustic potash. There seems to be no œsophagus nor stomach, and the whole of the posterior two-thirds of the body in the mature specimens was filled with a lobulated mass of sperm-cells. Under the border of the mantle of one female there were the dead and withered remains of five males, and in most cases one or two of the males were not fully developed; several appeared to be mature, and one or two were dead, empty, dark-coloured chitine sacs.

On Wednesday, June 18, we resumed our course with a fine breeze, force 5 to 7, from the south-east. In this part of our voyage we were greatly struck with the absence of the higher forms of animal life. Not a sea-bird was to be seen, with the exception of a little flock of Mother Carey's chickens, here apparently always *Thalassidroma wilsoni*, which kept playing round the ship, on the watch for food, every now and then concentrating upon some peculiarly rich store of offal as it passed astern, and staying by it while the ship went on for a quarter of a mile, fluttering above the water and daintily touching it with their feet as they stooped and picked up the floating crumbs, and then rising and scattering in the air to overtake us and resume their watch.

The sea itself in the bright weather, usually under a light breeze, was singularly beautiful—of a splendid indigo-blue of varying shades as it passed from sunlight into shadow, flecked with curling white crests; but it was very solitary: day after day went by without a single creature (shark, porpoise, dolphin, or turtle) being visible. Some gulf-weed passed from time to time, and bunches of a species of *Fucus*, either *F. nodosus* or a very nearly allied form, evidently living and growing, and participating in the wandering and pelagic habits of *Sargassum*. The floating islands of the gulf-weed, with which we have become familiar as we have now nearly made the circuit of the "Sargasso Sea," are usually from a couple of feet to two or three yards in diameter, sometimes much larger; we have seen, on one or two occasions, fields several acres in extent, and such expanses are probably more frequent nearer the centre of its area of distribution.

They consist of a single layer of feathery bunches of the weed *Sargassum bacciferum*, not matted together, but floating nearly free of one another, only sufficiently entangled for the mass to keep together. Each tuft has a central brown thread-like branching stem studded with round air-vesicles on short stalks, most of those near the centre dead, and coated with a beautiful netted white polyzoon. After a time vesicles so encrusted break off, and where there is much gulf-weed the sea is studded with these little separate white balls. A short way from the centre, towards the ends of the branches, the serrated willow-like leaves of the plant begin, at first brown and rigid, but becoming, farther on in the branch, paler, more delicate, and more active in their vitality. The young fresh leaves and air-vesicles are usually ornamented with the stalked vases of a *Campanularia*. The general colour of the mass of weed is thus olive in all its shades, but the golden olive of the young and growing branches greatly predominates. This colour is, however, greatly broken up by the delicate branching of the weed, blotched with the vivid white of the encrusting polyzoon, and riddled by reflections from the bright blue water gleaming through the spaces in the network. The general effect of a number of such fields and patches of weed, in abrupt and yet most harmonious contrast with the leaves of intense indigo which separate them, is very pleasing.

These floating islands have inhabitants peculiar to them, and I know of no more perfect example of protective resemblance than is shown in the gulf-weed fauna. Animals drifting about on the surface of the sea with such scanty cover as the single broken layer of the seaweed, must be exposed to exceptional danger from the sharp sea-birds hovering above them, and from the hungry fishes searching for prey beneath, but one and all of these creatures imitate in such an extraordinary way, both in form and colouring, their floating habitat, and consequently one another, that we can well imagine their deceiving both the birds and the fishes. Among the most curious of the gulf-weed animals is the grotesque little fish, probably *Antennarius marmoratus*, which finds its nearest English ally in the "fishing frog" (*Lophius piscatorius*), often thrown up on the coast of Britain, and conspicuous for the disproportionate size of its head and jaws, and for its general ugliness and rapacity. None of the examples of the gulf-weed *Antennarius* which we have found are more than 50 mm. in length, and we are still uncertain whether such individuals have attained their full size. It is this little fish which constructs the singular nests of gulf-weed bound in a bundle with cords of a viscid secretion, which have been already mentioned as abundant in the path of the gulf-stream.

Scillæa pelagica, one of the shell-less mollusca, is also a frequent inhabitant of the gulf-weed. A little short

tailed crab (*Nautilograpsus minutus*) swarms on the weed and on every floating object, and it is odd to see how the little creature usually corresponds in colour with whatever it may happen to inhabit. Mr. Murray, who has the general superintendence of our surface work, brings in curious stories of the habits of these little crabs. We observe that although every floating thing upon the surface is covered with them, they are rarely met swimming free, and that whenever they are dislodged and removed a little way from their resting place, they immediately make the most vigorous efforts to regain it. The other day he amused himself teasing a crab which had established itself on the crest of a *Physalia*. Again and again he picked it off and put it on the surface at some distance, but it always turned at once to the *Physalia* and struck out, and never rested until it had clambered up into its former quarters.

On Thursday, the 19th, we sounded in 2,750 fathoms in a grey mud containing many foraminifera. Position of the ship at noon, lat. 35° 29′ N., long. 50° 53′ W.

The wind now gradually freshened, and for the next three days we went on our course with a fine breeze, force from 4 to 7, from the southward, sounding daily at a depth of about 2,700 fathoms, with a bottom of reddish grey ooze. On Tuesday the 24th the trawl was put over in 2,175 fathoms, lat. 38° 3′ N., long. 39° 19′ W., about 500 miles from the Açores. As in most of the deep trawls on grey mud, a number of the zoœcia of delicate branching polyzoa were entangled in the net. One of these on this occasion was very remarkable from the extreme length (4 to 5 mm.) of the pedicels on which its avicularia were placed. Another very elegant species was distinguished by the peculiar sculpture of the cells, reminding one of those of some of the more highly ornamented *Lepraliæ*. WYVILLE THOMSON

(*To be continued.*)

THE FRENCH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

THE second session of the French Association was opened at Lyons last Thursday, by an inaugural address from the President, M. de Quatrefages, who pointed out the almost inconceivable advance of Science during the past century, and the importance of Science in education.

In speaking of scientific education, the President said that the devotees of literature accused Science of stifling sentiment and imagination; she kills, say they, the ideal and stunts intelligence by imprisoning it within the limits of reality; she is incompatible with poetry. The men who speak thus have never read Kepler the astronomer, Pascal the geometer, Linnæus the naturalist, Buffon the zoologist, Humboldt the universal *savant*. What! says the President, Science stifle sentiment, imagination, she who brings us every hour into the presence of wonders! She lower intelligence, who touches on all the infinities! When *littérateurs* and poets know Science better, they will come and draw from her living fountain. Like Byron of our time, like Homer of yore, they will borrow from her striking imagery, descriptions whose grandeur will be doubled by their truth. Homer was a *savant* for his time. He knew the geography, the anatomy of his era; we find in his verses the names of islands and capes, technical terms like *clavicle* and *scapula*. None the less he wrote the Iliad.

No, the study of Science will never suppress the genius of an inspired poet, of a true painter, of a great sculptor. But she will bring more light to the path of an erring soul. She will perhaps transform into a wise man, or at least into a citizen useful to himself and others, one who without her would only have been one of those pretended incomprehensible geniuses, destined to perish of misery, of impotency, and of pride. While fully admitting the important place of literature in education, he would wish to see children initiated at an early age into the facts, the ideas, the methods of Science.

Governments, such as they have hitherto been, have almost always acted as if they had no need for the men who study Nature and her forces. But when any critical or important event occurs, then it is found necessary to appeal to them. Of whom are the juries of International Exhibitions composed? No doubt each State sends its worthy merchants, its tried chiefs of industry, its eminent agriculturists, but it also, and above all, sends its men of science. At these important times peoples are comparing their real strength, and each feels that it is for its honour in the present and its prospects in the future that the truth should appear; and to enlighten them, whether it be concerning cannons or silk-manufactures, telescopes or crystals, jewellery or hardware, it is felt that Science is indispensable, and men of science are appealed to.

But once the Exposition is closed, the State leaves the men of science to return to their studies. I wish, said M. de Quatrefages, it kept them in the service of their country. These men whom we ask to understand and judge of wonders would certainly be able to show how to produce them. When Science is everywhere, it would certainly not be useless to Government to have it in their power to be enlightened at any time on scientific questions. Although less pressing, less imperious than in the days of peril, the wants of agriculture, of industry, of commerce, like those of the army and navy, do not change their nature. Why wait the necessity for appealing to the *savants?*

A day will come when every great Administration will have its Consulting Committee, composed almost exclusively of men of science, and then many mistakes will be avoided, and many forces utilised which are at present lost. But in order that such an institution should be born and developed, it is necessary that the function of Science be universally comprehended and accepted. To attain this result is one of the chief aims of the French Association.

CHRISTOPHER HANSTEEN

ON the 11th of April last, Hansteen died at Christiania at the advanced age of 88, having been born on the 26th September, 1784. On leaving the cathedral school of Christiania, where he received his early education, he entered the University of Copenhagen in 1802, as a student of law, which, however, he soon abandoned for the more congenial study of mathematics. In 1806, he began his work as a public instructor in the capacity of mathematical tutor in the gymnasium of Fredricksburg, in the island of Zealand, and there he began also his life work as an original investigator by instituting researches into terrestrial magnetism. He first acquired distinction by taking the prize which had been offered for the best essay on this subject, by the Royal Society of Science of Copenhagen; and shortly thereafter, viz. in 1814, was appointed to the chair of Astronomy in the University of Christiania, which had been recently founded by Frederick VI. of Norway.

His great work, entitled "Untersuchungen über den Magnetismus der Erde," was published in 1819, at the expense of the King. This work was illustrated with an Atlas of Maps, and was the most satisfactory collection of observations on the variations of the needle, and was besides distinguished for its broad philosophical generalisations. In the further prosecution of his physical researches, he made his well-known journey into Siberia as far as Kiachta and Irkutsk, accompanied by Erman and Due, the expenses of this journey being liberally defrayed by the Norwegian Government. The establish-