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A NEW SPECIES OF TRIGONIA FROM UPPER CRETACEOUS BEDS NEAR THE ITONGAZI RIVER, NATAL

By Jeanne de V. Little

Abstract

A description is furnished of *Trigonia* (*Scabrotrigonia*) *itongazi,* a new species of Trigonia from the Upper Cretaceous Beds, occurring between the Itongazi and Umkandandhlovu Rivers, Alfred County, Natal. Its characteristic features are discussed.

In June 1944 Professor T. W. Gevers came on an occurrence of fossiliferous Upper Cretaceous beds at a locality along the South Coast of Natal between the Itongazi and Umkandandhlovu river mouths. This occurrence was described in 1945 (3). The fossils then collected were identified by the writer. The form listed as *Trigonia itongazi* sp. nov. is now described below.

Age of the Deposits

The fossil fauna indicated these rocks to be of the same age as those of the Umzamba and Umpenyati beds, i.e. the Campanian stage of the Senonian, Upper Cretaceous. In 1955 Y. H. Smitter (6) described a small collection of foraminifera from the Itongazi beds and came to the conclusion that it was possible to assign a more specific age to these deposits. On the faunal evidence based on the foraminifera described he concluded that the Itongazi beds are middle Maestrichtian in age.

Description of the Species

Trigonia (*Scabrotrigonia*) *itongazi* sp. nov.

Material.—Six moderately well preserved specimens, consisting of five right valves and one left valve, are available for study, as well as two broken left valves, (Nos. i951-8). The fossils occur in an exceedingly tough sandy marl and in only one specimen (a right valve) has it been possible to expose part of the interior. Removal of the matrix from the surface has also been difficult.

Holotype. — The most complete specimen consists of two separated valves, a right and a left valve, and this has been taken as the holotype of the species. It is No. i951 in the collection of the Bernard Price Institute for Palaeontological Research. One of the broken left valves shows the dorsal area very well and is cited as paratype (i952).

Dimensions.—The dimensions of the specimens are given below in millimetres.

	i 951		i952	i953	i954	i955	i956	i957
	R.V.	L.V.						
Length	42	42	36	36	35	37	40	25
Height	34	34	±28	±29	30	28	33	22
Thickness (one valve)	± 8	± 8	± 6	± 7	± 6	± 7	± 6.5	± 4

External features.—The shell is moderately small, crescentic, rather longer than high, with the umbo situated about a third of the length of the shell from the anterior end. The anterior margin is convex, the greatest curvature being at the middle, merging gradually with the ventral margin which is well curved, somewhat lengthened and meets the posterior margin sharply. The dorsal margin, which is slightly concave, slopes rapidly towards the posterior margin which it meets at an obtuse angle. The posterior margin is short and somewhat oblique.

The shell is moderately convex, the greatest inflation being in the region below the umbo. The umbones are small, pointed and well incurved. The area and escutcheon, taken together, are of uniform width from immediately behind the umbo to the posterior margin but widen slightly at the posterior margin. The marginal carina is represented by a distinct ridge-like fold which gradually becomes wider and less raised posteriorly; the inner carina can be traced as a raised fold near the umbo but it flattens out posteriorly, its position being indicated by the change in ornamentation. A median longitudinal furrow commences very close to the umbo and extends throughout the length of the area to the posterior margin. The escutcheon is elongated and narrow, ornamented with small irregularly spaced ribs which are at right angles to the inner carina and do not extend beyond it, except in the neanic stage. The area between the inner and marginal carinae is oranmented with fine lines of growth which, near the posterior margin, curve broadly over the fold which takes the place of the marginal carina. In this portion of the valve there are traces of fine, slightly curved striae crossing the lines of growth.

In the adult shell three concentric furrows, corresponding with distinct growth stages, divide the valve into zones. Between these furrows, or sulcations, the lines of growth are very distinct, in some instances almost like fine ribs. Measured from the umbo these furrows occur at the following distances:—

	i951		i952	i953	i954	i955	i956	i957
	R.V.	L.V.						
First	13	13	11	±13			±15	±12 mm.
Second	25	25	21	±24	±23	±18	±27	±22
Third	32	32	±28	±30	±29	±25	±31	

These furrows correspond exactly with the lines of growth. The change in rate of growth is emphasised by the development of a "step" just above the furrow, indicating a marked slowing down of deposition of shell material. In the zone between the umbo and the first furrow the lines of growth are crossed by 6 to 8 fine, concentric, widely-spaced ribs. These ribs commence on the anterior margin, at right angles to it, then bend upwards to meet the marginal carina at an acute angle. The ribs carry minute nodules. In the neanic stage, up to 5 mm. from the umbo, the ribs developed on the escutcheon cross the inner carina, the median longitudinal furrow and meet the concentric ribs of the flank at the marginal carina at an acute angle.

Beyond this point the area is smooth, being crossed only by lines of growth. In the

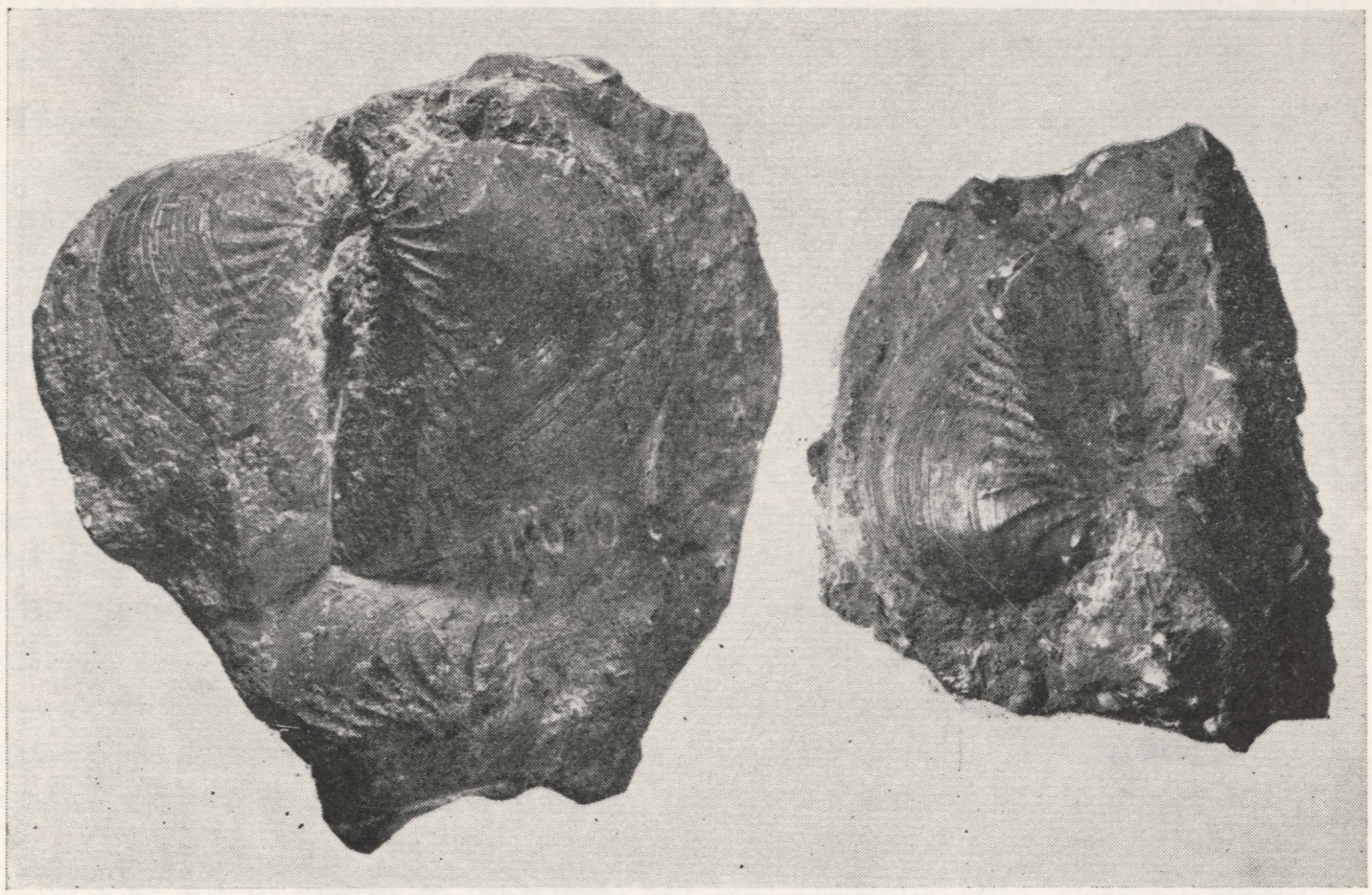


Fig. 39—Trigonia (Scabrotrigonia) itongazi. **LEFT: Holotype, i951, with both valves. RIGHT: Referred specimen i952, right valve.** Natural size.

zone beyond the first furrow, the concentric ribs are represented on the anterior margin by not more than 5 ridges which are no longer at right angles to the margin. These ribs are directed downwards, making an obtuse angle with the margin. They die out over the main portion of the flank where they can not be traced. Near the marginal carina, however, they reappear with a vertical trend, meeting the marginal carina at an acute angle. In the posterior portion of the valve these ribs are prominent and occupy the area immediately anterior to the marginal carina, crossing the growth lines and the concentric furrows without a break. Towards the lower margin these ribs change direction becoming slightly concave towards the posterior. These ribs also carry minute nodules. Where the ribs meet the ventral margin they do so at a right angle. The main area of the flank is crossed only by the well-developed lines of growth.

Internal features.—In the case of one right valve it has been possible to expose, in part, portion of the sub-umbonal region. The anterior tooth is large, elevated and directed parallel to the anterior margin. Both sides of the tooth are finely grooved. There appears to be a gap between the anterior tooth and the long, relatively narrow, posterior tooth. This posterior tooth is situated close to and parallel to the hinge margin. It is also finely grooved. It has not been possible to free the sockets from the matrix. On the posterior margin there is a short internal rib which separated the incurrent and excurrent siphons. Where the ribs on the area below the marginal

carina meet the ventral margin there is a series of notches in the edge of the valve. The inner surface of a relatively well preserved fragment is slightly pearly.

Discussion

Van Hoepen (8) holds that the names *Laevitrigonia, Scaphotrigonia,* and *Scabrotrigonia* proposed by Deecke (2) for the Laeves or Glabrae, Scaphoideae and Scabrae respectively are *nomina nuda,* and in this he is followed by Crickmay (1). Rennie (5), however, in discussing the classification of the Trigonias, while deploring the casual way in which Deecke proposed these new generic terms, states that in his opinion these names were validly proposed and must so be regarded. He designates *Trigonia scabra* Lamark genotype of *Scabrotrigonia.* He also considers that, of the six genera proposed by van Hoepen, namely, *Pterotrigonia, Acanthotrigonia, Linotrigonia, Pisotrigonia, Ptilotrigonia* and *Rinetrigonia,* some of them (if not the majority) could be included in the synonymy of *Scabrotrigonia* Deecke. In the belief that Rennie is correct in this contention the writer has referred the species described above to *Scabrotrigonia.*

This classification is based on (a) the nature of the escutcheon and the area (b) the nature of the juvenile ornamentation (c) the nature of the carinae (d) the nature of the ornament on area and escutcheon as well as on the flanks.

Lycett ((4) p. 218) contends that the separation of genera in the case of the *Trigoniae* should be based on the principle " . . . that the internal characters are the only features which can be relied upon as affording decided distinctions more important than those of species or of subgenera, and that the modifications which embrace all the features connected with the external figure and surface ornaments are only of subordinate or sectional value, more or less linked together, and are chiefly of interest and importance in comparing the stratigraphic value or succession in geological time of these several features, and of affording separation between the several series of forms of which such groups are composed." Rennie (ibid. p. 326) while pointing out that "classification based on adult characters alone has certainly led in the past to the proposal of certain groups of a very artificial character . . ." states that "The retention of a distinctive juvenile ornamentation in many *Trigoniae* has indeed been of great value in the determination of relationships and discrimination of natural groups . . ."

In this regard it is interesting to note that the nature of the ornamentation of the escutcheon and the area in the juvenile stage of *Trigonia* (*Scabrotrigonia*) *itongazi* as well as the ornamentation of the flank show a marked similarity to the ornamentation of *T. elegans* Baily at the same stage of development. In both species, too, the development of this juvenile ornamentation resembles that of *T. shepstonei* Griesbach. Further, the internal characters of the three species may be compared. Both *T.* (*Linotrigonia*) *elegans* Baily and *T.* (*Acanthotrigonia*) *shepstonei* Griesbach have been referred by Rennie to the *Scabrotrigonia.*

Not only in the juvenile stages is it possible to compare *T. itongazi* and *T. elegans.* The nature, development and arrangement of the concentric ribs in the area between

the umbo and the first of the furrows in the shell of *T. itongazi* are very similar to the adult ornamentation of *T. elegans*.

The effacement of ornament from the middle portion of the valve of *T. itongazi*, accompanied as this is by the appearance of the furrows which are taken to indicate distinct changes in rate of growth, gives this species a striking resemblance to the Jurassic *Trigonia gibbosa* Sow. Lycett (4) notes a similar tendency to effacement of ornament in the case of the Australian Tertiary species *T.* (*Neotrigonia*) *howitii* McCoy. This resemblance to the *Laevitrigonia* is superficial and may be taken to be an example of parallel variation in these groups.

There are other features in which *T. itongazi* resembles certain of the *Laevitrigoniae*, features which are also common to the *Scabrotrigoniae*, *T. pennata* and *T. sulcataria* of Albian age. According to the description given by Lycett (4), in these forms, as in *T. itongazi*, the portion of the valve immediately anterior to the marginal carina, carries "a series of faintly defined perpendicular costellae which are directed upwards, some from the pallial border, others from the posteal extremities of the costae, to the angle of the valve; the area and the escutcheon have also their transverse costellae; the whole of the ornamentation is slightly crenulated."

Recently the rate of growth of several species of lamellibranch has been studied in detail at the Scottish Marine Biological Association's laboratory at Millport. The lamellibranchs studied are found on shores which are composed either of clean sand throughout or of sand in the lower part with a little mud and poorer oxygenation in the upper parts. Stephen (7) has pointed out that in the lamellibranchs living under similar conditions there are two quite distinct types of shell. In the first there are a number of well-marked rings on the shell, in the second kind of shell these rings are not obvious. In the first type it has been shown that "these (rings) are laid down in winter when growth is retarded, the wider areas between being laid down when growth is rapid". Once the value of the first well-marked ring is known these rings can be used to estimate the age of the individuals. In the case of the specimens of *T. itongazi* examined, the distances of the first furrow or ring from the umbo varies between 11 and 15 mm; the second between 18-27 mm and the third between 25-32 mm. It is apparent that the development of these rings occurs after a minimum size has been attained by the individual and it is possible that the variation in rate of growth that their appearance indicates is seasonal. In this connection it is interesting to note that several specimens of *T. elegans* Baily examined by the writer also possess one or two well-marked rings on the shell.

Acknowledgements

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p. 124 Second line from bottom, for "is" read "it".
p. 129 Second line from bottom, for "undilted" read "'undiluted".
p. 131 For *"Taurotragus of oryz"* read *"Taurotragus* cf *oryz"*; after *Cephalophus pricei* add "cf *Cephalophus (Guevei) caelurus* p. 15".

p. 121 Ten lines from bottom, for "distances" read "distance"; third line from bottom, for "whishes" read "wishes"; second line from bottom, for "Departement" read "Department".