ON A COLLECTION OF MELANIIDS AND NERITIDS FROM THE ANDAMAN ISLANDS : (MOLLUSCA, GASTROPODA).

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INTRODUCTION.

In the course of his investigations on the shell fisheries of the Andamans during 1932-1935, Dr. H. S. Rao, Assistant Superintendent, Zoological Survey of India (at present Chief Research Officer, Central Marine Fisheries Research Station, Madras), collected some Melaniids and Neritids from various freshwater pools and streams in the North, South and Middle Andamans. The collection was handed over to me for study in 1940-41, but for various unavoidable reasons a report on this could not be published earlier.

The collection, though small, is fairly representative of the species usually found in the Andamans. A few previously known forms are, however, being recorded for the first time from this area, and a new species of *Melanoides* and a new variety of *Melanoides tigrinus* are also described.

I am thankful to Dr. H. S. Rao for giving me an opportunity to study the collection and to Dr. B. N. Chopra, Officiating Director, Zoological Survey of India, for his valuable suggestions and criticisms.

Family MELANIIDAE.

Sub-family *MELANIINAE.*

Genus **Melanoides** Olivier, 1807.

Subgenus **Stenomelania** P. Fischer, 1885.

Melanoides punctatus (Lamarck, 1822).

1822. *Melania punctata,* Lamarck, *Hist. Nat. Anim. Sans Verteb.* VI, p. 165.
1876. *Melania punctata,* Brot, *in Martini and Chemnitz's Syst. Conch.-Cab.* 1, Abth. 24, pp. 168, 169, pl. xx, fig. 4-4a.
1938. *Melania (Stenomelania) punctata* (in part), Adam and Leloup, *Mem. Mus. Roy. Hist. Nat. Belg.* II, Fasc. 19, pp. 93, 94, pl. v, fig. 9.

The figure given by Adam and Leloup in their paper cited above represents a true *punctata*, but the inclusion of other forms, such as *litigiosa, mindorensis, ornata* and *moluccensis*, in its synonymy is erroneous. Lea's *albescens* is, however, synonymous with *punctatus*.

There is a fairly large series of specimens of *M. punctatus* in the collection, varying greatly in shape, size and colouration of their shells. The young shells, which are quite subulate and have sharply acuminate spires (resembling more or less in shape those of Lea's *M. acus* figured

in Reeve's *Conch. Icon.*, pl. xiv, No. 92), are of pale yellowish colour and beautifully ornamented with a conspicuous spiral brown band round each whorl on its upper part. The uppermost whorls are found to be longitudinally ribbed. The transverse bands and the longitudinal ribs tend to disappear gradually with the maturity of the shells and in their place spiral lines develop on the surface which are not so regular. Besides these, regular transverse rows of prominent brown-dotted lines also appear on the surface. Most of the large shells are found to be covered completely or partially with white encrustations, which more or less conceal the original brown colour. The aperture in these shells is elongately-oval and the interior is bluish in colour.

Locality.—Rock-pools in the course of a stream on the East Coast of Interview Island, N. Andaman-many (26. xii. 33).

Distribution.—Nicobars, Dutch East Indies, Australia, Philippines (Guimaras, Negros, Siquijor, Cagayan, Misamis, Mindanao), Caroline Is. and New Caledonia. The species is recorded for the first time from Andamans.

Melanoides zelebori (Brot, 1872),

var. **solidiuscula** (Nevill, 1884).

1884. *Melania zelebori* var. *solidiuscula*, Nevill, *Hand List Moll. Ind. Mus.* II, p. 230.
1915. *Tiara (Radina) zelebori* var. *solidiuscula*, Preston, *Faun. Brit. Ind. Moll. Freshw. Gastr. & Pelec.*, p. 14.

One young specimen, having a slightly decollate shell of light brownish-olive colour, represents this interesting variety in the collection. Out of the eight whorls, the first two only appear to be strongly longitudinally ribbed, while the rest bear faint ribs only. The spiral striations on the surface are obsolete, excepting a few at the base of the last whorl only.

Locality.—A stream near bridge, Beadonabad, Port Blair, S. Andaman (25. xii. 35).

Distribution.—It is not known to occur anywhere beyond Andamans.

Subgenus **Melanoides** S.S.

Melanoides tuberculatus (Müller, 1774).

1774. *Nerita tuberculata*, Müller, *Verm. Terr. and Fluv. Hist.* II, p. 101.
1941. *Thiara (Melanoides) tuberculata*, Benthem Jutting, *Archives Neerland. de Zool.* V, pp. 267, 268, 327, 329.
1943. *Melanoides (Melanoides) tuberculatus*, Ray, *Journ. Roy. As. Soc. Bengal, Science*, IX, p. 71.

There is only one specimen in the collection which represents this extremely plastic and common species. The shell is young, pale yellowish-green, and is characteristically ornamented with regular spiral and longitudinal ridges intersecting each other and giving rise to small tubercles. The longitudinal reddish markings on the surface are also quite

conspicuous, though not very regular. Connolly[1] has given the full synonymy of this species.

Locality.—In stream connecting with the sluice near Chauldari, S. Andaman-1(5.xii. 34).

Distribution.—This is the most widely distributed species of the genus, having its range extending into Southern and Eastern shores of the Mediterranean Sea, Africa, Asia Minor, Palestine, Arabia, Syria, Persia, Aden, Mesopotamia, India, Ceylon, Burma, Annam, Siam, Indo-china, Andamans, Nicobars, East Indies to Australia and China, Formosa, Hainan and Viti.

Melanoides nevilli (Brot, 1877)

var. **andamanica** (Nevill, 1884),

1884. *Melania* (*Striatella*) *nevilli* var. *andamanica*, Nevill, *Hand List. Moll. Ind. Mus.* II, p. 236.
1915. *Tiara* (*Striatella*) *nevilli* var. *andamanica*, Preston, *Faun. Brit. Ind. Moll. Freshw. Gastr. and Pelec.*, p. 18.

Nevill in describing this variety writes, " Possibly a distinct species, though at present, I believe, it is correctly classed as a local variety of M. nevilli." It is well-represented in the collection by quite a large number of individuals, of which only seven are large with partly broken and decollate shells which have already turned black, while the rest are quite young and have pale yellowish-olive shells. In both, the spiral striations appear to be broad and regular, while the longitudinal ribs are not at all so prominent.

Locality.—A pool in the course of a stream, S. of Golf Course, Port Blair, S. Andaman-7(14.iii.34) ; a stream with a muddy bottom, Bee-hive Hill, near Long Island, M. Andaman-5 (24.iii.34) ; stream, north of Shadipore, Port Blair, S. Andaman-many (11.xi.35).

Distribution.—Confined to Andamans only.

Melanoides nicobaricus (Reeve, 1859).

1859. *Melania nicobarica*, Reeve, *Conch. Icon.* XII, pl. x, fig. 54.
1872. *Melania* (*Melanoides*) *nicobarica*, Mörch, *Journ. de Conchyliol.* XX, p. 321.
1877. *Melania nicobarica*, Brot, *in Martini and Chemnitz's Syst. Conch. Cab.* I, Abth. 24, pp. 235, 236, pl. xxv, fig. 11.
1915. *Tiara* (*Striatella*) *nicobarica*, Preston, *Faun. Brit. Ind. Moll. Freshw. Gastr. and Pelec.*, p. 19.

Hinds's *M. plutonis*[2] from the Fiji islands is considered by some authors as synonymous with *nicobaricus*. But after carefully examining the shells of both the species in the collections of the Zoological Survey of India I find that they are quite distinct.

Of the six specimens of *M. nicobaricus* in the collection, four have partly broken shells with acuminate spires, while the rest have perfect but decollate shells. The colouration of the shell is olivaceous green,

[1] Connolly, S. *Ann. S. Afric. Mus.* XXXIII, pp. 566, 567 (1939).
[2] Hinds, R.B. *Ann. and Mag. Nat. Hist.* (1) XIV, p. 8 (1844).

but appears in most cases to be concealed by a black or rust-stained layer. The spiral striations are present throughout the upper whorls, but faintly visible in the lower ones at the base.

Locality.—Edge of Dhanikhari stream near Manglutan, 'Maymyyo turning of the Road, S. Andaman-2 (11. xii. 32); stream, north of Cocoanut plantation, Long Island, M. Andaman-4(27.iii.34).

Distribution.—Originally known from Nicobars and subsequently from the Andaman Islands.

Melanoides rivularis (Philippi, 1847).

1847. *Melania rivularis*, Philippi, *Abbild. und Beschreib. Conchyl.* II, p. 21, pl. iv, fig. 6.
1884. *Melania (Striatella) rivularis*, Nevill, *Hand List. Moll. Ind. Mus.* II, p. 247.
1915. *Tiara (Striatella) rivularis*, Preston, *Faun. Brit. Ind. Moll. Freshw. Gastr. and Pelec.*, p. 20.

Philippi's *M. rivularis* which Nevill considers as " perhaps scarcely separable from subspecies *fontinalis* " is undoubtedly a distinct species, though Brot erroneously combines it with *M. tuberculatus* as a variety.

I assign to this species a series of specimens of varying shape and size. The shells are mostly decollate, olive-green, but appear to be rusted in most cases. The spiral striations on the whorls are quite conspicuous and regular.

Locality.—Stream, S.W of Golf Course, Aberdeen, Port Blair, S. Andaman—many (11.ii.34); weedy road-side pools between Port Bonington and Base Camp, N. Andaman-9 (24.ii.34).

Distribution.—First described from Java and later on from Andamans.

Melanoides fontinalis (Philippi, 1851).

1851. *Melania fontinalis*, Philippi, *Abbild. und Beschreib. Conchyl.* III, pp. 57, 58, pl. v, fig. 7.
1859. *Melania fontinalis*, Reeve, *Conch. Icon.* XII, pl. xvii, fig. 119.
1884. *Melania (Striatella) fontinalis*, Nevill, *Hand List. Moll. Ind. Mus.* II, p. 246.

That Philippi's *fontinalis* is distinct from his Javanese species *rivularis* is already stated above.

There is a series of young specimens only in the collection. The shell is slightly decollate, pale yellowish-olive and encircled with irregular spiral ribs which do not appear to be very prominent. In the smaller shells I find irregular longitudinal reddish-brown flames on the surface.

Locality.—In sandy pools at the edge of the stream from the Cholunga Range, Jirkatang, Andaman-2 (5.xii.32); in a small muddy stream near Golpatrar, Beehive Hill, near Long Island, N. Andaman-28 (24.iii. 34).

Distribution.—Originally known from " Pulo Pinang ", but according to Nevill " Penang " Specimens are known in the collections of the Zoological Survey of India from Pazundaung (Rangoon) and Java. Andaman appears to be a new record.

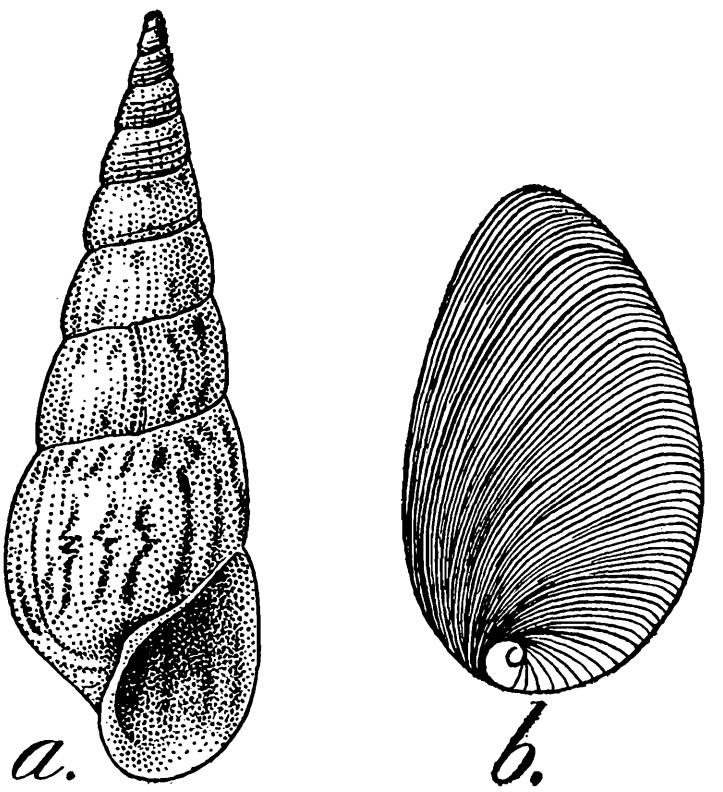
Melanoides tigrinus (Hutton, 1849).

var. **raoi,** nov.

There are altogether twenty-six specimens in the collection (including dry and spirit), of which sixteen have badly broken shells covered over with white encrustations on the surface, while the rest have perfect but slightly decollate shells with 10 whorls in each, excepting one which has 12. The similarity between these shells and the type-specimens of Hutton's *Melania tigrina* is so very close that they appear quite indistinguishable from a cursory view. But after critically comparing and examining the shells before me I find certain very interesting features on the basis of which the specimens are described as a distinct variety of *tigrina*. I propose for it the name *raoi* in honour of Dr. H. S. Rao, who collected the material.

The main points in which this new variety differs from the *forma typica* are :—The colouration of the shell is pale yellowish-olive ; the red flame-shaped longitudinal streaks on the surface appear to be slightly pale, narrow and less clumsy ; the margins of the whorls appear slightly flattened ; the longitudinal ribs and tubercles are entirely absent on the upper whorls, but, instead of these, incised spiral lines appear above the sutures.

The shape and structure of the operculum also agrees with that of the *forma typica* figured by Annandale[1], the only difference being that the actual spirals are slightly more rounded and situated nearer to the inner anterior margin.



TEXT FIG. 1. *a*. Shell of *Melanoides* (*Melanoides*) *tigrinus* (Hutton) var. *raoi*, nov. × 3; *b*. Operculum of the same. × 7.

1. Annandale, N. *Rec. Ind. Mus.* XVIII, p. 29, fig. 3d (1919).

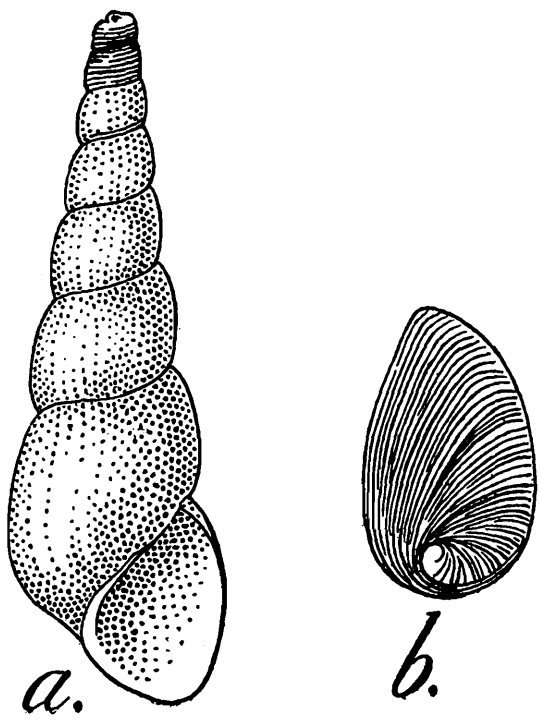
Locality.—Stream, S.W of Golf Course, Aberdeen, Port Blair, S. Andaman--1(11.ii.34); stream, north of Cocoanut Plantation, Long Island, M. Andaman-17 (27.iii.34); stream near bridge, Beadonabad, Port Blair, S. Andaman—2 (25.xii.34).

Type-specimens.—M15939-2. Zool. Surv. Ind. collected from a pool in the course of a stream, S. of Golf Course, Port Blair, S. Andaman—7(14.iii.34).

Melanoides prashadi, sp. nov.

There is a series of specimens, numbering twenty-four, in the collection which were collected along with the shells of *M. rivularis* in a stream, S.W of Golf Course, Aberdeen, Port Blair, S. Andaman, on 11.ii.34. On a critical examination they do not appear to match with any of the existing species of the genus and I, therefore, describe them as new.

Shell subulately-turreted, thick, dextral, smooth, pure olive-green, shining but slightly rusted here and there; spire acuminate with the apex slightly eroded; whorls 7 or 8 in decollate shells, probably ten in a complete shell, convex, regularly increasing in size, last whorl tumid, obliquely angular below, uppermost whorls regularly concentrically striated; the striations disappearing completely on the lower whorls; suture obliquely transverse, much exserted; regular longitudinal lines of growth also present throughout; aperture small, triangularly-ovate, columella white, thick, callously reflected, the outer lip slightly expanded, but produced below in the form of an obtuse angle before its union with the inner lip, the interior of the aperture whitish.



TEXT FIG. 2. *a.* Shell of *Melanoides* (*Melanoides*) *prashadi*, sp. nov. × 3; *b.* Operculum of the same. × 7.

There is only one operculum found in the collection, but it is difficult to say to which specimen it actually belongs. The shape and structure of the operculum is more or less like that of *M. tuberculatus*, the only difference being that the nucleus with its actual spirals appears to be situated slightly more below the inner anterior margin.

Type-specimens.—M. 15940/2. Zool. Surv. Ind.

Remarks.—The shell of *Melanoides prashadi* somewhat approaches that of the new variety *raoi* in having the uppermost whorls only adorned with spiral striae. In the shape of its aperture, the new species more or less resembles *M. torquata* v.d. Busch (1842) from Java, which Reeve (1859) and Preston (1915) include in the synonymy of *M. terebra* (Benson).

Subgenus **Tarebia** H. and A. Adams, 1859.

Melanoides semigranosus (v.d. Busch, 1842).

1842. *Melania semigranosa*, v.d. Busch, *in Philippi's Abbild. Beschreib. Conchyl.* 1, p. 2, pl. i, fig. 13a-b.

1860. *Melania semigranosa*, Reeve, *Conch. Icon.* XII, pl. xxiv, fig. 167a-b.

1914. *Melania (Tarebia) lineata* var. *semigranosa*, Leschke, *Jahrb. d. Hamb. Wissensch. Anstal.* XXXI(2), p. 19.

1921. *Melania (Tarebia) semigranosa*, Prashad, *Rec. Ind. Mus.* XXII, p. 493.

1938. *Melania (Tarebia) granifera lineata*, Adam and Leloup, *Mem. Mus. Roy. Hist. Nat. Belg.* II, Fasc. 19, pp. 90, 91.

Prashad in supporting Dautzenberg's conclusion[1] that Busch's *semigranosa* should be treated as a distinct species rather than a variety of *lineata* remarks, " The specific characters as defined by Mousson are, as was also found by Dautzenberg, quite constant in a large series of specimens" This view appears to me (after carefully examining a fairly large series of specimens in the collection) more reasonable than the contrary view of Brot, Nevill, Preston, Rensch and Adam and Leloup. I believe that Dautzenberg's species *lineata*, figured in pl. ii, nos. 8, 8a-b,is not the true *lineata* of Gray (1828), but the young shells of *semigranosus*.

Locality.—In stagnant pools in the course of a stream near Rangat Camp, M. Andaman-many (25.iii.34) ; in weedy pools with a muddy bottom in the course of a stream near Rangat Camp, M. Andaman—Many (25.iii·34) ; Dhanikhari stream near Manglutan, Maymyyo turning of the Road, S. Andaman-1 (11.xii.34) ; a stream near junction of Maymyyo, Manglutan Road, S. Andaman—3 ; a stream close to Rangat Camp, M. Andaman—3 (19.i.35).

Distribution.—Originally described from Java, but subsequently from Banka, Bali, Sumatra, Borneo, Celebes, Cambodia, India and Burma.

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[1]. Dautzenberg, Ph. *Ann. Soc. Roy. Malacol. Belg.* XXXIV, p. 14, pl. ii, figs. 9, 9a-c (1899).

Subgenus **Plotia** Röding, 1798.

Melanoides scabra (Müller, 1774).

1774. *Buccinum scabrum*, Müller, *Verm. Terr. and Fluv. Hist.* II, p. 136.
1934. *Melania (Plotia) scabra*, Rensch, *Archiv f. Hydrobiol. Suppl.* XIII, p. 234.
1937. *Melania (Plotia) scabra*, Viader, *Maur. Inst. Bull.* 1(2), p. 37.
1941. *Thiara (Plotia) scabra*, Benthem Jutting, *Archives Neerland. de Zool.* V, pp. 280, 325, 328.
1943. *Melanoides (Plotia) scabra*, Ray, *Journ. Roy. As. Soc. Bengal. Science*, IX, p. 73.

The taxonomic position of *M. scabra* appears to be rather uncertain owing to lack of anatomical details. Lamarck's *spinulosa* is, no doubt, a synonym of *scabra*, but Lea's *acanthica*, which Adam and Leloup erroneously combine with it, is entirely distinct.

There are about forty shells of this variable and wide-spread species in the collection which agree with the description of the species. Most of them have turned black.

Locality.—On the underside of rotting leaves in weedy pools with muddy bottom in the course of a stream near Rangat Camp, M. Andaman (25.xii.34).

Distribution.—First recorded from Tranquebar, Madras. Rensch has enumerated the localities of its occurrence, but has omitted Ceylon and Burma. The species is evidently distributed from Mauritius to the Philippines.

Melanoides acanthicus (I. and H. Lea, 1850)

var. **roepstorffiana** (Nevill, 1884).

1884. *Melania acanthica* var. *roepstorffiana*, Nevill, *Hand List. Moll. Ind. Mus.* II, p. 281.
1915. *Tiara (Plotia) acanthica* var. *roepstorffiana*, Preston, *Faun. Brit. Ind. Moll. Freshw. Gastr. and Pelec.*, p. 37.

While indicating the relationship of this interesting variety Nevill remarks, " Very near to Brot's pl. 28, fig. 10A (Philippines)"

In the collection before me there is a large series of specimens which appear to be quite typical of this variety.

Locality.—Dhanikhari stream near Manglutan, Maymyyo turning of the Road, S. Andaman—5 (11.ii.34) ; a small muddy stream, Beehive Hill, near Long Island, M. Andaman-many (24.iii.34) ; in stream, north of Cocoanut Plantation, Long Island, M. Andaman-many (27.iii.34).

Distribution.—Originally recorded from Andamans, but has since been known from the Philippines. I have also examined a few specimens of this variety received as presentations from Mr. R. V Se haiya, Annamalai University, who collected them from Annamalainagar, Madras, S. India.

Family Neritidae.

Subfamily *Neritinae.*

Genus **Neritina** Lamarck, 1816.

Subgenus **Neritina** S. S.

Section **Neritina** S. S.

Neritina pulligera (Linnaeus, 1767).

1767. *Nerita pulligera*, Linné, *Syst. Nat.* ed. XII, p. 1253, No. 726.
1888. *Neritina (Clypeolum) pulligera* and var. *canalis*, Tryon, *Man. Conch* X, pp. 56, 57, pl. xviii, figs. 6-12 ; pl. xix, figs. 14-19, 22, 24.
1908. *Neritina (Hemisphaericae) canalis* and *N.(H.) pulligera*, Horst and Schepman, *Cat. Moll. Mus. H. N. Pays-Bas*, p. 416.
1923. *Neritina (Neritina) pulligera*, Baker, *Proc. Acad. Nat. Sci. Philadelphia*, LXXV, pp. 117, 137, 149, pl. xii, fig. 17 (radular teeth).
1941. *Neritina (Neritina) pulligera*, Benthem Jutting, *Archives Neerland. de Zool.* V, pp. 270, 324, 328, 329.

I assign to this species sixteen specimens differing greatly amongst themselves in size. The shells are dark brown in colour and striated throughout. The apex is more or less eroded in all cases. The columellar area is wide, polished and greyish black, and the deep orange band running parallel to the outer lip as well as the orange colour inside the aperture are only faintly visible in some cases. Baker has studied the radular teeth of the species, indicating its affinity with *N. punctulata.*

Locality.—Near Binchgunj, Port Blair, S. Andaman-1 ; Dhanikhari stream near Manglutan, Maymyyo turning of the Road, S. Andaman-3 (11. xii. 34) ; Dhanikhari stream near junction of Maymyyo, Manglutan Road, S. Andaman-1(21. ii .35) ; a stream, north of Shadipore, Port Blair, S. Andaman-11(11. xi. 35).

Distribution.—The range of this common Indo-Malayan form extends through East Indies to Australia and thence to the Philippines and Polynesia.

Subgenus **Vittina** Baker, 1923.

Section **Vittoida** Baker, 1923.

Neritina variegata Lesson, 1830.

1830. *Neritina variegata*, Lesson, *in Duperey's Voy. de la Cog. Zool* II, p. 378.
1923. *Neritina (Vittoida) variegata*, Baker, *Proc. Acad. Nat. Sci Philadelphia*, LXXV, pp. 117, 137, 146, 147, pl. xi, fig. 14 (radular teeth).
1937. *Vittina variegata*, Reich, *Arch. Naturgesch. N.F.* VI, p. 77.
1938. *Neritina variegata*, Adam and Leloup, *Mem. Mus. Roy. Hist. Nat. Belg.* II, Fasc. 19, pp. 66, 67.

I have got the remnants of two shells (the last whorls only) in the collection, the upper portions being entirely lost possibly by erosion. The colouration of the shell is dark brown and there are rude striations

on the surface. The columellar callus is characteristically marked above with orange red. Baker and Adam and Leloup have described and figured the radular teeth of this species.

Locality.—A stream, north of Shadipore, Port Blair, S. Andaman—2(11. vi .35).

Distribution.—The range of *N variegata* extends from Andamans and Nicobars through East Indies to Polynesia.

Genus **Theodoxus** Montfort, 1810.

Subgenus **Clithon** Montfort, 1810.

Theodoxus bicolor (Recluz, 842).

1842. *Nerita bicolor*, Recluz, *Proc. Zool. Soc. London*, p. 172.
1843. *Nerita subpunctata*, Recluz, *ibid*, p. 199.
1879. *Neritina subpunctata* and *N. bicolor*, von Martens, in Martini *and Chemnitz's Syst. Conch.—Cab.* II, *Abth.* 10, pp. 179-181, pl. xviii, figs. 18-24.
1888. *Neritina (Clithon) bicolor*, Tryon, *Man. Conch.* X, p. 69, pl. xxv, figs. 67-69, pl. xxvi, fig. 75.
1938. *Neritina bicolor*, Adam and Leloup, *Mém. Mus. Roy. Hist. Nat. Belg.* II, Fasc. 19, p. 63, pl. xiv, fig. 15.

The great variability of the shell characters of Recluz's *Nerita bicolor* often renders the identification of the species difficult and hence the confusion prevailing over its nomenclature. Adam and Leloup have rightly followed Tryon in combining Recluz's *subpuncta a*, Musson's *punctifera* and Souleyet's *rugata* with *bicolor*, but they see to ave failed in ascertaining its true generic position.

There is only one young specimen in the collection which belongs to this species. It has a subglobose shell of pale greenish-yellow colour, with the apex slightl eroded. The surface is rudely flexuously striated throughout, but the striae are mostly covered with a black layer (more towards the apex which conceals the true colouration. The columellar area is bluish-white.

Locality.—A stream close to the Rangat Camp, M. Andaman-l (19. i.35).

Distribution.—Tryon summarizes the range of this greatly variable species as "East Indies to Philippines" Its occurrence in Andamans somewhat extends the distribution westwards.