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Publisher: Taylor & Francis
Informa Ltd Registered in England and Wales Registered Number:
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Annals and Magazine of Natural History: Series 2

Publication details, including instructions for
authors and subscription information:

<http://www.tandfonline.com/loi/tnah08>

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Published online: 23 Dec 2009.

To cite this article: W.H. Benson Esq. (1850) XXXI.—Characters of nine new or imperfectly described species of Planorbis inhabiting India and China , Annals and Magazine of Natural History: Series 2, 5:29, 348-352, DOI: [10.1080/03745486009494926](https://doi.org/10.1080/03745486009494926)

To link to this article: <http://dx.doi.org/10.1080/03745486009494926>

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XXXI.—*Characters of nine new or imperfectly described species of Planorbis inhabiting India and China.* By W. H. BENSON, Esq.

1. *Planorbis hemisphærule*, Cantor MSS.; Benson, Ann. Nat. Hist. vol. ix.

Testa nitida, olivaceo-cornea, leviter exilissime radiato-striata, subdiaphana, supra valde convexa, spira planulata, apice vix depresso; sutura impressa; anfractibus $4\frac{1}{2}$, ultimo extus declinato, majusculo, inferne obtuse subangulato, intus laminis raris radiantibus munito, subtus excavato; umbilico mediocri profundo, margine subangulato; apertura obliqua subcordata, margine superiori arcuato, prominente, inferiori recedente.

Diam. major 6 mill., minor 5, axis vix 3 mill.

Hab. in insula Chusan Imperii Sinensis. Theo. Cantor.

In describing this shell I formerly omitted any notice of the internal laminae, which indicate an approach to the more regular structure observable in the English *Pl. lineatus* (*segmentina* of Leach), as they were not very apparent through the substance of the shell in the specimen examined, and are not visible in the aperture. This species as well as *Pl. papyraceus* of the same paper having been originally named by Dr. Cantor, will retain his name as the authority, although the asterisks denoting that circumstance have been too indiscriminately placed, as in the case of *Helix ravida*, mihi, and *Novaculina (Solen) constricta*, Lamarck.

2. *Planorbis Calathus*, nobis, n. s.

Testa nitidiuscula, albido-cornea, vel lutescente cornea, subdiaphana, exiliter radiato-striata, supra convexa, versus apicem planulata, apice concavo, sutura impressa; anfractibus 4, ultimo extus depresso, inferne angulato, intus laminis denticulisque radiatis frequentioribus munito, subtus subplanulato, versus umbilicum angustum, profundum excavato; apertura obliqua, cordato-sagittata, intus remote labiata, margine superiori arcuato, prominente, inferiori subrecto, recedente.

Diam. major $4\frac{2}{3}$, minor 4, axis 2 mill.

Hab. in lacubus Bhimtal et Neini Tal, regionis Kemaonensis Himalayanæ; neenon in stagnis nonnullis agri Rohillani, prope urbem Moradabad, Indiæ septentrionalis.

In a note to a paper on the singular genus *Camptoceras*, and on the minute Melaniadous genus *Tricula*, contained in the 'Calcutta Journal of Natural History' for 1842, I noticed the unusual structure of this species, but omitted to add a specific description. The shell belongs to the same type as the Chinese forms above described, and with the English species *Pl. lineatus*, and the Bengal *Pl. trochoïdes*, forms a fourth species of analogous but varying internal structure.

It is a very local species, but abundant in the places indicated. Besides size, it differs from the Chusan species in sculpture, in its more angular form at the periphery, and in its less excavated lower disc, and narrower umbilicus. It is somewhat singular that the only species of *Planorbis* which have been observed with internal laminæ, should inhabit such widely separated localities as westernmost Europe, the eastern part of Asia (both of them insular situations), the north-western part of India, and the mouth of the Ganges. *Planorbis umbilicalis*, nobis (Journ. As. Soc. vol. v.), an allied Bengal form, is utterly destitute of any internal teeth or laminæ, as is also the species next to be described.

3. *Planorbis cænosus*, nobis, n. s.

Testa nitida, luteo-cornea vel olivaceo-cornea, oblique et rude (præcipue subtus) radiato-striata, subdiaphana, supra depresso-convexa; spira parvula, apice excavato; sutura impressa; anfractibus $3\frac{1}{2}$, ultimo majori, extus depressiusculo, inferne carinato, subtus planato, versus umbilicum majorem leviter excavato; apertura obliqua, sagittiformi, margine superiori arcuato, prominente, inferiori recedente, recto.

Diam. maj. vix 6 mill., minor 5, axis $1\frac{1}{2}$.

Hab. in stagno prope urbem Moradabad, agris Rohillanis.

Less abundant and still more confined in locality than *Pl. Calathus*. The specimens taken by Dr. Bacon and myself were supposed to be merely a large variety of that species, but on clearing them, lately, from a thick ochreous deposit with which they were disfigured, I perceived that not only were they destitute of internal laminæ, but that the shells were more depressed and more angular at the keel, and that the relative proportions of various parts differed.

4. *Planorbis Cantori*, nobis, n. s.

Testa nitidula, cornea, subdiaphana, radiato-striata, depressa, supra convexiuscula, spira planata, apice concavo, sutura bene impressa; anfractibus $5\frac{1}{2}$, convexiusculis, lente crescentibus, ultimo antice majori, subtus convexo, periphæria subcarinata; umbilico aperto, profundiusculo; apertura obliqua subcordiformi, margine supra valde arcuato, fuscato, infra leviter rotundato.

Diam. maj. 7, minor $6\frac{1}{4}$, alt. 2 mill.

Diam. spiræ $3\frac{1}{2}$; lat. anfract. ult., antice, 3 mill.

Hab. in stagnis Bengalensibus prope castra Barrackpore. Teste Theo. Cantor.

This shell, of a subenticular form, is intermediate between the subtrochoid species and the more symmetrical smaller *Planorbis*. It comes much nearer to *Pl. convexiusculus*, Hutton, Journ. As. Soc. Calcutta, July 1849, than *P. umbilicalis*, nobis, which, from the tenor of his foot-note in page 657, Capt. Hutton has never seen. The forms of the European and American shells with

which I compared it, and the slope of the last whorl, underneath, towards the penultimate whorl, independently of other characters noted, ought to have indicated that the description was quite inapplicable to *Pl. convexiusculus*, which is wound on a regularly increasing open spiral, instead of rapidly increasing in the breadth of the last whorl. This rapidity of increase, but in a less degree, is observable in *Pl. Cantori*. *Pl. umbilicalis*, moreover, could never, by possibility, have been overlooked among examples of *Pl. compressus*, as Capt. Hutton states to have been the case with his Pinjore specimens of *Pl. convexiusculus*.

5. *Planorbis labiatus*, nobis, n. s.

Testa solidiuscula, plano-depressa, nitida, albido-cornea, subdiaphana, oblique arcuato-striata, striis remotiusculis spiralibus decussata; apice profunde concavo; sutura profunda; anfractibus $3\frac{1}{2}$, cito crescentibus, convexis, ultimo antice majori, ab axe superiorum discedenti, rotundato, carina mediana levissima submembranacea instructo, infra valde convexo; umbilico subaperto profundiori, margine interiori subangulato; apertura obliqua, cordiformi, intus albo-labiata; margine superiori arcuato, inferiori rotundato.

Diam. maj. 5, minor 4, axis vix 2 mill.

Hab. in stagno prope urbem Moradabad. Inter specimina *Pl. compressi* (Hutton) detexi.

This little shell is remarkable for the departure of the last whorl from the axis which governs the previous volutions. This is especially apparent underneath, where the earlier whorls in the umbilicus proceed regularly, the last whorl becoming suddenly excentric. The whitish rib within the lip is also a marked character, as well as the proportion of the axis to the diameter.

6. *Planorbis Sindicus*, nobis, n. s.

Testa minuta, perforata, sublenticulari, albida, lævi, subdiaphana, supra convexa; spira planulata, apice depresso; anfractibus $2\frac{1}{2}$, ultimo medio obtuse angulato, subtus convexo; apertura cordata, obliqua, margine superiori arcuato, prominente, inferiori recedente.

Diam. $2\frac{1}{2}$ mill., axis $\frac{3}{8}$ mill.

Hab. in fluvio Indo, regione Sindica superiori.

This very distinct and minute species, remarkable, after *Pl. trochoides*, nobis, for its small umbilicus, but of a less trochoid, and more lenticular form, I found adhering to the inside of a specimen of *Paludina Bengalensis* sent to me, with other shells common to the Gangetic Provinces, from the banks of the Indus above Sukkur, by my friend Major FitzGerald, Bengal Cavalry, from the expedition which accompanied Shah Shujah under Lord Keane to Cabul. No other specimen appears to have been met with.

7. *Planorbis rotula*, nobis, n. s.

Testa minuta, depresso-planata, apertissime umbilicata, luteo-cornea, diaphana, impolita, spiraliter obsolete striata; anfractibus $3\frac{1}{2}$, cylindræis, lente horizontaliter increscentibus, supra et subtus æqualiter apparentibus; ultimo ad periphæriam rotundato, nullo modo angulato; sutura supra infraque profunde impressa; umbilico minime profundo; apertura vix obliqua, rotundato-lunata; margine superiori arcuato.

Diam. maj. $2\frac{2}{3}$, minor 2, paulo plus, axis 1 mill.

Hab. in agro Rohillano, prope urbem Moradabad, raro occurrans.

This is the most agile freshwater mollusk which has ever fallen under my observation. I discovered it in 1841, on high ground westward of a house belonging to the Nuwab of Rampore at Moradabad, which became flooded during heavy rain, and which had no communication with tank, marsh, or other body of water. The shells must have lain under ground during at least nine months in the year, and I failed to find them in the same spot at the corresponding season in subsequent years. The little animal suspended itself below the surface in the shallow water, and projected itself at a rapid rate by a series of quick and sudden jerks, the disc of the shell acting below as a kind of oar. The sudden starts called to mind the manner of the oceanic *Pteropodes*. The motions of *Pl. compressus* and other allied species exhibit nothing similar. I had ample opportunities of ascertaining this point from having kept *P. compressus* for months in a glass vase in which I watched its habits. *Pl. rotula* is thus enabled to escape from the drying-up shallows, and to enjoy, for as long a period as possible, its short-lived liberty, which a slower mode of progression would much tend to abridge.

The inaccessibility of the work, in which I originally described the two following species, to the generality of readers, induces me to take advantage of the present opportunity of redescribing them more fully. Comparative remarks on the species, and other observations on the genus, will be found on reference to the journal quoted.

8. *Planorbis umbilicalis*, nobis.

Testa polita, luteo-cornea, subopaca, leviter radiato-striata, supra convexa, spira planulata; apice concavo; sutura impressa; anfractibus 4, ultimo extus depresso, majusculo, inferne obtuse angulato, infra planiusculo, majori, versus umbilicum subapertum, profundum declivi; apertura obliqua, subcordata, margine superiori arcuato, prominente, inferiori recedente.

Diam. major 7 mill., minor $5\frac{1}{2}$, axis $2\frac{1}{2}$.

Diam. spiræ 3 mill., anfr. ult. 4, supra.

Pl. umbilicalis, Benson, Journ. As. Soc. Calcutta, 1836, vol. v. p. 741-2.

Hab. in rivis Bengalæ orientalis.

9. *Planorbis trochoides*, nobis.

Testa vix perforata, diaphana, nitida, inconspicue radiato-striata, subtrochiformi, convexa; spira parvula, arete convoluta, concava; sutura profunde impressa; anfractibus $3\frac{1}{2}$, penultimo valde convexo, ultimo majori, versus suturam obtuse angulato, extus depresso, inferne acute carinato, intus laminis rarissimis plerumque munito, subtus planato, medio, versus umbilicum inconspicuum, leviter excavato, versus periphæriam vix declivi; apertura obliqua, subsagittata, margine superiori arcuato, prominente, inferiori recedente.

Diam. 3 mill., axis vix 2.

Pl. trochoides, Benson, Journ. As. Soc. vol. v. p. 742-3.

Hab. in hortis palatii proregalis apud castra Barrackpore Bengalæ. Specimina pauca detexi.

The infrequency and irregularity of the internal laminæ in this species, causing them to look more like accidental thickenings of the shell, made me overlook this structure in my original description. The species is singular from the nearly total absence of umbilicus, and from its rendering nugatory, as far as this species is concerned, the characters of the genus "anfractibus omnibus utraque conspicuis," and "apertura ab axe remotissima;" but for the reason stated in the work referred to, its removal from the genus *Planorbis* appears inexpedient, and the subsequent discovery of a species, proximate in this respect, in *Pl. Sindicus*, confirms my formerly expressed opinion.

It is desirable to observe, that in all the above descriptions I have treated the shells as practically dextral, with reference to the true position of the animal contained in them.

April 10th, 1850.

XXXII.—*Observations on the Littorinidæ.*

By WILLIAM CLARK, Esq.

To the Editors of the Annals of Natural History.

GENTLEMEN,

Norfolk Crescent, Bath, April 2, 1850.

I OFFER for the consideration of malacologists a tolerably complete memoir on the true *Littorinidæ*; that is, I have given descriptions of the types of each genus. This account was written during the summer months of the last year, 1849, after a protracted examination of many hundreds of, I may say, nearly all the varieties of *Littorina rudis*, which have long occupied a position as species, to which it will appear they are not entitled. In close connection with this subject is a very short correspondence