

Tangaroeng and Moara Kaman, Herr Bock has found traces of a former Hindoo race, and a Dyak had lately dug up a beautifully formed bronze Hindoo goddess. From this point Herr Bock diverged from the Mahakkan, in order to visit the lake district and observe the Dyak inhabitants. He has made a number of sketches of these savages, many of whom are cannibals. The most dreaded tribe are the Tring Dyaks, whose chief, by name Sibau Mobang, Herr Bock summoned to meet him in the name of the Sultan. This man is most villanous in looks, and told our traveller that he frequently cut off the heads of either sex for the sake of eating the brain, which was sweet, as were also the palms of the hands, but the shoulder was bitter; and he presented him with his shield, covered all over with tufts of human hair. At the last village in the Malay part of his dominions, Moara Pahou, the Sultan summoned a large number of the Dyaks to accompany him and accumulated a body of some 600 in all, of whom 75 accompanied Herr Bock one or two days' journey in advance. The Dyak tribes are constantly at war with each other in order to obtain heads, and the Malays look down on them as savages, and by this means the terror of their name is increased. The upper part of the Moara Pahou branch of the Mahakkan is broken by rapids, over which the praus had to be dragged by rattang ropes. The last village on this river, Moara Anar, was reached on December 20, and then the march through the forest over the water-shed commenced. One of the advanced party was here killed, but no further loss was sustained. A Dyak road has been made through the forest with narrow bamboo bridges over the numerous small streams; these, however, were at the time mostly under water, owing to the recent floods. The journey on foot occupied four days of twelve hours, during two of which Herr Bock had to feed on the wild fruits, his provisions having been left behind. Perfect silence here reigns, broken only by the occasional note of a bird, though none are to be seen. No attempt at molestation appears to have been made by the more savage tribes of the Dyaks, although at one village the chief pressed his visitors to partake of rice and fruit, which they had been forewarned was poisoned, and therefore declined. The end of this march brought our traveller to the river Benangau, a tributary of the Tewé, down which he passed till he arrived on Dutch territory, where the Dyaks are altogether comparatively civilised, and very different to those of Koetei.

Very little that is new in zoology appears to have been obtained in this journey, which lay across a rather barren district; but Herr Bock has had splendid opportunities for making ethnological observations and these have been turned to good account. Many attempts were made to find the family which were said to have tails—but though several Dyaks were spoken to who had seen them, their whereabouts was not discovered.

The journey was undertaken at the desire of the Dutch government, who will doubtless take care that its successful accomplishment is duly honoured.

THE AUDIPHONE

THE instrument which is now being introduced into this country under the name of the audiphone, is the invention of Mr. R. G. Rhodes of Chicago. It is intended, as its name attempts to indicate, to provide the deaf with the means of hearing, and is for some persons undoubtedly a more efficient aid than the hearing-trumpet. The figures appended show the original form of the instrument, and the modification of it suggested by Prof. Colladon of Geneva. The American audiphone consists of a thin elastic plate or sheet of hard ebonite rubber, furnished with a handle, and about the size and shape of an ordinary palm-leaf fan. The strings attached to the upper edge serve to bend it into a curving form, and

a small clamp fixes the string at the handle. When thus strained into shape, the instrument is pressed against the upper front teeth by the deaf operator, the convex side being turned outwards. The sounds received upon the thin sheet cause it to vibrate, and the vibrations are thus conveyed through the teeth and bones of the skull to the auditory nerves. Its use is therefore confined to the

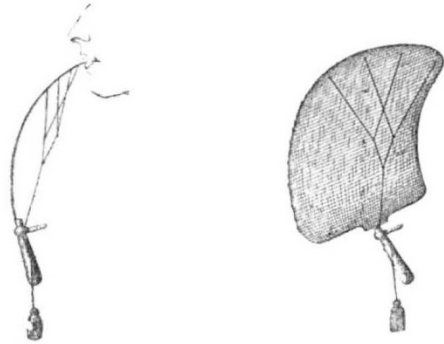


FIG. 1.—Rhodes's Audiphone.

partially deaf, or at least to those in whom the auditory sense is not entirely absent, or the nerve atrophied.

The ebonite of which the audiphone is made being costly, Prof. Colladon has suggested a cheap and efficient substitute in the form of a strip of elastic cardboard of the peculiar kind known to the trade as satin-board or shallon-board, and which may be described as a fine kind of yellow mill-board with a very smooth, glazed surface.

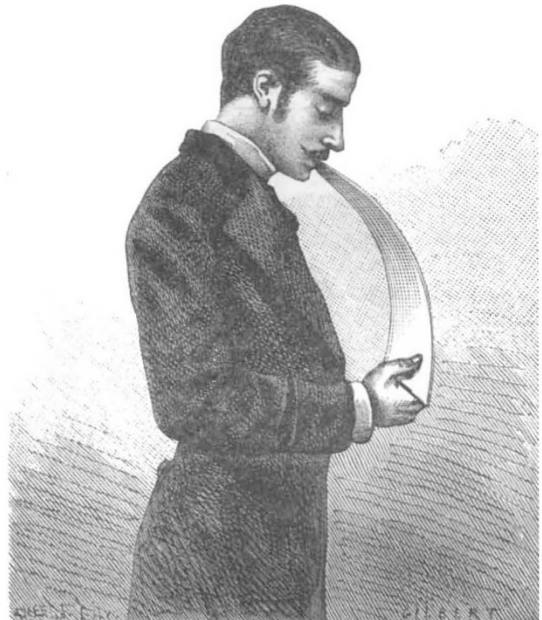


FIG. 2.—Colladon's Audiphone.

A sheet of this material, about eighteen inches long by ten broad, and varnished at the edge where it is placed in contact with the teeth, yields results quite equal, if not superior, to those afforded by the ebonite article of fifty times the cost. Prof. Colladon has made a number of experiments in conjunction with M. Louis Sager, upon the hearing of deaf-mutes. Not all who tried the instrument

could succeed in hearing with it, but all with whom the experiment was successful preferred the card audiphone to that of ebonite.

A number of deaf mutes under the care of M. Sager, were blindfolded and provided with audiphones; the distances from a grand piano, at which they began to hear the sounds, indicated their different degrees of deafness. They could distinguish at once between the high and the low notes of the instrument, and between its tones and those of a violoncello. The shrillest tones of the violin produced little effect. Similar experiments were made by M. Colladon in another establishment for deaf-mutes, near Geneva, under the care of M. Forestier.

Mr. Thomas Fletcher, of Warrington, has communicated to us a further improvement. After a long series of experiments he has found the best material of which the audiphone can be made is birch-wood veneer. If cut to an oval about 12 inches by $8\frac{1}{2}$, and steamed and bent to a curve, it does not require the cords of the Rhodes' pattern, and is more convenient for use than Colladon's form. Mr. Fletcher states that a disk of half the above size suffices for a musician who may, in consequence of partial deafness, require such aid, and who cannot use a hearing trumpet on account of the inconvenience of holding it while playing his instrument. The disk of veneer is so light that it may be held between the teeth without effort and almost without consciousness of its presence. If stained black it is less visible.

THE ELASMOPODA (HJALMAR THÉEL) A NEW ORDER OF HOLOTHURIDEA

ALTHOUGH the Holothuridea show a greater tendency to a bilateral arrangement of their internal organs than any other group of the Echinodermata, most of them are fusiform or cylindrical in shape, and the radiate symmetry prevails so far externally that the five radial ambulacral vessels and their appendages are similar, that they run symmetrically at equal distances from one another from the oral to the apical pole, and that they are used indifferently for the purposes of progression. In all Holothuridea, however, two ambulacra, those of the *bivium*, are essentially dorsal, while the three ambulacra of the *trivium* are ventral; and in one little group of the ordinary Dendrochirota, which includes the well-known genus *Psolus*, a very distinct ambulatory tract is defined



FIG. 1.—*Elpidia glacialis*, Théel. Side view.

on the ventral surface of the body, and the pedicels of the rest of the ambulacral system are either absent or greatly modified. From the form of the ambulatory disk and the position of the mouth and apex, a *Cuvieria*, with its tentacles expanded, has a very striking resemblance to a large *Doris*.

In the year 1875 Dr. Hjalmar Théel, attached as naturalist to Nordenskjöld's expedition to the Yenisei, dredged in the western portion of the Kara Sea at a depth of 150 fathoms, fourteen specimens of a small Holothurian, which he was at first inclined to take for a nudibranchiate mollusc. *Elpidia glacialis*, Théel, is about 20 mm. long and 8 mm. broad. The anterior por-

tion is abruptly contracted, so as to give the appearance of a head, and the mouth, surrounded by a ring of ten tentacles, simple with the exception of two terminal papillæ, is turned downwards. A transverse section of the body is semicircular, the dorsal surface being strongly arched, while the ventral (trivial) surface is flat, and forms an ambulatory disk. The skin, which has the usual structure of the skin in the Holothuridea, is strengthened by a thick layer of felted calcareous spicules of different forms, with delicate branches which project through the skin, roughening it slightly. Very sparsely scattered, just below the epidermis, there are a few large wheels much like those of *Myriotrochus*, and a large number of very minute wheels are found in the outer layers of the skin. *Elpidia* has eight very prominent partially retractile pedicels or water-feet, placed in two opposite rows of four, on the lateral ambulacra of the trivium, along the edges of the ventral disk. Radial vessels are developed in two ambulacra only, the vessels of the ambulacra of the bivium and the central ambulacrum of the trivium being entirely suppressed. The nervous system is radially symmetrical, five cords running back symmetrically from the oral nerve ring along the five ambulacral lines. Otocysts of peculiar structure are placed at intervals along the course of the nerves.

On the back there are two rows of paired foot-like appendages much in the position of the bivial ambulacra; the appendages of the anterior group bend forwards, and those of the posterior backwards. From the absence of the bivial water-vessels these appendages are not in connection with the water-vascular system; they receive twigs, however, from the radial nerves.

Elpidia is unisexual; the small genital opening is placed in the dorsal middle-lines about mid-way between the crown of tentacles and the anterior group of dorsal appendages; the so-called "respiratory tree" and the Cuvierian glands are absent.

Elpidia is very remarkable both in external form and in internal structure, and differs widely both from the typical Pedata and from the Apoda, in many respects taking an intermediate place between these groups.

Since the appearance of Dr. Théel's paper Messrs. Koren and Danielsen have described in the *Nyt Magazin for Naturvidenskaberne*, two new genera procured by the Norwegian North-Sea Expedition, whose close relation to *Elpidia* is manifest. The characters of these genera will be given in their place in the systematic list.

On looking over the Holothuridea of the *Challenger* Expedition, I at once recognised the resemblance of a large number of the deep-sea species to the form which Dr. Théel had worked out with much care and skill, and acting under the advice of my friend, Prof. Lovén, I asked Dr. Théel to be good enough to undertake the description of the *Challenger* material belonging to the class, Prof. Lovén kindly offering his advice and assistance. Dr. Théel was over last summer and examined the collection. He recognised over 200 species, half of which are new to science, and of these the greater number from the deep-sea are related to *Elpidia*. The group enlarged to such an extent, and presenting so many marked peculiarities quite revolutionised the *facies* of the Holothuridea, and asserted itself as an order of value equal at all events to that of the PEDATA and APODA. For this order Dr. Théel proposes the name ELASMOPODA.

Dr. Théel selected all the forms belonging to the new order in the *Challenger* collection, and carried them with him to Sweden, and a few weeks ago he published, with the permission of the Treasury, in the *K. Sv. Vet.-Akad. Handl.*, Band 5, No. 19, the first part of a preliminary report on the Holothuridea of the *Challenger* Expedition, in which seven new genera and seventeen new species of Elasmopoda are defined.

The following are the genera established by Dr. Théel, and I add the definitions of the two others described by