

NOTES ON FRESHWATER MOLLUSCA FROM THE MALAY ARCHIPELAGO

by

TERA VAN BENTHEM JUTTING

(Zoological Museum, Buitenzorg)

1. East Indian Planorbidae.

The family of Planorbidae with its numerous and various members in European waters is rather poorly represented in the Malay Archipelago. It is not the number of species which is so very small, there have been described 12 Planorbis and 2 Segmentina. But most of them seem to be very local and with the exception of *Planorbis exustus* they are of small size. Thus they never form such an important element in the freshwater fauna in this region as their congeners do in palaeartic and nearctic waters.

Most probably, however, continued investigation will throw more light on the specific position of different forms and on their distribution. A few collecting trips in Java have already shown me that the javanese species at least have a wider dispersal than hitherto has been supposed.

PARAVICINI and VAN HEURN stated in 1922 (Natuurk. Tijdschr. Ned. Indië, Vol. 82, p. 31) that *Planorbis convexiusculus* in Java is one of the freshwater mollusks which are everywhere to be found.

Here follows a list of all the species described from the Dutch East Indies:

Planorbis

<i>badae</i> BOLLINGER 1914	Celebes
<i>convexiusculus</i> HUTTON 1850	Sumatra, Java, Lombok, Celebes, Soemba, Boeroe
<i>elberti</i> HAAS 1912	Lombok
<i>exustus</i> DESHAYES 1834	Sumatra
<i>infralineatus</i> MARTENS 1867	Java
<i>montrouzieri</i> GASSIES 1857	North New Guinea
<i>proclivis</i> MARTENS 1897	Sumatra
<i>sagoensis</i> BULLEN 1906	Sumatra
<i>sarasinorum</i> BOLLINGER 1914	Celebes
<i>sumatranus</i> MARTENS 1897	Sumatra
<i>tondanensis</i> QUOY & GAIM. 1833	Celebes
<i>turbinellus</i> TAPP. CAN. 1883	Aroe Ids.

Segmentina

<i>calathus</i> BENSON 1850	Sumatra, Java, Aroe Ids.
<i>congenera</i> BÖTTGER 1915	Aroe Ids.

In this summary only 3 species are mentioned from Java: *Planorbis convexiusculus* (= *compressus*) and *infralineatus* and *Segmentina calathus*. We will discuss the *Planorbis* first. (Fig. 1). For a better comparison their distinctive characters are placed here side by side (vide description VON MARTENS, Malak. Blätt. Vol. 14, 1867, p. 213).

<i>convexiusculus</i>	<i>infralineatus</i>
1. testa subdepressa	testa depressa
2. supra leviter	supra leviter
3. infra vix immersa	infra vix immersa
4. striatula	striatula
5. sculptura spirali nulla	infra lineis subtilibus spiralibus sculpta
6. angulo peripherico plus minusve obsoleto	medio angulata
7. pallide cornea	luteobrunnea
8. nitidula	—
9. anfractibus 4, depresso teretes	anfractibus 4½—5
10. sutura sat profunda distincti	sutura sat profunda distincti
11. modice involuti	modice involuti
12. apertura obliqua	apertura obliqua
13. ovata	ovata
14. peristomate tenui	peristomate intus albolabiata
15. diam. maj. 4½, min. 4, alt. 1½ mm	diam. maj. 6½, min. 5, alt. 2 mm
16. apert. lat. 2, alt. 1 mm.	apert. lat. 2½, alt. 1½ mm

Apart from the dimensions, only the points 1, 5, 6, 7, 8 and 14 present differences between the two forms. To these BÖTTGER (Ber.Senck.Naturf.Ges. 1891, p. 245) in discussing *P. infralineatus* adds the very glossy shell (this in fact renders point 8 of no further distinctive importance), the light horny white colour and the more expanded aperture. At the same time however, this author doubts the value of such characteristics, as all of them (except the spiral striation) occurred in indian and chinese shells of *P. convexiusculus* as well. In concluding he remarks: "I fear that closer observation would finally remove this hitherto undisputed species to the group of the very variable *compressus* forms".

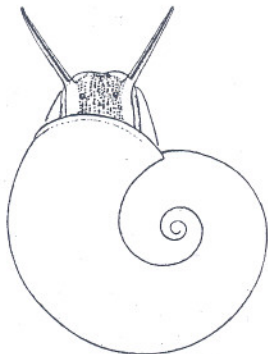


Fig. 1. *Planorbis convexiusculus* HUTTON
Koeripan. (× 7)

As I happened to have for examination a fairly extensive series of javanese *Planorbis* from different localities I tried to find out whether *P. infralineatus*

should be maintained as a separate species.

To begin with I give an enumeration of the collecting-places:

Lake on E. slope of Mount Patoeha, West Java, 1500 m alt. 20. IV. 1930.

Telaga Patengan on W. slope of Mount Patoeha, West Java, 1600 m alt. 9. VI. 1930.

Lake near Koeripan, vicinity of Buitenzorg, West Java, 200 m alt. 20. VII. 1930.

Lake at Tjibodas, West Java, 1400 m alt. 28. VII. 1930, coll. LIEFTINCK. Telaga Sewiwi, Dieng plateau, Central Java, 2000 m alt. 11. VIII. 1930.

Lake of Tjigombong, vicinity of Buitenzorg, West Java, 500 m alt. 1. IX. 1930.

There is a great deal of variation among them. Typical *convexiusculus* and typical *infralineatus* are present, but between these lies an almost continuous series of transitional forms of which the accompanying figures may give an idea. From shells of *convexiusculus* with rounded periphery and without any trace of spiral striation (Fig. 2) we pass to forms with an obsolete peripheral angle (Fig. 3) then to such with a noticeable carina which are

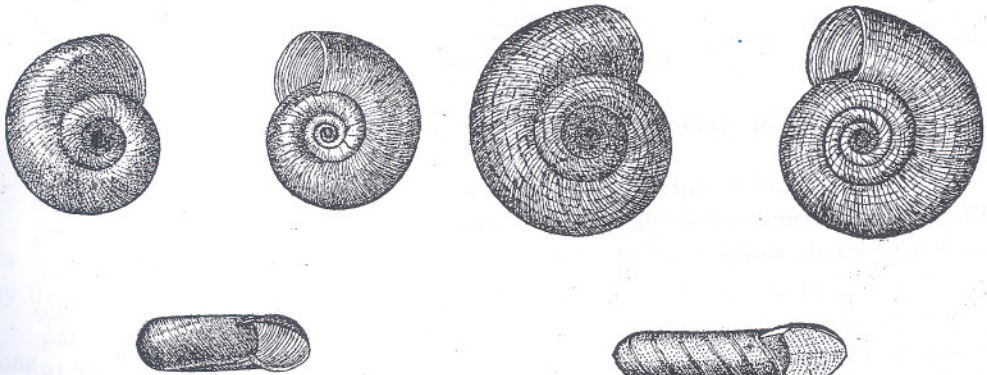


Fig. 2. *Planorbis convexiusculus* HUTTON. Lake on Mt. Patoeha. ($\times 5$)

Fig. 3. *Planorbis convexiusculus* HUTTON. Telaga Patengan. ($\times 5$).

immediately connected with keeled forms having a more or less conspicuous spiral structure besides (Fig. 4). Finally this is linked to shells agreeing perfectly with the original diagnosis of *infralineatus* the only difference I could observe being the occurrence of spiral lines on either top or basal side or on both.

Shells of *convexiusculus* possessing a peripheral angle as represented in Fig. 3 belong to the var. *siamensis* MARTENS. Those with a distinct carina may be termed var. *japonica* MARTENS. The stages 3 and 4 are two phases of *infralineatus* not sufficiently separated. The presence of a peripheral angle is a characteristic which

seems to become more pronounced with advanced age, hence the smaller individuals as a rule are more like *convexiusculus*, the larger ones like *infralineatus*.

In concluding I give it as my opinion that among the javanese *Planorbis* two distinct species can no longer be maintained but that we ought better to

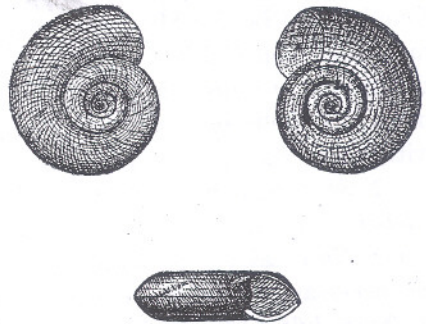


Fig. 4. *Planorbis convexiusculus* HUTTON. Koeripan. ($\times 5$)

regard *convexiusculus* and *infralineatus* as the extremes of a variation range with every possible transitional form between them.

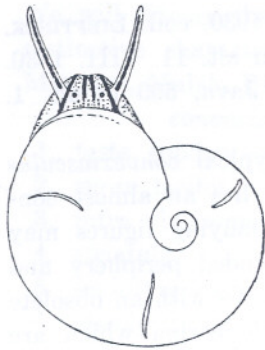


Fig. 5. *Segmentina calathus* (BENSON). Koeripan. ($\times 13$).

In dealing with *Segmentina calathus* (BENSON) (Figs. 5 and 6) I have only to add a few more localities to the distribution of this species which as far as it concerns Java was only known from Buitenzorg (MARTENS, Erg. WEBER, 1897, p. 15).

Drains on cocoa-nut estate Pagandaran, near Dirk de Vriesbay, S. coast of West Java, 3. IV. 1930, coll. B. POLAK.

Lake near Koeripan, vicinity of Buitenzorg, West Java, 20. VII. 1930.



Fig. 6. *Segmentina calathus* (BENSON). Pagandaran. ($\times 7$).

2. On the generic position of *Ancylus javanus* MARTENS.

During a journey through the Malay Archipelago in the years 1888—1889 Prof. MAX WEBER made extensive collections of freshwater molluscs which were afterwards worked out by E. VON MARTENS (Erg. WEBER, Vol. IV, 1897).

Among the species VON MARTENS found two small ancyloid shells that proved to be new to science, one from Buitenzorg, Java and one from Celebes. These he called *Ancylus javanus* and *celebensis* respectively (l.c. p. 15 and 16, pl. 1, fig. 35—37 and 38—39, pl. 12, fig. 8). He points out further how these records form a most welcome addition to our knowledge of the distribution of the genus as until that time *Ancylus* was known from India and Ceylon, the Philippines and North Australia, but not from the Malay Archipelago.

Two other ancyloid mollusks (*adhaerens* and *pileolus*) have since been found in Celebes by Messrs. P. and F. SARASIN and described in *Die Süßwassermollusken von Celebes 1898*, p. 84—88. The authors created a new genus for them: *Protancylus*, on account of anatomical details and they add: had we possessed shells only we would certainly have united the two present species with *Ancylus*.

Now it remained uncertain whether *Ancylus javanus* and *celebensis* might not possibly also be included in this new genus. No details of structure however were known to provide the necessary information, except a description and a figure of the radula of *celebensis* which was said by VON MARTENS to show some resemblance to that of *Velletia lacustris*.

In the beginning of May 1930 when visiting the little freshwater lake Telaga Warna near Buitenzorg, Java, situated at about 1400 m alt. I collected several specimens of *Ancylus javanus* (Fig. 7) which were rather common at moderate depth



Fig. 7. Shell of *Protancylus javanus* (MARTENS). Telaga Warna ($\times 7$).

on leaves which had fallen into the pond. Afterwards I found the same species under similar conditions in a little stream in the Botanical Gardens at Buitenzorg (alt. 270 m) and in Lake Tjigombong, some miles off Buitenzorg (alt. 500 m).

On comparing my shells with VON MARTENS' description it struck me at once that he mentions the apex being curved to the left, but in his figure it is drawn with the top inclined to the right, as is also the case in all my specimens. We may safely assume that VON MARTENS obviously confounded front and rear end of the shell. Also in his measures of the dimensions of the shell a mistake must have crept in. For if the shell length is 2.5 mm, the corresponding breadth cannot be $\frac{1}{3}$ mm. A reduction from the figures 35 and 36 on pl. 1 leads to the conclusion that probably 1.3 mm is meant.

A number of 12 of the larger shells from Telaga Warna have the following dimensions (in $\frac{1}{10}$ mm):

long	broad	long	broad	long	broad
32	24	27	19	24	18
30	20	26	20	23	17
29	21	26	19	21	16
28	21	25	19	21	15

As I was able to study *Ancylus javanus* in living condition I could compare its morphology with the descriptions of the species of *Protancylus* published by the SARASINS.

The presence of long and slender tentacles, of a respiratory sac with gill, of a muscular stomach and especially the structure of the radula serve to remove our javanese *Ancylus* to the genus *Protancylus*.

A sketch of the animal from above and below (Fig. 8)

together with a figure of the shell (Fig. 7), radula (Fig. 9) and egg (Fig. 10) illustrate these few notes.

The radula is 0.6 mm long and consists of 120 transverse rows, each containing 35 or 37 teeth. The rachis is provided with 2 cusps, two or three neighbouring laterals bear 4, those following outward 5—7 cusps or more, but because of their minute size the exact number is often difficult to count. In the last four or five teeth of each row the number of cusps diminishes, every tooth becoming also smaller.

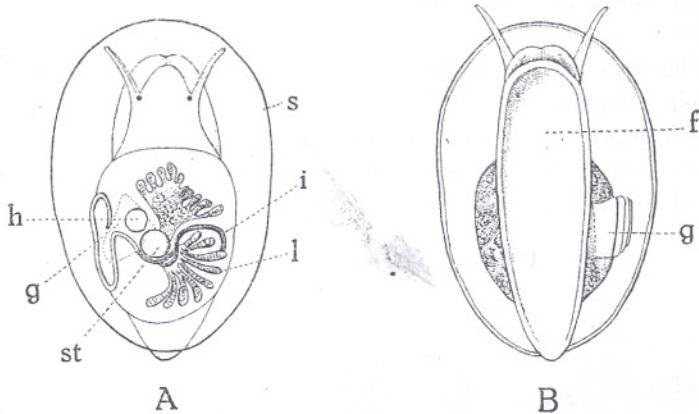


Fig. 8. *Protancylus javanus* (MRTS.). Telaga Warna. ($\times 14$).
f. foot, g. gill, h. heart, i. intestine, l. digestive gland, s. shell,
st. stomach.

On comparing this analysis with SARASIN'S description of the radula of *Protancylus adhaerens* we find some differences. In the first place the number of teeth in every transverse row of *adhaerens* is 61. SARASIN observed only 3 cusps at each of the four innermost laterals next to the rhachis. Moreover in

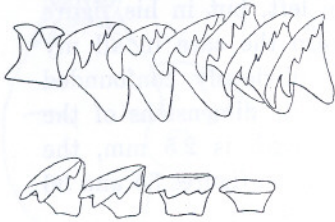


Fig. 9. Elements from radula of *Protancylus javanus* (MRTS) ($\times 600$).

his figure of the marginal teeth the cusps are relatively smaller and a little more numerous than in the case of *javanus*.

Finally if we remember VON MARTENS' words alluding to the resemblance of the radula in *Velletia lacustris* and *Ancylus celebensis* we may almost feel sure that we have to do with a *Protancylus* in the last named species also. Probably the SARASINS supposed this, but they did not precisely state it as their opinion.

This likeness of the radula in *celebensis* and *lacustris* however, is a very superficial one. Not only are the transverse rows of *celebensis* straight or nearly so, in contradistinction to the condition in *lacustris* where they are distinctly flexed, but also the shape of every single tooth is so decidedly different, that any trace of a closer relation between these two mollusks must positively be rejected.

The eggs of *Protancylus javanus* were first found in Telaga Warna and were obtained afterwards from animals spawning in the laboratory. They are laid singly on leaves and are covered by a hyaline chitinous capsule, like a watch glass, circular or suboval in outline and ± 0.6 mm in diameter.

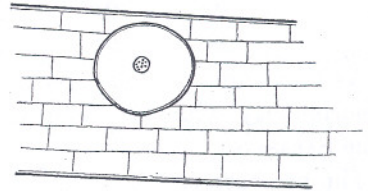


Fig. 10. Egg of *Protancylus javanus* (MRTS) ($\times 16$).

3. *Pila conica* (GRAY) its eggs and progeny.

One of the commoner freshwater gastropods inhabiting a great part of the Malay Archipelago and British India is a small species of apple snail, *Pila conica* (GRAY) syn. *Pila scutata* (MOUSSON). (Fig. 11).

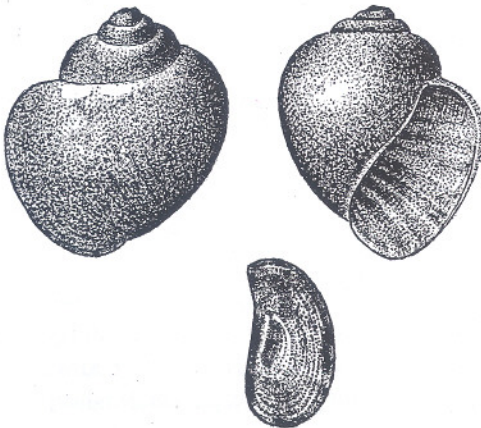


Fig. 11. *Pila conica* (GRAY), Lake Tjigombong. (nat. size).

It lives at small depths among the waterplants upon which it feeds. In March 1930 I observed a female spawning in Lake Tjigombong, West-Java. In order to deposit her eggs she had climbed against an old tree trunk which floated on the water. And there with the front part of her body and shell emerged, the eggs were laid just above the waterline in a cluster of

about a hundred. (Fig. 12). They are round, each being circa 3 mm diameter.

At the moment of production the eggshells are gelatinous and sticky but soon afterwards they become hard and calcareous. The whole eggmass of this species is not enveloped by a common calcareous layer as is the case with the spawn of its congener, the large *Pila ampullacea*, also an inhabitant of the East Indian Archipelago. *Pila conica* resembles in this respect more the British Indian *Pila globosa* (SWAINSON) (PRASHAD, Mem.Ind.Mus. Vol. 8, 1925, p. 69 and p. 91; BAHL, Ibid. Vol. 9, 1928, p. 1).

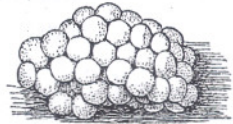


Fig. 12. Eggs of *Pila conica* (GRAY). Lake Tjigombong. (nat. size).

The egg mass was removed from Lake Tjigombong to the laboratory at Buitenzorg and here after a week the first young snail hatched (Fig 13). During the following days others appeared and in about ten days all had come out. They could be kept and brought up very well in small glass vessels and were fed on *Elodea* and minute waterweeds from stones. In this way the animals

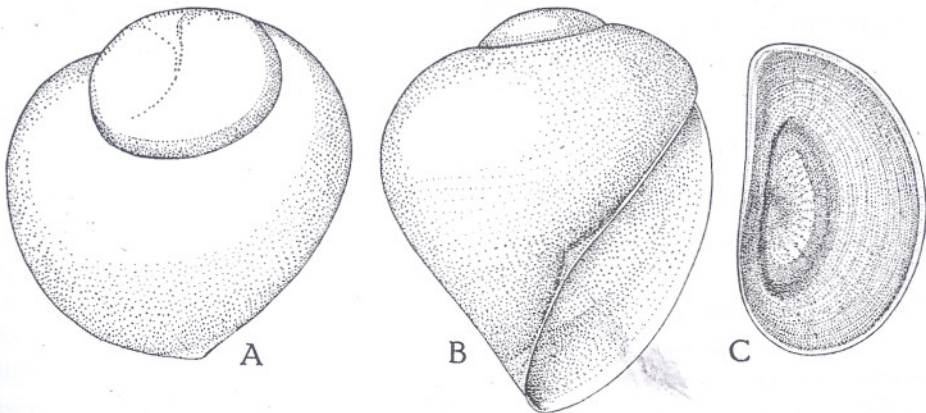


Fig. 13. Shell and operculum of *Pila conica* (GRAY) just hatched. ($\times 20$).

which measured about 1.7 mm high and broad at birth were 9 mm high and 7 mm broad after two months and 16 mm high and 13 mm broad after six months.

4. East Indian species of *Pisidium* and *Sphaerium*.

Our knowledge of the small East Indian freshwater mussels belonging to the genera *Pisidium* and *Sphaerium* is rather scanty. It is true that on the whole these bivalves are far less numerous in the Malay Archipelago than in European waters, but still a few species have been recorded. Perhaps their small size may explain why they have often been overlooked and moreover they seem to be very locally distributed, although the archipelago with its various freshwater situations, lakes, ponds and rivers is rich in apparently

appropriate habitats. Yet I am sure that further research will bring to light several other forms in different localities.

Previously 3 species of *Pisidium* and 5 species of *Sphaerium* were known viz.:

<i>Pisidium australe</i>	LAMARCK 1818	Timor	alt. ?
" <i>sumatranum</i>	MARTENS 1897	Sumatra	" 1150 m
" spec.	v. B. JUTTING 1928	Soemba	" 100 m
<i>Sphaerium alticola</i>	KOBELT 1913	New Guinea	" 3800 m
" <i>haasi</i>	BÖTTGER 1915	Aroe Ids.	" ?
" <i>cecilae</i>	PRASHAD 1921	Sumatra	" <2400 m
" <i>buruense</i>	v. B. JUTTING 1927	Boeroe	" 850 m
" <i>ranae</i>	" " " 1927	"	" 750 m

Most of the species seems to live by preference at considerable elevation above the sea, only the Soemba and the Aroe shell being collected in the low lands whereas of *Pisidium australe* no altitude is recorded. On the isle of Java however no representatives of either genus had so far been found.

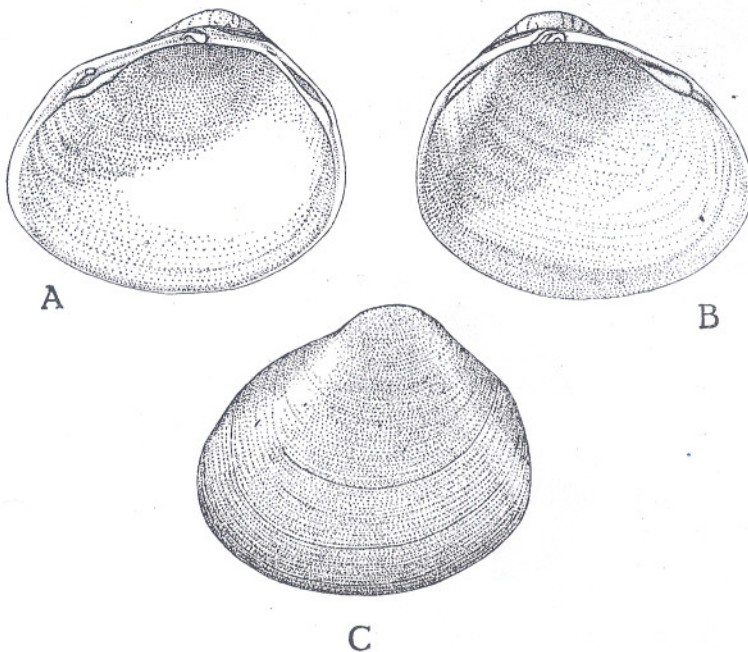
In this respect the following two species collected in West and Central Java during 1930 serve to enlarge our knowledge of the dispersal of these Cycladidae.

Both species proved to be new to science. Descriptions and figures are given below.

Pisidium javanum n.sp. (Fig. 14).

Shell rounded triangular, inaequilateral, rather thick, white, with pale brown epidermis. — Anterior margin at first stretching forward gradually in faint curve. From lateral teeth on sloping with obtuse angle more directly downward and passing with rounded front almost imperceptibly into ventral margin. — Posterior margin shorter and steeper making obtuse angles in passing to dorsal and ventral margins. — Ventral margin rounded. — Umbones moderately prominent, more so in older than in young specimens and in the former recurved slightly inward. — Close concentric striation like flat ribs on the whole exterior of the shell except on the nepionic part which is smooth. — Right valve bears two laterals on each side, the dorsal ones being smallest, the anterior ventral ones powerful and causing a tooth-like protuberance in this part of the hinge. There is one curved cardinal, rather low in front, becoming better developed and more prominent towards the rear. — Left valve has one lateral on each side and two cardinals of which the posterior-dorsal one is a long, low ridge, the antero-ventral one a short, high plica. — Ligament short, hardly visible exteriorly.

18 Specimens have been collected at Lake Tjigombong, West Java, 500 m alt. and 18 specimens in a little mere near Dolog river, Dieng Plateau, Central Java, alt. 2000 m.

Fig. 14. *Pisidium javanum* n.sp. ($\times 10$).

- a. interior of right valve
 b. interior of left valve
 c. exterior of same.

Measurements in $\frac{1}{10}$ mm:

Lake Tjigombong.

	1)																	
L.	43	40	37	36	36	35	32	32	31	30	30	29	27	27	27	27	22	18
H.	37	35	31	31	31	28	27	27	26	25	25	25	24	24	24	23	18	14
Diam.	24	22	19	20	20	17	17	16	14	16	16	14	14	14	14	15	12	9

River Dolog.

	1)																	
L.	36	36	35	34	32	31	30	30	29	27	27	25	24	24	22	21	20	19
H.	31	31	31	30	28	27	27	25	25	24	23	22	21	20	18	16	17	17
Diam.	22	20	22	20	20	18	16	15	18	13	14	12	12	12	11	10	9	8

1) Type specimen

The type specimen is preserved in the Zoological Museum at Buitenzorg, the paratypes partly in this same Museum and partly in the Zoological Museum at Amsterdam.

Sphaerium javanum n.sp. (Fig. 15).

Shell rounded oviform, subaequilateral, not very thick, white, with pale brown epidermis. — Anterior margin sloping gradually obliquely downward without notable angle off the lateral teeth and passing with rounded front almost imperceptibly into ventral margin. — Posterior margin a little shorter

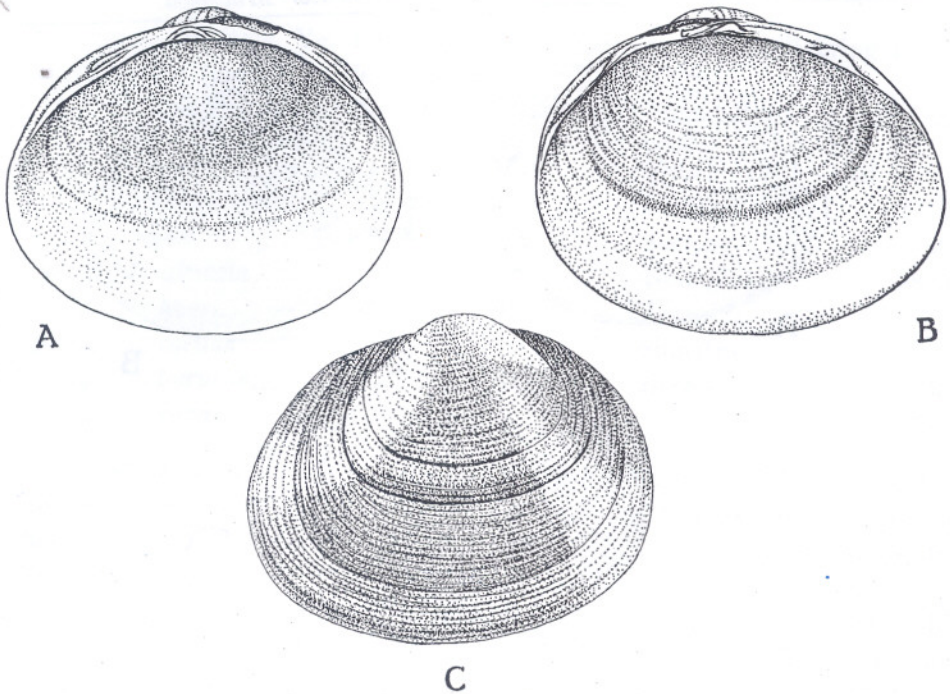


Fig. 15. *Sphaerium javanum* n.sp. ($\times 10$).

- a. interior of right valve,
 b. interior of left valve,
 c. exterior of same.

and steeper making a very faint angle near the lateral teeth and thence passing without clear markation into ventral margin. — Ventral margin rounded. — Umbones hardly prominent, not recurved inward. — Exterior of shell very closely concentrically striated, except on the nupial part which is smooth. — Right valve bears two laterals on each side, the dorsal ones being smallest, the antero-ventral ones thickest. There is one cardinal tooth curved to a nearly right angle, the posterior side giving off a dorsal branch on its way. — Left valve has one lateral on each side and two cardinals. Of these the postero-dorsal one is a nearly straight ridge, the antero-ventral one a short but high plica. — Ligament short, hardly visible exteriorly.

27 Specimens have been collected in a little mere near Dolog river, Dieng plateau, Central Java, alt. 2000 m.

Measurements in $\frac{1}{10}$ mm:

	1)																										
L.	51	50	49	48	46	45	43	43	43	42	41	39	37	35	35	35	33	30	29	29	27	26	26	25	25	21	19
H.	42	42	40	39	38	37	36	36	35	34	34	32	32	30	29	29	25	24	24	24	23	21	21	20	19	17	16
Diam.	26	26	25	25	25	23	24	23	21	21	21	20	20	18	18	18	17	14	14	14	13	12	11	11	11	10	9

1) Type specimen

The type specimen is preserved in the Zoological Museum at Buitenzorg, paratypes partly in this same Museum and partly in the Zoological Museum at Amsterdam.