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MOLLUSCA FAUNA OF ITANAGAR WILDLIFE SANCTUARY, ARUNACHAL PRADESH

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INTRODUCTION

The state of Arunachal Pradesh is an important constituent of the 'Seven Sisters' of north-east India, one of the designated rich biodiversity zones in the World. The relative isolation of the region together with high rainfall, lush-green forests and less vigorous temperature extremities, makes it an ideal habitat for the land and freshwater mollusca. Approximately one third of the total Indian fauna is represented here with above 70% endemism (Ramakrishna & Mitra, 2002). Apart from its proximity to the Himalaya, surroundings of Arunachal Pradesh (being bordered by Bhutan, China and Myanmar on three sides) add to its Zoogeographical significance. Though a consolidated report on the mollusca as a whole is still not available, the rich malacofauna of the state has been thoroughly explored and worked out from time to time. Over 100 new species and genera have been described. Important works are from Dey *et al.*, 1985, Ghosh, 1913, Godwin-Austen, 1876, 1876a; 1914–1918; Gude, 1915; and Preston, 1915.

The present report is based on material collected from Itanagar Wildlife Sanctuary area by the Itanagar Field Station of Zoological Survey of India during 1986–1996.

The classification followed here is that of Vaught, 1989.

SYSTEMATIC ACCOUNT

Freshwater Mollusca

Key to the families

1. Shell univalve 2
- Shell with two valves PISIDIIDAE
2. Shell elongate 3
- Shell depressed PLANORBIDAE

3. Shell without an operculum. Spire much shorter than body whorl in length, columella twisted LYMNAEIDAE
 — Shell with an operculum, spire equal or longer than body whorl, columella not twisted 4
 4. Shell with circular aperture, operculum with concentric growth-lines VIVIPARIDAE
 — Shell with ovate aperture, operculum with spiral growth-lines THIARIDAE

Class GASTROPODA

Order MESOGASTROPODA

Family VIVIPARIDAE

Genus *Bellamyia* Jousseume, 1886

Bellamyia bengalensis f. annandalei (Kobelt)

1909. *Paludina bengalensis f. annandalei* Kobelt, *Nachr. Malak. Ges.*, **60** : 16.

1989. *Bellamyia bengalensis f. annandalei* : Subba Rao, *Handbook, Freshwater Molluscs of India, zool. Surv. India* : p. 46, fig. 57.

Material examined : 12 exs., Tamin, L. Subansiri, Coll. G. Thirumalai; 3 exs., Bolong village, Dibang valley, 8.4.1993, Coll. P. T. Bhutia.

Diagnosis : Shell thin, rather conical, with dark spiral; bands, whorls 5–6, flat-sided, slowly increasing, aperture sub-circular, operculum thin.

Distribution : INDIA : Arunachal Pradesh, Andhra Pradesh, Tamil Nadu and West Bengal.

Family THIARIDAE

Key to the genera

- Shell rounded or ovate, body whorl usually longer than spire, whorls up to 5 *Paludomus*
 — Shell elongated, body whorl shorter than spire, whorls more than 5 *Brotia*

Genus *Brotia* H. & A. Adams, 1866

Sub-genus *Antimelania* Crosse and Fischer, 1892

Brotia (Antimelania) costula (Rafinesque)

1833. *Melania costula* Rafinesque, *Atlantique J.*, **5** : 166.

1989. *Brotia (Antimelania) costula* : Subba Rao, *Handbook, Freshwater Molluscs of India, zool. Surv. India* : p. 108, figs. 142-194, 197, 198.

Material examined : 2 exs., Pakhui, E. Kameng, 31.3.1995, Coll. P. T. Bhutia; 6 exs., Doimuk, Papum Pare, 19.11.1996, Coll. G. Thirumalai; 1 ex., Ganga river, 6.4.1998, Coll. P. T. Bhutia.

Diagnosis : Shell thick, large, elongate turreted with 10–12 whorls; distinctly sculptured with spiral nodulose ridges and axial ribs, sometimes with spines; aperture ovate, angularly produced below; columellar margin broad and curved. A highly variable species includes a number of varieties and subvarieties.

Distribution : INDIA : Arunachal Pradesh, Andhra Pradesh, Assam, Manipur, Meghalaya, Mizoram and West Bengal. *Elsewhere* : Indonesia, Malaysia, Myanmar and Thailand.

Genus *Paludomus* Swainson, 1840

Sub-genus *Paludomus* s. str.

Paludomus (Paludomus) conica (Gray)

1834. *Melania conica* Gray, *Griffith Cuvier Moll.*, pl. 14, fig. 5.

1989. *Paludomus (Paludomus) conica* : Subba Rao, *Handbook, Freshwater Molluscs of India*, p. 113, figs. 227, 228.

Material examined : 15 exs., River Ganga. Arunachal Pradesh, 14.8.1987. Coll. P. K. Chakravarty.

Diagnosis : Shell thick and strong, globosely conical, dark brown; whorls 4½–5 rounded, body whorl large and twice as long as spire, shell finely sculptured by spiral striae, a few spiral ridges also present at the sutural region; aperture ovate, columella thickened.

Distribution : INDIA : Widely distributed throughout north-eastern region. *Elsewhere* : Bangladesh, Bhutan.

Order BASOMMATOPHORA

Family LYMNAEIDAE

Genus *Lymnaea* Lamarck, 1799

Sub-genus *Pseudosuccinea* Baker, 1908

Lymnaea (Pseudosuccinea) acuminata f. typica Lamarck

1822. *Limnaea acuminata* Lamarck, *Hist. Nat. Anim. Sans. Vert.*, 6(2) : 160.

1989. *Lymnaea (Pseudosuccinea) acuminata f. typica* : Subba Rao, *Handbook, Freshwater Molluscs of India, zool. Surv. India* : p. 127, figs. 258-259.

Material examined : 1 ex., Pakhui, E. Kameng, 31.3.1995, Coll. P. T. Bhutia; 19 exs., Likabali, W. Siang, 22.11.1997, P. T. Bhutia; 38 exs., Bolong village, Dibang valley, 8.4.1993, Coll. P. T. Bhutia.

Diagnosis : Shell large, thin, ovate with an inflated body whorl and a very short and acutely pointed spire, aperture large, outer lip widely expanded, columella twisted. Shows variation in general shape.

Distribution : INDIA : Common throughout, abundantly occurs in freshwater bodies with vegetations. *Elsewhere* : Bangladesh, Myanmar and Pakistan.

Lymnaea (Pseudosuccinea) luteola f. ovalis Gray

1822. *Limnaea luteola f. ovalis* Gray, in *Sowerby's Genera Rec. Foss. Shells*, 1 : 178, fig. 4.

1989. *Lymnaea (Pseudosuccinea) luteola f. ovalis* : Subba Rao, *Handbook, Freshwater Molluscs of India*, *zool. Surv. India* : p. 129, figs. 266, 267 & 284.

Material examined : 1 ex., Pakhui, E. Kameng, 31.3.1995, Coll. P. T. Bhutia.

Diagnosis : Shell thin, sub globosely inflated, bodywhorl large and rounded, spire short and pointed; aperture rather large, outer lip not much expanded, rather straight. Differs from the above species in the body whorl being more rounded, and the outer lip being rather straight and not widely convex.

Distribution : INDIA : Common throughout. *Elsewhere* : Myanmar and Sri Lanka.

Family PLANORBIDAE

Genus *Indoplanorbis* Annandale & Rao, 1921

Indoplanorbis exustus (Deshayes)

1834. *Planorbis exustus* Deshayes, in *Belanger, voy. Index Orientales*, p. 417, pl. 1, figs. 11-13.

1989. *Indoplanorbis exustus* : Subba Rao, *Handbook, Freshwater Molluscs of India*, *zool. Surv. India* : p. 147, figs. 326-327.

Material examined : 1 ex., Doimuk, Papum Pare, Coll. P. T. Bhutia.

Diagnosis : Shell moderately large, depressedly coiled, with a sunken spire, thick, sinistral, sutures deeply impressed, aperture ear shaped.

Distribution : INDIA : Very widely distributed throughout the country, abundantly occurring in all types of freshwater, ponds, ditches, canals, drains; with or without vegetations. *Elsewhere* : Bangladesh, Celebes, Indonesia, Malaysia, Myanmar, Pakistan, Thailand and Vietnam.

Remarks : This species is a known vector snail, serving as intermediate host of a large number of cattle-infecting parasites.

Class BIVALVIA

Order VENEROIDA

Family PISIDIIDAE

Genus *Sphaerium* Scopoli, 1777

Sphaerium indicum Deshayes

1854. *Sphaerium indicum* Deshayes, *Proc. zool. Soc. London*, **22** : 342.

1989. *Sphaerium (Sphaerium) indicum* : Subba Rao, *Handbook, Freshwater Molluscs of India*, *zool. Surv. India* : p. 213, figs. 600, 610, 612, 613.

Material examined : 11 exs., Tamin, L. Subansiri, Coll. G. Thirumalai; 3 exs., Hapoli, L. Subansiri, 16.11.1995, Coll. G. Thirumalai.

Diagnosis : Shell minute, fairly thick, oval, slightly inequilateral, ventral margin roundly curved; finely concentrically striate, a single cardinal on the right valve, lateral teeth well developed.

Distribution : INDIA : Fairly commonly distributed in large ponds, lakes with vegetations, on plains as well as high altitudes.

Land Mollusca

Key to the families

(basing on the material included in the report)

1. Shell with an operculum *Cyclophoridae*
- Shell without an operculum 2
2. Shell elongate, higher than broad 3
- Shell depressed, broader than high 4
3. Shell broad and large to very large, seldom below 40 mm. in length; with coloured markings. *Achatinidae*
- Shell narrower and smaller, seldom reaching 20 mm. in length; without coloured markings. *Subulinidae*
4. Shell more depressed, height-diameter ratio approx. 1 : 3; *Helixarionidae (Sivella)*
- Shell less depressed, height-diameter ratio approx. 1 : 2. 5
5. Shell imperforate or narrowly perforate; outer lip simple *Ariophanitidae*
- Shell openly perforate; outer lip reflected 6
6. Interior of body whorl with a number of folds and plates *Plectopylididae (Plectopylis)*
- Interior of body whorl without folds or plates *Bradybaenidae*

Order MESOGASTROPODA

Family CYCLOPHORIDAE

Key to the genera

- Shell larger, globosely turbinate, without sutural tube *Cyclophorus*
- Shell smaller, depressed, with sutural tube *Pearsonia*

Genus *Cyclophorus* Montfort, 1810Sub-genus *Glossostylus* Kobelt & Moellendorff, 1899*Cyclophorus sidiensis* Godwin-Austen

1915. *Cyclophorus (Glossostylus) sidiensis* Godwin-Austen, *Rec. Indian Mus.*, **8** : 495, pl. 38, fig. 3.

1921. *Cyclophorus (Glossostylus) sidiensis* : Gude, *Fauna British India, Mollusca*, **III** : 67.

Material examined : 1 ex., Midpu, Doimuk, Papum Pare, 19.11.1996, Coll. G. Thirumalai.

Diagnosis : Shell moderately large, conically turbinate, narrowly umbilicate, keeled at the periphery; with distant raised spiral lirae, finer lirae in between; brownish in colour; whorls 5, flatly convex on sides; aperture suboblique, circular, peristome rather thin, reflected, columellar margin vertically curved; finely sculptured on base.

Distribution : INDIA : Arunachal Pradesh (Abor hills).

Remarks : Known from Arunachal Pradesh only.

Genus *Pearsonia* Kobelt, 1902Sub-genus *Pearsonia* S. St.*Pearsonia oakesi* (Godwin-Austen)

1915. *Spiraculum oakesi* Godwin-Austen, *Rec. Indian Mus.*, **8** : 496, pl. 39, fig. 3.

1921. *Pearsonia (Pearsonia) oakesi* : Gude, *Fauna British India, Mollusca*, **III** : 124.

Material examined : 1 ex., Kebali to Chidu village, Dibang valley, 21.12.1996, Coll. G. Thirumalai.

Diagnosis : Shell moderately large, depressedly coiled, very widely umbilicate, fairly thick, greyish with dark brown markings (mostly in zig-zag patterns) throughout, narrow band of same colour on the periphery; spire depressed, scarcely raised above; whorls 5; the last large, slightly descending in front, provided with an unusually long sutural tube which originates a little distance behind the aperture and is directed obliquely backward; aperture circular, peristome double, the

outer reflected and produced at the upper inner angle forming a 'silt' adhering to the penultimate whorl; inner peristome continuous with a slight notch at the upper inner angle.

Distribution : INDIA : Arunachal Pradesh.

Remarks : Known from Arunachal Pradesh only. The present report is the first subsequent record of this species after Godwin-Austen (1915). The sutural tube and the 'silt' in the outer peristome are among the shell modifications commonly exhibited by many of the land operculates and are used as breathing devices (Subba Rao *et al.*, 1987).

Order STYLOMMATOPHORA

Family SUBULINIDAE

Genus *Glessula* von Martens, 1860

Glessula crassula (Reeve)

(pl. fig.)

1850. *Achatina crassula* (Benson) Reeve, *Conch. Icon.*, 5 : *Achatina*, pl. 22, fig. 12.

1914. *Glessula crassula* : Gude, *Fauna British India, Mollusca*, 2 : 429.

Material examined : 1 ex. Anini Road, Dibang valley, 14.12.1986, Coll. G. Thirumalai.

Diagnosis : Shell rather small, pyramidal, light brownish, vertically striate, with 7 whorls, flatly convex, suture deeply impressed; aperture small, ovate, outer lip thin, columellar margin concavely arched and abruptly truncate below.

Distribution : INDIA : Hills of north-east India, Arunachal Pradesh, Meghalaya, Nagaland and Darjeeling in West Bengal.

Glessula crassilabris (Benson)

1836. *Achatina crassilabris* Benson, *J. Asiat. Soc. Bengal*, 5 : 353.

1914. *Glessula crassilabris* : Gude, *Fauna British India, Mollusca*, 2 : 426.

Material examined : 1 ex., Kimin, Papum Pare, 12.2.1996, Coll. G. Thirumalai.

Diagnosis : Shell elongate – turreted, rather thin, straw-coloured, finely sculptured with vertical striae; spire conical, apex blunt, suture deep, excavated; whorls 7–8, convex; aperture ovate, outer lip slightly thickened inside; columella arched and truncated below. Differs from the above being longer and proportionately narrower.

Distribution : INDIA : Hills of north-east India, Arunachal Pradesh, Meghalaya, Nagaland and Darjeeling in West Bengal. *Elsewhere* : Myanmar.

Family ACHATINIDAE

Genus *Achatina* Lamarck, 1799*Achatina fulica fulica* Bowdich1822. *Achatina fulica* Bowdich, *Elements of Conchology*, 1 : pl. 13, fig. 3.1950. *Achatina (Lissachatina) fulica fulica* : Bequart, *Bull. Mus. Comp. Zool. Harvard*, 105(1) : 216, pl. 8.*Material examined* : 7 exs., Lichi, Subansiri, Coll. G. Thirumalai.

Diagnosis : Shell large to very large, often reaching 100 mm. in length, ovately conical, strongly inflated, light yellowish or whitish with brown markings throughout; whorls 8, rounded and rapidly increasing, last whorl large exceeding half of total shell length; suture deep-impressed with a number of spiral striae just below; aperture large, ovate, outer lip simple, thin, columella strongly arched and truncate.

Distribution : INDIA : Abundantly occurs throughout including the Andaman and Nicobar Islands, except the dry north-west part of the country. *Elsewhere* : Malaysia, Mauritius, Scyelles, Singapore and Zanzibar.

Remarks : Though known to be abundant throughout eastern India, it is for the first time recorded from Arunachal Pradesh; Raut & Ghosh (1984) or Dey *et al.*, (1985) did not record this species from the state.

Family HELIXARIONIDAE

Genus *Sivella* Blanford, 1863*Sivella castra* (Benson)1852. *Helix castra* Benson, *Ann. Mag. Nat. Hist.*, (2)10 : 349.1914. *Trochomorpha (Sivella) castra* : Gude, *Fauna British India, Mollusca*, 2 : 3.1995. *Sivella castra* : Subba Rao *et al.*, *State Fauna Series 4*, (8) *zool. Surv. India*, 67 : pl. 14, figs. 182.*Material examined* : 4 exs., Yazali, L. Subansiri, 10.11.1996, Coll. G. Thirumalai.

Diagnosis : Shell medium sized, depressedly conical, umbilicate, apex obtuse; obliquely striate, whorls 5–6, rather flattened above, last whorl keeled at the periphery, flat on base; suture shallow, marginate; aperture oblique, subquadrate, outer lip thin.

Distribution : INDIA : Arunachal Pradesh, Assam, Meghalaya, Mizoram, Sikkim and West Bengal. *Elsewhere* : Malaysia, Myanmar and Thailand.

Family ARIOPHANTIDAE

Key to the genera

- Shell imperforate, whorls less than 5, rapidly increasing in size *Cryptaustenia*
- Shell perforate, whorls above 5, slowly increasing in size *Macrochlamys*

Genus *Cryptaustenia* Cockerell, 1891*Cryptaustenia silcharensis* (Godwin-Austen)

1907. *Austenia silcharensis* Godwin-Austen, *Land & Freshwater Moll. India*, **2** : 107, figs. 1-3c.
 1908. *Cryptaustenia silcharensis* : Blanford & Godwin-Austen, *Fauna British India Mollusca, (Testacellidae & Zonitidae)* p. 186
 1995. *Cryptaustenia silcharensis* : Subba Rao *et al.*, *State Fauna Ser. 4(8), zool. Surv. India* : 68, pl. 14, figs. 5, 6.

Material examined : 1 ex., Jairampur, Changlang, 8.11.1995, Coll. Ram Sevak; 1 ex., Rima Village, Changlang, 10.11.1995, Coll. Ram Sevak; 2 exs., Deomali, Tirap, 14.11.1995, Coll. Ram Sevak; 1 ex., Lichi, L. Subansiri, Coll. Thirumalai; 2 exs., Banderawa, Papum Pare, 14.7.1998, Coll. P. T. Bhutia.

Diagnosis : Shell small, depressed, very thin, straw-coloured, faintly striate, spire flattened, not rising above the level of body whorl; suture impressed; whorls 3 rapidly increasing, the last much wider than the rest, rounded at periphery and below; aperture oblique, widely lunate, peristome simple thin, columellar margin strongly curved.

Distribution : INDIA : Arunachal Pradesh, Assam, Meghalaya. New record for Arunachal Pradesh.

Cryptaustenia sp.

Material examined : 1 ex., Lichi, L. Subansiri, Coll. G. Thirumalai; 2 exs., Banderdewa, Papum Pare, 14.7.1988, Coll. P. T. Bhutia.

Remarks : The shells were damaged and could not be identified up to the species.

Genus *Macrochlamys* Benson, 1832*Macrochlamys atricolor* Godwin-Austen

1875. *Helix-Nanina atricolor*, Godwin-Austen, *J. Asiat. Soc. Beng.*, **2** : 2, pl. 1, fig. 2.
 1908. *Macrochlamys atricolor* : Blanford & Godwin-Austen, *Fauna British India, Mollusca, (Testacellidae & Zonitidae)*, p. 99, test-fig. 44.
 1995. *Macrochlamys atricolor* : Subba Rao *et al.*, *State Fauna Ser. 4(8), zool. Surv. India*, : 73, pl. 16, figs. 1, 2.

Material examined : 10 exs., Midpu, Doimuk, Coll. G. Thirumalai.

Diagnosis : Shell large, depressed, fairly thick, perforate, smooth, polished, yellowish-brown; faintly and minutely striate; spire low-conoid, scarcely raised; suture shallow, whorls 6, convex, the last rounded at the periphery and below, slightly impressed at umbilical region; aperture oblique, lunate, peristome thinly labiate inside, basal margin arcuate, columellar margin reflected at the perforation.

Distribution : INDIA : Arunachal Pradesh, Assam, Meghalaya, Manipur, Nagaland.
Elsewhere : Myanmar.

Remarks : New record for Arunachal Pradesh.

Macrochlamys sp.

Material examined : 1 ex., Lichi, L. Subansiri, Coll. G. Thirumalai; Banderdewa, Papum Pare, 14.7.1988, Coll. P. T. Bhutia.

Remarks : Damaged shells, could not be identified up to the species.

Family PLECTOPYLIDIDAE

Genus *Plectopylis* Benson, 1860

Sub-genus *Endothyrella* Zilch, 1960

Plectopylis (Endothyrella) plectostoma (Benson)

1836. *Helix Plectostoma* Benson, *J. Asiat. Soc. Beng.*, 5 : 351.

1914. *Plectopylis plectostoma* : Gude, *Fauna British India, Mollusca*, 2 : 81.

1995. *Plectopylis plectostoma* : Subba Rao *et al.*, *State Fauna Ser. 4(8), zool. Surv. India*, : 61, pl. 10, figs. 1, 2.

Material examined : 1 ex., Yazali, L. Subansiri, 8.4.1999, Coll. P. T. Bhutia.

Diagnosis : Shell small, sinistral, depressedly conoid, narrowly umbilicate, spire slightly raised, apex obtuse, plaitedly sculptured by oblique striae and spiral plications above, smoother below; whorls 5, narrowly coiled, last whorl compressed and distinctly descending in front; aperture oblique, lunate, outer lip thickened and reflected; parietal callus with a raised ridge; a number of plates, folds and denticles (parietal armature) present on the inner wall of the last whorl.

Distribution : INDIA : Hills of north-east India, Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland, Sikkim and Darjeeling in West Bengal. *Elsewhere* : Myanmar.

Family BRADYBAENIDAE

Key to the genera

- Shell strongly sculptured, last whorl descending in front *Aegista*
- Shell weakly sculptured, last whorl straight in front *Bradybaena*

Genus *Aegista* Albers, 1850

Sub-genus *Plectotropis* Von Martens, 1860

Aegista (Plectotropis) tapeina (Benson)

1836. *Helix tapeina* Benson, *J. Asiat. Soc. Beng.*, 5 : 352.

1914. *Plectotropis tapeina* : Gude, *Fauna British India Mollusca*, 2 : 214.

1995. *Plectotropis tapeina* : Subba Rao *et al.*, *State Fauna Ser. 4(8)*, *zool. Surv. India* : 83, pl. 24, figs. 2, 3.

Material examined : 1 ex., Yazali, L. Subansiri, 10.1.1988, Coll. G. Thirumalai.

Diagnosis : Shell moderately large, sublenticular, widely umbilicate, thick, greenish, with distinct oblique striae, spiral sculpture weak; spire conoidly raised; whorls 7, flattened above, last whorl angulate at the periphery, fairly convex below, descending near the aperture; aperture oblique, subcircular, peristome thin, reflected, columellar margin reflected. Shows variation in height-diameter ratio and also in angulation of the last whorl.

Distribution : INDIA : Common throughout north-eastern region, Arunachal Pradesh, Assam, Meghalaya, Mizoram and northern parts of West Bengal. *Elsewhere* : Myanmar.

Genus *Bradybaena* Beck, 1837

Bradybaena similaris (Ferussac)

1822. *Helix (Helicella) similaris* Ferussac, *Tabl. Syst. Limacons*, 1822, No. 262.

1914. *Eulota similaris* : Gude, *Fauna British India Mollusca*, 2 : 200.

Material examined : 6 exs., Yazali, L. Subansiri, 8.4.1999, Coll. P. T. Bhutia; 6 exs., Anini Road, Dibang Valley, 14.12.1986, Coll. G. Thirumalai.

Diagnosis : Shell depressedly globose, umbilicate, rather thin, brownish; or pale whitish, often with a brown band around the periphery; spire convex, apex pointed, decussately sculptured above and also below, whorls 5–6 convex, last whorl rounded or subangulate at the periphery, convex below; aperture oblique, peristome thin, reflected, columellar margin reflected. Also a variable shell, varies in height of spire or angulation of the last whorl.

Distribution : INDIA : Arunachal Pradesh, Assam, Manipur, Mizoram. *Elsewhere* : One of the very widely distributed species. Argentina, Australia, Brazil, China, Cuba, Japan, Indonesia, Malaysia, Myanmar, Sri Lanka, Thailand, West Indies and various Pacific Islands.

GENERAL DISCUSSION

The material collected from Itanagar Wild Life Sanctuary includes 18 species under 16 genera and 12 families. All the species of freshwater molluscs (7 species under 5 genera and 5 families) have all India range of distribution. Most of the 11 species of landforms are Indo-Malayan in distribution. The two land operculates (*Pearsania oakesi* and *Cyclophorus sidiensis*) are endemic to Arunachal Pradesh. Two of the Pulmonates (*A. fulica* and *B. similaris*) are among the ubiquitous species occurring in many parts of the world. Of the seven remaining species, three species (including *A. fulica*) are for the first time recorded from Arunachal Pradesh and the remaining are confined to the hills of north east India extending to Myanmar.

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