Rec. zool. Surv. India, 77 : 215-245, 1980

ON FRESHWATER MOLLUSCS OF ANDAMAN AND NICOBAR ISLANDS

By

N. V SUBBA RAO, A. K. DAS* AND S. C. MITRA

Zoological Survey of India, Calcutta

(With 4 Plates)

INTRODUCTION

Andaman and Nicobar Islands had been frequently explored in the past for marine fauna. There is very little information on the freshwater fauna, specially molluscs. Mörch (1872) in his Catalogue mentioned about 15 species of freshwater molluscs belonging to families Thiariidae, Neritidae and Cyrenidae (=Corbiculidae). Preston (1908, 1915) described five new species and his account included 34 species (including varieties) reported from these Islands.

Knowledge of freshwater molluscs is all the more essential as they serve as intermediate hosts for many helminth parasites. It has become more pertinent as wealth of livestock in the Islands is being improved.

Keys are provided to genera and species, as an aid to identification. Freshwater molluscs are variable in their shell characters and identifications based on shell morphology alone cannot be completely relied upon. Measurement (in mm.) are given for the largest, medium and smallest specimen of each species.

Freshwater habitats are scarce in the Islands. Stagnant freshwater pools are found in certain Islands of Andaman group and in Great Nicobar. There are perennial streams and rivers in Middle Andaman and Great Nicobar Islands. In general there are more streams than stagnant water ponds. As a result, the stream inhabiting freshwater forms belonging to Thairiidae and Neritidae are of common occurrence.

2. *List of Species*

Class GASTROPODA

Order ARCHEOGASTROPODA

Family NERITIDAE

1. *Neritina (Neritina) pulligera* (Linnaeus)

* Zoological Survey of India, Andaman and Nicobar Regional Station, Port Blair.

2. *N. (Vittina) variegata* Lesson
3. *N. (Vittina) turrita* (Gmelin)
4. *N. (Neripteron) auriculata* Lamarck
5. *Clithon corona* (Linnaeus)
6. *C. bicolor* (Recluz)
7. *Neritodryas subsulcata* (Sowerby)
8. *N. cornea* (Linnaeus)
9. *Septaria lineata* (Lamarck)
10. *Septaria porcellana* (Linnaeus)

Order MESOGASTROPODA

Family PILIDAE

**11. *Pila scutata* (Mousson) subsp. *compacta* (Reeve)

Family VIVIPARIDAE

**12. *Bellamya bengalensis* f. *typica* (Lamarck)

Family HYDROBIIDAE

**13. *Digoniostoma pulchella* (Benson)
14. *Stenothyra hungerfordiana* Nevill

Family THIARIIDAE (Melaniidae)

15. *Brotia fuscata* Born
*16. *Faunus ater* (Linnaeus)
*17. *Thiara cybele amara* (Mörch)
*18. *T (Radina) hastula subacutissima* Nevill
*19. *T. (R.) zeleborii* (Brot)
T (R.) zeleborri nana Nevill
T (R.) zeleborri solidiuscula Nevill
20. *T scabra* (Müller)
21. *T amarula* (Linnaeus)
*22. *Melanoides tuberculatus* (Müller)
23. *M. charon* (Preston)
24. *M. expatriata* (Preston)

25. *M. multistriata* (Preston)
•26. *M. sublutosa* (Nevill)
•27. *M. turricula* (Lea)
28. *M. nevilli* (Brot)
29. *M. nevilli andamanica* (Reeve)
30. *M. nicobarica* (Reeve)
31. *M. punctata* (Lamarck)
32. *M. granifera pergranosa* Nevill
33. *M. torulosa* (Bruguiere)
34. *M. crebra* (Lea)
•35. *M. rivularis* (Philippi)
36. *M. fontinalis* (Philippi)
37. *M. tigrina raoi* Ray
•38. *M. prashadi* Ray
39. *M. semigranosus* (v.d. Busch)

Order BASOMMATOPHORA

Family LYMNAEIDAE

••40. *Lymnaea ovalis* Gray
••41. *L. acuminata* f. *rufescens* Gray
••42. *L. luteola* f. *typica* (Lamarck)

Family PLANORBIDAE

••43. *Indoplanorbis exustus* (Deshayes)
••44. *Gyraulus convexiusculus* (Hutton)
••45. *Segmentina taia* Annandale & Rao

Class BIVALVIA

Order EULAMELLIBRANCHIATA

Family UNIONIDAE

•46. *Pseudodon (Pseudodon) nicobaricus* (Mörch)

• denotes species not studied by us.
••denotes species recorded for the first time.

Family CORBICULIDAE

47. *Geloina galatheae* (Mörch)

48. *G. siamica* Prime

49. *Batissa inflata* Prime

50. *B. similis* Prime

Family SOLENIDAE

51. *Novaculina andamanensis* Preston

Key to the families

1.	Shell operculate	2
—	Shell non-operculate	6
2.	Shell small to moderate size, thick, solid, subglobular or subpatelliform, variously sculptured or with spiny outgrowth, aperture 'D' shaped	Neritidae
—	Shell small to large, globosely conical fusiform or turretted, aperture ovate, surface usually with bands or smooth or with tubercles or spines	3
3.	Shell large globosely inflated, aperture large, operculum usually calcified and concentric ...	Pilidae
—	Shell small to medium size, conical, fusiform or turretted, aperture ovate, operculum multispiral, surface smooth, with or without bands or with nodules or spines	4
4.	Shell of moderate size, smooth, with or without bands, narrowly perforate or imperforate, aperture orbicular, found in stagnant waters	Viviparidae
—	Shell small, fusiform or elongately turretted, operculum horny usually spirally whorled, very narrowly perforate or imperforate ...	5
5.	Shell small, corneous, fusiform with small oval aperture, operculum horny, spirally-whorled, sometimes with thickened peristome, usually occur in stagnant waters, sometimes in estuarine waters also ...	Hydrobiidae
—	Shell elohgately turretted, usually many whorled often with varied sculptures - spines or tubercles, sometimes rather smooth with roundish appearence, aperture ovate, usually angular below ; usually found in streams ...	Thiariidae

6.	Shell thin, smooth, polished and ovate, spire elevated and pointed, body whorl large, columella twisted	Lymnaeidae
—	Shell discoidally flattened, quite often disc-shaped, spire very rarely raised	Planorbidae
	Pelecypoda	
	Shell thick and massive, trigonal or roundly ovate, with coarse spiral striations, umbones often eroded	Corbiculidae
—	Shell transversely elongate, more or less gaping at both ends, umbones not prominent, external ligament on an elongate ridge ...	Solenidae

SYSTEMATIC ACCOUNT

Class GASTROPODA

Order ARCHAEOGASTROPODA

Family NERITIDAE

The family Neritidae was dealt in detail by Subba Rao (1975). He reported 4 genera and 9 species from the streams in these Islands.

Key to the genera

1.	Shell symmetrical cap-like, without whorls, small apex, very wide aperture ; operculum squarish, not closing the aperture and without apophyses	*Septaria*
—	Shell asymmetrical, with one or more spiral whorls, aperture comparatively small, operculum semicircular with two apophyses at the posterior end, closing the aperture completely	2
2.	Shell small, pea-shaped, surface more or less coarsely striated with growth lines, some with spines, radula with anteriorly expanded central, supported by an extra lamella from the centre of the base	*Clithon*
—	Shell generally large, generally smooth and shining or with very fine striae but never with spines	3
3.	Operculum with longitudinally grooved rib, ridges ending in fiinger-like projections at the free end ; inner marginal teeth of radula with a few denticles (2-4)	*Neritodryas*
—	Rib of operculum not grooved ; inner marginal teeth of radula with several denticles along the cutting edge	*Neritina*

Genus **Neritina** Lamarck, 1816

Neritina Lamarck, 1816, *Encycl. Method. Vers.*, **2**, pl. 155

Type species : by subsequent designation *Nerita pulligera* Linnaeus, Children, 1823.

The genus has a very wide distribution occuring in the streams in Asia, Africa, America and Australia. The genus is reported by about 70 species in all, but 4 species are so far recorded from these Islands.

Subgenus **Neritina** *S.St.*

Neritina (Neritina) pulligera Linnaeus

(Pl. I fig. 1)

Nerita pulligera Linnaeus 1767, *Syst. Nat.* ed. 12, p. 1253, no. 726. Type-locality : "Rivers of India".

Neritina pulligera Linnaeus : van Benthem Jutting 1956 *Treubia*, **23** (3) : 307, fig. 24.

Material examined.—102 ex. from Cholung range : Jikra-Dhani Kari stream near Manglutan : Rangat river : streams near Baratang ; Port Blair — Andamans. Streams near Champion village, Nan Cowry Island and Ramjao village, Kamorta Islands in Nicobars.

Distribution.—Common in Andaman and Nicobar Islands. On the mainland India it was reported from Coleroon river, South India (Subba Rao, 1975). Elsewhere : Thailand, Indonesia, North western Australia, Celebes, New Guinea, New Caledonia, Fiji Island, Philippines and Japan.

Remarks.—The collection exhibits uniformity in the shape of the shell and colouration. The shell is orbicularly ovate with an expanded aperture. Columellar callus is bluish black on the outer half, gradually fading to the inner half. A deep orange band runs on the inner margin of outer lip.

Egg capsules were seen over the surface of shells from January to May.

Measurements (in mm.).—

	Length	Width	Height of the aperture
Smallest (Ramjao)	9.05	7.20	5.00
Medium (Port Blair)	29.25	20.55	14.40
Largest (Kachal)	41.60	31.20	25.60

Subgenus **Vittina** Baker, 1923

Neritena (Vittina) variegata Lesson, 1831

(Pl. I fig. 2)

Neritina variegata Lesson 1831, *Voy Coquille Zool.* **2** : 378. Type-locality : New Ireland.

Neritina variegata Lesson : van Benthem Jutting 1956, *Treubia*, **23** (2) : 305, fig. 29.

Material examined.—250 ex. Andaman and Nicobar Islands.

Distribution.—It is not known to occur on the mainland India. It was reported earlier from Nicobar Islands but it is a first record from Andaman Islands. Elsewhere : Indonesia ; Australia, Queensland to North western Australia ; New-Calenodia, New Guinea, New Ireland Samoa, Fiji, Tahiti and Philippines.

Remarks.—The animals were found adhering to stones and other solid substrata in running freshwater streams, showing preference for strong current.

The species exhitits much polymorphism. All kinds of shells banded, spotted or reticulated are represented in the collection. The orange spot on the columellar callus is absent in some specimens. In some the apices were eroded.

Measurements.—

	Length	Width	Height of the aperture
Smallest (Wright myo)	3.90	3.05	1.90
Medium (Baratang)	18.65	13.60	10.00
Largest (Jirkatang)	27.90	21.05	19.20

Neritina (Vittina) turrita (Gmelin, 1791)

(Pl. I figs. 3 & 4)

Nerita turrita Gmelin, 1791, *Syst. Nat.*, ed **13** : 3686, no. 71. Type-locality : Islands of Antilles.

Neritina turrita Lamarck ; van Benthem Jutting, 1956, *Treubia* **23** (2) 302, fig. 23.

Material examined.—3 ex. Kamorta Island and Passa bridge, Car Nicobar.

Distribution.—The species was reported for the first time from Nicobar Islands (Subba Rao, 1975). Elsewhere : Indonesia, Moluccas, New Guinea, Marianas, Carolines and Philippines.

Remarks.—The habitat of the species in Kamorta is not known but in Car Nicobar, it was collected from back waters.

It is variable in colour pattern. Basing on this von Martens (1879) distinguished three varieties viz : *Neritina strigilata* Lamarck, *Neritina seciconica* Lamarck and *Neritina cumingiana* Recluz. The present material includes the variety *strigilata* characterised by black, oblique spiral stripes and *semiconica* distinguished by three transverse bands of black spots.

Measurements.—

	Length	Width	Height of the aperture
Smallest (Passa bridge)	11.80	7.85	5.80
Medium (Kamorta)	23.25	15.00	11.35
Large (Kamorta)	31.60	20.25	16.55

Subgenus **Neripteron**

Neritina (Neripteron) auriculata Lamarck, 1816

Neritina auriculata Lamarck, 1817 *Encycl. Meth. Explic. Planches, pl.* 455, fig. 6. Type-locality : New Holland.

Neritina auriculata Lamarck : van Benthem Jutting, 1956, *Treubia,* **23** (2): 297, fig. 22.

Material examined.—1 ex. stream near Forest Department Camp office, East coast of Smith Islands, North Andamans ; 1 ex. ; Daring Village, Camorta Islands ; 2 ex. Stream near Passa village, Car Nicobar.

Distribution.—Subba Rao (1975) reported it for the first time from Porto Novo, Andaman and Nicobar Islands. Elsewhere : Madagascar, Sri Lanka, Indonesia, Moluccas, New Ireland, Australia ; New Caledonia, Philippines.

Remarks.—The shell is semiglobular with wide aperture and a well-developed columellar callus. Peristome is broad and produced into two "auricles" or "wings" at the upper and lower columellar sides.

The species is known for its variation in the development of "auricles". But the two specimens in our collections show moderate growth of auricles.

Measurements.—

	Length	Width	Height of the aperture
Medium	11.05	7.95	6.40
Smallest	4.85	4.20	3.35

Genus **Neritodryas** von Martens, 1869

Niritodryas von Martens, 1869, *Sitzungsberichtser Gasellschaft naturforschender Freunda in Berlin*, p. 21 Type species : *Nerita cornea* Linnaeus.

Members of this genus generally occur by the sides of streams. It occurs in tropical freshwater streams of Asia.

It is represented by four species in all, of which two species namely, *N. cornea* and *N. subsulcata* are reported from the Islands. Recent collections by the senior author include only the latter species. The former is represented by two specimens in the old collections.

Neritodryas subsulcata (Sowerby, 1836)

(Pl. I fig. 6)

Neritina subsulcata Sowerby, 1836, *Conch. Illustr.*, no. 50, figs. 50. Type-locality : Philippine Islands.

Neritodryas subsulcata Sowerby, van Benthem Jutting, 1956, *Treubia*, 23 (2) : 294, fig. 18.

Material examined.—24 ex., Stream near Ramjao village, Kamorta ; Creeks in Kachal ; Stream near Chiriatapu, South Andamans.

Distribution.— Andaman and Nicobar Islands. Elsewhere : Indonesia ; Moluccas ; New Hebrides ; Fiji and the Philippines.

Remarks.—The species is characterised by a semiglobular shell with conspicuous and raised broad spiral ribs, crossed by fine longitudinal striations. Aperture is bluish-white with diffused black penetrating from the outer margin of columellar callus.

It was found feeding on the algae on damp stones by the side of freshwater streams.

Measurements.—

	Length	Width	Height of the aperture
Smallest	13.00	9.00	8.05
Medium	30.00	21.25	27.05
Largest	39.50	30.00	24.50

Neritodryas cornea (Linnaeus)

Nerita cornea Linnaeus, 1758, *Syst. Nat.* ed. 10 : 777

Neritodryas cornea Linnaeus ; Benthem Jutting 1956, *Treubia*, 23 (2) : 291 figs. 2, 16.

Material examined.— 2 specimens from "Kachal" in the old collections of National Zoological Collections.

Distributions.—From Nicobar Islands to New Caledonia including the Malay Archipelago, the Philippines and Fiji.

Remarks.—It can be distinguished from the above species by its superficial spiral grooves and black spiral bands. Columellar callus is either white or yellow.

According to van Benthem Jutting (1956) it is a brackish water species and occurs in mangrove regions. As such it may not be a primary freshwater species.

Genus **Clithon** Montfort, 1810

Clithon Montfrot, 1810, *Conch. Syst.*, **2** : 326 Type species : *Nerita corona* Linnaeus.

Clithon corona (Linnaeus, 1758)

(Pl. I fig. 8)

Nerita cornona Linnaeus, 1758, *Syst. Nat.* ed. 10 : 777. Type-locality : Rivers of Asia.

Clithon corona (Linnaeus) van Benthem Jutting, 1956 *Treubia*, **23** (2) : 225.

Material examined.— 405 ex. All from Andaman Islands.

Distribution — Andaman and Nicobar Islands to Melanesia and north to the Philippines.

This is a first record from Andaman Islands.

Remarks.—It is strongly polymorphic. A single population showing variation contained specimens with spires of varying heights and colouration. The shouldering of the body whorl and the development of spines were also variable. The spined and spineless forms were found occupying the same habitat.

Measurements.—

	Length	Width	Height of the aperture
Smallest (Port Blair)	6.40	4.65	2.95
Medium ,,	13.40	10.25	8.15
Largest ,,	20.00	14.70	10.90

Clithon bicolor (Recluz, 1842)

(Pl. I fig. 7)

Nerita bicolor Recluz, 1842, *Proc. Zool. Soc. Lond* p. 172. Type-locality : Agoo (in a mountai stream), Phillippines.

Theodoxus (Clithon) bicolor (Recluz) : Ray 1947, *Rec. Indian Mus.*, 45 (4) : 308.

Clithon bicolor (Recluz) : van Benthem Jutting, 1956, *Treubia*, 23 (2) : 272, fig. 5.

Material examined.—232 ex. All from Andamans.

Distribution.—Andmans ; Indonesia ; the Philippines and Formosa.

Remarks.—The shell is generally olive green or olive-brown with small dark squares and the spire is more produced than in the preceding species.

It is generally found in fresh and running waters sticking to small stones and pebbles.

Measurements.—

	Length	Width	Height of the aperture
Smallest	11.25	9.00	8.20
Medium	17.25	15.00	13.15
Largest	19.65	16.90	14.85

Genus **Septaria** Ferussac, 1807.

Septaria Ferussac, 1807, *Essai d'une meth. Conch.*, p. 61 Type species: *Patella borbonica* Bory de St. Vincent, 1803.

In this genus the shell assumes a more open limpet-like form. The spire which has a simple convoluted form in other genera is transformed into a simple nucleus of the spire with the apex inflected into the form of a beak. The columellar callus is transformed into a septum or shelf. The operculum is very much reduced when compared to the size of the aperture and do not close it.

Distribution.—It is common in tropical regions of Madagascar, Comoros, Seychelles, Mauritius, Reunion Islands, India, Sri Lanka, Malay Archipelago, the Philippines and many Pacific Islands.

The genus is represented by 24 species in the Indo-Pacific region. The following two species are known from the Islands.

Septaria lineata (Lamarck, 1816)

(Pl. I fig. 9)

Navicella lineata Lamarck, *Encycl. Meth. Vers. Explic. Planches.*, pl. 456, fig. 2, Type-locality : Not known.

Septaria lineata (Lamarck) : van Benthem Jutting, 1956, *Terubia*, **23 (2) : 317**, fig. 4 and 33.

Material examined.—44 ex. Port Blair and Great Nicobars.

Distribution.—India : West Bengal, Calcutta ; Tamilnadu, Porto Novo and Andaman & Nicobar Islands. Elsewhere : Sri Lanka ; Indonesia ; New Guinea ; the Philippines and Fiji.

Remarks.—The shell varies in shape depending on the nature of substratum. It shows considerable colour variation also.

Measurements.—

	Length	Width	Height of the the aperture	Width of Septum
Smallest (Great Nicobar)	12.70	8.20	10.50	2.20
Medium (Port Blair)	24.70	15.25	18.05	4.60
Largest (Great Nicobar)	37.55	26.45	30.15	7.40

Septaria porcellana (Linnaeus, 1758)

(Pl. II fig. 1)

Patella porcellana Linnaeus 1758, *Syst. Nat.* ed. **10** : 781. Type-locality : "O. Indiae".

Septaria porcellana Linnaeus ; van Benthem Jutting, 1956, *Treubia*, **23 (2)** : 315, fig. 31.

Material examined.—88 ex. Andamans.

Distribution.—Andaman and Nicobar Islands. Elsewhere : Sri Lanka ; Singapore ; Indonesia ; New Guinea ; New Caledonia ; Samoa Archipelago ; Tahiti and the Philippines.

Remarks.—The collection does not show much variation in the shell structure. The colour pattern, however, shows variation. The meshes of the colour network may be wide or narrow, some times coalesing or appearing as zigzag markings or triangular radiating marks.

Some shells are found with egg capsules over them.

Measurements.–

	Length	Width	Height of the aperture	Width of septum
Smallest	15.40	10.60	11.05	2.40
Medium	24.20	17.55	18.30	2.70
Largest	28.30	21.15	21.05	4.25

Order MESOGASTROPODA
Family PILIDAE
Genus **Pila** (Bolten) Roding, 1798

Pila Bolten, 1798, *Mus. Bolten.* p. 145 Type species *Helix ampullacea* Linnaeus.

It is very common in the freshwater ponds and pools of the mainland India, but in the islands it is rare. In general it is distributed in the tropical regions of Africa and Asia.

Only one species is known from these Islands.

Pila scutata compacta (Reeve), 1856

(Pl. II fig. 2)

Ampullaria compacta Reeve, 1856, *Conch, Icon.*. **10.**

Ampullaria, pl. XIV, fig. 62, pl. XV, fig. 71. Type-locality Malacca.

Pila conica (Gray), var. *compacta* (Reeve), Prashad 1925, *Mem. Indian Mus.*, **8**: 79, pl. XV, figs. 9, 10.

Material examined.—Two ex., Port Blair.

Distribution.—The typical form is widely distributed extending from Burma to Celebes and north to the Philippines. It is not found in Moluccas or New Guinea (van Benthem Jutting, 1956).

Hitherto, the subsp. *compacta* (Reeve) was known from Burma only. It is recorded for the first time from Andaman and Nicobar Islands and thus its range extends further westwards.

Remarks.—Hitherto, the species was known as *Pila conica* (Gray, 1828), But as the specific name is preoccupied by *Ampullaria conica* Lamarck, 1804, for a fossil french shell the immediately available name ***Pila scutata*** (Mousson) is used.

Prashad (1925) gave good figures and description of this subspecies.

Measurements.—

Length 40.00 Width 40.00 Height of aperture 30. 90.

Family VIVIPARIDAE

The representatives of this family are exclusively freshwater forms and none are found in marine and brackish waters. The family is very widely distributed with the exception of South America. Prashad (1928) made a detailed study of the zoogeographical distribution of the family.

Recent authors are more inclined to distinguish the family into two subfamilies Viviparinae and Bellamyinae. Representatives of the former are found in Europe, Asia Minor, northerm Asia and North America, while that of the latter are distributed in Africa, tropical Asia and Australia. Accordingly all those species from Africa and South and East Asia and Australia which were formerly placed in the genus *Viviparus* Montfort, 1810 are now accommodated in the genus *Bellamya* Jousseaume, 1886.

We accept the above contention and hence treat the species under the genus *Bellamya*. It is represented by a single species in the islands.

Genus **Bellamya** Jousseaume, 1886

Bellamya bengalensis form **typica** (Lamarck)

(Pl. I fig. 5)

Paludina bengalensis Lamarck, 1822, *Hist. nat. Anim. sans. Vert.*, **6** (2) : 174.

Viviparus bengalensis race *bengalensis* : Annandale & Rao, 1921, *Rec. Indian Mus* , **22** : 270, pl. 1, figs. 1-3.

Meterial.—12 ex., Andamans (Coll. *G. H. Booley*).

Distribution.—Common throughout India, Bangladesh, Burma and Sri Lanka.

Remarks.—No recent collections of this species have been made.

Measurements :

Largest Length 32.20 Width 23.40 Height of the aperture 15.70.

Family HYDROBIIDAE

The representatives of the family are more common in brackish water with a few species extending into freshwater. Like the family

Viviparidae, it is also very widely distributed. It is represented by two genera, including one species each.

Genus **Digoniostoma** Annandale, 1920

Digoniostoma Annandale, 1920, *Ind. J. Med. Research*, VIII, p. 104 Type species : *Digoniostoma cerameopoma* (Benson).

Digoniostoma pulchella (Benson)

Paludina pulchella Benson, 1836, *J. Asiat. Soc. Beng.*, **5** : 746, (Refers to No. I *Valvata ?* Hutton, *J. Asiat. Soc. Beng.* **3** : 90 (Type-locality : Mirjapore).

Digoniostoma pulchella (Benson) ; Ray & Mukherjee, 1963, *Rec. zool. Surv. India*, **61** : 418, pl. 18, figs. 8, 8a.

Material.—Five ex., Magar Nallah, Great Nicobar, July, 1976. (Coll. *Sharma Deorani*).

Distribution.—Very widely distributed in Mainland India. It is recorded for the first time from the Andaman & Nicobar Islands.

Genus **Stenothyra** Benson, 1856

Stenothyra Benson, 1856, *Ann. Mag. nat. Hist.*, (2) **17** : 469 Type species : *Stenothyra deltae* Benson.

Stenothyra hungerfordiana Nevill

Stenothyra hungerfordiana, 1880, Nevill, *J. Asiat. Soc. Beng.*, **49** (2) 159. Type-locality : Andamans ; 1881 Nevill, *J. Asiat. Soc. Beng.*, **50** : 156, pl. 7, fig. 9 ; Prashed, 1921, *Rec. Indian Mus.*, **22** : 127.

Material.—1 ex. Andamans (Coll. *F. Stoliczka*).

Distribution.—This species is so far known from Andamans only.

Measurements.—

Length 2.70 Width 1.30 Height of the aperture 0.75.

Family THIARIIDAE

The family has very wide distribution extending to temperate, subtropical and tropical regions of the world.

In the islands members of this family show a preferance for slow-moving streams. Some representatives of the genus *Melanoides* particularly *M. nicobaricus* (Reeve), are even found in stagnant freshwater

pools. Qualitatively and quantitatively this family is more represented than the other families.

Key to the genera

1. Operculum multispiral, nucleus central, shell with longer spire in relation to the body whorl (ratio of height of the shell to height of aperture 3 : 1) .. .. *Brotia.*

— Operculum few-whorld, nucleus at basal side, shell more turretted and more sculptured ... 2

2. Shell pagoda-like with spire descending in regular steps ; often with spines or sharp nodules ... ... *Thiara.*

— Shell more elongated with evenly descending spire, surface of the snell variously ornamented but never with spines or sharp nodules ... ... *Melanoides.*

Genus **Brotia** H. Adams, 1866

Brotia H. Adams., 1866, *Proc. zool. Soc. London*, p. 150

Brotia fuscata (Born)

(Pl. II fig. 8)

Helix fuscata Born, 1780, *Test Vindob, p.* 390.

Tiara (Radina) fuscata Preston, 1915, *Fauna Brit. India. Mollusca*, Freshwater Gastropoda & Pelecypoda, p. 13.

Material.—(i) Four ex. Nicobars (Coll. ?) (ii) 12 ex. Natural freshwater springs near Ramjao, Camorta, 20. 3. 72 (Coll. *A. G. K. Menon & Party*).

Distribution.—Nicobars. Elsewhere : Fiji.

Measurements.—

Largest	Length 4.50	Width 11.50	13.75

Genus **Thiara** Roding, 1798

Thiara Röding, 1798, *Museum Boltenianum*, 2 : 109. Type species : ***Helix amarula*** Linnaeus.

Key to the species

1. Shell large and thick, usually black or dark olive-brown, smooth. Zone between suture and crown of spines little sloping ... *amarula.*

— Shells thinner and smaller, spines on the axial whorls generally sharp no thick ridge along the suture ... ... *scabra*

Thiara scabra (Müller)

(Pl. II fig. 3)

Buccinum scabrum Müller, 1774, *Hist, Verm. Terr. Fluv.* 2 : 136. Type-locality : Tranquebar.

Thiara scabra Benthem Jutting, 1956, *Treubia*, 23 (2) : 393-397, figs. 72 & 88.

Material.— (i) Four ex., Andamans (Coll. ?). (ii) 40 ex., On the underside of rotting leaves in weedy pools with muddy bottom in the course of a stream near Rangat Camp, M. Andaman, 25. 12. 34 (Coll. *H. S. Rao*)

Distribution.— Widely distributed throughout India. *Elsewhere :* Indonesia ; Java, Timor ; Seychelles ; Mauritius.

Thiara amarula (Linnaeus)

(Pl. III figs. 7 & 8)

Helix amarula Linnaeus 1758, *Syst. Nat.* Ed. 10 : 774. Type-locality : "Asiae".

Thiara amarula Benthem Jutting, 1956, *Treubia*, 23 (2) : 387-89, fig. 82.

Material.—Two ex., (Great Nicobars (Coll. ?) Reg. No. M 1325.

Distribution.—India : Nicobar Islands. Eleswhere : Mauritus, Indonesia, Philippines, Fiji, New Caledonia.

Measurements.—

Largest Length 31.30 Width 17.15 Height of the aperature 20-15.

Remarks.—No recent collections were made. Preston (1915) reported *Thiara cybele* var *amara* (Morch), which perhaps may belong to this species.

Genus Melanoides Olivier, 1807

Melanoides Olivier, 1807, Voyaga a l'Emp. Ottoman, 2 : 40. Type species : *Nerita tuberculata* Muller.

Key to the species in Andaman & Nicobar Islands.

1. Nodules, spiral/longitudinal ridges more or less uniformly present throughout ... 2

—	Sculpture absent or consists of irregular microscopic striae, or spiral/longitudinal ridges, not uniform throughout the shell ...	6
2.	Shell thick nodules present throughout the surface	3
—	Spiral/longitudinal ridges or ribbings uniformly present	4
3.	Shell rather small, nodules equally strong throughout	*granifera* subsp. *pergranosa*
—	Shell large, nodules along suture stonger than those on other parts, below the periphery nodules weak	*torulosa*
4.	Shell straw coloured, prominent vartical ribbings give the shell a coarse appearence. Often irregular brownish blotches or streaks present	*crebra*
—	Spiral grooves more prominent, fine sculpture uniform throughout	5
5.	Shell dark brown, strong spiral striac present, sutures deep incised, whorls nearly flat, aperture proportionately small ...	*multistriata*
—	Shell elongately pointed, spiral grooves uniform on upper whorls, on lower whorls grooves present only on lower parts (above the sutures)	*nevilli*
6.	Sculpture consists of spiral or longitudinal ribbings or ridges prominent only on upper whorls	7
—	Shell smooth or with irregular microscopic striae	9
7.	Shell rather fusiform, upper whorls conspicuously vertically ribbed, rest of the shell more or less smooth	*punctata*
—	Shell with upper whorls spirally grooved ...	8
8.	Shell rather thin of moderate size pale-olive, spiral grooves on lower part (above the suture of upper whorls	*tigrinus* subsp. *raoi*
—	Shell moderately thick, larger, blackish brown, spiral grooves present on upper whorls, very often infra-sutural ridge present on body whorl	*nicobarica*
9.	Shell thick, elongate, brownish black, growth-lines prominent, faint spiral sculpture present, columella entends to form a slight callus ...	*charon*
—	Shell smaller, thick brownish, faint irregular spiral striae present	*fontinalis*

Melanoides charon (Preston)

(Pl. II fig 7)

Thiara (*Radina*) *charon* Preston, 1908, *Rec. Indian Mus.*, **2** : 196, pl. 15, fig. 22 (Type-locality — Andaman Island).

Material.—One ex. (Holotype)—Andamans (Coll. ?).

Distribution.— So far known from Andaman Islands.

Measurements.—

Length 48.70 Width 11.20 Height of the aperture 13.00

Remarks.—After Preston's (1908) original description, this species has not been collected. It may actually belong to the genus *Brotia* and may turn out to be a synonym of already known species. However, for want of sufficient material we are retaining it as originally designated by the author.

Melanoides expatriata (Preston)

(Pl. II fig. 5)

Melania expatriata Preston, 1908, *Rec. Indian Mus.*, **2** : 196, pl. 15, fig. 23 (Type-locality : Andaman Island).

Material.—1 ex. (Holotype), Andamans (Coll. ?).

Distribution. – So far known from Andaman Islands only.

Measurements.—

Length 32.35 Width 11.35 Height of the aperture 10.80

Remarks.—The specimen studied by Preston (1908) is the only representative from the islands. Except for its decollation it resembles *M. nicobaricus* and can be considered as synonymous with the latter.

Melanoides multistriata (Preston)

(Pl. III fig. 2)

Tiara (*Radina*) *multistriata* Preston, 1908, *Rec. Indian Mus.*, **2** : 196, pl. 15, fig. 24 (Type-locality : Andaman Islands).

Distribution.—One (decollated - Holotype) Andamans (Coll. ?).

Material.—So far recorded from Andamans only.

Measurements.—

Length 25.70 (Decollated), Width 9.80 Height of the aperture 10.26

Remarks.—As in the case of preceding two species this is also known by its type only, and none of these has been recorded by any one after Preston (1908, 1915).

Melanoides nevillei (Brot)

(Pl. II fig. 9)

Melania nevillei Brot, 1874, *Conch. Cab.*, 11, pl. 22, fig. 13.

Material.—6 ex., Andamans, Coll. (?).

Distribution.—This species seems to be restricted to Andaman Islands. Elsewhere : Tahiti.

Measurements.—

Length 25.85 Width 7.80 Height of the aperture 7.70

Melanoides nevilli andamanica (Nevill)

(Pl. II fig. 4)

Melania (Striatella) nevilli var. andamanica, Nevill, 1884, *Hand list, Moll. Indian Mus.*, **2** : 236 (Type locality — Andaman).

Material.— (1) One ex. Andaman (Coll. ?) Type.
(2) 40 ex. Andaman (Coll. ?).

Distribution.— So far known from Andamans only.

Remarks.—Differs from the Typical form in having uniform sculpture throughout the shell.

Measurements.—

Length 30.60 Width 9.70 Height of the aperture 9.70

Melanoides nicobarica (Reeve)

(Pl. II fig. 10)

Melania nicobarica Reeve, 1859, *Conch. Icon.*, **12**, pl. 10, fig. 54 (Type-locality : Nicobars).

Material.— (1) Seven ex., Magar Nallah, Great Nicobar, July, 1976 (Coll. *Sharma Deorani*).

(2) Six ex. Nicobar, (Coll. ?). (3) 15 ex. Andamans. Coll. (?).

Distribution.—Originally describe from Nicobars, subsequently recorded from Andamans Islands.

Remarks.—It is characterised by possessing smooth polished shells with spiral striae on upper whorls, often with an infrasutural ridge on body whorl.

Measurements.—	Length	Width	Height of the aperture
Largest	47.20	14.95	14.25

Melanoides (Radina) punctata (Lamarck)

(Pl. II fig. 11)

Melania punctata Lamarck, 1822, *Hist. Nat. Anim. Sans vert.*, 6 : 165.

Melanoides punctata (Lamarck) : van Benthem Jitting, 1956, *Treubia*, 23 (2): 418 - 20, fig. 97.

Material.—(i) 12 ex. Nicobar, (Coll. ?). (ii) 95 ex. from rock pools in the course of a stream on the east coast of Interview Island, N. Andaman, 26.xii.1933 (Coll. *H. S. Rao*).

Distribution.—In India it is known to occur in the Nicobar Island only. Elsewhere Dutch East Indies, Australia, Philippines Caroline Islands, New Caledonia.

Remarks.—The shells show variations in colour, shape and size. However usually they are yellowish brown with sharply pointed spire and longitudinal ribbings on the apical whorls.

Measurements.—	Length	Width	Height of the aperture
Medium	39.65	12.35	11.45

Melanoides granifera pergranosa Nevill

(Pl. III fig. 1)

Melonia (*Tarebia*) *lineata* subvar, *pergranosa* Nevill, 1877 *Hand list Moll. India Mus.*, pt. 11 : 277.

Material.—(1) 23 ex. Janglighat farm, S. Andamans, (Coll. *Head of Entomology Div., I.A.R.I., New Delhi*).

Distribution.—India : West Bengal and Andaman Islands. Elsewhere : Burma.

Measurements.—

Length 15.30 Width 7.50 Height of the aperture 7.50

Melanoides torulosa (Bruguiere)

(Pl. II fig. 6)

Bulimus torulosa Bruguiere, 1789, *Encyl. Meth, Verms.*, **1** : 332.

Tiara (*Radina*) *crunulata* Preston, 1915, *Fauna Brit. India* (Freshwater Gastropoda and Pelecypoda), p. 11.

Melanoides torulosa (Bruguiere) van Benthem Jutting, 1956, *Treubia*, **23 (2)** : 410, fig. 92.

Material.—(1) Two ex. Andamrns. (Don. *F. A. de Roepstorff*).

Distribution.—Andamans, Vizagapatnam, Andhra Pradesh. Elsewhere : Burma, Sri Lanka, Malaysian Islands, Solomon Islands and Philippines.

Measurements.—Largest specimen

Length 42.95 Width 12.90 Height of the aperture 16.20

Remarks.—Seshaiya (1940) studied the breeding of these species.

Melanoides crebra (Lea).

(Pl. III fig. 5)

Melania crebra Lea, 1850, *Proc. zool. Soc., Lond.*, p. 193,

Material.—(i) 10 ex., S. Andamans (Coll. ?) (ii) 25 ex. In weedly pools with muddy bottom in the course of a stream near Ramgat Camp, M. Andaman, 25.3.34. (Coll. *H. S. Rao*), (iii) 10 ex. Magar Nallah, Great Nicobar, July, 1976 (Coll. *Sharma Deorani*).

Distribution.—Andamans and Nicobar Islands ; Philippines ; Preparis Island, Bay of Bengal (Preston).

Remarks.—The shells are characterised by a coarse sculpture of criscrossing spiral and vertical ridges throughout.

Measurement.— Length	Width	Height of the aperture
39.50	11.75	11.45

Melanoides fontinalis (Philippi)

(pl. III fig. 4)

Melania fontinalis Philippi, 1851, *Abbild, und. Beschr. Conchyl.*, **3** : 57-58, pl. 5, fig. 7.

Material.—28 ex. In a small muddy stream near Golpatrar, Buhive Hill, near Long Island, N. Andaman, 24.3.34. (Coll. *H. S. Rao*).

Distribution.—In India it is restricted to Andamans only.

Eleswhere : Malaysia ; Java ; Burma.

Remarks.—Rather small and narrow shells with rounded whorls, very often encrusted.

Measurement.—	Length	Width	Height of the aperture
Medium	15.80	6.04	5.55

Melanoides tigrina raoi Ray

(Pl. III fig. 3)

Melanoides tigrina (Hutton) var. *raoi* Ray, 1947, *Rec. Indian. Mus.*, **45** : 303-304, lest fig. 1, b. (Type-locality : Port Blair, S. Andaman).

Material.—(i) Two ex. Stream, South west of Golf Course, Aberdeen, Port Blair, 11.2.34 (Coll. *H. S. Rao*). (ii) 17 ex. Stream, Morth of coconut platation, Long Island, M. Andaman, 27.3.34 (Coll. *H. S. Rao*).

Distribution.—So far known from Andamans only.

Remarks.—Ray (1947) has given detaild description and figures for this species.

Measurements.—

Length 24.85 Width 8.30 Height of the aperture 4.80

Melanoides semigranosa (v.d. Bursch)

Melania semigranosa, v.d. Busch, 1842, in Phillippi's *Abbild. Buschr, Conchyl.*, **1 : 2**, pl. 1, fig. 13a, b (Type-locality — Java).

Material.—10 ex., In pools in the course of a dry stream near Rangat Camp, M. Andaman, 25.3 34. (Coll. *H. S. Rao*).

Distribution.—India : Andaman Islands. Elsewhere : Java, Banka, Bali, Sumatra, Borneo, Celebes, Cambodia also Burma.

Remarks.—It was treated as a variety of *M. lineata* by Preston (1915). This species however, differs from it in having broader shells with much more prominent nodules, deeply incised sutures and the spire being much shorter in relation to the body whorls.

Order BASOMMATOPHORA

Family LYMNAEIDAE

Genus **Lymnaea** Lamarck, 1799.

Lymnaea Lamarck, 1799, *Prodr, Nouv. clas. Cog.*, p. 74

Type species : *Lymnaea stagnalis* (Linnaeus) Hubendick, 1951, Recent Lymnaeidae, pp. 1-122, pls. 1-5. Text figs. 1-369.

Lymnaea ovalis Gray

(Pl. III fig. 6)

Limnaea (*Limnaea*) *ovalis* Gray, 1820, in Sowerby's *Genera Rec. Shells*, pt. 7: *Limnaea*, fig. 4.

Lymnaea acuminata f. **rufescens** Gray

Limnaea rufescens Gray in Sowerby's *Genera of shells, I. Limuaea*, fig. 2.

Limnaea (*Pseudosuccinea*) *acuminata* f. *rufescens* Annandale and Rao, 1925, *Rec. Indian Mus.*, **27** : 181, fig. 111.

Material.—Seven ex. Andamans (Coll. ?).

Distribution.—Common throughout India, For Andaman and Nicobar Island it is a new record.

Measurements.—

Length 20.40 Height 12.75 Height of the aperture 15.85

Remarks.—According to Hubendick (1937) it is probably synonym of *L. luteola.*

Material.—14 ex. Andamans (Coll. ?).

Distribution.—Widely distributed in mainland India. It is recorded for the first time from Andaman & Nicobar Islands also. Elsewhere : Bangladesh, Burma and Pakistan.

Measurements.—

Lentgh 32.50 Width 16.70 Height of the aperture 24.25

Remarks.—Hubendick (1951) stated that the name *acuminata* is preoccupied by a fossil species *(acuminate* Brongnial, 1810) and hence should be replaced by *L. auricularia* race *rufesens.*

Lymnaea luteola f. **typica** (Lamarck)

(Pl. III fig. 9)

Limnaea luteola Lamarck, 1822, *Hist. Nat. Anim. sans. vert.*, **6** (2) : 160. Type-locality : Bengal.

Limnaea (Pseudosuccinea) luteola f. *typica* : Annandale and Rao, 1925, *Rec. Indian Mus.*, **27** : 184

Material.—20 ex. Dhobi line, Atlanta Point, Port Blair, 20.7.78. (Boll. *M. Sil*).

Distribution.—Common throughout Indian mainland, Sri Lanka, Pakistan, Bangladesh, Burma and Nepal.

Measurements.—

Length 20.50 Width 13.40 Height of the aperture 16.20

Family PLANORBIDAE

Key to the genera

1.	Shell relatively large, discoidal wirh convex whorls and deep sutures, aperture ear-shaped	*Indoplanorbis*
—	Shell minute, very much suppressed, disc-like, whorls nearly flattened	2
2.	Shell paucispiral, whorls rapidly increasing, aperture rather wide	*Gyraulus*
—	Shell very minute, orbicular, furnished with internal transeverse partitons (marking externally vissible) aperture circular	*Segmentina*

Genus **Indoplanorbis** Annandale & Prashad, 1920

Indoplanorbis Annandale & Prashad, 1920, *Rec. Indian Mus.*, **22** : 578-580. Type species : *Planorbis exustus*, Deshayes.

Indoplanorbis exustus (Deshayes)

(Pl. III fig. 10)

Planorbis exustus Deshayes, 1834, *Beleng, Voy. Ind. Orient Zool.*, p. 417, pl. 1, figs. 11-13.

Material.—Six ex., Dairy Farm Port Blair, 20.1.78. (Coll. *M. Sil*).

Distribution.—This species is for the first time recorded from the Andaman & Nicobar Islands. In mainland it is widely distributed. Elsewhere : Bangladesh, Pakistan, Sri Lanka, Burma, Kalay Peninsula and Archipelago, Thailand, China Tibet and Iran.

Remarks.—The shell is discoidal with convex whorls, it shows considerable variations in general shape. This species is very common and found almost in every freshwater pool of S. Andamans.

Genus **Gyraulus** Charpentier, 1837

Gyraulus "Agassiz" Charpentier, 1837, *Neue Denkschar. sllg. Schrreiz*, Gesell, 2(2) : 21 Type species : *Planorbis albus* Muller (Subsequently designated by Dal in 1870).

Gyraulus convexiusculus (Hutton)

Planorbis convexius Hutton, 1850, *J. Asiat. Soc. Beng.*, **18**(2) : 657 (Chandahar, in tanks ; Quetta and the Kojuck pass).

Material.—Four ex., Dilthanman. tank, Port Blair, 16.2.78. (Coll. *M. K. Dev Ray*).

Distribution.—Common throughout mainland India, extends from Iran to the Phillippines and Japan. Now it is recorded from the Andaman & Nicobar Islands for the first time.

Genus **Segmentina** Fleming, 1828

Segmentina Fleming, 1928, *Hist. Brit Anim.* p 279. Type species *Planorbis nitidus* Muller.

Segmentina taia Annandale & Rao

Segmentina taia Annandal & Rao, 1925, *Rec. Indian Mus.*, **27** : 110-111, fig. 2 (Type-locality : Inle lake, Burma).

Distribution.—Annandale and Rao described this species from Inle lake, Burma. Its present record extends its range to Andamans.

Material.—Eight exs., Attached to small gravel in sluggish stream, with muddy bottom, below Machligaon, Port Blair, (Coll. *H. S. Rao*).

Class BIVALVIA

Order EULAMELLIBRANCHIATA

Family CORBICULIDAE

Key to the genera

Shell oval subtrigonal, convex, generally of a brownish-green collour, right valve with four lateral teeth	*Geloina.*

Shell roundly ovate or sub-trigonal, relatively thicker, usually covered with a blakish, brown periostrocum, spiral striations coarser ; right valve with double lateral teeth ... *Batissa.*

Genus **Batissa** Gray, 1852

Batissa Gray, 1853, *Ann. Mag. Nat. Hist.*, (2) **11** : 38 Type species : ***Batissa tenebrosa*** Hinds.

Batissa similis Prime

(Pl. IV figs. 1 & 2)

Batissa similis Prime, 1859, *Ann. Lyceum. Nat. Hist. Soc.* New York, **7** : 112 ; Prashad, 1921, *Rec. Indian Mus.*, **22** : 147.

Batissa capillata Preston, *Rec. Indian Mus.* **2** : 207, pl. 16, fig. 39.

Material.—(i) One ex. Andaman (Coll. *Rev. J. Warneford*). (ii) 3 ex. Andamans (Coll. ?). (iii) 15 ex., Great Nicobar Expd ; (10.4.1966, Coll. *A. Daniel & Party*).

Distribution.—Andaman & Nicobar Islands.

Measurements.—	Length	Height	Thickness
Largest	113.75	86.00	47.20

Batissa inflata Prime

Batissa inflata Prime, 1860, *Proc. Zool. Soc.*, London, P. 320 ; Prashad, *Rec. Indian Mus.*, **22** : 149.

Material.—Ond ex., Andaman Islands. (Coll. ?).

Genus **Geloina**

Geloina galatheae Mörch

(Pl. IV fig. 3)

Cyrena (Corneocyclar) galatheae (Reinhardt MS.), Mörch, 1850, *Cat. Conch. Kierulf*, p. 32, pl. 2

Cyrena galatheae ; Prashad, 1921, *Rec. Indian Mus.*, **22** : 144-45, pl. 20, figs. 14-17.

Material.—(i) Six ex., Nicobar Islands (Car Nicobar, Kondul, Trincat), (ii) 1 ex., John Lawrence island Andamans (Coll. ?).

Remarks.—Prashad (1921) gave a detailed description of the shell. It is greatly inequilateral and vaulted ; distal half of posterior margin highly truncated ; umbo placed anteriorly, hinge curved and placed anteriorly with compact but strong laterals.

Distribution.—Originally recorded from Galathea river in Great Nicobar Island, the species was reported from Car Nicobar ; Kondul and Trinked Islands in the Nicobars and John Lawrence and Havelock Islands in the Andamans.

Measurements.—	Length	Weight	Thickness
Largest	77.15	71.60	46.75

Geloina siamica (Prime, 1861)

(Pl. IV fig. 4)

Cyrena siamica Prime, 1861, *Proc. Acad. Nat. Sci. piladelph* P. 126 ; Prashad, 1921, *Rec. Indian Mus.*, 22 : 139-140, pl. 20, figs. 3-5.

Material.—Two ex., Nicobar Islands. (Coll. ?)

Distribution.—It has a wide range from Cochin-China, Siam, Cambodia to Burma and the Nicobar Islands.

Measurements.—

Length 55.00 Height 7.85 Thickness 30.60

Family SOLENIDAE

Genus **Novaculina** Benson, 1830

Novaculina Benson, 1830, *Glean. Sci.*, 2 No. 13 : 63 Type species : *Novaculina gangetica* Benson.

Novaeulina andamanensis Preston

(Pl. IV fig. 5)

Novaculina andamanensis Preston, 1908, *Rec. Indian Mus.*, 2 : 209, pl. 16, fig. 40 (Type-locality : Andaman Islands 1915, *Fauna Brit. India*, Freshwater Gastropoda and Pelecupoda, p. 230.

Material.—Holotype, Reg. No. M 20765/4

Distribution.—Not known beyond Andamans.

Remarks.—As Preston (1915) remarked "no further speceimen has come to light". The shell is smaller and thinner than that of *Novaculina gangetica*, the type species. More specimens are necessary to assess the validity of this species.

Measurements.—

Length 17.5 Height 7.85 Thickness 3.75

GENERAL REMARKS

A comprehensive and up to-date picture of freshwater molluscan fauna of Andaman and Nicobar group of islands is presented. The study includes concerned literature, named and unnamed collections both old and recent collections available in Zoological Survey of India.

The up-to-date list presented here includes 51 species of gastropods and Bivalves occurring in these islands, 9 species are recorded for the first time. Among gastropods, neritids (9 species) and thiariids (25 species) are the most successful. Perhaps with their thick and strongly built shell, they have best adapted themselves to streams. Interestingly, many of these species are restricted to these islands only and do not occur in mainland India. However, *Paludomus*, a common thiariid, which abounds in the streams of Western ghats and also in North-eastern regions on the mainland, is absent here. Other usually common freshwater gastropods are very poorly represented and hitherto none of these was known to occur here. Thus, Pilidae (1 sp.), Viviparidae (1 sp.), Hydrobiidae (2 spp.) and Planorbidae (3 spp.) are all new records for these islands, the record of species like *Indoplanorbis exustus* (Deshayes), *Gyraulus convexiusculus* (Hutton), *Lymnaea acuminata* (Lamarck) etc. should be viewed seriously since, all these are known to act as intermidiate hosts of important helminth parasites. Among the species recorded here for the first time, *Pila scutata* (Mousson) and *Segmentina taia* Annandale & Rao were so far known from Burma only.

The families Unionidae and Sphaeriidae the ancient freshwater forms and cosmopolitan in distribution, are conspicuously absent from these islands. The occurence of *Novoculina andamanensis* has to be received with some doubt. The bivalves are further interesting in that the genus *Batissa* is not represented on the mainland. The genus is distributed in the Malay Archipelago and other islands.

From the present knowledge it is difficult to attach any biogeographical importance to the malacofauna of these islands. Nevertheless, the occurrence of typical stagnant water dwellers in poor numbers suggests the recentness of this fauna. Of the several species reported only two species of thiariids are endemic to the islands. This again points to the recentness of the fauna. In the presence of several species of neritiids and thiarids, the fauna bears resemblance to that of Indonesia.

It is likely that further attempts may add some more species to the list and may bring to light some other aspects of distribution as well. Special efforts are necessary to collect bivalve molluscs.

SUMMARY

A comprehensive account of the freshwater molluscs of the

Andaman and Nicobar Islands is given in the paper. Fifty one species of gastropods and bivalves are reported from the islands ; and ten of them are recorded for the first time. Keys to the identification of families, genera and species are given. The present study revealed the dominance of gastropods as individuals and in number of species. The families Neritidae and Thairidae are the most common among gastropods. Several other common freshwater families occurring on the mainland are either absent or poorly represented. Of the total number of species, except for two thiariids, none of them are found to be endemic to the islands. However, the biogeographical importance of the freshwater molluscs is not very high.

ACKNOWLEDGEMENTS

We are grateful to the Director, Zoological Survey of India for the necessary facilities and encouragement. We are very much obliged to Dr. K. C. Jayarama Krishnan, Deputy Director for kindly going through the manuscript and making useful suggestions. Our thanks are also due to Shri G. Ramakrishna for helpful suggestions ; to Surgeon Commander N. B. Idnani, INHS KALYANI, and Dr. Sharma Deo Rani, ICAR, Port Blair for the collection of some molluscs reported in this paper, and to Shri K. Dey, Photographer and Shri M. K. Sengupta, Artist for the illustrations.

REFERENCES

HUBENDICK, B., 1951. Recent Lymnaeidae - Their variation morphology, Taxonomy, Nomenclature and distribution. *Kungl. Svenska Vetenskapsakademiens Handlingar,* **30** : 1-222.

JUTTING, Y S. S. VAN BENTHEM, 1956. Systematic studies on the non-marins mollusca of the Indo-Australian Archipelago - V. Critical revision of the Javanees Freshwater Gastropods, *Treubia,* **23(2)** : 259-476, figs. 1-135.

MÖRCH, O. A. L., 1872. Catalogue des Mollusques terrestres et flaviatiles des anciennes colonies danoises dugolfe du Bengale., *J. de Conch.*, **20** : 303-345 & *vid. Medd.* XI, 9-35.

PRASHAD, B., 1921. Notes on lamellibranchs in Indian Museum, *Rec. Indian Mus.*, **22** : 139-149.

PRASHAD, B., 1925. Revision of the Indian Ampullarridae, *Mem. Indian Mus.*, **8** : 69-89, pl. 13.

PRASHAD, B., 1928. Recent and fossil Viviparidae, A study in distribution, evolution and palcogeography, *Mem. Indian Mus.*, **8** : 153-251, pl. 91.