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Indian Brachionidae (Eurotatoria: Monogononta) and their distribution

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Abstract

Thirty-one species of Brachionids (Eurotatoria: Brachionidae) are reported from India. *Brachionus bennini* (Leissling) and *B. patulus macracanthus* (Daday) are new records from this country. Two new synonyms are proposed. Comments are made on the distribution of the different taxa.

Introduction

The Brachionidae are presently believed to include seven genera (Koste, 1978) i.e., *Brachionus, Keratella, Platyias, Anuraeopsis, Notholca, Kellicottia* and *Paranuraeopsis.* Of these, the first five genera are represented in India, where they form significant fraction of the total Rotifera (Sharma & Michael, 1980) and form an important component of the plankton.

This communication reviews the diversity, taxonomic status and distribution of all known Indian taxa of the Brachionidae. Thirty-one species are recognised from this country. Two taxa are new records from India. Two new synonyms are proposed.

Material and methods

The present observations are based on the study of over 2000 samples collected by the author from various localities in Eastern (West Bengal and Orissa), North-Western (Panjab, Haryana and Himachal Pradesh) and North-Eastern Indian (Meghalaya, Assam, Nagaland, Mizoram, Manipur, Arunachal Pradesh and Tripura) and also on the previous Indian literature. Measurements, wherever mentioned, are given in micrometers (μm).

Taxonomic remarks

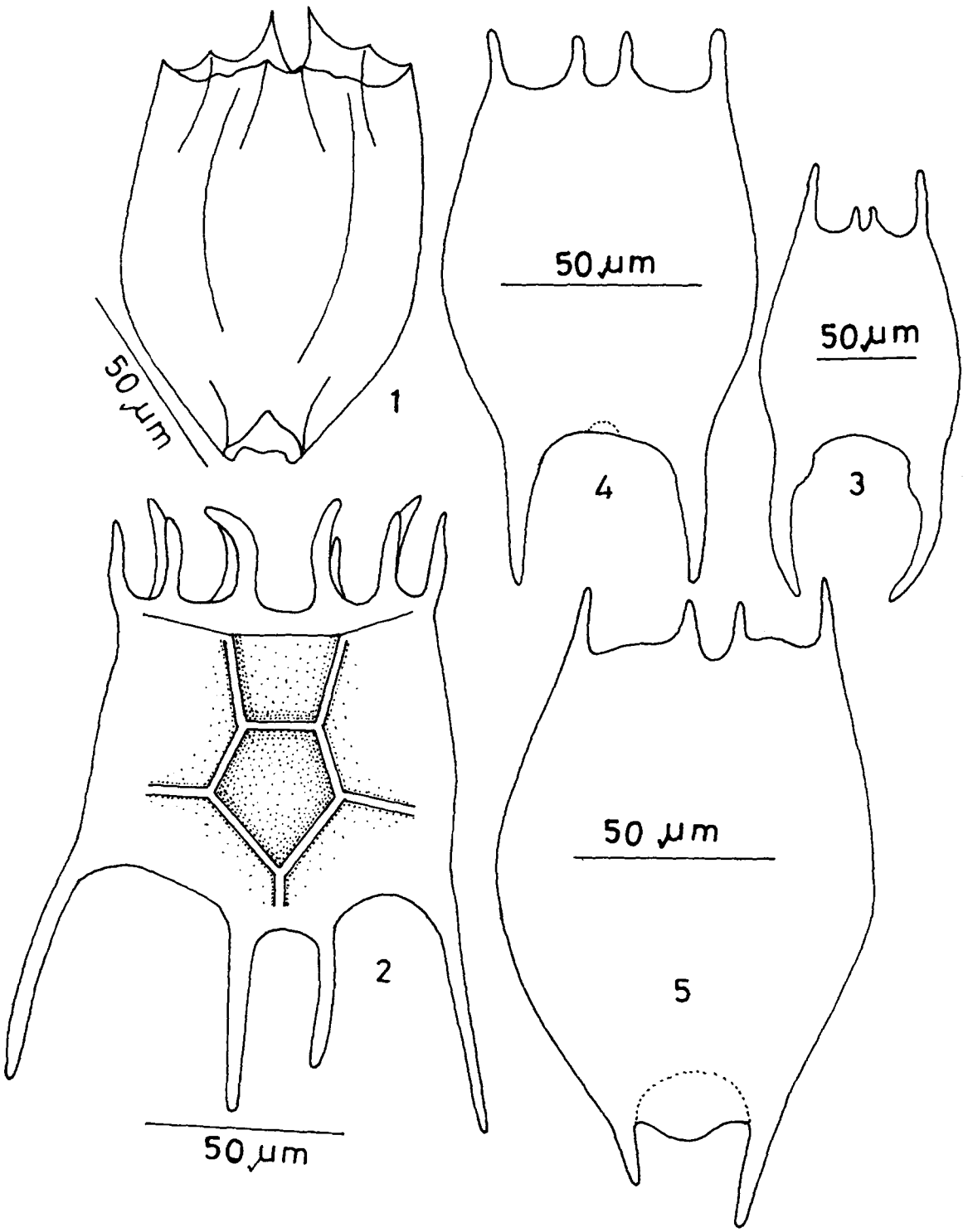
Because of morphological plasticity in various brachionids, considerable anomalies exist in the Indian literature regarding the taxonomic status of many taxa. Much of these discrepencies are the result of attempts to assign specimens to previously described taxa. Thirty-one species are presently recognised from this country. Taxonomic remarks on the different taxa are given below: –

Genus *Brachionus*

It is one of the most ancient genus of monogonont rotifers and includes about 46 species. A review of Indian species of *Brachionus* has been done by Sharma (1983). Additional comments are based on the study of more collections or on some recently published reports:

Brachionus bennini (Leissling): Characterised (Fig. 1) by the shape of its occipital spines, ventral margin and that of the foot-opening. It comprises a new record from this country; only one specimen of this species was collected from Mizoram (North-Eastern India).

Brachionus patulus macracanthus (Daday): Shows (Fig. 2) longer posterior and postero-lateral spines. Represents a new record from India; it has been collected only from Meghalaya State (N.E. India).



Figs 1–5. 1) *Brachionus bennini* (Leissling), ventral view; 2) *Brachionus patulus macracanthus* (Daday), dorsal view; 3) *Brachionus forficula* Wierzejski, dorsal view (after Sharma, 1980); 4, 5) *Brachionus forficula minor* Voronkov, dorsal views.

Brachionus forficula: This species is represented by the typical specimens (Fig. 3) and *B. forficula minor* (Fig. 4). Some specimens of the later from Mizoram (N.E. India) show (Fig. 5) reduced and unequal posterior spines. The same are identical with the material from Malaysia (Fernando & Zankai, 1981).

Brachionus calyciflorus: It is a variable species and such variations are also reported in the Indian material (Sharma, 1983). Rao & Mohan (1983) described v. *waltairensis* new var. from Visakhapatnam, Andhra Pradesh which is presently proposed to be a synonym of f. *anuraeiformis* (Brehm).

Genus *Keratella*

Amongst about 37 known species of *Keratella*, only seven have so far been reported from India. Specimens from Chirawa, Rajasthan State (Fig. 6) were raised to the status of a distinct species *K. edmondsoni* by Nayar (1965). They differ from *K. quadrata* (Fig. 7) in the absence of posterior-most dorsal median plaque. Further, Nayar's species agrees with *K. serrulata* (Ehrb.) in its dorsal pattern but lacks characteristic serrulations of the occipital spines. The specific identity of '*K. edmondsoni*' could not be ascertained as 'type-material(?)' was not available for examination.

Because of distinct geographical distribution (Berzins, 1955) of *K. valga*, its record from Nagpur, Central India (Arora, 1966) needs confirmation. However, Arora's figure itself shows insufficient details of the posterior region of the dorsal pattern (Fig. 8).

Specimens of *K. tropica* show morphological (cyclomorphic) variation (Figs 9–14). Some specimens (Fig. 15) collected by Wulfert (1966) from Baroda (Gujarat) differ from the typical *tropica* in its dorsal pattern. Of the other species, *K. lenzi* (Fig. 16), *K. procurva* (Fig. 17) and *K. cochlearis* (Figs 18, 19) represent the typical condition.

Genus *Platyias*

Platyias longispinosus Arora 1966 described from Nagpur, Central India (Fig. 20) is proposed as a synonym of *P. leloupi* (Gillard, 1957). Further, Arora's material broadly resembles specimens reported (Fig. 21) from Lake Tanganyika, Central Africa (Gillard, 1957).

Dhanapathi (1974) described *Platyias quadricornis andhraensis* from Andhra Pradesh (Figs 22–24). Besides the usual morphometric variations, this new subspecies differed from *P. quadricornis* in the presence of cuticular plates at the base of first foot-joint.

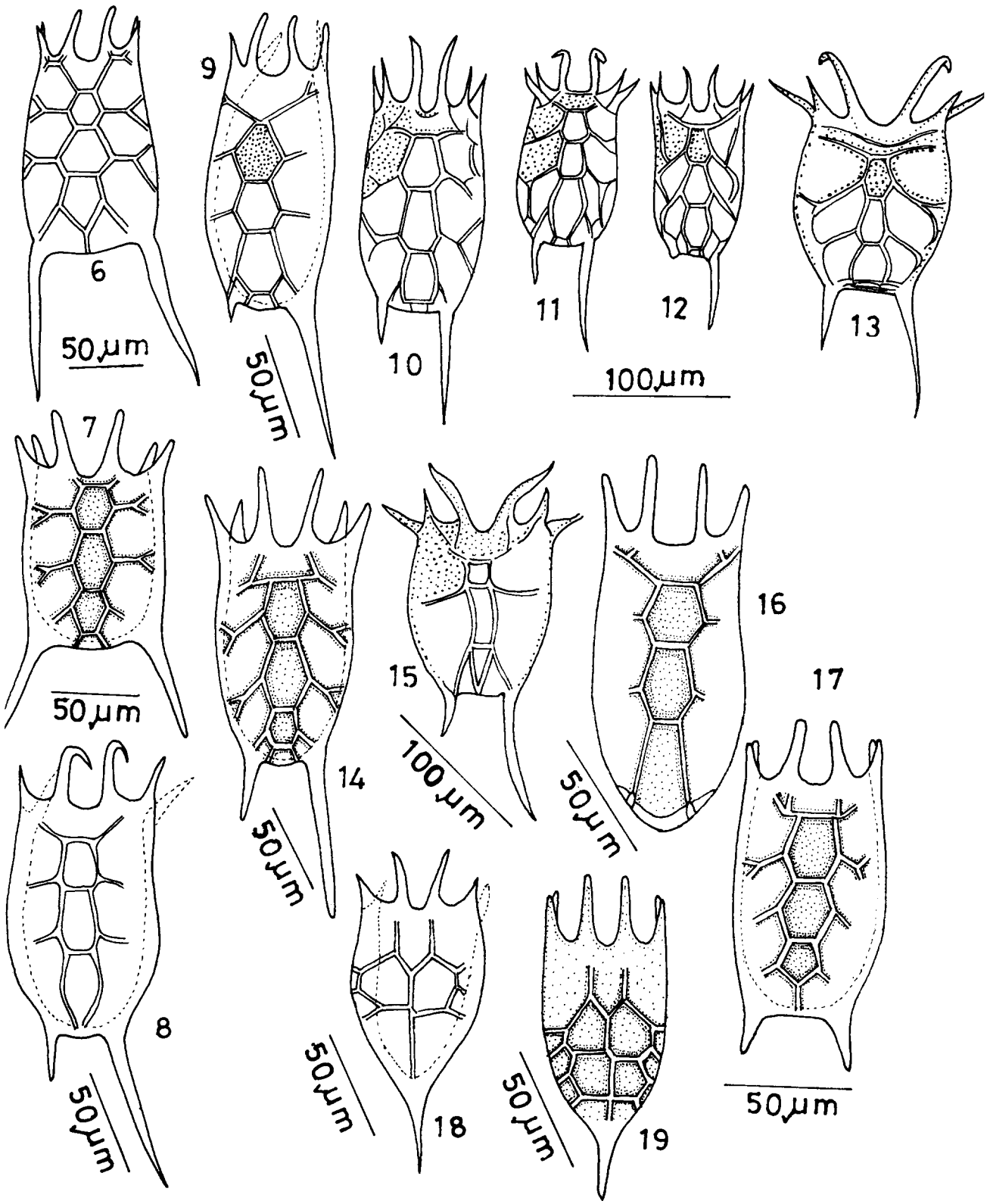
Genus *Anuraeopsis*

It includes only two species from India – *fissa* (Figs 25–29) and *coelata* (Figs 30–35). Vasisht & Battish (1971) reported *A. navicula* (misspelt as *A. naricula*) with insufficient details (Fig. 36) but it apparently refers to *A. coelata.*

Genus *Notholca*

This genus is represented by only two species, *N. squamula* (Müller) and *N. acuminata* (Ehrb.). The former has been collected from Ladak and Kashmir (Edmondson & Hutchinson, 1934) while the later has been reported from Mansbal lake (Qadri & Yousuf, 1982) and Anchar lake (Balkhi *et al.*, 1984) in Kashmir valley. However, none of the stated species reports include figures of the studied material to ascertain the specific identity.

Figs 6–19. 6) *Keratella edmondsoni* (Ahlstrom), dorsal view (after Nayar, 1965); 7) *Keratella quadrata* (Müller), dorsal view (after Sharma, 1979); 8) *Keratella valga* (Ehrb.), dorsal view (after Arora, 1966); 9) *Keratella tropica* (Apstein), dorsal view (after Arora, 1966); 10–13) *Keratella tropica* (Apstein), dorsal views (after Wulfert, 1966); 14) *Keratella tropica* (Apstein), dorsal view (after Sharma, 1979); 15) *Keratella tropica* (Apstein), dorsal view (after Wulfert, 1966); 16) *Keratella lenzi* Hauer, dorsal view (after Sharma, 1979); 17) *Keratella procurva* (Thorpe), dorsal view (after Sharma, 1979); 18) *Keratella cochlearis* Gosse, dorsal view (after Arora, 1966); 19) *Keratella cochlearis* Gosse, dorsal view (after Sharma, 1979).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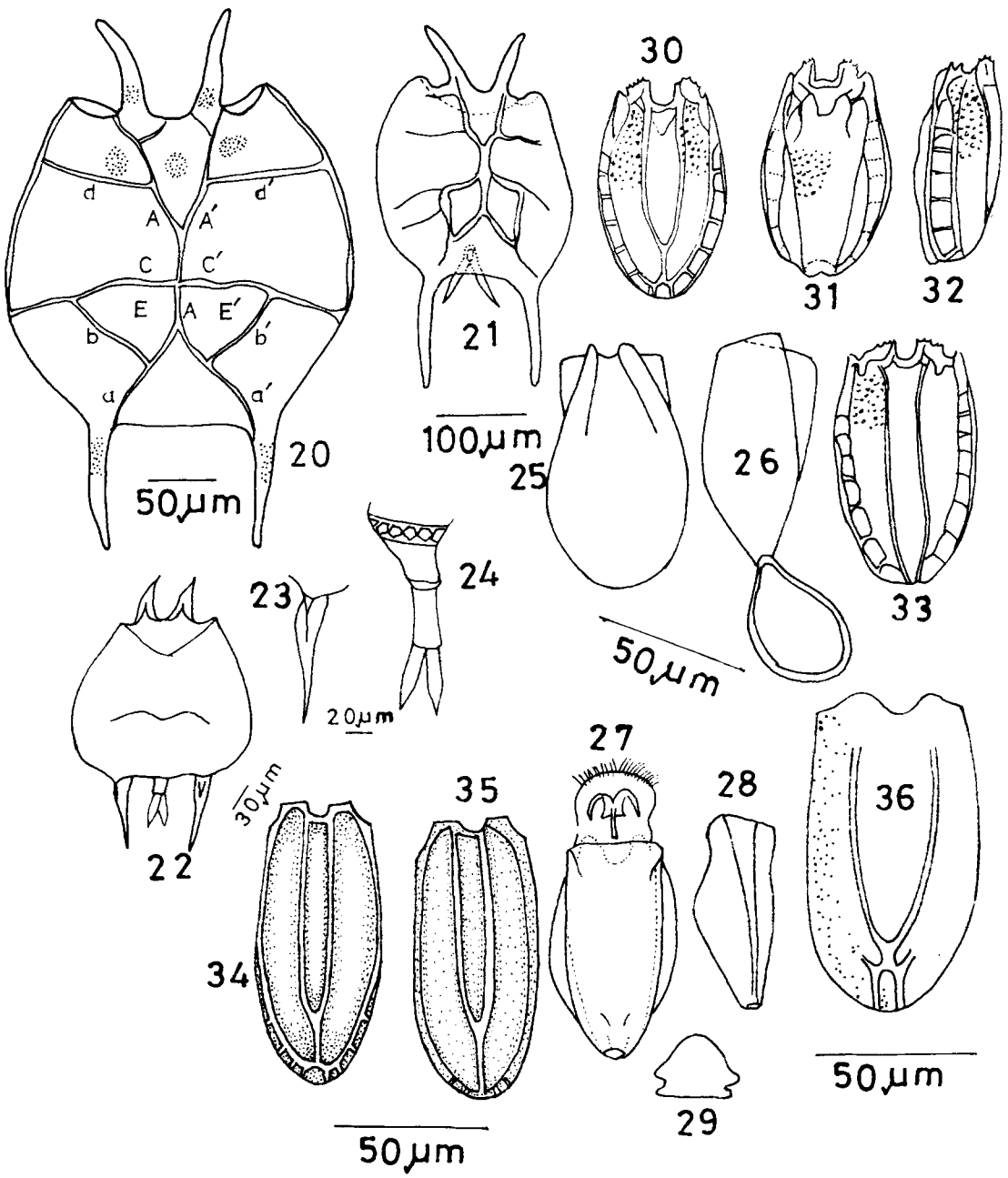

Figs 20–36. 20) *Platyias leloupi* (Gillard) = *P. longispinosus* Arora, dorsal view (after Arora, 1966); 21) *Platyias leloupi* (Gillard), dorsal view (after Gillard, 1957); 22–24) *Platyias quadricornis andhraensis* Dhanapathi, dorsal view, posterior spine and foot (after Dhanapathi, 1974); 25, 26) *Anuraeopsis fissa* Gosse, dorsal view and lateral view (after Sharma, 1979); 27–29) *Anuraeopsis fissa* Gosse, ventral view, lateral view and cross-section (after Wulfert, 1966); 30–33) *Anuraeopsis coelata* (De Beauchamp), dorsal view, ventral view, lateral view and dorsal view (after Wulfert, 1966); 34, 35) *Anuraeopsis coelata* (De Beauchamp), dorsal view and ventral view (after Sharma, 1979); 36) *Anuraeopsis coelata* (= *A. navicula*: Vasisht & Battish) dorsal view (after Vasisht & Battish, 1971).

Discussion

The genus *Brachionus* is of Gondwanian origin and has invaded Eurasia and North America secondarily by dispersal from Africa and India (Dumont, 1983). It is missing in the arctics but predominates in the tropics and subtropics. An abundance of *Brachionus* spp. in tropical faunas has been registered by Green (1972), Chengalath *et al.* (1974), Pejler (1977), Fernando (1980a, 1980b), Sharma & Michael (1980) and Sharma (1983). Various species of this genus dominate plankton samples in warmer parts of peninsular India. Further, they are conspicuous for their absence or rare occurrence at northern altitudes in this country. A majority of the reported Indian species of *Brachionus* are eurytopic, alkaline, cosmopolitan, cosmotropical or pantropical and show wide a distribution. *B. dimidiatus, B. leydigi* and *B. pterodinoides* are reported only from restricted localities (Sharma, 1983). *B. donneri* was considered to be an interesting element in the rotifer fauna of South-East Asia (Dumont, 1983). Described from Madras (Tamil Nadu), this brachionid has recently been collected from the States of Assam and Meghalaya in North-Eastern India (unpublished data). Besides, it is also known from Sri Lanka, Cambodia and Panama (Fig. 37). Koste (personal communication) considers it to be of circumtropical distribution. *B. forficula*, an old world species, is suggested (De Ridder, 1981) to be a geographical vicariant of both *B. havanaensis* and *B. trahea.* Specimens of *B. forficula minor* with reduced and unequal posterior spines were not reported earlier from this country.

Keratella shows the widest latitudinal range. Endemism in this genus is concentrated near both poles, with no endemism in the tropics and little in the subtropics, except Australia and South America (Dumont, 1983). Likewise, all the Indian species of *Keratella* are also known from elsewhere. *K. tropica* appears to be most widely distributed in this country; this common species of tropical and subtropical regions is replaced by the cosmopolitan *K. coch-*

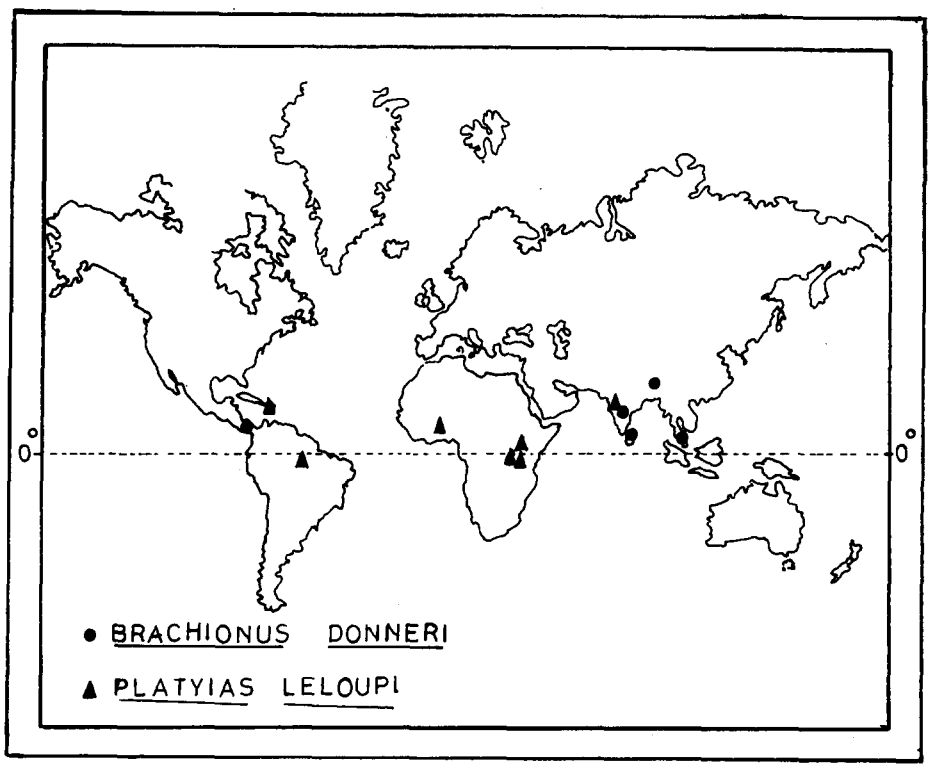

Fig. 37. Geographical distribution of *Brachionus donneri* Brehm and *Platyias leloupi* (Gillard).

learis at northern Indian altitudes. The later forms a dominant component of limnetic zooplankton in hill regions of North-Eastern India. *K. quadrata*, very common in the arctic, the boreal and the temperate regions, is notable for its rare occurrence in Indian waters; it has been reported only from Panjab, Rajasthan, Kerala and Assam. *K. valga*, a characteristic of warmer-temperate climates, has interestingly been reported from Central India along with *K. tropica*. *K. procurva* is collected from Panjab, Kerala, Rajasthan, West Bengal and Orissa while *K. edmondsoni* is reported only from Rajasthan. *K. lenzi* is rare in collections from Panjab and West Bengal but common in acidic or slightly alkaline waters in Assam and Nagaland in North-Eastern India.

The warm stenothermal tropical *P. leloupi* is recorded only from Central India. This species was first supposed to be an 'Ethiopian element' (Pejler, 1977) but is now known from Brazil, Africa, Ceylon and India (Fig. 37). *P. quadricornis* appears to be widely distributed in this country while *P. quadricornis andhraensis* is an endemic element in the Indian Rotifera.

Anuraeopsis fissa shows a wide distribution in India, as compared with *A. coelata*. *Notholca squamula* (Müller) and *N. acuminata* (Ehrb.) are both reported from Kashmir State while the former has also been collected from Ladak. More species of this arctic genus may occur at northern high altitudes.

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