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DISTRIBUTION AND ECOLOGY OF RECENT OSTRACODES FROM MANSAR LAKE, JAMMU

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ABSTRACT

The paper reports for the first time the Recent freshwater ostracode assemblage from the Mansar Lake of Jammu. This assemblage comprises 6 taxa : *Darwinula stevensoni*, *Candona lactea*, C. sp., *Candonospis kingsleii*, *Ilyocypris gibba* and *Ilyocypris* sp. Besides the information regarding distribution and systematic description of the ostracodes, this paper incorporates brief comments on the ecological relationship. The pH of the water fluctuates between 6.5 and 8.2, with a maximum in November and minimum in July. The dissolved oxygen values fluctuate between 8.4 and 13.8, mg/1 in the surface and 4.8 to 5.6 mg/l at deeper zones. Free carbon dioxide is maximum in the months of July/August and in winter months (at all depths) mainly due to higher respiratory activity of fauna during summer months and due to decay and decomposition of aquatic vegetation during winter.

INTRODUCTION

The Mansar Lake area is entirely covered by the lower Siwalik followed by Quaternary. Mansar Lake is a large eutrophic water body, 54 kms east of Jammu city (32o8' N-75o2'E) at an altitude of 666 m above mean sea level (fig. 1). Although aquatic flora and fauna of the lake have been fairly well documented, it is surprising that the ostracode fauna has not received any attention so far. The necessity of studying the ostracodes and their ecological relationship from the Mansar Lake of Jammu stems from their significance in the palaeoecological and ecological relationship in relation to that of the adjacent Kashmir region, which has already been well documented through the works of Bhatia (1968, '69), Bhatia and Singh (1970a, 70b, 1971) and Singh (1969, 1973). The present study records the ostracode fauna and their ecological relationship from the Mansar lake of Jammu. Samples from thirty stations in the lake were analysed for ostracodes and have yielded six ostracode species listed below:

Darwinula stevensoni (Brady and Robertson)	A
Candona lactea Baird	A
Candona sp.	R
Candonopsis kingsleii (Brady and Robertson)	F
Ilyocypris gibba (Ramdohr)	F
Ilyocypris sp.	R

(A = Abundant : F = Frequent and R = Rare)

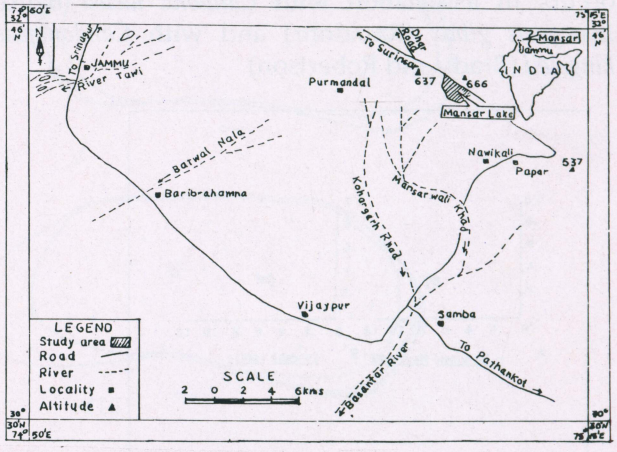


Fig. 1. Location map of the study area.

SYSTEMATIC DESCRIPTION

Phylum **Arthropoda**
Class **Crustacea**
Subclass **Entomostraca**
Order **Ostracoda**
SubOrder **Podocopa**
Family **Darwinulidae**
Genus ***Darwinula*** Brady and Robertson, **1885.**

Darwinula stevensoni (Brady and Robertson)
(Pl.I, figs. a,b,c,; fig. 3 I, II, III)

Argilloecia aurea Brady and Robertson, 1870, p. 16: pl. 8, figs. 4-5.
Polycheles stevensoni Brady and Robertson, 1970, pp 25-26, pl. 7; figs. 1-7; pl. 10, figs. 4-14.
Darwinula stevensoni (Brady and Robertson), Brady and Norman, 1889, pp 122-123; pl. 10, figs. 7-13, figs. 1-9 ; pl. 23, fig. 5. – Bhatia, 1968, pl. 3.; figs. 5a-b; pl 5, fig. 13.

Material : Over sixty specimens, adult and juvenile.

Dimensions : See Fig. 2 A.

Remarks : The present specimens from Mansar lake are characterized by elongate, ovate outline in lateral view, right valve slightly larger than the left. Overlapping distinctly along anterior, posterior and ventral margins. Rosette-shaped muscle scar pattern consisting of ten spots. This species has also been reported from the Upper Siwalik beds near Chandigarh (Bhatia and Khosla, 1967a), from Bhiwani Tehsil (Bhatia and Khosla 1969b), from the Upper Karewas of Kashmir (Bhatia (1968) and from the lakes of Kashmir (Singh, 1977).

Ecology : The present species has been found along the lake margins with abundant vegetation. It occurs in association with *Candona lactea* Baird, *Ilyocypris gibba* (Ramdohr) and with *Candonopsis kingsleii* (Brady and Robertson).

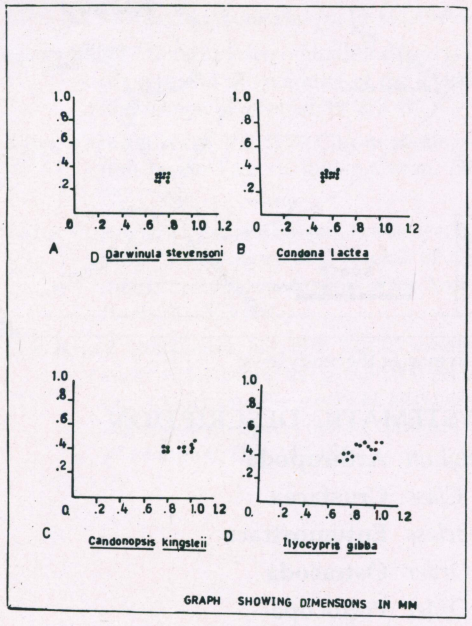


Fig. 2. Graph showing dimensions in mm.

Family **Cyprididae**
Subfamily **Candoninae**
Genus ***Candona*** Baird

Candona lactea Baird
(Pl. I, figs.f, g; fig. 3 IV, V)

Candona lactea Baird, 1845, p. 255, pl. 18, figs. 25-27. – Bhatia 1968, pl. 2, fig. 5a-c, pl. 5, figs. 1-2, p. 472. – Bhatia and Singh, 1971, pl. 1, fig. 5, p. 218. – Bhatia and Khosla, 1977, p. 336, fig. 2B.

Material : Over fifty specimens (all females).

Dimensions : See fig. 2B.

Remarks: In India, it has been reported from the Upper Siwalik beds near Chandigarh (Bhatia and Khosla, 1967), the Upper Karewas of Kashmir (Bhatia, 1968) and fresh water lakes of Kashmir Valley (Bhatia and Singh, 1971).

Ecology : *Candona lactea* Baird is in general a cold hardy species (Staplin, 1963). Though it is a fresh water species, it also lives in polyhaline water (Mckenzie 1964). The present specimens from Mansar lake have been collected from shallow-water sediments along the margins. These are thin, smooth shelled forms with a moderate inner lamella.

Subfamily **Candoninae** Dday
Genus ***Candonopsis*** Vavra, 1891

Candonopsis kingsleii (Brady and Robertson)
(Pl. I, figs. d, e; fig. 3 VI, VII, VIII, IX)

Candonopsis kingsleii Brady and Robertson, 1870 p. 17 pl. 9. figs. 9-12. —Vavra, 1891, p. 54, fig. 16 (1-10). —Muller, 1900, p. 38, pl. 6; figs. 5, 6, 23-28; pl. 7; figs. 22, 25. —Sars, 1928, p. 38, pl. 41. —Swain, 1963, pl. 96; fig. 4; p. 806. —Bhatia and Singh, 1977, pl. 3; figs. 1-2; p. 407.

Material : Fifteen specimens, adult and juvenile.

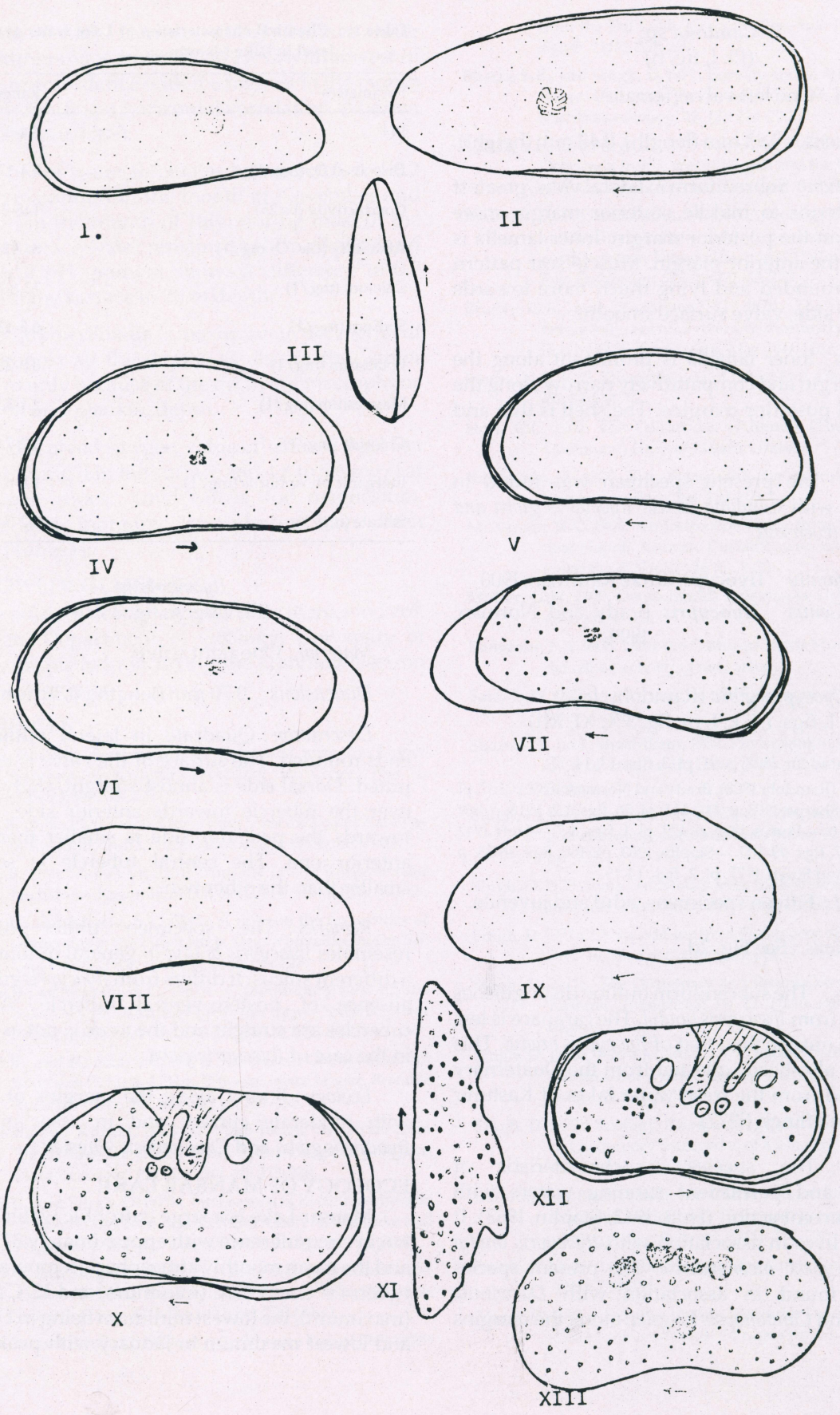
Dimensions : See fig. 2c.

Remarks : The specimens are similar in essential characters to *Candonopsis kingsleii.* Inner lamella is broad anteriorly and posteriorly. This species also occurs in the Upper Pleistocene deposits as reported by (Bhatia 1968) and from the Recent fresh water lakes of Kashmir (Bhatia and Singh, 1970).

Ecology : The species is commonly found in permanent small fresh water bodies and lakes with rich vegetation. The present species in Mansar lake is found along the margins in association with *Darwinula stevensoni* and *Candona lactea.*

Subfamily **Candoninae**
Genus ***Candona*** Baird, 1845

Fig. 3. I *Darwinula stevensoni*, right valve, internal view, x 94; II *Darwinula stevensoni*, left valve, internal view, x 115; II *Darwinula stevensoni*, carapace, dorsal view, x 54; IV *Candona lactea*, right valve, internal view, x 120; V *Candona lactea*, left valve, internal view, x 120; VI *Candonopsis kingsleii*, right valve, internal view, x 75; VII *Candonopsis kingsleii*, left valve, external view, x 75; VIII *Candonopsis kingsleii*, left valve, external view, x 74; IX *Candonopsis kingsleii*, right valve, external view, x 74; X *Ilyocypris gibba*, left valve, internal view, x 72; XI *Ilyocypris gibba*, carapace, dorsal view, x 72; XII *Ilyocypris gibba*, right valve, internal view, x 70; XIII *Ilyocypris sp.*, left valve, internal view, x 70;


I.
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII

Candona sp.
(Pl. I, fig. h)

Material : One left valve (female).

Dimensions : 0.93 mm (length), 0.43 mm (height).

Description : Subreniform in lateral view, greatest height posterior to middle, anterior margin more rounded than the posterior margin. Inner lamella is broader in the anterior margin. Muscle scar pattern somewhat rounded and lying much more towards the anterior side, valve surface smooth.

Remarks : Inner lamella is prominent along the anterior margin and comparatively narrow along the ventral and posterior margins. The shell is thin and smooth.

Ecology : The present specimen was found in association with *Candona lactea, Ilyocypris gibba and Darwinula stevensoni.*

Subfamily **Ilyocypridinae** Kaufman, 1900
Genus ***Ilyocypris*** Brady and Norman, 1899

Ilyocypris gibba (Ramdohr, 1808)
(Pl. I, figs. i, j, k, l, m; fig. 3 X, XI, XII)

Cypris gibba Ramdohr, 1808, p. 91, pl. 3, figs. 13, 14, 17.
Ilyocypris gibba (Ramdohr 1808), Brady and Norman, 1889, p. 107, pl. 22, figs. 1-5. —Sharpe, 1908, p. 410-411, pl. 56, figs. 1,2: 1918, p. 809, figs. 1, 2, 5, 7a, b. —Furtos, 1933, p. 427, pl. 1, figs. 4-7. —Hoff, 1942, p. 128-130, p. 7, figs. 99-100. —Staplin, 1963, pl. 160, figs. 36-38, p. 118. —Bhatia and Singh, 1977, pl. 2, figs. 14-15.

Material : Fifteen specimens, adul and juvenile.

Dimensions : See Fig. 2d.

Remarks: The subreniform outline distinguishes this species from *Ilyocypris bradyi*. The carapace is less quadrate in outline than that of *Ilyocypris bradyi*. This species has also been collected from the Quaternary deposits and from the fresh water lakes of Kashmir by Bhatia and Singh (1977).

Ecology : The species is characteristic of temporary and permanent running waters with sufficient current action (Hoff, 1942; Staplin, 1963). It commonly lives in association with *Ilyocypris bradyi* and *Heterocypris incongruense*. The present species has been found in association with *Darwinula stevensoni* and *Candonopsis kingsleii* along the margins in the lake.

Table 1: Chemical characteristics of Lake water at the surface level in Lake Mansar.

Parameters	Range
PH	6.4-8.2
Dissolved O_2 (mg/1)	8.4-13.8
Conductivity (bs 25)	148-375
Alkalinity ($CaCO_3$ mg/1)	84-124
Calcium (mg/1)	12.6-22.8
Sodium (mg/1)	6.5-13.9
Potassium (mg/1)	0.8-28
Magnesium (mg/1)	2.1-3.7
Chloride (mg/1)	5.2-7.7
Inorganic phosphorus (mg/1)	1.8-6.9
Silicate (mg/1)	0.2-3.6

Ilyocypris sp.,
(Pl. I, fig. n; fig. 3 XIII)

Material : One right valve.

Dimensions : 0.70 mm (length), 0.36 mm (height).

Description : Quadrate in lateral outline, both ends rounded. The surface of the valve is uniformly pitted. Dorsal side is almost straight, slightly raised over the tubercle towards anterior side. Tubercle towards the posterior side is smaller than that of anterior one. The central tubercle is somewhat smaller than the other two.

Remarks : The specimen under discussion resembles *Ilyocypris bradyi* in general outline but has a different sulcus. It differs from *Ilyocypris gibba* in the absence of postero-ventral tubercle. Also, the tubercles are straight and the peak is not as sharp as in the case of *Ilyocypris gibba*.

Ecology : Found along the margins of the lake with moderate current and in association with *Ilyocypris gibba* and *Candonopsis kingsleii*.

ECOLOGY OF MANSAR LAKE

Mansar Lake is a large eutrophic water body 4.3 km in circumference with approximately 37 m depth and the mean monthly atmospheric temperatures between 4.0°C and 23°C (minimum) and 32°C and 42°C (maximum), the lowest minimum being in December and lowest maximum in January with peak 42°C in

the month of May. Correspondingly surface water temperature ranges from 9°C to 26°C with lowest in January, in accordance with the highest in the month of June, exhibiting a horizontal correlation. (Sharma and Shashikant, 1989).

The pH of water fluctuates between 6.5 and 8.2 with the maximum in the month of November and minimum in the month of July; during most of the year, the surface water remains slightly alkaline and the vertical pH gradient shows a difference of 0.7 units from the surface to 20 m depth.

Free carbon dioxide is maximum in the month of July at almost all the depths as also in the winter months mainly because of the decaying macrophytic vegetation and planktic depth.

The dissolved oxygen values fluctuate between 8.4 and 13.8 mg' I in the surface and 4.8 to 5.6 mg/I at the deeper zones. Low values for magnesium, chloride and inorganic phosphorus have been noticed (Table 1).

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EXPLANATION OF PLATE

Plate I

(White bar scale equals 100 μm)

a. *Darwinula stevensoni*,, right valve,, internal view.

b. *Darwinula stevensoni*,, "rosette" shaped muscle scar pattern.

c. *Darwinula stevensoni*,, carapace,, dorsal view.

d. *Candonopsis kingslei*,, right valve,, internal view.

e. *Candonopsis kingsleii*,, left valve,, external veiw.

f. *Candona lactea*,, left valve,, external view. g.

g. *Candona lactea* left valve,, internal view.

h. *Candona* sp. left valve,, internal view.

i. *Ilyocypris gibba*,, right valve,, external view.

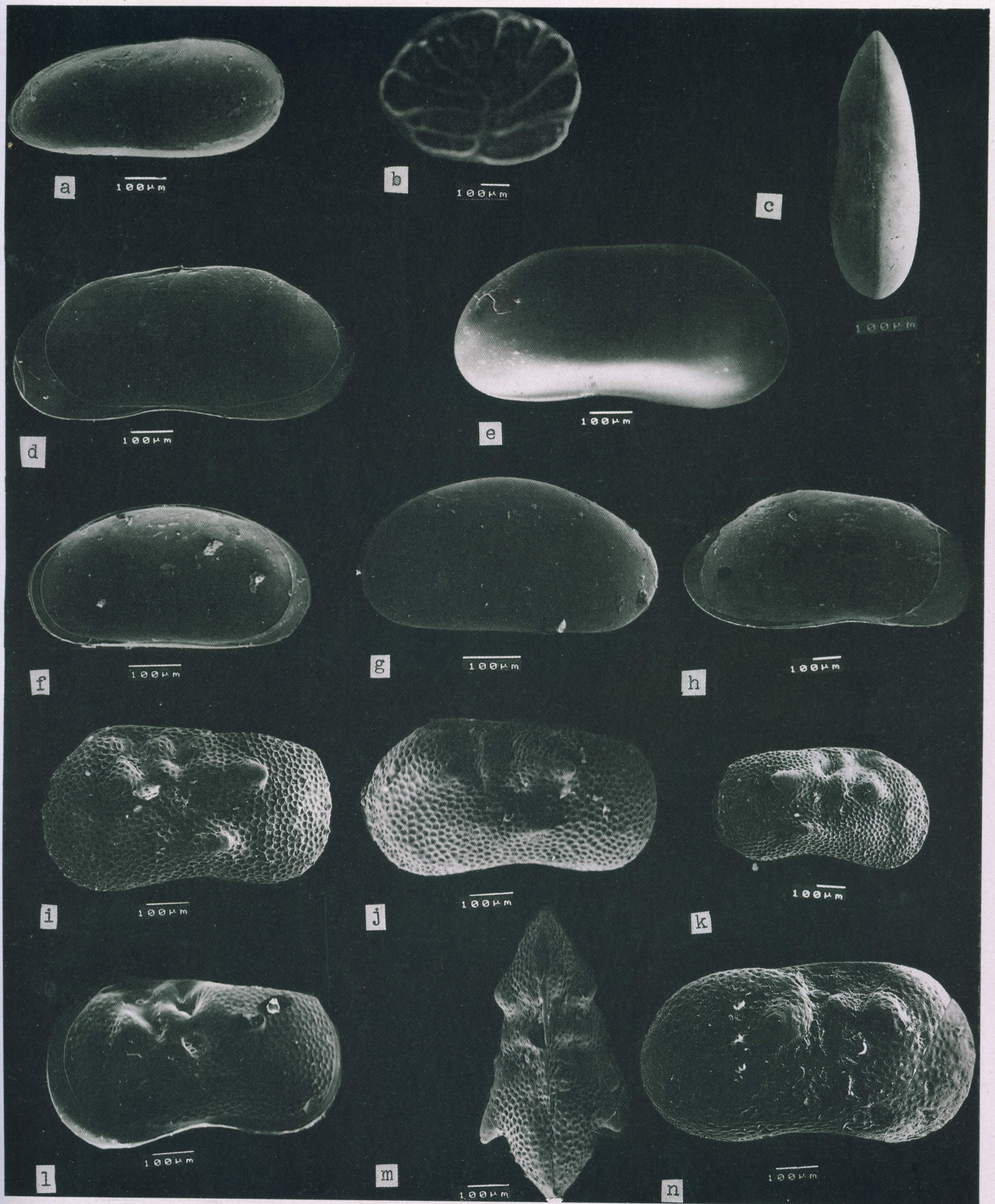
j. *Ilyocypris gibba*,, right valve,, external view.

k. *Ilyocypris gibba*,, right valve,, external view.

l. *Ilyocypris sp.*,, left valve,, internal view.m.

m. *Ilyocypris* gibba,, carapace,, Dorsal view.

n. *Ilyocypris* sp.,, left valve,, outside view.



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