XIX DESCRIPTION OF SOME SPECIMENS OF *PLEUROTOMA CONGENER*, E A SMITH, FROM THE ANDAMAN SEA, WITH SPECIAL REFERENCE TO CERTAIN PECULIARITIES OF THE APERTURE

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(Plate XII).

Pleurotoma congener, one of the most beautiful amongst the Pleurotomidae of the Indian Ocean, was first described in 1894 by Mr. E. A. Smith from specimens in the collections obtained during the cruises of H.M. Indian Marine Survey Steamer "Investigator" from the depth of 128 fathoms in the Bay of Bengal, and between 142 and 400 fathoms west of Colombo off the coast of Ceylon.

As is so frequently the case in consequence of the fragility of the aperture in the Pleurotomidae, the edge of the outer lip is missing in the original types described by Mr. E. A. Smith. Since the publication of the original description, further specimens have been obtained by the Marine Survey from the Andaman Sea (in Lat. 13° 17′ 15″N., Long. 93° 10′ 25″E.), in depths of 185 fathoms. Many of the shells are partly overgrown by organisms and were apparently dead at the time when they were dredged up, but in two of them the aperture is practically perfect and exhibits, along the outer lip, features of such a singular nature that they have been thought worthy of special notice. As the specimens differ in several details from the original type, it will be useful to give a complete description.

Pleurotoma (Gemmula) congener, E. A. Smith.

1879. *Pleurotoma coronifera*, Martin, *Tertiaerschichten auf Java*, p. 61, pl. xi, fig. 2.
1884. *Pleurotoma coronifera*, Martin, *Samml. des geol. R. Mus. in Leiden*, 1st ser., III, p. 58, pl. iv, fig. 58.
1894. *Pleurotoma congener*, E. A. Smith, *Ann. Mag. Nat. Hist.* (6), xiv, p. 160, pl. iii, figs. 4, 5.
1895. *Pleurotoma (s. sti.) coronifera*, Martin, *Samml. des geol. R. Mus. in Leiden* (new series), I, p. 38.
non Pleurotoma coronifera, Bellardi, *Moll. terr. terz. Piem. e Lig.*, 2d part, p. 34, fig. 20 (1877).

Fairly large, of a variable but moderate degree of elongation, with rather broad slightly conoidal spire measuring about five-ninths of the total height, with broad body-whorl somewhat abruptly contracted anteriorly into a rather short stem corresponding to the terminal canal.

The protoconch, when fully preserved, constitutes a remarkably beautiful object. It is slightly oblique to the axis of the remainder of the shell. It is shaped like a *Turbo*, broadly conoidal in outline. It consists of a minute, highly glazed, slightly excentric nucleus followed by four spire-whorls of which the two first are very low and very broadly conical, the two last much taller and rather strongly convex. The first whorl is smooth. The three others are covered with very delicate sharply angular ribs stretching from suture to suture, slightly curved, with forward directed concavity, and most of them very oblique and anteriorly antecurrent except on the last half of the last whorl when they become practically vertical. In some specimens the transition to the spire proper is quite abrupt, while in other cases a gradual shortening of the protoconch ribs establishes a transition into the crenulations of the sinus band. The protoconch is followed by seven and a half spire-whorls, the height of which is generally equal to two-fifths of their width or slightly more in the case of specimens with a relatively narrow spire; the maximum thickness being situated nearer to the anterior than to the posterior margin of the whorls, and coinciding with the zone of accretions to the apertural sinus.

The sutures are rather deeply incised and are surrounded by a prominent broad ridge or swelling, while another ridge of the same character, corresponding with the zone of accretions to the apertural notch, occupies a more anterior position upon the whorls. The anterior margin of the whorls forms a deeply sunken zone between the sinus ridge of one whorl and the circumsutural ridge of the next whorl, proportionately scarcely broader than that between the two ridges of one whorl; and, in many specimens, as both ridges are equally prominent, the spire usually assumes the appearance of a cone very evenly encircled at close intervals, the grooves being of about the same average width as the ridges. In a few specimens, the circumsutural ridge is decidedly less prominent than the sinus band, and the spire thereby acquires somewhat more of a stepped appearance. Both ridges are bifid, the two component spiral threads being both equal in the case of the sinus ridge, while, in the case of the circumsutural swelling, the more anterior thread, to a degree varying in different specimens, is more prominent than the posterior thread which either immediately adjoins the suture, or is separated from it by one or two fine raised spiral lines. Three raised spiral lines or minor threads, of which the more posterior one is usually much thinner than the two others, are observed along the floor of the groove separating the two main ridges of each whorl Two more spiral threads may occur along the depressed zone anteriorly to the sinus ridge, or else, there may be but one, as the more anterior of the two may

be entirely concealed by the posterior margin of the following whorl. The interval between these two anterior threads may carry an additional fine revolving line. Two more or less distinct revolving lines may bound the sinus ridge externally to its two main threads, one on either side. The sinus ridge is crenulated at close and even intervals by short straight ribs, practically vertical or very slightly oblique and anteriorly retrocurrent, swelling into blunt granules across the two main spiral ridges. The circumsutural ridge is also denticulated, but at less regular intervals, by thickened lines of growth. The course of the lines of growth is steeply antecurrent or practically normal to the posterior suture, antecurrent at about 45° to the anterior suture, strongly retrocurrent from either side to the sinus ridge.

The broad body-whorl measures from nearly five-eighths to nearly two-thirds of the total height. Anteriorly to the sinus-ridge it contracts with a hemispherical or somewhat flattened convexity, connected by a rather broad and rather shallow concavity with the rather short terminal stem, which is rather bluntly truncated and very distinctly dorsally deflected at its extremity. The ornaments of the last spire-whorl are continued upon the corresponding portion of the body-whorl, with a tendency towards an increase in the number of minute spiral raised lines of the lowest order. In those specimens in which the spire-whorls exhibit two main spiral threads anteriorly to the sinus ridge, the convexity of the base, anteriorly to the level of the suture, carries two more main spiral threads. In those specimens in which there is only one main thread clearly visible on the anterior part of the spire-whorls, the next one, concealed by the suture, becomes clearly disclosed at its termination, and is followed on the anterior convexity by only one more main thread. Consequently, anteriorly to the sinus ridge, the convex portion of the body-whorl carries three or four main spiral threads or keels conspicuously granulated at their intersections with the raised lines of growth. From one to three fine spiral raised lines are observed in each of the intervals between these granulated keels. Another similar granulated keel occurs at the junction of the anterior concavity and of the terminal stem. A number of thin raised spiral lines, either all of one size or else more or less regularly alternating, decorate the concavity. The terminal stem carries numerous spiral threads at first alternating in three sizes and afterwards, more or less regularly in two, as far as the zone of accretions of the terminal truncation; the threads of the first order being at first distinctly granulated and but slightly inferior in thickness to the above-described main granulated keels of the anterior part of the body-whorl, and afterwards gradually decreasing anteriorly while the granulations become fainter. The terminal zone of accretions which causes the terminal dorsal deflection of the stem carries very fine, rather blunt spiral lines crossed at irregular intervals by the somewhat rugose accretions. The lines of growth become vertical at the junction of the convex and concave portions of the base, and maintain that

direction up to the margin of the terminal zone of accretions when they finally become retrocurrent.

The somewhat small aperture is lanceolar, posteriorly terminated by a narrow channel, while anteriorly it contracts gradually into the rather short oblique canal. The junction of the columella with the base of the last spire-whorl is curved though rather abrupt. Anteriorly to the base of the last spire-whorl the course of the columella is, on an average, straight as far as the commencement of the canal, and slightly oblique, the direction being anteriorly towards the left of the shell. Not far from the base of the last spire-whorl it exhibits a blunt, broad revolving swelling, clearly visible when the outer lip is incomplete. At the commencement of the canal the columella becomes more strongly oblique, but it extends anteriorly only for a very short distance as a distinctly differentiated structure, the anterior portion of the canal being formed merely by the thin shell-wall without any differentiated columellar margin or columella. The columellar margin is almost everywhere very thin: it has a very slightly raised edge at the commencement of the canal, posteriorly to which it is quite flush with the adjoining outer surface, except at its posterior termination where it exhibits a small button-like callous thickening resembling that of a *Drillia*, which contributes to contract the posterior channelled termination of the aperture. The outer lip which is very thin terminates normally to the suture. The sinus is moderately broad, very deep without any raised edge. The convexity of the outer lip, anteriorly to the sinus, does not project much further forward than its posterior termination. The internal walls of the shell are lirate, but the internal lirae cease at a considerable distance from the aperture.

In the two specimens in which the outer lip is complete, or almost complete, it exhibits a most peculiar structure which does not appear to have been noticed or described in any other Pleurotomid shell. The two anterior main threads of the convexity of the base, on approaching the aperture, grow into extremely prominent trumpet-like hollow expansions which, nevertheless, do not breach the margin of the outer lip whose outline is continuous, the hollow expansions being, in the present condition of the shells, quite shut off from the interior of the shell. It is evident, however, that this was not so at the time of their formation, and that they must have originated from a more or less siphon-like fold of the mantle with the formation of a deep sinus which was afterwards obliterated. This peculiar growth was evidently several times repeated, for there are several of these trumpet-shaped foliaceous expansions fitting inside one another, the last ones becoming gradually smaller on approaching the present aperture. It is moreover to be noticed that the growths are not simultaneous on the two main threads which are affected by them. On one of the specimens, it is upon the most anterior of the main threads of the convexity of the base that this structure is first observed; then, without any closing of the temporary sinus thus produced, the

mantle-fold which originated the structure shifted its position to the next principal thread posteriorly to the one upon which the structure was first developed. Consequently the expansion shifts its position forward (towards the aperture) and at the same time posteriorly from the one main thread to the other, enclosing the next similar structure produced presumably after a temporary arrest of growth. In the other specimen it is observed that the growth commenced on the more posterior of the threads concerned, shifted to the anterior one, and once more meandered back to its original position. As has already been mentioned, the successive expansions fitting inside one another become finally smaller on approaching the aperture till the sinus is obliterated and the outline of the outer lip becomes regularised in this part of the shell; but, when this happens, it would appear as though the supposed mantle-fold had once more shifted its position still further forward, for now a distinct stromboid sinus appears as an expansion of the spiral thread at the limit of the concave neck and terminal canal, representing what might be the initial stage of a structure similar to the curious expansions above described. These structures evidently result from some hitherto unrecorded anatomical peculiarity.

Dimensions.

Height	31 mm.	36 mm.	37 mm.	41 mm.
Thickness	11 ,,	13 ,,	14 ,,	17 ,,
Height of spire	17 ,,	20 ,,	21 ,,	24 ,,
Height of body-whorl	20 ,,	22 ,,	23 ,,	25 ,,

Of the specimens, the measurements of which are above tabulated, the first is the smallest of those available, the last the largest. The two others are those exhibiting the peculiar apertural features above described.

Remarks.—Compared with the original types, the Andaman specimens above described are generally somewhat smaller, with a more evenly conical, less conoidal spire, the apex, in particular, being much more pointed instead of blunted as it is in the originally figured specimen. The circumsutural rim at all stages of growth and the revolving main keels of the body-whorl anteriorly to the sinus-band are also much more distinctly granulated in the case of the Andaman specimens.

A fossil variety of this shell occurs in the lower and upper Miocene and Pliocene formations of western India, the same variety also occurring fossil in the upper Miocene formations of Java and Sumatra from which it was described by Martin (*loc. cit.*) as *Pleurotoma coronifera*, a name pre-employed in the zoological nomenclature by Bellardi for a fossil species from the Miocene of Piedmont. The blunt posterior swelling of the columella, clearly visible in the fossil specimens from India and from Java, has not been observed in any other species of *Pleurotoma* fossil or recent.

In all the fossil specimens from India and Java the outer lip is incomplete. Judging from an illustration published by Sacco

(*Moll. terz. Piem. e Lig.*, part XXX, pl. xi, fig. 35), there are indications of a similar structure in the case of a fossil from the Pliocene of Zinola near Savona, described as *Pleurotoma monile*, Brocchi, var. *granocostata*, Sacco, which seems related to *Pleurotoma congener*, from which it is distinguished principally by its less distinctly bifid circumsutural rim and by the differently disposed crenulations of its sinus band, which are much wider-spaced and are elongated in the direction of the spiral ornaments instead of being constituted by axial ribs.

In conclusion, I wish to express my best thanks to Dr. N. Annandale for the favour of enabling me to study these interesting specimens, and to M. R. Ry. Sethu Ram Rao of the Geological Survey of India and Babu S. C Mondul of the Zoological Survey of India, for preparing the beautiful photographs illustrating their structures.