PROCEEDINGS OF LEARNED SOCIETIES.

GEOLOGICAL SOCIETY.

March 25, 1891.—Dr. A. Geikie, F.R.S., President, in the Chair.

The following communication was read:—

"Notes on Nautili and Ammonites." By S. S. Buckman, Esq., F.G.S.

1. *The Position of the Last Septum.*—Mr. Bather's theory of shell-growth in Cephalopoda (Ann. & Mag. Nat. Hist. 1888, i. p. 300) seems to depend upon the idea that the last septum in the young in *Nautilus* and *Ammonites* was always formed at a proportionately increased distance from the penultimate. This supposition is not borne out by specimens of *Nautilus*, *Witchellia*, *Lioceras*, *Ludwigia*, and *Grammoceras* examined by the Author.

2. *Shell-muscles of Nautili and Ammonites.*—Two specimens of Ammonites in the Author's collection are marked by impressions which seem to indicate the position of the shell-muscle.

May 27, 1891.—Dr. A. Geikie, F.R.S., President, in the Chair.

The following communication was read:—

"On the Lower Jaws of *Procoptodon*." By R. Lydekker, Esq., B.A., F.G.S.

After reviewing Sir R. Owen's writings upon the large extinct Kangaroos for which he established the genus *Procoptodon* in 1874, the Author describes two mandibular rami from the clay beds of Miall Creek in the neighbourhood of Bingera, N.S.W., which belong to this genus, and from their characters and a comparison of them with the lower jaws in the British Museum, he maintains that this part of the skull indicates two very distinct species of the genus, for which he retains the names *P. rapha*, Ow., and *P. goliah*, Ow., though it is possible that the types of those two species are really specifically identical, in which case the name *P. pusio*, Ow., might have to be adopted for one of the species described.

MISCELLANEOUS.

On a Freshwater Medusa. By Dr. J. v. Kennel.

In my 'Biologischen und faunistischen Notizen aus Trinidad' I alluded to a little Medusa which I had found in considerable numbers on the east coast of the island in a small freshwater lagoon entirely cut off from the sea. The creatures were altogether absent in the broader portion of the lake near the sea, and were first encountered about fifty paces further inland, where a gentle current was perceptible, and the flora as well as the fauna bore the impress of a freshwater habitat. It is true that Polychæte Annelids and specimens of *Mysis* were also found in abundance at this spot among the luxuriant Algæ and freshwater plants, yet the representatives of the small freshwater animals greatly exceeded them in

numbers: larvæ of frogs and insects, species of Daphnids, Naids, *Chætogaster*, *Dero*, *Æolosoma*, *Clepsine*, *Planorbis*, *Physa*, and *Ancylus* were so richly represented in individuals that the spectator might easily declare the water to be fresh without even testing it. The tongue was in fact the only test applied; but it was universally agreed that no saltness was perceptible to the taste. Our horses, too, drank the water unhesitatingly, without being especially thirsty, and horses are there considered to be particularly discriminating in the matter of water. On these grounds I believed that I was entitled to claim my jellyfish as a freshwater animal, and am still of this opinion, the more so since several examples of Medusæ have already been discovered in fresh water—*Limnocodium* in the *Victoria-regia* ponds in Kew Gardens and a Medusa from the Tanganyika Nyanza.

If I now attempt to describe the freshwater Medusa from Trinidad, and to assign it to its proper systematic position, this is unfortunately only possible for the sexual form, the free-swimming jellyfish, since I did not succeed in discovering a hydroid at the same spot from which it might have sprung. Apart from the possibility that I did not make a sufficiently exhaustive search, it would also be conceivable that the hydroid generation had died down at that season of the year (March), a not impossible event in the case of a tender organism proceeding from the sea, considering the high temperature of the water at that period and that at another season of the year the hydroid form would appear again; or we may suppose that the hydroids live in the sea, and that their Medusæ alone pass into the lagoon at the rainy season, when there is a communication with the ocean, and adapt themselves, at least partially, to a freshwater existence. It must be confessed that the probability of the latter theory is but small; for in none of the Medusæ which I collected were the sexual products perfectly ripe, so that we may assume that they had not very long separated from their place of origin. Communication between the water in which they were living and the sea had at that time been severed for at least two months. If they had been cut off from the sea as Medusæ this interval would well have sufficed for the attainment of full sexual maturity.

It is, however, always a serious matter to assign a species to its place in a system on the basis of one developmental stage only, when that system is to a large extent constructed on the morphological and structural relationships of the asexual generation and on the mode of development of the sexual form. Nevertheless it appears desirable so to characterize the animal that later investigators who may happen to take up the study may be able to recognize it and determine its position and affinities to better purpose.

The diameter of the bell of the little craspedote Medusa is from 2 to $2\frac{1}{2}$ millim., and in shape it is strongly arched, so that even when expanded to its utmost extent it is still almost hemispherical, and considerably more than hemispherical when in a state of contraction. The muscular ring at the margin of the bell is powerfully developed and is capable of contracting so strongly that the aperture of the velum becomes almost closed. The velum itself is thin

but very broad ; it projects horizontally all round to the extent of one third the diameter of the bell. The margin of the bell is smooth and slightly undulating only when contracted more strongly than usual. Round its periphery gently bulbous swellings mark the origin of sixteen to eighteen tentacles (the number varies perhaps between wider limits), which are of great length and fineness and sharply pointed at the tips. In the specimens killed in weak osmic acid and excellently preserved they still measure from 6 to 10 millim. The nematocysts are distributed in fine closely-packed whorls throughout the entire length, with the exception of the bulbous base. On the ex-umbrellar surface of the base of each tentacle there is found an ocellum, a simple spot of pigment, without refractile body. Nevertheless several pigment-cells take part in its composition. In many tentacles the pigment-spot is circular ; yet in its clear centre no stronger refractile body could be detected ; we merely find a few ordinary epithelial cells surrounded by blackish-brown pigmented cells arranged in the shape of a cross. The ocelli are entirely naked ; other sense-organs, as well as marginal bulbs between the tentacles, are completely wanting.

The very powerful manubrium, hanging down in the subumbrella and extensible as far as the velum, is shaped like a quadrilateral prism, with four interradial longitudinal grooves, so that a transverse section is cruciform, with the arms of the cross bluntly rounded. In accordance with this, its lumen is also cruciform, the arms of the cross having a radial direction and running into the longitudinal ridges of the manubrium.

Oral lobes are wanting. The four radial longitudinal ridges of the manubrium converge at the end with bluntly rounded tips, and so embrace the oral opening.

There is a small roundish atrium, prolonged into four radial canals, which, however, do not follow the most direct route to the circumferential canal, but are much coiled, even in the case of the living animal when perfectly at rest.

If the living animal be examined or slightly magnified it at first appears as though four broad, twisted, enteric pouches arise from the centre of the transparent bell, being distinguished by their yellowish-brown hue, and do not reach the margin of the umbrella. Sections show us that the radial canals, as soon as they leave the atrium, are indeed greatly dilated, so that their ventral wall is seen like a protuberance projecting towards the subumbrella, but that, in addition to this, they are also surrounded on both sides and on the subumbrellar surface by the gonads. These extend from the origin of the canals at the atrium along two thirds of their course, after which the canals become very fine and transparent, and proceed in true radial direction to the circumferential canal, into which they open. It is highly probable therefore that it is only in consequence of the powerful development of the gonads in the course of the originally straight radial canals that the latter acquire their twisted form through vigorous growth in a longitudinal direction.

The sexual products are, as has been mentioned above, not yet perfectly ripe in the specimens which were microscopically examined, yet I found in them a multitude of young ova already of tolerably

large size. The coiling of the radial canals is evidently insufficient for the unfolding of the gonads; the latter therefore themselves become closely twisted once more, and thereby acquire their striking breadth on the subumbrellar surface and on the sides of the canals.

The living Medusæ were of hyaline transparency, with a pale yellowish tinge; only the tentacles and the margin of the bell appeared slightly milky, the former owing to the innumerable nematocysts, the latter in consequence of the tracts of the circumferential muscle. The yellowish-brown bands of the gonads showed plainly through the tissues.

If we now consider the systematic position of our Medusa, it may be most advisable to test the diagnoses of Häckel's exhaustively worked-out system, with reference to their applicability to this freshwater form.

Häckel divides the Craspedota into Anthomedusæ, Leptomedusæ, Trachomedusæ, and Narcomedusæ. The two latter divisions do not here concern us. Neither is it necessary to consider the Anthomedusæ, for only in the Leptomedusæ do the gonads lie in the walls of the radial canals.

Of the four subdivisions of the Leptomedusæ it can only be a question of the Thaumantidæ or Æquoridæ, for in the case of the Cannotidæ the gonads are plumose branches of the radial canals, while in the Eucopidæ they are vesicle-shaped evaginations therefrom.

While, however, the Æquoridæ further "always possess marginal vesicles," which are wanting in our Medusa, there only remain the Thaumantidæ, in which the gonads form frill-like folded bands along the radial canals, marginal vesicles are always absent, ocelli usually present.

If we construct a synoptical survey of the genera which belong to this subdivision, we get the following table :—

4 radial canals and 4 gonads. *b.*
8 radial canals and 8 gonads (Melicertidæ).
16 radial canals (Orchistomidæ).

b. 4 or 2 tentacles.
8 tentacles.
16 or more tentacles. *c.*

c. No marginal bulbs nor cirrhi. *d.*
Between the tentacles, bulbs and cirrhi.

d. Independent mouth and atrium, no gastro-genital cross.—*Thaumantias.*
Mouth and atrium obliterated, a gastro-genital cross.—*Staurostoma.*

According to this table we should arrive at the genus *Thaumantias* for our Medusa. The four species placed here by Häckel, however, have frilled and very variable oral lobes, which does not agree with what we find in this freshwater form.

It follows, therefore, that if we are to find a place for the medusoid form only, as I am compelled to do, a new genus must be intercalated. If, when the hydroid is discovered and the mode of development understood, a new position should be found for the creature, it can be transferred at any time to its proper place. In

the meantime my only concern was to introduce this undoubtedly interesting little freshwater Medusa into literature, under a designation and description which would enable it to be re-identified, and so I must search out for it among its companions the best possible position according to the knowledge of it which we at present possess.

Leptomedusæ.
Thaumantidæ.
Gen. nov. *Halmomises* (from ἅλμη, saltwater, and μισεῖν, to hate).
Sp. nov. *lacustris.*

Without marginal bulbs, cirrhi, or marginal vesicles. Umbrella hemispherical, 16–18 (? 24) tentacles, with gentle bulbous thickened bases, on the outer side of each of which an ocellum (simple ring of pigment). Velum thin, but broad; manubrium powerful, with broad base, bluntly quadrangular; mouth without lobes, cruciform, the four clefts in the direction of the angles. Atrium small, but distinct. Four radial canals, greatly widened in the central three fourths of their length, projecting towards the sub-umbrella; beset at this point with frill-like gonads, owing to the development of which they become coiled. The last peripheral third of the radial canals narrow, running straight.

Size, 2–2½ millim., diameter of the bell. Colour hyaline, faintly yellowish. Gonads yellowish brown.

Locality: freshwater lagoon on the east coast of Trinidad, south of Mayaro Point, in a cocoa-nut plantation.—*Sitzungsberichte der Naturforscher-Gesellschaft bei der Universität Dorpat*, Bd. ix. Heft 2, 1891, pp. 282–288.

On the Causes affecting Variations in Linaria vulgaris.
By Thomas Meehan.

Few subjects more deserve the attention of thoughtful students of biology than the extent of variation aside from the conditions of environment. Instructive papers bearing on evolution are continually appearing, the full value of which is impaired by the passing suspicion that the authors have not fully perceived how great is the innate power to vary, independent of any external influences. That environment or surrounding circumstances have considerable influence on the production of new forms may surely be admitted without detriment to a profound belief that very much more is due to a tendency to change implanted in the organism, the laws governing which the keenest scrutiny has hitherto been baffled in the effort to detect. It is possibly from this confession of ignorance that the advocates of change by environment have gained so much strength. He who has something tangible to please us has more power than he who has to confess that he does not know. Those of us who would not have conceded as much to environment as is frequently claimed for it, can only insist that change is evidently going on in order, and evidently in accordance with a regular plan; while if all claimed for environment were conceded to be sound, it would subject change to the mere chapter of accidents, and the harmony and the exact dependence of one thing on another, which everywhere prevails, could scarcely exist.

Kennel, Julius von. 1891. "On a freshwater Medusa." *The Annals and magazine of natural history; zoology, botany, and geology* 8, 259–263. https://doi.org/10.1080/00222939109460431.

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