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# FRESH-WATER OSTRACODA FROM THE PALEOCENE OF THE NEMEGT BASIN, GOBI DESERT, MONGOLIA

(Plates XV-XVIII)

Abstract. — Eleven species of fresh-water Ostracoda from the Paleocene of the Nemegt Basin (Tsagan Khushu, Naran Bulak and Ulan Bulak localities), Gobi Desert, are described and figured. One new genus Caganella n. gen. and four new species: Caganella mongolica n. sp., Limnocythere nemegtensis n. sp., Timiriasevia naranbulakensis n. sp. and T. ulanbulakensis n. sp. are erected. The remaining seven species belong to the genera Candoniella SCHNEIDER, 1956, Timiriasevia MANDELSTAM, 1947, ?Eucypris VAVRA, 1891 and ?Lycopterocypris MANDELSTAM, 1956.

#### INTRODUCTION

The present paper is the second on the fossil fresh-water ostracods from the Gobi Desert, collected during the Polish-Mongolian Palaeontological Expeditions (1963—1965). The Upper Cretaceous ostracods from the Nemegt Basin, in the Gobi Desert, have been described in SZCZECHURA and BLASZYK (1970). The ostracods described in the present paper come from strata, designated as Paleocene by GRADZIŃSKI *et al.* (1968/1969). The Paleocene ostracods from Mongolia have not been described previously. The ostracod samples from the Nemegt Basin were collected in the localities of Naran Bulak, Tsagan Khushu and Ulan Bulak where the Paleocene sediments are developed as claystones, siltstones and marls. The exact location of the outcrops and their lithological descriptions are given in GRADZIŃSKI *et al.* (1968/1969). Text-figures 1—3, in the present paper, illustrate parts of the geological profiles of the Paleocene deposits at Naran Bulak, Tsagan Khushu and Ulan Bulak. The profiles in Text-figs. 1 and 2 are after GRADZIŃSKI *et al.* (1968/1969), whilst Text-fig. 3 is based on unpublished data submitted by Dr. J. LEFELD. Table 1 lists the identified ostracod species and records their occurrence in the samples examined. In addition to the ostracods, the samples contain numerous Characea which are being investigated by Dr. J. KARCZEWSKA and Mrs. M. ZIEMBIŃSKA-TWORZYDŁO.

#### ACKNOWLEDGEMENTS

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The specimens described in the present paper are housed in the Palaeozoological Institute of the Polish Academy of Sciences in Warsaw, abbreviated as Z. Pal.

#### MATERIAL AND STRATIGRAPHY

Out of the five samples from Naran Bulak, Tsagan Khushu and Ulan Bulak, the author has picked out over 300 specimens comprising complete carapaces, single valves and numerous carapace fragments. The collection contains adult as well as juvenile individuals. The majority of the valves were damaged and compressed. Often the valves are filled by smaller valves, arranged one inside the other in the form of a cone in cone (see Pl. XVIII, Figs. 4a, 6). Such series of cone in cone valves may belong to one species or may contain the valves belonging to different species. The valves in a cone in cone series often fit tightly into each other and are arranged either in the same direction, in an opposite direction or disorderly.



Fig. 1

Part of the geological profile of Paleocene sediments at Tsagan Khushu (after GRADZIŃSKI et al., 1968/1969). M — Lens with numerous bone-fragments of small mammals.

The similar preservation of ostracod valves in cone in cone assemblages has been described by MANDELSTAM (see MANDELSTAM & SCHNEIDER, 1963), who interpreted it as due to mechanical action. The present author agrees with the opinion that this phenomenon is caused by mechanical action, within the richly accumulated valves. Such rich accumulation of ostracod valves does not occur, however, in Recent basins in normal conditions. It is not excluded that in the Paleocene Basin the rich accumulation was due to seasonal shallowing; water movements (?) being responsible for the deposition of the ostracod valves in a cone in cone series. The samples studied are not very rich in ostracods and the state of preservation, individuals often being badly damaged, indicates that they were not deposited "*in situ*" but were probably transported. The variability of the ostracods suggests a considerable seasonal change in their environment (see SZCZECHURA, 1971).

Eleven ostracod species, belonging to six genera, are recognized: Timiriasevia MANDEL-STAM, 1947, Limnocythere BRADY, 1868, Candoniella SCHNEIDER, 1956, ?Eucypris VÀVRA, 1891, ?Lycopterocypris MANDELSTAM, 1956 and Caganella n. gen. Two species: Timiriasevia cf. T. opinabilis KAZIMINA, 1957 and T. naranbulakensis n. sp. (described by SZCZECHURA and BLASZYK, 1970, as Timiriasevia sp.) are known from the Cretaceous of Mongolia. Of the nine remaining species, three are described as new, five identified only at generic level, and one tentatively assigned to Candoniella mordvilkoi MANDELSTAM, 1963, a species known from the Cretaceous of the Asiatic part of the USSR.



Fig. 2

Part o' the geological profile of Paleocene sediments at Naran Bulak (after GRADZIŃSKI et al., 1968/1969). 1 — Tortoise remains, 2 — Archaeolambda planicanina, 3 — Pseudictops, 4 — Dinocerata, 5 — fish remains, 6 — Pseudictops, 7 — lens with numerous bone-fragments of small mammals.

Fig. 3

Part of the geological profile of Paleocene sediments at Ulan Bulak (by courtesy of Dr. J. LEFELD).

It is impossible to draw conclusions as to the age of the studied sediments on the basis of the ostracods, as the majority of the described species are new. The stratigraphic range of the ostracod genera does not throw much light on the age of this assemblage either. The only exception is the genus *Limnocythere* BRADY, 1868, which according to MORKHOVEN (1963) and KASHEVAROVA *et al.* (1960), first appears in the Paleocene. The occurrence of two species, belonging to *Timiriasevia*, present in the Cretaceous of Mongolia suggests an early Paleocene age.

A comparison of the ostracod assemblages with those known from the Upper Cretaceous of Mongolia (GALEEVA, 1955; LUBIMOVA, 1956; SZCZECHURA & BLASZYK, 1970) shows that the genus *Cypridea* Bosquet, 1852, dominant in the Upper Cretaceous assemblage of the Nemegt Basin, does not occur in the Paleocene of the same basin,

#### Table 1

Occurrence of Paleocene ostracods from Nemegt Basin

Age	For- mation	Samples * Nos.	Locality	?Eucypris sp.	Candoniella cf. C. mordvilkoi MAND.	?Lycopterocypris sp.	Caganella mongolica n. gen., n. sp.	Caganella sp.	Limnocythere nemegtensis n. sp.	Timiriasevia cf. T. opinabilis KAZM.	T. naranbukalensis n. sp.	T. ulanbulakensis n. sp.	Timiriasevia sp. I	Timiriasevia sp. 2
		NB 18			+	l	l		+-	+		+		
е	eds	NB 15	Naran Bulak		+	+	+		+	+				
aleocer	hite B	NB 9		+	+	+	+	+	+	+	+	+	+	+
đ	A	CE 3	Tsagan Khushu	+		+	+	+	+	+			+	
		1a	Ulan Bulak			+	+	?	+	?		+		

\* The numbers refer to the lithological samples collected by Dr. J. LEFELD and housed in the Institute of Geological Sciences, Polish Academy of Sciences, Warsaw.

# DESCRIPTIONS

# Subclass OSTRACODA LATREILLE, 1806 Order PODOCOPIDA MÜLLER, 1894 Suborder PODOCOPINA SARS, 1866 Superfamily CYPRIDACEA BAIRD, 1845 Family CYPRIDIDAE BAIRD, 1845

Genus EUCYPRIS VAVRA, 1891

?Eucypris sp.

(Pl. XVIII, Figs. 4, 5)

Material. — One complete carapace, one single adult valve and one single juvenile valve, badly preserved.

Dimensions (in mm):

,			Length	Height
Specimen	Z. Pal. N	lo. MgO/13	0.710	0.415
		<b>MgO/14</b>	0.540	0.295

**Description.** — Valve triangularly ovate in lateral outline, insignificantly convex. Left valve larger than the right, being higher and more truncated posterodorsally. Dorsal margin of the left valve, somewhat angulated anteriorly, abruptly sloping towards the posterior end; in the right valve it is less truncted posteriorly and anteriorly. Ventral margin concave medially. Anterior end broadly, rather evenly rounded; posterior end narrowly rounded. Valve surface smooth. Internal morphological features unknown.

**Remarks.** — It is probable that the two illustrated forms, assigned to *?Eucypris* sp., represent in fact two different species. Insufficient knowledge of the species, here tentatively referred to *Eucypris* on the basis of the general appearance of the specimens, does not allow the present author to attribute it to any, so far known, species.

Occurrence. — Paleocene, Nemegt Basin (Tsagan Khushu and Naran Bulak localities), Gobi Desert.

#### Genus CANDONIELLA SCHNEIDER, 1956

#### Candoniella cf. C. mordvilkoi MANDELSTAM, 1963

(Pl. XVI, Figs. 4, 5)

Material. — Eight probably adult, complete carapaces, well preserved. Dimensions (in mm):

				Length	Height	Width
Specimen	Z. Pal.	No.	MgO/15	0.475	0.215	0.195
"	**		MgO/16	0.490	0.220	0.195

**Description.** — Carapace elongated (length more than twice the height), weakly and evenly inflated, being pointed at both ends. Left valve, somewhat larger than the right one, overlapping the latter along almost the entire margin except for the anterior end. Dorsal margin inconspicuously arched, almost parallel to the medially slightly concave, ventral margin. Both ends of the carapace almost identically, well rounded. Valve surface smooth. Internal morphological features not known.

Variation. — Insignificant variation concerns mainly the length/height ratios and the carapace inflation.

**Remarks.** — Specimens described here as *Candoniella* cf. *C. mordvilkoi* MANDELSTAM, 1963, are very similar to the species described as *Candoniella mordvilkoi*, from the Cenomanian of Kazakhstan (USSR), differing, however, by being somewhat more inflated in dorsal view. In comparison with the specimen, assigned to this species, by SZCZECHURA & BLASZYK (1970), from the Upper Cretaceous of Mongolia, the Paleocene form, from above, is more pointed at both ends.

Occurrence. --- Palaeocene, Nemegt Basin (Naran Bulak locality), Gobi Desert.

#### Genus LYCOPTEROCYPRIS MANDELSTAM, 1956

## ?Lycopterocypris sp.

(Pl. XVIII, Figs. 7, 8)

Material. — Few single, probably adult valves, always infilled by valves belonging to other species,

Dimensions (in mm):

				Length	Height
Specimen Z	. Pal.	No.	MgO/17	0.710	0.390
37	,,		MgO/18	0.760	0.390

**Description.** — Valve kidney-shaped in side view, weakly and evenly inflated. Dorsal margin gently arched, ventral margin inconspicuously concave. Both ends of the valve are very similar and broadly rounded, making the valve orientation very difficult. Valve surface smooth. Internal morphology unknown.

Variation. — Insignificant variation within the studied valves mainly concerns the length/ height ratio.

**Remarks.** — Tentative assignment of this species to *Lycopterocypris* is based entirely on its general appearance and similarity to *Lycopterocypris infantilis* LUBIMOVA, 1956, a species occurring in the Lower Cretaceous of Mongolia. The present material differs, however, in the less well arched dorsal margins, and less differentiated (in shape) anterior and postrior ends.

Occurrence. — Paleocene, Nemegt Basin (Ulan Bulak, Tsagan Khushu and Naran Bulak localities), Gobi Desert.

#### Caganella n. gen.

*Type species: Caganella mongolica* n. sp. *Derivation of the name: Caganella* — after the locality Tsagan Khushu, where it is very common.

**Diagnosis.** — Cyprididae with large, thick-walled, irregularly ovate carapace, higher anteromedially, somewhat truncated posteriorly; both ends of carapace well rounded, posterior more evenly so. In dorsal view the carapace is fairly swollen or somewhat flattened, bluntly pointed anteriorly, rounded posteriorly. Larger left valve overlaps the right valve except for the posterodorsal and anteroventral margins, the latter being more or less extended. Valve surface smooth or finely pitted. Hinge margin straight, adont. Duplicature broadest anteriorly, forming there a distinct vestibule. Muscle scars (see Pl. XVIII, Fig. 1) consist of six scars arranged in two coinciding rows and one or two (?) scars in front and below.

**Remarks.** — The genus *Caganella* may be compared to Cypridea BOSQUET, 1852. Both genera are similar in their general appearance, valvular overlap and extension of the anteroventral region. Differences concern the hinge and the internal morphology. The terminally differentiated hinge margin in Cypridea species contrasts with the simple, adont hinge of *Caganella*; moreover, the anteroventral marginal notch, characteristic of Cypridea, is lacking in *Caganella*. The new genus is erected to include *C. mongolica* and *Caganella* sp.

Caganella mongolica n. gen., n. sp.

(Pl. XV, Figs. 5-8)

Type specimen: Pl. XV, Figs. 5a-c (Z. Pal. No. MgO/19). Type horizon and locality: Paleocene (White Beds), Tsagan Khushu. Derivation of the name: mongolica — described from Mongolia.

**Diagnosis.** — Carapace large, thick-walled, irregularly ovate, highest in front of the middle. Laterally flattened, swollen posteriorly in dorsal view. Left valve larger than right, overlapping the latter along almost the entire margin except for the posterodorsal and anteroventral parts. Dorsal margin gently arched, somewhat truncated posteriorly; ventral margin weakly sinuate in front. Both ends of carapace well rounded, posterior end being slightly oblique in its upper part, extended in its lower part. Carapace surface faintly pitted. Duplicature largest anteroventrally, forming there a distinct vestibule. Hinge margin straight, adont.

Material. — Over two hundred, mostly adult, complete carapaces, some single valves, rarely well preserved, and numerous carapace fragments.

Dimensions (in mm):

			Length	Height	Width
Specimen 2	Z. Pal. N	o. MgO/19	0.860	0.540	0.490
"	**	MgO/20	0.880	0.565	_
,,	"	MgO/21	0.810	0,490	0.415

**Description.** — Carapace large, solid, irregularly ovate in lateral outline, highest in front of the middle, somewhat truncated posterodorsally. Laterally flattened in dorsal view, swollen posteriorly. Larger left valve overlaps the right along almost the entire margin except for the posterodorsal and anteroventral margins. Dorsal margin gently arched, ventral margin almost straight, only slightly sinuate near the middle. Posterior end broadly and evenly rounded, anterior end, somewhat obliquely rounded, weakly extended towards the ventral margin. Valve surface faintly pitted. Indistinctly visible muscle scars consist of six elongate scars arranged in two converging rows, with one or more (?)scars in front and below. Duplicature well developed, largest anteroventrally, where a distinct vestibule is present. A flange is present along the anteroventral margin of both valves. Hinge margin straight, adont; in the left valve it is provided with a shallow groove corresponding to the list-like valve edge of the right valve. Other internal morphological features are not known.

Variation. — Significant variation concerns the size, length/height ratio within the individuals referred to this species. It is difficult to establish if it reflects different instars, sexual differentiation or, as is very probable, it reflects a seasonal variation (cf. SZCZECHURA, 1971). It is mainly because of the state of preservation of studied material.

**Remarks.** — Some similarity, especially in side view, may be found between *Caganella mongolica* and *Candona pagei* SWAIN, 1949, a species described from the lacustrine Eocene deposits of the western United States. In comparison with the American species, the Mongolian one is distinctly flattened laterally, being widest posteriorly when viewed from above. A comparison with *Caganella* sp. is given on p. 92.

Occurrence. — Paleocene, Nemegt Basin (Tsagan Khushu, Ulan Bulak and Naran Bulak localities), Gobi Desert.

#### Caganella sp.

#### (Pl. XVI, Figs. 1, 2)

Material. — Four adult and one probably juvenile, complete carapaces, most specimens damaged.

Dimensions (in mm):

	Length	Height	Width
Specimen Z. Pal. No. MgO/24	0.980	0.540	0.540

**Description.** — Carapace thick-walled, irregularly ovate in side view, highest medially almost twice as long as high, fairly and rather evenly inflated, being widest centrally; in the lower part of the anterior end it is somewhat extended and indistinctly constricted. Larger valve

overlaps the right valve along almost the entire margin except for the posterodorsal and anteroventral part. Dorsal margin gently arched, indistinctly angulate medially, weakly truncated posteriorly; ventral margin almost straight. Anterior and broadly rounded, angulate at the ventral margin, posterior end less broadly and more evenly rounded. Valve surface smooth, glossy. Internal morphological features unknown. Juvenile form, in comparison with the adult one, is more triangular in lateral outline and slimmer.

**Remarks.** — Specimens assigned to *Caganella* sp. are similar to those referred to *Caganella mongolica* n. gen., n. sp. (see p. 90). The main differences between the two species concerns the size, shape and valve ornamentation; from above *Caganella* sp. is subovate in contrast to the laterally flattened *C. mongolica*. Moreover, *C. mongolica* has a pitted shell surface, whilst in *Caganella* sp. the shell is smooth and more elongated, having a better developed anteroventral extension.

Occurrence. — Paleocene, Nemegt Basin (Tsagan Khushu, Naran Bulak, Ulan Bulak (?) localities), Gobi Desert.

# Superfamily CYTHERACEA BAIRD, 1850 Family LIMNOCYTHERIDAE KLIE, 1938

# Genus LIMNOCYTHERE BRADY, 1868

Limnocythere nemegtensis n. sp.

(Pl. XV, Figs. 1-4)

Type specimen: Pl. XV, Figs. 1*a-c* (Z. Pal. No. MgO/25). Type horizon: Paleocene (White Beds), Tsagan Khushu. Derivation of the name: nemegtensis — after the Nemegt Basin.

**Diagnosis.** — Carapace angularly-ovate in lateral outline, in front of the middle bearing a deep sulcus which is nodose anteriorly. Large, rib-like inflation occurs in anterior part of the carapace, extending adventrally below the sulcus turning upwards to disappear posteroventrally. Similar inflation runs below the posterodorsal margin. Valve surface strongly pitted.

Material. — About one hundred adult and juvenile, complete carapaces, rarely well preserved, and numerous fragments, mostly of single valves.

Dimensions (in mm):

			Length	Height	Width
Specimen	Z. Pal. N	No. MgO/25	0.540	0.270	0.245
"	"	MgO/26	0.590	0.295	0.195
"	,,	MgO/27	0.515	0.270	0.170
"	"	MgO/28	0.415	0.220	0.145

**Description.** — Carapace thin, fragile, angularly-ovate in lateral outline; irregularly and moderately inflated, widest centrally, being pointed anteriorly in dorsal view. The valves are virtually equivalve. Dorsal margin straight, ventral margin concave anteromedially, slightly extended, rounded posteriorly. Anterior end only slightly rounded, posterior end obtusely rounded. In front of the centre there is a subvertical sulcus which is enlarged in its upper part and bordered along its anterior edge by some irregular hollow nodes. The nodes in the lower and upper part of the sulcus, as well as at the anterior cardinal angle appear to be the most characteristic of that species. Below the posterodorsal margin there runs a large rib-like inflation

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which posteriorly bends down and disappears at the posteroventral margin. A similar inflation occurs in the anterior part of the carapace, extending below the sulcus to meet the ventral margin, then turn upwards and disappear posteroventrally. Valve surface strongly pitted. Duplicature not observed at the anterior end, where there is a wide marginal area; posteriorly the marginal area, as well as the weakly developed duplicature are rather narrow. Neither normal nor marginal pore-canals are visible. Muscle scars, as partly seen from outside the carapace, typical for the Cytheracea, i.e. they consist of four scars arranged in a vertical row. Left valve hinge consists of terminal sockets, forming distinct hinge ear, and a list-like median element; corresponding elements ought to be present in the right valve (cf. Pl. XVIII, Figs. 2, 3. Illustrated fragments of valve most probably belong to the juvenile forms; there is lack of duplicature as well as grooved median element in the right valve. Both valves are weakly calcified).

Sexual dimorphism expressed by the larger and less posteriorly inflated male carapaces. Juvenile forms, in comparison with adults, are more angulate in side view, being at the same time more flattened and having a sharper rib-like inflation; the lateroventral rib is posteriorly longer in juveniles than in adult forms.

**Variation.** — Conspicuous variation is present in the valve morphology and its ornamentation. Many specimens are flattened without pitting but this is probably due to the bad state of preservation of those specimens.

**Remarks.** — Some similarity between the Mongolian *Limnocythere nemegtensis* n. sp. and *Limnocythere varia* STAPLIN (1963), from the Pleistocene of Illinois (U. S. A.) is present. *Limnocythere varia* is, however, larger, less rectangular in side view and reticulated instead of pitted.

Occurrence. — Paleocene, Nemegt Basin (Ulan Bulak, Tsagan Khushu and Naran Bulak localities), Gobi Desert.

## Family CYTHERIDAE BAIRD, 1850

## Genus TIMIRIASEVIA MANDELSTAM, 1947

Timiriasevia cf. T. opinabilis KAZMINA, 1957 (emend. MANDELSTAM, 1960)

(Pl. XVII, Fig. 1)

1970. Timiriasevia cf. opinabilis KAZMINA, 1957 (emend. MANDELSTAM 1960); J. SZCZECHURA & J. BŁASZYK, Fresh-wate Ostracoda..., p. 128, Pl. 29, Fig. 6a-c (with synonymy).

Material. — Twenty-two adult and juvenile carapaces, well preserved. Dimensions (in mm):

			Length	Height	Width
Specimen Z.	Pal. N	lo. MgO/29	0.390	0.220	0.245
,,	"	MgO/30	0.440	0.245	0.245

**Description.** — Carapace ovate in side view, evenly and markedly inflated, evenly rounded at both ends, in dorsal view; ventral side distinctly compressed. Both valves of the carapace almost identical in size. Anterior and posterior ends nearly equally rounded. Dorsal and ventral margins parallel to each other, straight. Valve surface finely reticulated laterally, ribbed ventrally. Internal morphology unknown.

**Variation.** — Inconspicuous variation concerns mainly the size and ornamentation of the carapace. Greater variation, concerning the valve inflation, made them sometimes similar to specimens attributed to *Timiriasevia ulanbulakensis* n. sp.

**Remarks.** — Specimen referred to *Timiriasevia* cf. *T. opinabilis* do not differ from the specimens described by SZCZECHURA and BLASZYK (1970) from the Upper Cretaceous of Mongolia, as *Timiriasevia* cf. *opinabilis*. At the same time they seem to be most similar to those here described as *T. ulanbulakensis* n. sp., but differ from them by being more swollen laterally, mostly medially, as well as by being lower, more compressed dorsally. There is also some difference in valve ornamentation. Comparison of *Timiriasevia* cf. *T. opinabilis* with *T. opinabilis* described from the Lower Cretaceous of the Asiatic part of USSR, is given in SZCZECHURA and BLASZYK (1970).

It must be added here, however, that in SZCZECHURA and BLASZYK (1970) specimens referred both to T. cf. T. opinabilis and Timiriasevia sp. (here named T. naranbulakensis) were wrongly orientated. According to REYMENT'S (1961) diagnosis of Timiriasevia the left valve is larger than the right, and moreover, its anterior end is always more broadly rounded than the posterior end. The present author's observations, based on the Mongolian species of Timiriasevia, leads her to the opinion that the right valve can be larger than left, and that the anterior end may be lower, less broadly rounded than the posterior one.

Occurrence. — Upper Cretaceous (Upper Nemegt Beds), Nemegt Basin (Altan Ula IV locality) and Paleocene, Nemegt Basin (Naran Bulak, Tsagan Khushu and Ulan Bulak (?) localities), Gobi Desert.

#### Timiriasevia naranbulakensis n. sp.

(Pl. XVII, Figs. 5-7)

1970. Timiriasevia sp.; J. SZCZECHURA & J. BŁASZYK, Fresh-water Ostracoda..., p. 128, Pl. 29, Figs. 1a-c.

Type specimen: Pl. XVII, Figs. 7a-c (Z. Pal. No. MgO/31). Type horizon and locality: Paleocene (White Beds), Naran Bulak. Derivation of the name: naranbulakensis — after the name of the locality Naran Bulak.

**Diagnosis.** — Carapace subovate in side view, highest behind the centre, strongly inflated laterally, more so posteriorly, somewhat constricted anterodorsally and along the anterior margin. Ventral side compressed, even concave along the contact margin. Anterior end and, to a lesser degree, posterior margin rimmed. Valve surface subconcentrically reticulated laterally, ribbed ventrally. Posterior end bears a few wart-like tubercles. Sexual dimorphism well pronounced.

**Material.** — Four adults and one juvenile, all complete carapaces, well preserved. Dimensions (in mm):

			Length	Height	Width
Specimen	Z. Pal. No.	MgO/31	0.565	0.370	0.390
"	,,	MgO/32	0.590	0.370	0.345
"	"	MgO/33	0-490	0.295	0.320

**Description.** — Carapace solid, subovate in side view, with greatest height behind the centre. In dorsal view the carapace is tumid, most swollen posteriorly, tapering frontally. Admarginal parts of the anterior end and anterodorsal region somewhat constricted. Ventral side compressed, even concave along the contact margin. Both valves are very similar in size although the right valve seems to be a little larger than the left, overlapping it mainly along the dorsal and anterodorsal margins. Dorsal margin markedly arched, sloping more noticeably to the anterior than posteriorly; ventral margin nearly straight, somewhat sinuate anteriorly. Anterior end distinctly rimmed, slightly obliquely rounded; posterior end more broadly and more evenly rounded, indistinctly rimmed. Lateral valve surface subconcentrically reticulated; ventral surface ribbed. The posterior end bears a few wart-like tubercles. Internal morphology unknown.

Sexual dimorphism well pronounced; male specimen slimmer, having the dorsal margin more truncated frontally, than is the case with the females. The juvenile form is less elongated and more rounded in lateral outline than in the adults.

**Remarks.** — The male representative of *T. naranbulakensis* n. sp. does not differ from the specimen described by SZCZECHURA and BLASZYK (1970) from the Upper Cretaceous of Mongolia as *Timiriasevia* sp. The disagreement in the description of both forms, which are undoubtedly conspecific, results from the incorrect orientation of *Timiriasevia* sp. in SZCZECHURA and BLA-SZYK (1970); further remarks concerning the similarity of that species with others so far known are to be found in SZCZECHURA and BLASZYK (1970).

Occurrence. — Upper Cretaceous (Upper Nemegt Beds), Nemegt Basin (Altan Ula IV locality) and Paleocene, Nemegt Basin (Naran Bulak locality), Gobi Desert.

#### Timiriasevia ulanbulakensis n. sp.

(Pl. XVII, Figs. 3, 4)

Type specimen: Pl. XVII, Figs. 3*a-b* (Z. Pal. No. MgO/34). Type horizon and locality: Paleocene (White Beds), Naran Bulak. Derivation of the name: ulanbulakensis — after the locality Ulan Bulak.

**Diagnosis.** — Carapace bean-shaped in lateral view, indistinctly arched dorsally, somewhat higher frontally than posteriorly; widest medially. Both ends of carapace equally, well rounded. Valve surface reticulate, more coarsely so posteriorly.

Material. — About forty adult and juvenile, complete carapace and two single valves, mostly well preserved.

Dimensions (in mm):

,-			Length	Height	Width
Specimer	Z. Pal. 1	No. MgO/34	0.415	0.245	0.270
"	"	MgO/35	0.320	0.195	0.195

**Description.** — Carapace bean-shaped in lateral outline, slightly arched dorsally, highest medially. From above it is fairly tumid, widest just behind the centre, with acutely rounded anterior end and well rounded posterior end. Ventral side compressed. Both valves of the carapace very similar in size, the right valve, however, seems to overlap the left valve along almost the entire margin except for the anterior end. Dorsal margin gently arched, nearly straight, ventral margin almost straight. Anterior and posterior ends similar, well rounded, the former being weakly rimmed. Valve surface reticulate laterally, ribbed ventrally. Posteriorly there occur a few wart-like tubercles. Internal morphological features weakly visible, obscured. Muscle scars and pore-canals invisible. Hinge margin of the left valve provided with smooth furrow; no terminal elements. Juvenile forms may be distinguished by their smaller size.

**Variation.** — Insignificant variation concerning the size and shape of the carapace, which may be, to a different degree, inflated and elongated.

**Remarks.** — Close similarity and even relationship seems to exist between *Timiriasevia* ulanbulakensis and T. cf. T. opinabilis. A comparison of these two species is given on p. 94.

Occurrence. --- Paleocene, Nemegt Basin (Naran Bulak and Ulan Bulak localities), Gobi Desert.

#### Timiriasevia sp. 1

(Pl. XVI, Fig. 3)

Material. — One adult, complete carapace, and some fragments of single valves. Dimensions (in mm):

	Length	Height	Width
Specimen Z. Pal. No. MgO/36	0.735	0.440	0.540

**Description.** — Carapace thick-walled, large, subovate, with hump-like dorsal extension behind the middle in lateral outline; heart-shaped in dorsal view. Ventral side compressed, concave along the contact margin where a small depression occurs in the posterodorsal region. The larger, right valve overlaps the left valve along almost the entire margin except for the lower part of the anterior end. Dorsal margin markedly arched, somewhat incised anteriorly, roughly sloping posteriorly.

Ventral margin almost straight, weakly sinuate anteriorly, almost entirely hidden by the inflated adventral part of the carapace which overhangs the ventral margin. Anterior end rimmed, somewhat acutely rounded; posterior end more broadly and more evenly rounded. Valve surface pitted and ribbed, the pits and ribs being arranged subconcentrically; ventral side covered by subparallel ribs, only indistinctly pitted. Some four to five, spiny tubercles, occur on the dorsal margin. Internal morphology unknown.

**Remarks.** — *Timiriasevia* sp. 1 in dorsal view resembles *Timiriasevia polymorpha* MAN-DELSTAM (*in* GALEEVA, 1955), a species described from the Lower Cretaceous of Mongolia. It is, however, much higher in side view. Similar differences may be found when comparing *Timiriasevia* sp. 1 and *T. mackerrowi* BATE, 1965, a species described from the Middle Jurassic of England. Both compared species are quite differently ornamented, however, to *Timiriasevia* sp. 1.

Occurrence. — Paleocene, Nemegt Basin (Naran Bulak and Tsagan Khushu localities), Gobi Desert.

#### Timiriasevia sp. 2

#### (Pl. XVII, Fig. 2)

**Material.** — Two adult, complete carapaces, well preserved. Dimensions (in mm):

	Length	Height	Width
Specimen Z. Pal. No. MgO/37	0.490	0.295	0.345

**Description.** — Carapace solid, subovate in side view, highest centrally, laterally inflated, widest just behind the centre, compressed ventrally. Both valves are of similar size, although the left valve appears to be somewhat overlapping by the right valve, except for at the anterior end. Dorsal margin arched, ventral margin straight. Anterior end very slightly rimmed, somewhat acutely rounded, posterior end more broadly ro nded. Surface of the carapace reticulated, anteriorly, the elements of the ornamentation tending to be directed towards the anteroventral margin; ventral side covered by subparallel ribs. Internal morphology unknown.

**Remarks.** — *Timiriasevia* sp. 2 most closely resembles *Timiriasevia ulanbulakensis* n. sp. The main difference between the two species lies in the size and the general outline of the carapace.

*Timiriasevia* sp. 2 is larger, higher and more arched dorsally, being at the same time differently shaped, especially posteriorly, when viewed dorsally.

Occurrence. — Paleocene, Nemegt Basin (Naran Bulak locality), Gobi Desert.

Palaeozoological Institute of the Polish Academy of Sciences Warszawa, April 1970

#### BIBLIOGRAPHY

Вате, R. H. 1965. Freshwater ostracods from the Bathonian of Oxfordshire. — Palaeontology, 8, 4, 749-759, London. GALEEVA, L. I. — see Галеева, Л. И.

- GRADZIŃSKI, R., KAŹMIERCZAK, J. & LEFELD, J. 1968/1969. Geographical and geological data from the Polish-Mongolian Palaeontological Expeditions. Results Polish-Mongol. Palaeont. Exped., I. — Palaeont. Pol., 19, 33-82, Warszawa.
- Казнеvarova, N. P., Mandelstam, M. I. & Schneider, G. F. see Кашеварова, Н. П., Мандельштам, М. И. & Шнейдер, Г. Ф.
- LUBIMOVA, P. S. see Любимова II. С.

— Кадміна, Т. А. & Rechetnikova, М. А. — see Любимова, Т. А., Казьмина, Т. А. & Решетникова, М. А. Mandelstam, М. І. — see Мандельшітам, М. И.

- & Schneider, G. F. see Мандельштам, М. И. & Шнейдер, Г. Ф.
- MORKHOVEN, F. P. C. VAN. 1963. Post-palaeozoic Ostracoda: their morphology, taxonomy and economic use. 1-478, Amsterdam.

REYMENT, R. A. 1961. Timiriasevia Mandelstam, 1947. In: R. C. Moore (ed.), Treatise on Invertebrate Paleontology, Part Q (Arthropoda), Q358, Lawrence, Kansas.

STAPLIN, F. L. 1963. Pleistocene Ostracoda of Illinois. Part II: Subfamilies Cycloprinae, Cypridopinae, Ilocyprinae; families Darvinulidae and Cytheridae. Stratigraphic ranges and assemblage patterns. — J. Paleont., 23, 2, 1164-1203, Menasha.

SWAIN, F. M. 1949. Early Tertiary Ostracoda from the western interior United States. - Ibidem, 23, 2, 172-181.

- SZCZECHURA, J. 1971. Seasonal changes in Cyprinotus (Heterocypris) incongruens (Ostracoda) and their significance to the interpretation of variability in fossil ostracods. In: OERTLI H. J. (ed.), Paléoécologie Ostracodes Pau 1970. — Bull. Centre Rech. Pau-SNPA, 5 suppl., 191-204, Pau.
  - & BŁASZYK, J. 1970. Fresh-water Ostracoda from the Upper Cretaceous of the Nemegt Basin, Gobi Desert. Results Polish-Mongol. Palaeont. Exped., II. — Palaeont. Pol., 21, 107-118, Warszawa.

Галеева, Л. И. 1955. Остракоды меловых отложений Монгольской Народной Республики. Гостоптехиздат, 1-64, Москва.

Клшеварова, Н. П. Мандельштам, М. И. & Шнейдер, Г. Ф. 1960. Надсемейство Cytheracea Baird, 1850. *In*: Ю. А. Орлов (red.), Основы Палеонтологии, Arthropoda, 365-411, Москва.

Любимова, П. С. 1956. Остракоды меловых отложений восточной части Монгольской Народной Республики. — Тр. ВНИГРИ, Н. сер., 93, 1-174, Ленинград.

— , Казьмина, Т. А. & Решетникова, М. А. 1960. Остракоды мезозойских и кайнозойских отложений западно-Сибирской Низменности. — *Ibidem*, 160, 1-373.

Мандельштам, М. И. 1956. Роды Mongolianella, Ilyocyprimorpha, Orygoilyocypris, Lycopterocypris, Theriosynecum и др. Сборн. "Матер. Палеонт. (новые семьи и роды)". Госгеолиздат, Москва.

— & Шнейдер, Г. Ф. 1963. Ископаемые остракоды СССР, семейство Сургіdidae. — Тр. ВНИГРИ, 203, 1-242, Ленинград.

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# PLATE XV

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Paleocene (White Beds), Nemegt Basin (Tsagan Khushu), Gobi Desert, Mongolia.	
All specimens approx. > 70	

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## PLATE XVI

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All specimens approx. 70

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All specimens approx. $\times$ 70	

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#### PLATE XVIII

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All specimens approx.  $\times 70$ 

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