

which, opaque in both eyes, exhibits an obscure and degenerate faceting in the left, but is devoid of all traces of facets in the right, the shorter and the broader of the two; and (c.) the relative amount of pigment, represented by the dark shading. $\times 12$. Zeiss' a*. Oc. 2. Abbe camera.

Fig. 6. The right chela. $\times 3$.

„ 7. *Lyreidus stenops*, n. sp., ♀. Dorsal view (to the right) of the abdomen, with side view (to the left) of its spinigerous 4th tergum. $\times 2$.

„ 8. The carapace of the same in outline. Natural Size.

This species may at once be distinguished from its congeners by its narrow metope, its unarmed carapace, and its decumbent abdominal spine. A single specimen of it, with a male and two females of another species identical with the specimen from Japan referred in the above description to *L. 3-dentatus*, has been received by me from Hongkong from Brigade-Surgeon Hungerford, since this paper was written.

XIV.—*Natural History Notes from H. M.'s Indian Marine Survey Steamer 'Investigator,' Commander ALFRED CARPENTER, R. N., Commanding. No. 5. On some Nodular Stones obtained by trawling off Colombo in 675 Fathoms of Water.—By E. J. JONES, A. R. S. M., Geological Survey of India.*

[Received February 2nd;—Read March 2nd, 1887.]

(With Plate II.)

These nodules were forwarded to the Superintendent of the Indian Museum, and by him passed on to the Director of the Geological Survey, by whom they were subsequently entrusted to me for examination.

The results of this investigation, though owing to want of time incomplete, are, as will be seen, of considerable interest; and I hope at some future time to be able to go into the subject more fully.

The nodules were obtained during a trawling operation off Colombo in water of 675 fathoms, and are stated to have been found associated with sand and mud, which formed a hard calcareous crust at the bottom of the sea, and a small quantity of which was forwarded with the specimens.

The stones are irregularly rounded, and vary in shape from almost spherical to roughly cylindrical with rounded ends. The specimens received varied in size from 1—4 inches in length and $1\frac{1}{4}$ — $\frac{3}{4}$ inch in thickness. Externally, they are rough and mostly have one or two small excrescences of the size of a pin's head, and a few small pittings of about the same size; the colour is dirty light grey.

On breaking them open, the fractured surface has much the appearance of an ordinary slate without the cleavage, and is of a much darker colour than the exterior. Running along the central line of a long cylindrical one which I broke open, there is a narrow vein of a brownish colour.

A microscopic examination of a thin slice shewed merely a confused mass of aggregates resembling in their structure that of sphærolites, such as occur in the so-called sphærolitic lavas, with the remains of Foraminifera and Radiolaria disseminated throughout the mass. With ordinary light, little is to be seen except more or less radiating fibrous aggregates, but, as soon as the section is observed between crossed Nicol's prisms, the whole field is seen to be covered with little dark crosses with their limbs parallel to the planes of the prisms, and, on revolving the stage, the limbs of the crosses keep the same orientation whilst the section revolves.

It is when thus observed that the aggregates are seen to be entirely distinct from one another, as each cross keeps to its own aggregate, and the crosses do not overlap; so that, by revolving the stage, the limit of each aggregate can be determined by tracing the path of the outer end of one of the limbs of the crosses.

In the volcanic rocks in which this structure is known, it appears to be due to incipient crystallization in a glassy mass; and at first it might be supposed that these masses were of igneous origin. This idea, however, is untenable on account of the remains of Foraminifera (of several species, the most easily recognised of which are the globigerinæ) and Radiolaria which are sparsely scattered through the mass and, in some cases, enclose a sphærolitic aggregate.

An indeterminate greenish substance, which probably consists of glauconite, is also seen scattered through the mass.

The only difference that can be detected between the central vein and the portion between it and the exterior is that the aggregates in the central vein are much larger and the colour brown instead of green, and that it is unacted on by hydrochloric acid, which dissolves out some calcic carbonate from the other portion.

As mentioned by Mr. Daly in his letter forwarding the nodules, these are very heavy, having a sp. gr. of 3.77 at a temperature of 30° C. as against water of 4° C.

A qualitative analysis shewed the nodules to consist in great part of baric sulphate together with small quantities of calcic and strontic sulphates, small quantities of calcic and magnesian phosphates, aluminic silicate, calcic carbonate, and traces of iron, sodium, and manganese.

Not having the time to devote to a complete quantitative analysis,

I made, in order to arrive at an approximate estimate of the proportion of baric sulphate present, a determination of the sulphuric acid. An average sample from two of the nodules powdered and dried at 100° C. gave 82.5 % of baric sulphate, the whole SO_2Ho_2 being calculated as $\text{SO}_2\text{BaO}''$.

This result is, however, of course too high, as a small quantity of the SO_2Ho_2 is combined with Ca. and Sr. in the form of calcic and strontic sulphates, though, from the results of the qualitative analysis, it is probably not much too high; and we may, I think, safely take 75% as the percentage of baric sulphate present.

In order to see whether the material was derived from the mud in which the nodules occur, and which also contained Foraminifera, I made a qualitative analysis of the mud, and found it to consist mainly of aluminic silicate, with small quantities of calcic carbonate, some iron, and a trace of manganese; there was also a trace of an alkaline earth which was not removed by boiling with hydrochloric acid and subsequent washing, but this, on spectroscopic examination, shewed itself to be lime.

In spite of the negative result of the analysis of the mud, I am inclined to think, from the presence of the Foraminifera both in the mud and enclosed in the nodules, that the latter have been formed at the bottom of the sea either at the spot where they were found or at no great distance therefrom, though it is difficult to imagine how the material was obtained, but it is possible that a careful analysis of a larger quantity of the mud would reveal a trace of Barium, for sea-water contains a slight trace of this element.

I cannot at present call to mind any instance of sphærolitic structure occurring without the aid of heat.

In volcanic lavas and in artificial glasses, it may be regarded as concretionary, or as resulting from incipient crystallisation or devitrification around certain points or nuclei. The nuclei when they exist consist either of a granule or a minute crystal or crystallite, but most commonly no nucleus is discernible.*

In this case, however, it would seem, that it must be due to slow segregative action; and, baric sulphate being very slightly soluble in water, the deposition would be very slow and may have been to some extent crystalline, at any rate sufficiently so to produce the same effect as incipient crystallisation from a glassy mass.

The execution of the accompanying plate has been kindly superintended by Mr. J. Wood-Mason.

* Rutley's Study of Rocks, p. 183.

EXPLANATION OF PLATE II.

Fig. 1, 2. The external appearance, natural size, of some of the nodules.

Fig. 3. A thin slice treated with hydrochloric acid and seen between crossed Nicol's prisms; shewing the dark crosses and radiating structure of the aggregates.

Fig. 4. A thin slice shewing some of the enclosed Foraminifera as seen by ordinary light; from a microphotograph (Smith and Beck's $1\frac{1}{2}$ " obj.) taken in the Biological Laboratory of the Indian Museum, Calcutta.

XV.—*Natural History Notes from H. M.'s Indian Marine Survey Steamer 'Investigator', Commander ALFRED CARPENTER, R. N., Commanding. No. 6. On Six new Amphipods from the Bay of Bengal.—By G. M. GILES, M. B., F. R. C. S., Surgeon-Naturalist to the Marine Survey.*

[Received and Read March 2nd, 1887.].

(With Plates III—VIII.)

CONTENTS.

§ 1. A description of two new Species (i. *Phronima bucephala* and ii. *Phronimella hippocephala*) of the Amphipod Family *Phronimidæ*, with some Remarks on the Genera of the Family.

§ 2. *Rhabdosoma investigatoris*.

§ 3. *Amphipronoë longicornuta*.

§ 4. *Lestrigonus bengalensis*.

§ 5. *Eurystheus hirsutus*.

§ 1. *A Description of two new Species of the Amphipod Family Phronimidæ with some Remarks on the Genera of the Family.*

The genus *Phronima* of the division *Hyperina* and family *Phronimidæ* is a very limited and peculiar one. The species that belong to it are remarkable for their bizarre form, and for the circumstance that the head is considerably prolonged downwards, like that of a quadruped, in a direction at right angles to the long axis of the body.

The number of joints in the legs appears to be less than the normal seven. This is due, on the one hand, to the coxal plates being fused with the pleuron of each segment, and, on the other, to the circumstance that the dactylopodite is in most instances very small or reduced to a mere rudiment. Spence Bate* gives as a generic character that the 6th thoracic appendage (third pereopod) has the dactylopodite fused with the propodite. This is, however, I am inclined to believe, an error, arising probably from the want of fresh specimens. Such also appears

* Catalogue of Amphipodous Crustacea in the British Museum, p. 316.



Jones, Edward James. 1888. "XIV.—Natural History Notes from H. M.'s Indian Marene Survey Steamer 'Investigator, ' Commander Alfred Carpenter, R. N., Commanding. No. 5. on Some Nodular Stone, Obtained by Trawling Off Colombo in 675 Fathoms of Water." *The journal of the Asiatic Society of Bengal* 56(II), 209–212.

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