

OSTRACOD SPECIES OF THE GENUS *CYTHEROPTERON* FROM LATE PLEISTOCENE, HOLOCENE AND RECENT SEDIMENTS OF THE LAPTEV SEA (ARCTIC SIBERIA)

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Abstract

Sixteen species of the genus *Cytheropteron* from the Laptev Sea Late Pleistocene, Holocene deposits and Recent surface sediments have been described. Analysis of the literature on this subject and the collections of O.M. Lev from St. Petersburg, together with our own material from the Laptev Sea, allowed us to introduce certain changes in the taxonomy of this genus. One species *Cytheropteron laptevensis* Stepanova sp. nov. is described as new.

Key words: Ostracoda, *Cytheropteron*, taxonomy, Late Pleistocene, Holocene, Recent, Laptev Sea.

Resumen

Se describen dieciséis especies del género *Cytheropteron* procedentes de sedimentos del Pleistoceno Superior, Holoceno y del Reciente del mar de Laptev. El análisis de la literatura referente a este tema, junto con las colecciones del O.M. Lev de San Petersburgo, así como nuestro material del mar de Laptev, nos ha permitido introducir algunas modificaciones en la taxonomía de este género. Una especie nueva, *Cytheropteron laptevensis* Stepanova sp. nov., es descrita en este trabajo.

Palabras clave: Ostracoda, *Cytheropteron*, taxonomía, Pleistoceno Superior, Holoceno, Reciente, mar de Laptev.

INTRODUCTION

Various species of the genus *Cytheropteron* are common in high latitudinal benthic assemblages. There are certain difficulties in identification of the species belonging to this genus, primarily due to high species diversity and the existence of closely related species with similar morphology and, hence, numerous synonyms. Another problem is that Russian publications on Arctic ostracods (Lev, 1972, 1983; Schneider, 1962) are not well known abroad, and collections from the Russian institutions and museums have never been compared to other collections.

Different scientists have described species of genus *Cytheropteron* from many regions: North Atlantic (Whatley & Coles, 1987), Great Britain and Ireland (Brady, 1868a; Brady *et al.*, 1874; Brady & Norman, 1889; Neale & Howe, 1973; Whatley & Masson, 1979; Athersuch *et al.*, 1989), Gulf of Alaska (Brouwers, 1994), Northeastern North America (Cronin, 1981, 1989). Lev (1972, 1983) gave descriptions of ostracod species from the Quaternary marine sediments of the high-latitude areas of the Arkhangel'sk Region (northeastern Russian Plain) and Taimyr Peninsula. We analyzed most of the publications dealing with taxonomic

descriptions of *Cytheropteron* species. Although we have not yet had the opportunity to study original collections in non-Russian Institutions, we studied in detail the collections of O.M. Lev stored in “VNIIOkeangeologiya”, St. Petersburg, Russia. This allowed us to resolve some controversial taxonomic problems.

In this paper we describe sixteen ostracod species of genus *Cytheropteron* from Late Pleistocene and Holocene deposits and surface sediments of the Laptev Sea. Of these one species is referred to as a new species.

MATERIAL

We analyzed specimens of *Cytheropteron* species from coretop and downcore sediment samples collected in the Laptev Sea during several Russian-German TRANSDRIFT expeditions, mainly, TRANSDRIFT V in August 1998 (aboard R/V Polarstern). Coretop samples, the uppermost one centimetre of sediments, were taken from box and kasten cores. These were obtained in different parts of the Laptev Sea at 26 stations covering a water depth range from 11 to 276 m (Fig. 1, see also Stepanova *et al.*, 2003a).

Fossil ostracods were studied in four sediment cores, PS-51/135-4, PS-51/138-12, PS-51/080-13, and PS-51/154-11 from different parts of the Laptev Sea shelf and continental slope (Fig. 1). All cores were AMS¹⁴C dated (Bauch *et al.*, 2001). Cores from the middle eastern Laptev Sea shelf, PS-51/135-4 (water depth 51 m) and PS-51/138-12 (water depth 45 m), date back to 11.2 and 11.3 cal. ka, respectively; core PS-51/080-11 from the inner shelf (water depth 21 m) – to 6.3 cal. ka; and core PS-51/154-11 from the upper continental slope of the western Laptev Sea shelf (water depth 270 m) – to more than 15.7 cal. ka.

All specimens are stored at Moscow State University, Geological Faculty, Chair of Palaeontology, collection No. 292/1-287. Electronic photomicrographs were made at the Palaeontological Institute RAS.

For taxonomic description and comparison, we studied the collections of O.M. Lev stored in the All-Russian Institute for Geology and Mineral Resources of the World Ocean (“VNIIOkeangeologiya”, former NIIGA), St. Petersburg, Russia.

When describing modern and fossil distribution of species we included our data on Recent and Holocene ostracods from the Kara Sea (Stepanova *et al.*, 2003b; Taldenkova *et al.*, 2003), but did not describe any of them here. Recent ostracods were identified from 30 surface samples obtained in the eastern part of the sea

from water depths ranging between 10 and 295 metres. Holocene ostracods originate from core BP-00/07-5, eastern Kara Sea (water depth 43 m) that dates back to more than 8 cal. ka (Simstich *et al.*, submitted).

SYSTEMATIC DESCRIPTIONS

We follow the supragenetic taxonomy provided by Nikolaeva (1989) and the morphological terminology of Nikolaeva (1989) and Athersuch (1989). Size groupings of *Cytheropteron* are based on the following carapace length standard: small: 0.3-0.4 mm; medium: 0.4-0.6 mm; large: > 0.6 mm. We distinguish between fossil and modern distribution of ostracods. By modern distribution we mean all ostracods found in surface sediments, but not necessarily living ones.

Subclass OSTRACODA Latreille, 1806
Order PODOCOPIDA Sars, 1866
Family CYTHERURIDAE G. Müller, 1894
Genus *Cytheropteron* Sars, 1866

- 1868 *Cytheropteron* Sars - Brady, 1868a, p. 447.
- 1874 *Cytheropteron* Sars - Brady *et al.*, p. 201.
- 1880 *Cytheropteron* Sars - Brady, p. 135.
- 1928 *Cytheropteron* Sars, p. 223.
- 1961 *Cytheropteron* Sars - Reyment *et al.*, p. 292.
- 1963 *Cytheropteron* Sars - Swain, p. 816.
- 1969 *Cytheropteron* (*Cytheropteron*) - Elofson, p. 88.
- 1979 *Cytheropteron* Sars - Whatley & Masson, p. 224-225.
- 1983 *Cytheropteron* Sars - Lev, p. 116.
- 1989 *Cytheropteron* Sars - Nikolaeva *et al.*, p. 133.
- 1989 *Cytheropteron* Sars - Athersuch *et al.*, p. 221.

Type species.—*Cythere latissima* Norman, 1864, Recent, North Atlantic (SD Brady & Norman, 1889).

Diagnosis.—Small to medium size. Carapace ovate to subrhomboidal or triangular in lateral view. Commonly, it possesses a caudal process upturned towards dorsal margin and a wing-like lateral process, or may be tumid ventro-laterally, highly variable morphologically in size and shape. Valves are unequal, right valve overlaps left valve dorsally. Surface smooth, wrinkled or ornamented: punctate, often reticulate, it may bear weak ribs, ridges or tubercles. Ala expansion may terminate in a spine. Eye tubercles absent. Usually four ovate elongated muscle scars forming a subvertical row in the midlength of valve, right above ventral margin. Hinge antimerodont: in right valve with two terminal dentate hinge bars and a median crenulate groove, left valve complementary.

The genus includes more than 200 species.

Stratigraphical range.—Jurassic - Recent, global distribution

Cytheropteron arcuatum Brady, Crosskey
and Robertson, 1874
Pl. I, Figs. 1, 2

1874 *Cytheropteron arcuatum* Brady, Crosskey and Robertson, p. 203, Pl. VIII, Figs. 16-18; Pl. XIV, Figs. 19-22.

1889 *Cytheropteron arcuatum* Brady, Crosskey and Robertson - Brady & Norman, p. 213, Pl. XX, Figs. 28-30.

1899 *Cytheropteron arcuatum* Brady, Crosskey and Robertson - Whatley & Masson, p. 229, Pl. 1, Figs. 1-5.

1900 *Cytheropteron arcuatum* Brady, Crosskey and Robertson - Lord, Pl. 2, Figs. 13-15.

1901 *Cytheropteron arcuatum* Brady, Crosskey and Robertson - Cronin, p. 402, Pl. 7, Fig. 1.

1902 *Cytheropteron arcuatum* Brady, Crosskey and Robertson - Lev, p. 117, Pl. XI, Fig. 6.

1903 *Cytheropteron arcuatum* Brady, Crosskey and Robertson - Cronin, Pl. V, Fig. 12.

1904 *Cytheropteron arcuatum* Brady, Crosskey and Robertson - Whatley *et al.*, Pl. 1, Fig. 16.

1905 *Cytheropteron arcuatum* Brady, Crosskey and Robertson - Kupriyanova, Pl. 2, Fig. 10.

1906 *Cytheropteron arcuatum* Brady, Crosskey and Robertson - Didić, Pl. 2, Figs. 7-8.

1907 *Cytheropteron arcuatum* Brady, Crosskey and Robertson - Stepanova *et al.*, 2003a, Pl. II, Figs. 13, 14.

Type series.—Brady *et al.*, 1874, p. 203, Pl. VIII, Figs. 16-18; Scotland, Errol; Pleistocene; Pl. XIV, Figs. 19-22; Scotland, Drylers; Pleistocene.

Description.—Carapace small, subtriangular in lateral view, with flattened anterior and posterior margins. Dorsal margin strongly convex, gradually passing into anterior margin through the obtuse cardinal angle, and into posterior margin through slight concavity. Ventral margin straight, slightly concave in anterior third. Anterior margin arcuately rounded. Posterior margin lower than anterior, caudate, upturned towards dorsal margin. Greatest length at mid height, greatest height in the center of valve. Ala with rounded anterior edge and subvertical posterior. Ala extremity terminates with a spine, a round punctum occurs in the central part of ala expansion. Surface is pierced by pore canals aligned in subvertical rows forming stream-like pattern. Fine ribs form weakly developed fossae on anterior and posterior margins.

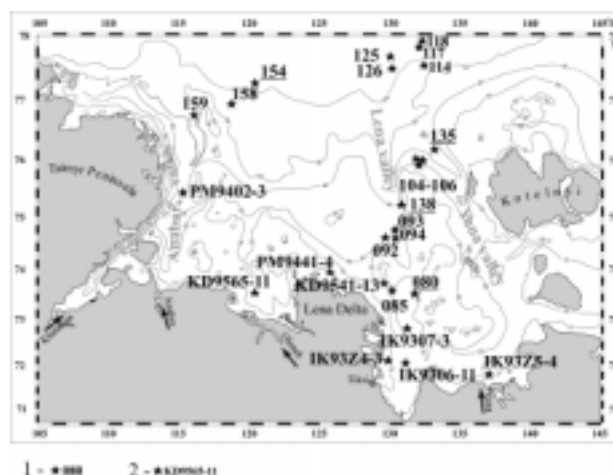


FIGURE 1—Site locations in the Laptev Sea.

1 – stations of TRANSDRIFT V expedition; underlined are sediment cores used in this study; 2 – stations of the previous TRANSDRIFT expeditions (I-IK93, II-PM94, III-KD95).

Measurements, mm.—

	L	H
MSU292/77	0.29	0.2
MSU292/78	0.35	0.21
MSU292/79	0.28	0.18

* L - maximum length; H – maximum height.

Comparison.—*Cytheropteron arcuatum* differs from *C. foresteri* Brouwers, 1994 from the Pleistocene-Holocene deposits of the Gulf of Alaska (Brouwers, 1994, Pls. 24-25, Pl. 17, Figs. 13-18, Pl. 18, Figs. 2, 3, 6, Pl. 19, Figs. 1-4, Pl. 20, Figs. 10, 11, 22, 23) in more convex dorsal margin, presence of fine ribs on posterior and anterior margins, and smaller pore puncta.

Variability.—Carapaces may differ in height. Weak ornamentation of the margins varies from fine ribs to almost smooth surface.

Fossil distribution.—Neogene through Quaternary marine sediments: Lower Severnaya Dvina River, Novaya Zemlya, Lower Pechora River, Lower Ob River, Lower Yenisei River; Pleistocene: Scotland, Ireland, Norway, North Sea, Laptev Sea, Champlain Sea, coastal Maine, Boston “blue clay”, western Goldthwait Sea (Quebec); Holocene: eastern Kara Sea, Laptev Sea (Fig. 2).

Modern distribution.—Greenland Sea, Barents Sea, Kara Sea, Laptev Sea, East-Siberian Sea, Beaufort Sea, Canadian Arctic, Baffin Sea (Fig. 2).



FIGURE 2—Distribution of *Cytheropteron arcuatum*.
1 – fossil distribution; 2 – modern distribution.

Material.—Eighty-four valves and 32 carapaces from Late Pleistocene through Holocene deposits of the Laptev Sea.

Cytheropteron biconvexa Whatley and Masson, 1979
Pl. I, Figs. 3, 4

- 1979 *Cytheropteron biconvexa* Whatley & Masson, 1979, p. 229, Pl. 3, Figs. 5, 10, 14-16, 18-20.
- 1980 *Cytheropteron* sp. A - Lord, Pl. 2, Figs. 20-22.
- 1989 *Cytheropteron biconvexa* Whatley & Masson - Cronin, Pl. V, Figs. 5-6.
- 1993 *Cytheropteron biconvexa* Whatley & Masson - Lord *et al.*, Pl. 3, Fig. 4.
- 1999 *Cytheropteron biconvexa* Whatley & Masson - Kupriyanova, Pl. 2, Fig. 5.
- 2003 *Cytheropteron biconvexa* Whatley & Masson - Stepanova *et al.*, 2003a, Pl. II, Figs. 7, 8.

Holotype.—Micropalaeontology Collections stored in the Palaeontology Department, National History Museum, London, OS 10800; adult left valve, borehole, Forties Field, North Sea, Lat. 57°43'54.5"N, Long. 00°58'25.5"E. Type level – 5 m depth in borehole; Pleistocene.

Description.—Carapace small, fragile, subtriangular in lateral view. Dorsal margin slightly arched, gradually beveled towards anterior and posterior margins. Ventral margin straight, slightly concave in anterior third. Anterior margin flattened, arcuate and evenly rounded. Posterior margin also flattened, caudate, upturned towards dorsal margin. Caudal process convex in postero-dorsal part and straight or slightly concave in postero-ventral part. Greatest length at mid height, greatest height in the center of valve. Ala with rounded anterior edge and subvertical posterior. Two round puncta occur at the base of ala expansion close to its edges. Lateral valve surface bears two fine loop-like ribs. The first one stretches in a broad arc from the mid-dorsal point through lateral surface and ends at the base of anterior edge of ala. The second rib forms a loop convex upwards, its endings reach anterior and posterior edges of ala. This rib nearly touches dorsal margin. Distinct fine rib is developed along anterior edge of ala, the second fine rib, less distinct, extends along its posterior edge. Lateral valve surface between ribs is smooth. Several weak subvertical stream-like ribs occur on posterior margin.



FIGURE 3—Distribution of *Cytheropteron biconvexa*.
See key Fig. 2.

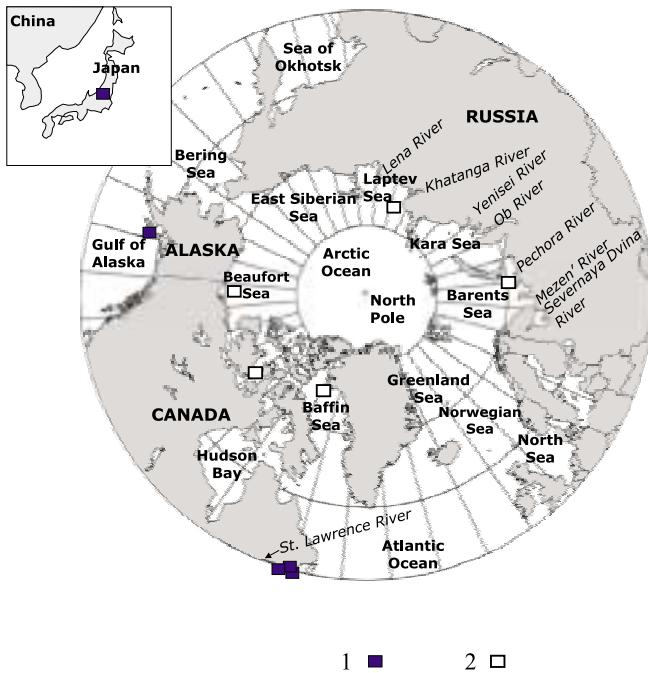


FIGURE 4—Distribution of *Cytheropteron champlainum*. See key Fig. 2.

Measurements, mm.—

	L	H
MSU292/76	0.4	0.23
MSU292/262	0.36	0.22

Comparison.—*Cytheropteron biconvexa* differs from *C. inornatum* Brady and Robertson, 1872 in the number of fine ribs on the lateral surface (two against three, fine ribs on the ala edges are not considered) and their pattern.

Variability.—Carapaces differ slightly in height in the center due to variations in convexity of the dorsal margin. Also, the height of the posterior margin varies slightly.

Remarks.—Specimens of this species from the Quaternary deposits of the western Russian Arctic are stored in VNIIOkeangeologia (St. Petersburg), collection of O.M. Lev. She did not identify them to species level.

Fossil distribution.—Pleistocene: North Sea, Northern Ireland, Norway, Goldthwait Sea (Quebec); Pleistocene-Holocene: Pechora Sea, Laptev Sea; Holocene of the eastern Kara Sea (Fig. 3).

Modern distribution.—Western Laptev Sea, Gulf of Alaska, Beaufort Sea, Canadian Arctic, Greenland Sea (Fig. 3).

Material.—Five valves and 4 carapaces from Late Pleistocene through Holocene deposits and from Recent surface sediments of the Laptev Sea.

Cytheropteron champlainum Cronin, 1981
Pl. I, Figs. 5, 6

1981 *Cytheropteron champlainum* Cronin, 1981, p. 404, Pl. 8, Figs. 7, 8.

1987 *Cytheropteron champlainum* Cronin - Cronin & Ikeya, p. 84, Pl. 3, Figs. 3, 6.

1989 *Cytheropteron champlainum* Cronin, Pl. IV, Fig. 7.

1994 *Cytheropteron champlainum* Cronin - Brouwers, p. 17, Pl. 17, Figs. 1-6.

1994 *Cytheropteron tarrensis* Brouwers, p. 36, Pl. 21, Fig. 1; Pl. 22, Figs. 4-10, 25.

2003 *Cytheropteron champlainum* Cronin - Stepanova et al., 2003a, Pl. II, Fig. 2.

Holotype.—U.S. National Museum (USNM), Department of Palaeobiology, USNM311142; female right valve; Canada, Ontario, north end of gravel pit, west side of road, 5.6 km N of Kars, Ontario, Canada; Pleistocene.



FIGURE 5—Distribution of *Cytheropteron dimlingtonensis*. 1 – fossil distribution; 2 – modern distribution; 3 – probable fossil distribution.

Description.—Carapace medium sized. Trapeziform in lateral view. Dorsal margin arcuately convex, gradually beveled towards anterior and posterior margins. Ventral margin straight, slightly concave in anterior third. Anterior margin arcuate and evenly rounded. Posterior margin lower than anterior, caudate, flattened, upturned towards dorsal margin. Greatest length at mid height, greatest height in the center of valve. Broad wing-like process with rounded edge overhangs ventral margin. Ala is subdivided by depression of slightly variable size. Valve surface with subvertical rows of puncta and fossae, or only fossae. Fine rib along ala edge extends from the lower section of anterior part of valve and merges with fossae muri at the posterior part of valve. Fine rib equal in length to dorsal margin runs slightly below and parallel to it. Below ala process, several fine ribs parallel to ventral margin stretch from anterior part of valve and eventually merge with fossae muri at posterior part of valve. The whole valve surface, besides fossae muri, is pierced by pore canals.

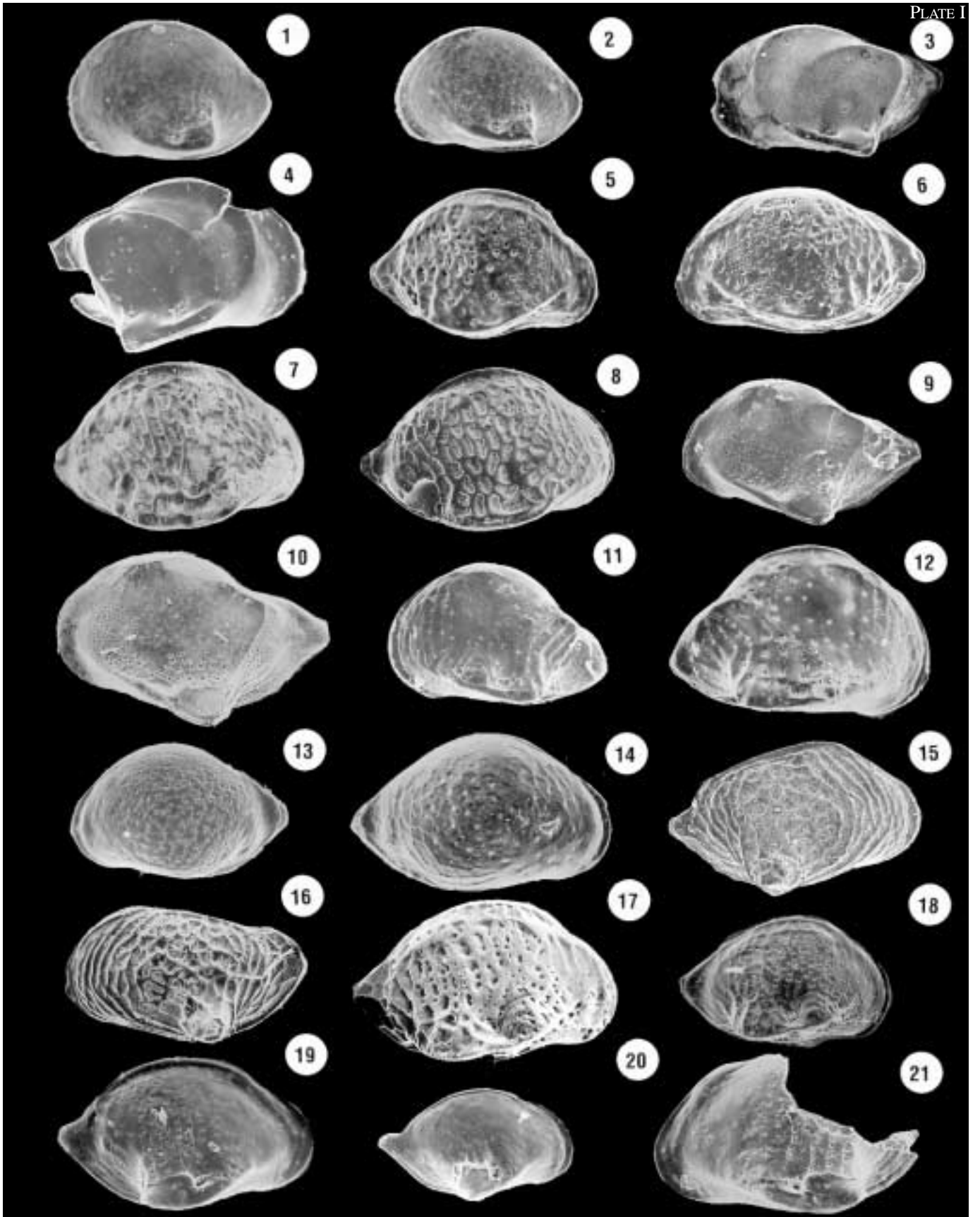
Sexual dimorphism.—Cronin (1981) pointed to strong sexual dimorphism: male carapace is higher and shorter. Our specimens demonstrate a similar pattern.



FIGURE 6—Distribution of *Cytheropteron discoveria*. See key Fig. 2.

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 PLATE 1–1, 2, *Cytheropteron arcuatum* Brady, Crosskey and Robertson, 1874; 1, left valve, external view, MSU292/77, x140; 2, left valve, external view, MSU292/78, x97; recent surface sediments of the western-central Laptev Sea. 3, 4, *Cytheropteron biconvexa* Whatley and Masson, 1979; 3, left valve, external view, MSU292/76, x100; 4, right valve, external view, MSU292/262, x130; recent surface sediments of the western-central Laptev Sea. 5, 6, *Cytheropteron champlainum* Cronin, 1981; 5, right valve, external view, MSU292/59, x86; 6, left valve, external view, MSU292/263, x80; recent surface sediments of the western-central Laptev Sea. 7, 8, *Cytheropteron dimlingtonensis* Neale and Howe, 1973; 7, right valve, external view, MSU292/277, x90; 8, right valve, external view, MSU292/279, x80; late Pleistocene of the western Laptev Sea. 9, 10, *Cytheropteron discoveria*, Brouwers 1994; 9, left valve, external view, MSU292/270, x100; 10, left valve, external view, MSU292/271, x115; Holocene of the western Laptev Sea. 11, 12, *Cytheropteron elaei* Cronin, 1989; 11, left valve, external view, MSU292/268, x115; 12, right valve, external view, MSU292/282, x110; recent surface sediments of the eastern Laptev Sea. 13, 14, *Cytheropteron inflatum* Brady, Crosskey and Robertson, 1874; 13, left valve, external view, MSU292/71, x70; 14, right valve, external view, MSU292/281, x130; recent surface sediments of the western-central Laptev Sea. 15, 16, *Cytheropteron montrosiense* Brady, Crosskey and Robertson, 1874; 15, right valve, external view, MSU292/180, x94; 16, left valve, external view, MSU292/266, x90; recent surface sediments of the southern Laptev Sea. 17, 18, *Cytheropteron nodosolatum* Neale and Howe, 1973; 17, right valve, external view, MSU292/213, x87; recent surface sediments of the southern Laptev Sea; 18, right valve, external view, MSU292/81, x90; recent surface sediments of the western-central Laptev Sea. 19–21, *Cytheropteron porterae* Whatley and Coles, 1987; 19, right valve, external view, MSU292/61, x87; 20, right valve, external view, MSU292/74, x70; 21, left valve fragment, external view, MSU292/283, x100; recent surface sediments of the western-central Laptev Sea.

PLATE I



Measurements, mm.—

	L	H
MSU292/59	0.53	0.3
MSU292/260	0.41	0.23
MSU292/263	0.57	0.31

Variability.—Ornamentation is highly variable ranging from small puncta (0.01 mm) to fossae (0.016 mm).

Comparison.—*Cytheropteron champlainum* differs from *C. dimlingtonensis* Neale and Howe, 1973, in ornamentation: *C. champlainum* carapace has both puncta and fossae, while *C. dimlingtonensis* – only fossae densely punctate inside.

Remarks.—Close examination of the published illustrations of *C. dimlingtonensis* Neale and Howe, 1973, *C. champlainum* Cronin, 1981 and *C. tarrensis* Brouwers, 1994 allowed us to include them in one group of species, since they have nearly identical shape and dimensions. Surface ornamentation within this group varies markedly, from small puncta to fossae. *Cytheropteron tarrensis* has the smoothest surface with puncta grading into elongated fossae towards posterior margin. The ornament of *C. champlainum* is identical but more distinct than that of *C. tarrensis*, therefore, we consider these species to be synonyms. Moreover, *C. dimlingtonensis* has solely reticulate surface sculpture (Pl. I, Figs. 7, 8).

Fossil distribution.—Plio-Pleistocene of Japan; Pleistocene of the Gulf of Alaska, Champlain Sea, Goldthwait Sea, Western Newfoundland, coastal Maine, Massachusetts and Nova Scotia (Fig. 4).

Modern distribution.—Barents Sea, western Laptev Sea, Beaufort Sea, Canadian Arctic, Baffin Sea (Fig. 4).

Material.—Twelve valves from Late Pleistocene and Holocene deposits and recent surface sediments of the Laptev Sea.

Cytheropteron dimlingtonensis Neale and Howe,
1973
Pl. I, Figs. 7, 8

1961 *Cytheropteron* cf. *pyramidale* Brady - Swain,
Fig. 2, N28.

1963 *Cytheropteron pyramidale* Brady - Swain,
p. 816, Pl. 97, Fig. 19, Pl. 98, Fig. 9.

1973 *Cytheropteron dimlingtonensis* Neale & Howe,
p. 242, Pl. 1, Figs. 3, 5.

1978 *Cytheropteron dimlingtonensis* Neale & Howe
- Robinson, Pl. 2, Fig. 4.



FIGURE 7—Distribution of *Cytheropteron elaeni*. See key Fig. 2.

1979 *Cytheropteron dimlingtonensis* Neale & Howe
- Whatley & Masson, p. 232, Pl. 6, Figs. 11, 13-16.
1999 *Cytheropteron champlainum* Cronin - Kupriyanova, Pl. 2, Fig. 2.

Holotype.—University of Hull; HU.50.Q.1.9.; left valve; England, Yorkshire, Dimlington; Pleistocene.

Description.—Carapace medium sized. Trapeziform in lateral view. Dorsal margin arcuately convex, gradually beveled towards anterior and posterior margins. Ventral margin straight, slightly concave in anterior third. Anterior margin arcuate and evenly rounded. Posterior margin lower than anterior, caudate, flattened, upturned towards dorsal margin. Greatest length at mid height, greatest height in the center of valve. Broad wing-like process with rounded edge overhangs ventral margin. Ala is subdivided by rounded depression (about 0.03 x 0.02 mm). Valve surface with distinct subvertical rows of fossae. Fine rib along ala edge extends from the lower section of anterior part of valve and merges with fossae muri at the posterior part of valve. Fine rib equal in length to dorsal margin runs slightly below and parallel to it. Below the ala process,

several fine ribs parallel to ventral margin stretch from anterior part of valve and eventually merge with fossae muri at posterior part of valve. The whole valve surface, besides fossae muri, is densely punctate.

Measurements, mm.—

	L	H
MSU292/229	0.4	0.21
MSU292/235	0.44	0.25
MSU292/277	0.51	0.34
MSU292/279	0.58	0.37

Variability.—The degree of reticulation is slightly variable. Shape of fossae varies from elongated to more rounded. Some carapaces are higher and shorter with more convex dorsal margin, possibly due to sexual dimorphism (published photomicrographs are not separated into sexes).

Comparison.—Comparison with *Cytheropteron champlainum* Cronin, 1981 is given above (see description of *C. champlainum*).

Cytheropteron dimlingtonensis differs from *C. latissimum* (Norman, 1864) from the Pleistocene depo-

sits of the North Sea (Whatley & Masson, 1979, pp. 225-227, Pl. 6, Figs. 7, 9, 12) by the presence of more distinct subvertical rows of puncta, more convex dorsal margin, and more evenly rounded ala edge.

Remarks.—Ostracods identified as *Cytheropteron subcircinatum* Sars 1866, (Lev, 1983, pp. 119-120, Pl. XVI, Figs. 1-2) from Pleistocene – Holocene deposits of the Lower Severnaya Dvina and Mezen' Rivers, and Kola Peninsula could be probably referred to *C. dimlingtonensis*. However, since descriptions of these specimens are not given in the publication of Lev (1983), we can not be absolutely sure that these species are synonyms. Therefore, we did not include *C. subcircinatum* sensu Lev (1983) in the list of synonyms.

We consider that the specimens attributed by Kupriyanova (1999) to *C. champlainum* (Kupriyanova, 1999, Pl. 2, Fig. 2) should be referred to as *C. dimlingtonensis*, since these specimens bear only reticulate ornament.

Fossil distribution.—Pleistocene: Great Britain; Pleistocene-Holocene of the Laptev Sea, Denmark, Pechora Sea; Pleistocene of northern Alaska (Gubik Formation); Probably, Pleistocene - Holocene: Lower Severnaya Dvina and Mezen' Rivers, Kola Peninsula; Holocene of the eastern Kara Sea (Fig. 5).

Modern distribution.—Laptev Sea, Spitsbergen coast (Fig. 5).

Material.—Sixteen valves from Late Pleistocene and Holocene deposits and Recent surface sediments of the Laptev Sea.

Cytheropteron discoveria Brouwers, 1994
Pl. I, Figs. 9, 10

1994 *Cytheropteron discoveria* Brouwers, p. 20, Pl. 11, Fig. 5, Pl. 13, Figs. 1-6, 9.

2003 *Cytheropteron inornatum* Brady & Robertson - Stepanova *et al.*, 2003a, Pl. II, Fig. 9.

Holotype.—U.S. National Museum (USNM); USNM 408516; left valve, Gulf of Alaska, locality DC2-80-EG-195; Pleistocene-Holocene (original information about age is not exact).

Description.—Carapace small, thin-shelled, subtriangular in lateral view. Dorsal margin strongly and arcuately convex, gradually beveled towards anterior margin, and passes into posterior margin through slight concavity. Ventral margin straight, slightly concave in anterior third. Anterior margin flattened and evenly rounded. Posterior margin also flattened, caudate. Caudal process convex in postero-dorsal part and slightly concave in postero-ventral part. Greatest

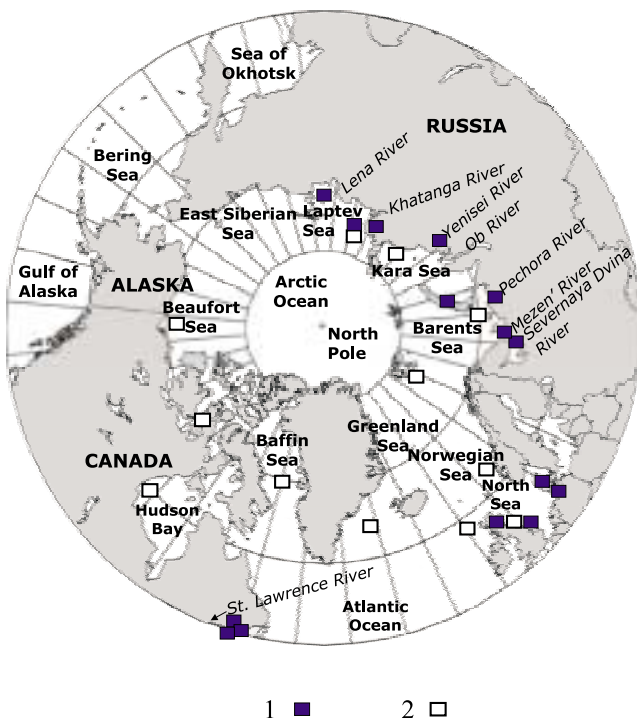


FIGURE 8—Distribution of *Cytheropteron inflatum*. See key Fig. 2.

length at mid height, greatest height in the center of valve. Ala with straight anterior edge and subvertical posterior one. Protruding part of ala densely punctate with very small puncta, largest puncta occur rarely at its base and on lateral valve surface above it. Part of ala with small puncta and with larger ones divided by biconvex rib. Very small puncta occur on posterior and anterior parts of valve; punctate area ends in front of dorsal margin. Lateral surface bears four fine ribs. One short rib extends parallel to postero-dorsal margin just below its concavity. Another short one occurs below anterior hinge edge subparallel to dorsal margin. A third rib extends upwards from ala extremity with minor inclination towards posterior margin and meets the first rib. The fourth rib extends from the ala extremity along the leading ala edge towards the anterior margin and ends just short of anterior margin. Several fine ribs occur on the posterior end parallel to postero-ventral margin. They originate at posterior side of ala and disappear short of caudal process extremity. These ribs partly merge forming elongated fossae. Carapace in posterior and anterior parts is densely punctate.

Measurements, mm.—

	L	H
MSU292/270	0.44	0.22
MSU292/271	0.42	0.19
MSU292/84	0.4	0.22

Variability.—Some carapaces are considerably less punctate than others (Stepanova *et al.*, 2003a, Pl. II, Fig. 9).

Comparison.—*Cytheropteron discoveria* Brouwers, 1994 differs from *C. inornatum* Brady and Robertson, 1872 from Recent sediments from waters around Scotland (Whatley & Masson, 1979, p. 238, Pl. 3, Figs. 1-3, 5-7) in having a punctate surface, in the number of fine ribs on the lateral surface (four against three) and in their pattern.

Remarks.—In Stepanova *et al.* (2003a) *C. discoveria* was mistakenly referred to as *C. inornatum* due to the poor material (two valves) on this species from the western Laptev Sea. Later we obtained more specimens from the Holocene deposits of the western



FIGURE 9—Distribution of *Cytheropteron montrosiense*. See key Fig. 2.

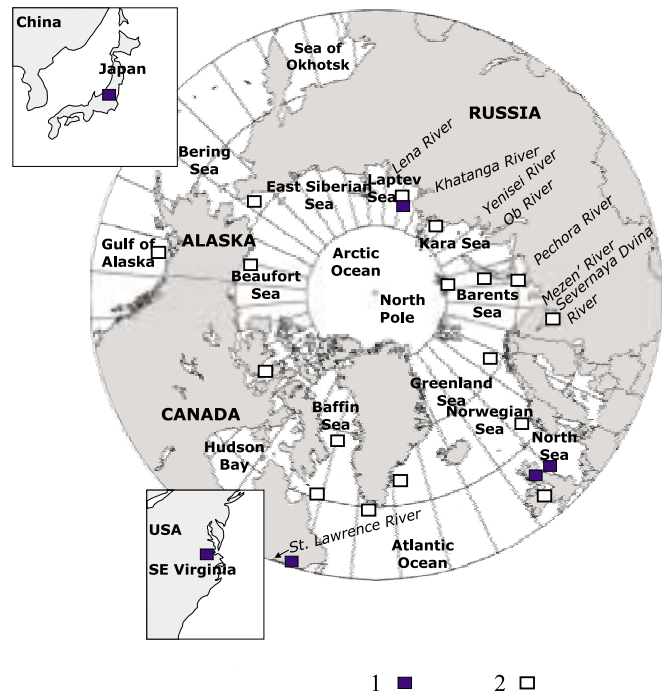


FIGURE 10—Distribution of *Cytheropteron nodosoalatum*. See key Fig. 2.

Laptev Sea which revealed a pronounced difference between these two species.

Fossil distribution.—Pleistocene-Holocene: Gulf of Alaska, Cook Inlet and Kodiak shelf, Pribilof Islands, western Laptev Sea (Fig. 6).

Modern distribution.—Gulf of Alaska, western Laptev Sea (Fig. 6).

Material.—Fourteen valves from Late Pleistocene to Holocene deposits of the western Laptev Sea and Recent surface sediment of the same area.

Cytheropteron elaei Cronin, 1989

Pl. I, Figs. 11, 12

1975 *Cytheropteron* sp. nov.? - Neale & Howe, Pl. 6, Fig. 5.

1981 *Cytheropteron nealei* Cronin, p. 406, Pl. 7, Fig. 7.

1983 *Cytheropteron paralatissimum* Swain - Lev, p. 120, Pl. XVI, Fig. 15.

1989 *Cytheropteron elaei* Cronin, Pl. V, Fig. 8.

1994 *Cytheropteron elaei* Cronin - Brouwers, p. 23, Pl. 22, Figs. 11-13.

1999 *Cytheropteron paralatissimum* Swain - Kupriyanova, Pl. 2, Fig. 9.

1999 *Cytheropteron bronwynae* Joy & Clark - Didié *et al.*, Pl. I, Fig. 14.

2003 *Cytheropteron elaei* Cronin - Stepanova *et al.*, 2003a, Pl. I, Fig. 14.

Holotype.—U.S. National Museum (USNM), Department of Paleobiology, USNM311151; female right valve?; Canada, Quebec, exposures on east side of Quebec Route 221, 7.2 km S of St. Remi; Pleistocene.

Description.—Carapace small, subtriangular in lateral view, with flattened anterior and posterior margins. Dorsal margin arcuate, strongly convex, slightly concave in front of posterior margin, passes into anterior margin through slight ledge. Ventral margin straight, slightly concave in anterior third. Anterior margin arcuately rounded. Posterior margin lower than anterior, subtriangular. Greatest length at lower third, greatest height in front third of valve. Ala with straight anterior edge and subvertical posterior. Along ala base a row of four fossae, each contains a punctum. Anterior part of valve with fine ribs parallel to anterior margin. On posterior part of valve, above posterior ala edge, three fine subvertical ribs slightly curved towards anterior margin. At hinge edges some ribs

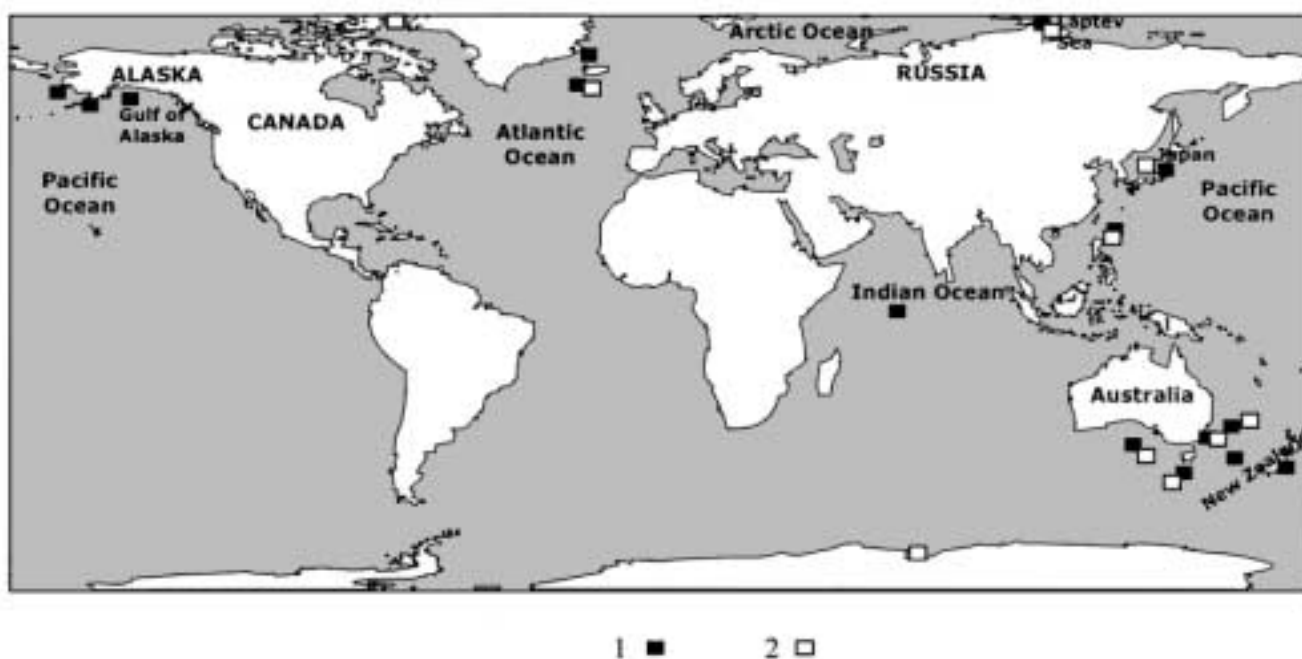


FIGURE 11—Distribution of *Cytheropteron perlaria*. See key Fig. 2.

merge forming two elongated nodes. Valves pierced by pore canals, pore puncta arranged in subvertical rows.

Measurements, mm.—

	L	H
MSU292/268	0.36	0.22
MSU292/282	0.39	0.25
MSU292/47	0.41	0.22

Variability.—Ornament of specimens is highly variable. Compared to our exemplars, specimens shown in most published micrographs possess more pronounced ribs on anterior part of valve and above posterior ala edge. Therefore, when these ribs merge, nodes they form on dorsal side are considerably bigger.

Comparison.—*Cytheropteron elaei* differs from *C. nodosum* Brady, 1868 from surface sediments of the seas around Great Britain and Ireland (Brady, 1868a, pp. 448-449, Pl. XXXIV, Figs. 31-34) in the absence of pronounced reticulation and presence of smaller nodes on dorsal side.

Remarks.—Cronin (1981) described species *Cytheropteron nealei* Cronin, 1981. Later this name was considered to be non-valid, being twice used earlier by other authors (“*Cytheropteron*” *nealei* Jarn, 1975, and *Cytheropteron?* *nealei* Joy and Clark, 1977), consequently Cronin (1989) gave this species a new name *Cytheropteron elaei* Cronin, 1989.

The specimen from the Iceland Sea identified by Didié *et al.* (1999) as *Cytheropteron bronwynae* (Didié *et al.*, 1999, Pl. I, Fig. 14) we would refer to as *C. elaei*.

Fossil distribution.—Neogene-Quaternary: Novaya Zemlya; Pleistocene: Kola Peninsula, Lower Severnaya Dvina River, Lower Pechora River, Taimyr Peninsula, Gulf of Alaska, Bering Sea, Beaufort Sea, Champlain Sea, Goldthwait Sea (Quebec); Holocene: Laptev Sea, eastern Kara Sea (Fig. 7).

Modern distribution.—Greenland Sea, Iceland Sea, Norwegian Sea, White Sea, Barents Sea, Kara Sea, eastern Laptev Sea, Chukchi Sea, Canadian Arctic, Beaufort Sea, Hudson Bay, Labrador Sea (Fig. 7).

Material.—One hundred thirty-seven valves, 20 carapaces and 25 juvenile valves from the Holocene deposits and Recent surface sediments of the Laptev Sea.

Cytheropteron inflatum Brady, Crosskey
and Robertson, 1874
Pl. I, Figs. 13, 14



FIGURE 12—Distribution of *Cytheropteron porterae*. See key Fig. 5.

1868 *Cytheropteron inflatum* Brady, Crosskey and Robertson - Brady, 1868b, Pl. V, Figs. 8-10 (nomen nudum).

1874 *Cytheropteron inflatum* Brady, Crosskey and Robertson, p. 204, Pl. VIII, Figs. 24-27, Pl. XIV, Figs. 26-29.

1889 *Cytheropteron inflatum* Brady, Crosskey and Robertson - Brady & Norman, p. 209, Pl. XX, Figs. 19-21.

1928 *Cytheropteron inflatum* Brady, Crosskey and Robertson - Sars, p. 231, Pl. CVI, Fig. 2.

1962 *Cytheropteron testudo* Sars - Wozidlo, Pl. 5, Fig. 15.

1979 *Cytheropteron inflatum* Brady, Crosskey and Robertson - Whatley & Masson, p. 237, Pl. 8, Figs. 8, 13-16.

1981 *Cytheropteron inflatum* Brady, Crosskey and Robertson - Cronin, p. 404, Pl. 2, Figs. 3-4.

1983 *Cytheropteron inflatum* Brady, Crosskey and Robertson - Lev, p. 118, Pl. XV, Figs. 7-8.

1989 *Cytheropteron inflatum* Brady, Crosskey and Robertson - Cronin, Pl. V, Fig. 11.

1996 *Cytheropteron inflatum* Brady, Crosskey and Robertson - Whatley *et al.*, Pl. 2, Figs. 1-2.

1998 *Cytheropteron inflatum* Brady, Crosskey and Robertson - Whatley *et al.*, Pl. 1, Figs. 20, 21.

2003 *Cytheropteron inflatum* Brady, Crosskey and Robertson - Stepanova *et al.*, 2003a, Pl. II, Fig. 1.

Type series.—Brady *et al.*, 1874, p. 204, Pl. VIII, Figs. 24-27; Scotland, Errol; Pleistocene; Pl. XIV, Figs. 26-29; Scotland, Drylers; Pleistocene.

Description.—Carapace medium, subtriangular in lateral view, with flattened anterior and posterior margins. Dorsal margin arcuately convex, gradually beveled towards anterior and posterior margins. Ventral margin straight, slightly concave in anterior third. Anterior margin arcuately rounded. Posterior margin lower than anterior, subtriangular. Greatest length at mid-height, greatest height in the center of valve. Strongly inflated lateral expansion above ventral margin. Several fine ribs follow its outline and form weakly developed fossae on posterior margin of valve. Valve surface bears numerous sporadically distributed puncta with pore canals.

Measurements, mm.—

	L	H
MSU292/71	0.55	0.25
MSU292/119	0.36	0.21
MSU292/73	0.37	0.18
MSU292/281	0.33	0.22

Variability.—Ornamentation is slightly variable. Some specimens of *C. inflatum* given in publications differ from our exemplars in occurrence of fine ribs not only on ventral, anterior and posterior margins, but on the whole valve surface where they form weakly developed fossae.

Comparison.—*Cytheropteron inflatum* differs from *C. walli* Whatley and Masson, 1979 from Pleistocene through Recent sediments of Great Britain (Whatley & Masson, 1979, p. 256, Pl. 8, Figs. 1, 3-6) in absence of distinct reticulation, more inflated carapace, and less defined lateral expansion.

Compared to *Cytheropteron testudo* Sars, 1869 (Sars, 1928, p. 230, Pl. CVI, Fig. 1), *C. inflatum* has a more laterally inflated carapace, less abundant pore puncta, and no wing-like process.

Remarks.—In Brady (1868b) only illustrations of *Cytheropteron inflatum* are given. The first description of this species was published in 1874. That is why this year is considered as the year of its attribution.

In the publication devoted to the Pleistocene ostracods of Germany, Woszidlo (1962) identified species



FIGURE 13—Distribution of *Cytheropteron pseudomontrosiense*. See key Fig. 2.

Cytheropteron testudo (Woszidlo, 1962, Pl. 5, Fig. 15), which we consider to be *Cytheropteron inflatum* (see also remarks in Whatley & Masson, 1979).

Fossil distribution.—Quaternary: Cheshskaya Bay coast, Lower Severnaya Dvina River, Lower Pechora River, Novaya Zemlya, Lower Yenisei River, Taimyr Peninsula, North Sea; Pleistocene: Scotland, Northern Germany (Schleswig-Holstein), Denmark, Champlain Sea, Goldthwait Sea (Quebec), Monreal (Canada); Holocene of the Laptev Sea (Fig. 8).

Modern distribution.—North Atlantic, Greenland Sea, Norwegian Sea, Great Britain coast, Barents Sea, Spitsbergen coast, Kara Sea, western Laptev Sea, Beaufort Sea, Canadian Arctic, Baffin Sea, Hudson Bay (Fig. 8).

Material.—Twenty-six valves from Holocene deposits and Recent surface sediments of the Laptev Sea.

Cytheropteron montrosiense Brady, Crosskey and Robertson, 1874
Pl. I, Figs. 15, 16

1868 *Cytheropteron montrosiense* Brady, Crosskey and Robertson - Brady, 1868b, Pl. 5, Figs. 1-3 (not Pl. 5, Figs. 4-5) (nomen nudum).

- 1874 *Cytheropteron montrosiense* Brady, Crosskey and Robertson, p. 205, Pl. 8, Figs. 28-32 (not Pl. 8, Figs. 33-36, Pl. 14, Figs. 13-16).
- 1962 *Cytheropteron montrosiense* Brady, Crosskey and Robertson - Wosizdlo, Pl. 5, Fig. 13.
- 1972 *Cytheropteron montrosiense* Brady, Crosskey and Robertson - Lev, Pl. 1, Figs. 18-19.
- 1978 *Cytheropteron montrosiense* Brady, Crosskey and Robertson - Robinson, Pl. 6, Fig. 5a (not 5b).
- 1979 *Cytheropteron montrosiense* Brady, Crosskey and Robertson - Whatley & Masson, p. 240, Pl. 2, Figs. 1-4, 6.
- 1983 *Cytheropteron montrosiense* Brady, Crosskey and Robertson - Lev, p. 117, Pl. XV, Fig. 4, Pl. XVI, Figs. 8-9.
- 1986 *Cytheropteron montrosiense* Brady, Crosskey and Robertson - McDougall *et al.*, Pl. 12, Figs. 3, 5 (not Pl. 12, Figs. 1, 2, 4, 6, 7).
- 1989 *Cytheropteron montrosiense* Brady, Crosskey and Robertson - Cronin, Pl. V, Fig. 2.
- 1993 *Cytheropteron montrosiense* Brady, Crosskey and Robertson - Lord *et al.*, Pl. 3, Figs. 1-2.
- 1996 *Cytheropteron montrosiense* Brady, Crosskey and Robertson - Whatley *et al.*, Pl. 2, Figs. 3-4.
- 1999 *Cytheropteron montrosiense* Brady, Crosskey and Robertson - Kupriyanova, Pl. 2, Fig. 3.
- 2003 *Cytheropteron montrosiense* Brady, Crosskey and Robertson - Stepanova *et al.*, 2003a, Pl. I, Fig. 15.

Type material.—Type specimens are stored in the Hancock Museum in Newcastle, type locality – Scotland, Drylers, Montrose; Pleistocene.

Description.—Carapace medium, subrhomboidal in lateral view, with flattened anterior and posterior margins. Dorsal margin straight, gradually passing into anterior margin through obtuse cardinal angle, and into posterior margin through slight concavity. Ventral margin straight, slightly concave in anterior third. Anterior margin arcuately rounded. Posterior margin lower than anterior, caudate, slightly upturned towards dorsal margin. Greatest length at mid height, greatest height in center of valve. Valves differ in outline: right valves with more convex dorsal margin. Caudal process slightly convex in postero-dorsal part in left valves, and concave in right valves. Laterally inflated expansion above ventral margin, with extremity shaped as a massive spine in posterior third of valve. Surface reticulate: subvertically elongated fossae at anterior and posterior margins, and rounded ones in central part.

Measurements, mm.—

	L	H
MSU292/130	0.34	0.18
MSU292/180	0.51	0.25
MSU292/266	0.47	0.24

Variability.—Reticulation slightly varies in its degree, possibly due to preservation.

Comparison.—*Cytheropteron montrosiense* differs from *C. sulense* Lev, 1972 in presence of massive spine on lateral expansion.

Remarks.—In Brady (1868b) only illustrations of *Cytheropteron montrosiense* are given. The first description of this species was published in 1874 that is why this year is considered as the year of its attribution.

Fossil distribution.—Neogene-Quaternary marine deposits: Lower Izhma river, Lower Severnaya Dvina River, Vaigach Island, Novaya Zemlya, Lower Ob River, Lower Yenisei River; Quaternary: North Sea, Pechora Sea; Pleistocene: Ireland, Scotland, Northern Germany (Schleswig-Holstein), Great Britain, Boston “blue clay” (Massachusetts); Late Pleistocene-Holocene



FIGURE 14—Distribution of *Cytheropteron sulense*. See key Fig. 2.



1 ■ 2 □

FIGURE 15—Distribution of *Cytheropteron suzdalskyi*. See key Fig. 2.



1 ■ 2 □

FIGURE 16—Distribution of *Cytheropteron tumefactum*. See key Fig. 2.

of the Beaufort Sea; Holocene: Laptev Sea, eastern Kara Sea (Fig. 9).

Modern distribution.—Greenland Sea, Norwegian Sea, Great Britain coast, White Sea, Barents Sea, Kara Sea, eastern Laptev Sea, East Siberian Sea, Beaufort Sea, Baffin Sea (Fig. 9).

Material.—Twelve valves and 5 carapaces from Holocene deposits and surface Recent sediments of the Laptev Sea.

Cytheropteron nodosoalatum Neale and Howe, 1973
Pl. I, Figs. 17, 18

1973 *Cytheropteron nodosoalatum* Neale & Howe, p. 240, Pl. 1, Figs. 6, 7a, b.

1975 *Cytheropteron nodosoalatum* Neale & Howe, Pl. 6, Figs. 8, 10, Pl. 7, Figs. 2, 4, 10, 11.

1979 *Cytheropteron nodosoalatum* Neale & Howe - Whatley & Masson, p. 242, Pl. 6, Figs. 3, 5, 6, 10.

1980 *Cytheropteron nodosoalatum* Neale & Howe - Lord, Pl. 2, Fig. 16.

1987 *Cytheropteron nodosoalatum* Neale & Howe - Cronin & Ikeya, p. 84, Pl. 3, Figs. 1, 2.

1989 *Cytheropteron nodosoalatum* Neale & Howe - Cronin, Pl. IV, Figs. 1-4.

2003 *Cytheropteron nodosoalatum* Neale & Howe - Stepanova *et al.*, 2003a, Pl. II, Figs. 3, 4.

Holotype.—University of Hull, HVH 9787; left valve; England, Yorkshire, Dimlington; Pleistocene.

Description.—Carapace medium, subrhomboidal in lateral view, with flattened anterior and posterior margins. Dorsal margin slightly convex, gradually beveled towards anterior and posterior margins, and slightly concave passing into them. Ventral margin straight, slightly concave in anterior third. Anterior margin arcuately rounded and bent towards ventral margin. Posterior margin lower than anterior, caudate, slightly upturned towards dorsal margin. Greatest length at mid height, greatest height in center of valve. Valves differ in outline: right valves shorter and higher with more convex dorsal margin. Caudal process straight or slightly convex in postero-dorsal part in left valves, and slightly concave in right valves. Broad lateral wing-like expansion, subdivided by a depression in its central part, overlaps ventral margin. On ala edges massive nodes flank this depression and give it a bipartite appearance. Surface reticulate and punctate, fossae and puncta in subvertical rows, fossae predominantly restricted to posterior part of valve, and

puncta over the entire surface. In central part round puncta prevail, on anterior and posterior margins they are considerably smaller and occur more densely. Elongated subvertical fossae with low muri above posterior node of ala. Fine rib stretches from lower part of anterior margin of valve, runs along ala edge, and ends at its posterior edge. Here it splits into two or three upward branches; at mid-height point of valve they merge with fossae muri. Fine rib equal in length to dorsal margin runs slightly below and parallel to it. Several fine ribs parallel to ventral margin, below ala expansion, run from lower anterior part of valve and merge with fossae muri on posterior part. Thread-like ribs forming fossae with puncta inside occur on posterior third of valve and anterior margin.

Measurements, mm.—

	L	H
MSU292/39	0.55	0.29
MSU292/81	0.43	0.23
MSU292/213	0.56	0.34

Variability.—Ornamentation varies from densely punctate surface to well developed fossae with puncta within them.

Comparison.—*Cytheropteron nodosoalatum* differs from *C. champlainum* Cronin, 1981 from Pleistocene deposits of the Goldthwait Sea and Presumpscot formation (Maine), in having massive nodes on the alate expansion.

Fossil distribution.—Plio-Pleistocene of Japan; Pleistocene: Great Britain, North Sea, SE Virginia, Goldthwait Sea and Presumpscot formation (Maine); Holocene of the Laptev Sea (Fig. 10).

Modern distribution.—Irish Sea, Norwegian Sea, White Sea, Barents Sea, Franz Josef Land coast, Novaya Zemlya coast, Kara Sea, Laptev Sea, Chukchi Sea, Gulf of Alaska, Beaufort Sea, Canadian Arctic, Baffin Sea, Davis Strait, Labrador Sea, southern and eastern coasts of Greenland (Fig. 10).

Material.—Thirteen valves and one carapace from Holocene deposits and surface Recent sediments of the Laptev Sea.

Cytheropteron perlaria Hao, 1988
Pl. II, Figs. 32, 33

1987 *Cytheropteron testudo* Sars - Whatley & Coles, Pl. 3, Fig. 1.

1988 *Cytheropteron testudo* Sars - Whatley & Ayress, Pl. 1, Figs. 7-8.

1988 *Cytheropteron perlaria* Hao sp. nov. - Hao, p. 280, pl. 47, Figs. 4-9.

1994 *Cytheropteron carolae* Brouwers, 1994, p. 17, Pl. 8, Figs. 12-14.

1999 *Cytheropteron perlaria* Hao - Swanson & Ayress, Pl. I, Figs. 7-13; Pl. II, Figs. 1-3.

1999 *Cytheropteron* sp. aff. *perlaria* Hao - Swanson & Ayress, Pl. 7, Figs. 1-6; Pl. 8, Fig. 1.

2003 *Cytheropteron testudo* Sars - Stepanova *et al.*, 2003a, Pl. II, Figs. 5, 6.

Holotype.—Chinese University of Geosciences in Beijing; left valve, N 40212; Okinawa Trough, station 919, 865; Late Pleistocene.

Description.—Carapace small, subtriangular in lateral view, with flattened anterior and posterior margins. Dorsal margin slightly convex, more convex in right valves, strongly bent towards posterior margin, so that it almost touches ventral margin. Ventral margin straight, slightly concave in anterior third. Anterior margin arcuately rounded, bent towards ventral margin. Posterior margin considerably lower than anterior, caudate. Caudal process in postero-dorsal part straight or



FIGURE 17—Distribution of *Cytheropteron laptevensis* Stepanova sp. nov. See key Fig. 2.

slightly convex in left valves, and slightly concave in right ones. Greatest length right above ventral margin, greatest height at anterior hinge edge. Wing-like expansion with rounded edge above ventral margin, flat, peak-like, subvertical to valve surface. Rib along ala edge. Two fine ribs right above ala expansion. At anterior margin one or several (maximum 3) thread-like ribs. They stretch from ala base parallel to anterior margin, reach dorsal margin, where they turn toward posterior margin and extend further parallel to dorsal margin. These ribs do not reach posterior part of valve. Valve surface evenly densely punctate. Puncta small, round.

Measurements, mm.—

	L	H
MSU292/69	0.37	0.21
MSU292/70	0.34	0.18
MSU292/71	0.36	0.2

Variability.—Number of fine ribs parallel to anterior and dorsal margins varies from one to three.

Comparison.—*Cytheropteron perlaria* Hao, 1988 differs from *Cytheropteron testudo* Sars, 1869 from Australian waters (Swanson & Ayress, 1999, p. 157, Pl. 4, Figs. 1-12; Pl. 5, Figs. 1-13; Pl. 6, Figs. 10-12) in having considerably smaller size, not exceeding 0.5 mm, while maximum carapace length of *C. testudo* is usually more than 0.5 mm.

Remarks.—Swanson & Ayress (1999) included *Cytheropteron perlaria* into the “species group” *Cytheropteron testudo*, that also includes: *C. delphinium*, *C. bikurangiensis*, *C. sarsi*, *C. taciturnum*, *C. testudo*, *C. wellmani*. All these species are morphologically very similar, and some of them are cosmopolites. Both *C. perlaria* and *C. testudo* were reported from the Arctic and North Atlantic. From our point of view the only obvious difference in carapace morphology between these two species is the carapace size. Previously we mistakenly attributed our specimens to *C. testudo* Sars, 1869, but according to Swanson & Ayress (1999), they should be referred to as *C. perlaria* Hao, 1988, since all of them do not exceed 0.5 mm.

Swanson & Ayress (1999) consider distribution of *C. perlaria* Hao, 1988 to be subordinated by that of *Cytheropteron testudo* Sars, 1869, but in their paper they mainly list findings of *C. perlaria* in the Southern Hemisphere. Therefore, we suppose that most findings of *Cytheropteron testudo* might also contain specimens of *C. perlaria*, since distinguishing of these species is very complicated.

We consider *Cytheropteron carolae* Brouwers (1994, p. 17, Pl. 8, Figs. 12-14) from Pleistocene through Holocene deposits of the Gulf of Alaska to be a synonym of *Cytheropteron perlaria* Hao, 1988. In original description of *C. carolae* there is no comparison with *C. perlaria* and also, in our opinion, the reference list does not include any publication with illustrations of *C. perlaria*. Therefore, we conceive it to be expedient to attribute specimens shown in Brouwers (1994) to *C. perlaria* Hao, 1988.

Fossil distribution.—Late Paleogene and Neogene deposits of: SW Pacific Ocean, Indian Ocean, North Atlantic Ocean. Late Eocene (Ototara limestone, Ashley mudstone) of New Zealand; Miocene-Pleistocene: New Caledonia basin, Lord Howe Rise, Challenger Plateau; Pleistocene-Holocene: North Atlantic, Gulf of Alaska, Cook Inlet, Pribilof Islands, South Australian continental slope, East Australian continental slope, Tasman Sea; Holocene: Queensland Plateau, western Laptev Sea, Denmark Strait (Fig. 11).

Modern distribution.—North Atlantic, western Laptev Sea, China Sea, Okinawa Trough, Queensland Plateau, New Caledonia basin, Lord Howe Rise, Challenger Plateau, East Australian continental slope, South Australian continental slope, Kerguelen Plateau, Prydz Bay (Antarctica) (Fig. 11).

Material.—Fourteen valves and 10 carapaces from Holocene deposits and Recent surface sediments of the Laptev Sea.

Cytheropteron porterae Whatley and Coles, 1987
Pl. I, Figs. 19-21

1987 *Cytheropteron porterae* Whatley & Coles, p. 64, Pl. 2, Figs. 21-23.

1996 *Cytheropteron porterae* Whatley & Coles - Whatley *et al.*, Pl. 2, Figs. 7, 9.

1998 *Cytheropteron porterae* Whatley & Coles - Whatley *et al.*, Pl. 2, Figs. 1-2.

2001 *Cytheropteron porterae* Whatley & Coles - Didié, Pl. 2, Figs. 19-21.

2003 *Cytheropteron porterae* Whatley & Coles - Stepanova *et al.*, 2003a, Pl. II, Figs. 10, 11.

Holotype.—Micropalaeontology Collections stored at Palaeontological Department, National History Museum, London, OS 12536; adult right valve, North Atlantic, DSDP site 607, Lat. 41°00'07"N, Long. 32°54'44" W, core 15 c.c., NN Zone 16, Late Pliocene.

Description.—Carapace medium, subrhomboidal in lateral view, with flattened anterior and posterior margins. Dorsal margin arcuately convex, in right valves stronger than in left ones, gradually beveled towards anterior and

posterior margins. Ventral margin straight, slightly concave in anterior third. Anterior margin arcuately rounded and bent towards ventral margin. Posterior margin lower than anterior, strongly caudate, slightly upturned towards dorsal margin. Greatest length at mid-height, greatest height at mid-length. Ala with gently rounded anterior edge and subvertical posterior edge. At ala base, a row of several (4-6) subvertically elongated fossae punctate within. The nearest to anterior margin fossa contains a large pit. Above the row of fossae, ala surface is smooth. Central part of valve bears subvertical rows of puncta. On posterior and, rarely, anterior margins, thread-like ribs run parallel to them forming weakly developed fossae.

Measurements, mm.—

	L	H
MSU292/61	0.59	0.28
MSU292/74	0.52	0.23
MSU292/89	0.4	0.17

Variability.—Reticulation varies in its degree on anterior and posterior margins; on anterior margin often not developed.

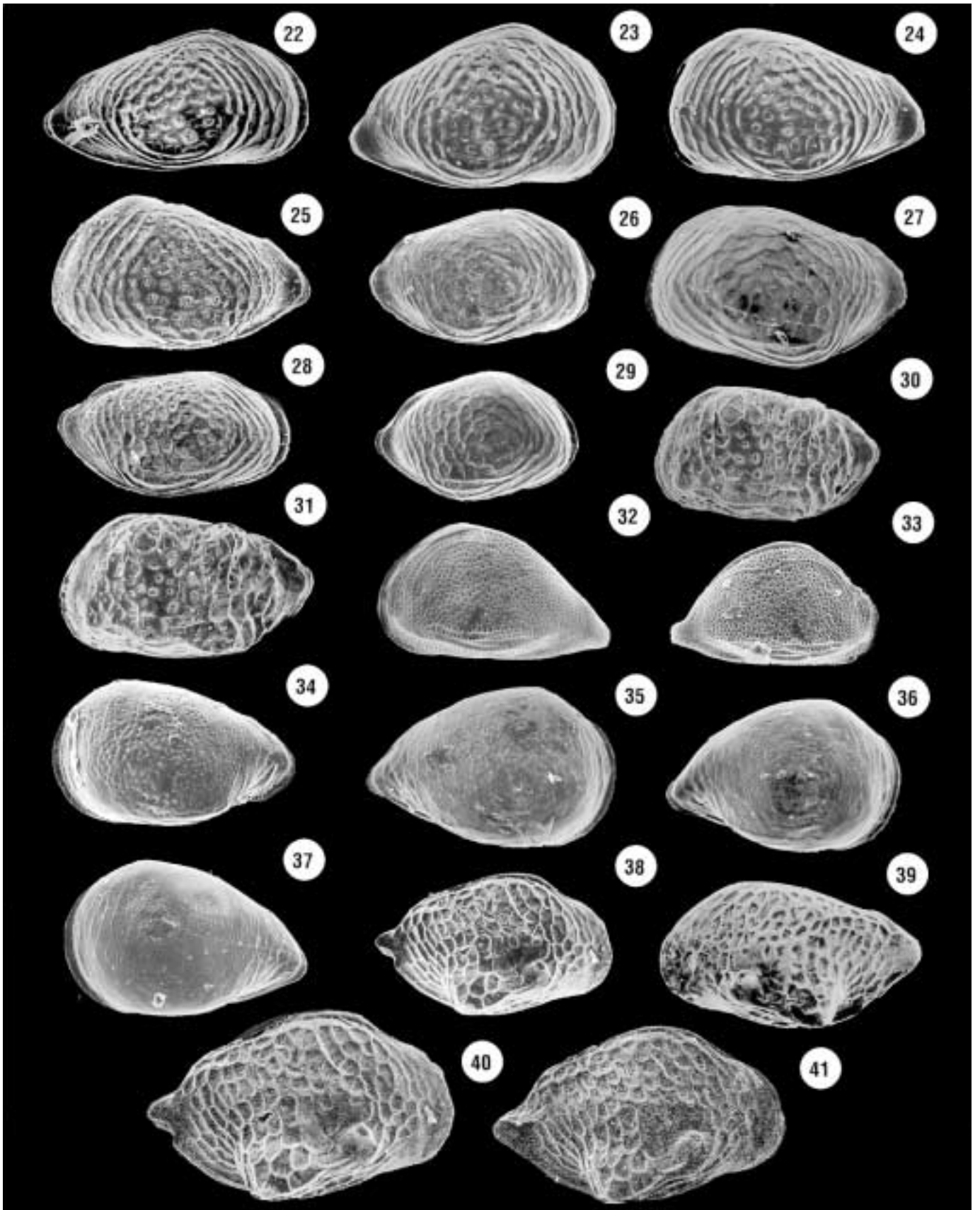
Comparison.—*Cytheropteron porterae* is distinguished from *C. carolinae* Whatley and Coles, 1987 from the Quaternary deposits of the North Atlantic (Whatley & Coles, 1987, p. 60-61, Pl. 2, Figs. 6, 7, 9) in its larger size and presence of puncta partially covering valve surface. *C. carolinae* has puncta over the entire surface and lacks reticulation and puncta at the base of the ala.

Fossil distribution.—Tentative findings in deep water Miocene deposits of the Indian Ocean; Pliocene-Quaternary: N. Atlantic; Pleistocene-Holocene: western Laptev Sea; Holocene of the eastern Kara Sea (Fig. 12).

Modern distribution.—Greenland Sea, Newfoundland, North Atlantic, Kara Sea and western Laptev Sea (Fig. 12).

Material.—Eighty valves and 13 carapaces from Late Pleistocene to Holocene deposits and Recent surface sediments of the western Laptev Sea.

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 PLATE 2—22-25, *Cytheropteron pseudomontrosiense* Whatley and Masson, 1979; 22, right valve, external view, MSU292/285, x135; 23, right valve, external view, MSU292/286, x155; 24, left valve, external view, MSU292/287, x120; late Pleistocene of the western Laptev Sea; 25, left valve, external view, collection of Lev (NIIGA), from sample N18, x100, identified by O.M. Lev as *Cytheropteron sulense*; late Pliocene-Pleistocene of the Malozemel'skaya tundra. 26-29, *Cytheropteron sulense* Lev, 1972; 26, right valve, external view, collection of Lev (NIIGA), N1183-69, x100; 27, left valve, external view, collection of Lev (NIIGA), N1183-68, x100; late Pliocene-Pleistocene of the Malozemel'skaya tundra; 28, right valve, external view, MSU292/179, x65; 29, right valve, external view, MSU292/135, x85; Holocene and recent surface sediments of the eastern Laptev Sea. 30, 31, *Cytheropteron suzdalskyi* Lev, 1972; 30, left valve, external view, MSU292/49, x75; 31, left valve, external view, MSU292/267, x85; Holocene and recent surface sediments of the eastern Laptev Sea. 32, 33, *Cytheropteron perlaria* Hao, 1988; 32, left valve, external view, MSU292/71, x120; 33, right valve, external view, MSU292/69, x96; recent surface sediments of the western-central Laptev Sea. 34-37, *Cytheropteron tumefactum* Lev, 1972; 34, left valve, external view, collection of Lev (NIIGA), from sample 2302 (identified by O.M. Lev as *Cytheropteron punctatum*), x105; 35, right valve, external view, collection of Lev (NIIGA), from sample 2302 x105; late Pliocene-Eopleistocene of the Arkhangelsk region; 36, right valve, external view, MSU292/60, x96; 37, left valve, external view, MSU292/264, x115; recent sediments of the western-central Laptev Sea. 38-41, *Cytheropteron laptevensis* Stepanova sp. nov.; 38, right valve, external view, MSU292/278, x110; 39, left valve, external view, MSU292/280, x135; 40, right valve external view, MSU292/253, x145; 41, right valve external view, MSU292/234, x125; Pleistocene-Holocene of the western Laptev Sea.



Cytheropteron pseudomontrosiense Whatley
and Masson, 1979
Pl. II, Figs. 22-25

- 1874 *Cytheropteron montrosiense* Brady, Crosskey and Robertson - Brady *et al.*, p. 205, Pl. VIII, Figs. 33-36 (not Pl. 8, Figs. 28-32, Pl. 14, Figs. 13-16).
1889 *Cytheropteron montrosiense* Brady, Crosskey and Robertson - Brady & Norman, p. 216, Pl. XIX, Figs. 26-27.
1963 *Cytheropteron montrosiense* Brady, Crosskey and Robertson - Swain, p. 817, Pl. 95, Fig. 14 (not Pl. 97, Fig. 21).
1977 *Cytheropteron montrosiense* Brady, Crosskey and Robertson - Cronin, Pl. III, Fig. 19.
1978 *Cytheropteron montrosiense* Brady, Crosskey and Robertson - Robinson, Pl. 6, Fig. 5b (not 5a).
1979 *Cytheropteron pseudomontrosiense* Whatley & Masson, p. 247, Pl. 2, Figs. 5, 7-10, 13, 14.
1980 *Cytheropteron montrosiense* Brady, Crosskey and Robertson - Lord, Pl. 2, Figs. 1-6.
1981 *Cytheropteron pseudomontrosiense* Whatley & Masson - Cronin, p. 404, Pl. 6, Figs. 5, 7.
1989 *Cytheropteron pseudomontrosiense* Whatley & Masson - Cronin, Pl. V, Fig. 4.
1991 *Cytheropteron pseudomontrosiense* Whatley & Masson - Brouwers *et al.*, Pl. 3, Fig. 2.
1999 *Cytheropteron pseudomontrosiense* Whatley & Masson - Kupriyanova, Pl. 2, Fig. 8.

Holotype.—Micropalaeontology Collections stored at the Palaentological Department, National History Museum, London, OS 10830; adult left valve, North Sea, Forties Field borehole, DB 13, Lat. 57°43'54.5"N, Long. 00°58'25.5" E, depth in core 5 m, upper part of the Quaternary succession.

Description.—Carapace medium, subtriangular in lateral view, with flattened anterior and posterior margins. Dorsal margin almost straight, slightly concave in posterior part, gradually beveled towards anterior and posterior margins. Dorsal margin passes into anterior margin through obtuse cardinal angle. Ventral margin straight, slightly concave in anterior third. Anterior margin arcuately rounded. Posterior margin lower than anterior, caudate. Greatest length at lower third, greatest height at anterior hinge edge. Valves differ in outline: right valves with more convex (distinct) cardinal angles, and left valves with gradually sloping cardinal angles. Caudal process in postero-dorsal part straight or slightly convex in left valves, and slightly concave in right valves. Rounded laterally inflated expansion above ventral margin. Surface is reticulate,

fossae distributed concentrically; in the central part of valve fossae rounded, on margins elongated. Above ventral margin fossae muri merge into ribs contouring lateral expansion.

Measurements, mm.—

	L	H
From sample N18, Belush'e, Identified as <i>C. sulense</i> (collection of O.M. Lev, VNIIOkeangeologiya)	0.41	0.24
N 292/285	0.37	0.19
N 292/286	0.32	0.19
N 292/287	0.39	0.21

Variability.—The degree of reticulation is variable. Usually fossae are well expressed.

Comparison.—*Cytheropteron pseudomontrosiense* differs from *Cytheropteron sulense* Lev, 1972 (Lev, 1972, p. 18, Pl. 1, Figs. 14-17) from the Late Pliocene-Early Pleistocene deposits of Arkhangel'sk Region in having solely subtriangular lateral valve outline, while *C. sulense* is ovate or trapeziform in lateral view.

Remarks.—We consider *C. pseudomontrosiense* and *C. sulense* to be two distinct species. The most interesting fact is that in original descriptions of both species, their authors (Lev, 1972, Whatley & Masson, 1979) put the same illustrations in the synonym list (Brady *et al.*, 1874, p. 205, Pl. 8, Figs. 33-36). We studied the collection of O.M. Lev stored in St. Petersburg in order to clarify this confusion. Most specimens shown in Lev (1972, 1983) are trapeziform, while *C. pseudomontrosiense* valves in published micrographs demonstrate a predominantly subtriangular outline. In Lev's collection we found specimens of both morphotypes. Thus, we suppose that Lev considered only trapeziform carapaces as adults, while subtriangular ones she thought to be late moult stages. Originally Whatley & Masson (1979) published micrographs of subtriangular specimens, though some of them were almost trapeziform. Specimens of both morphotypes are present in our samples from the Laptev Sea. All surface samples and Holocene sediment samples from the eastern Laptev Sea mainly contain specimens of *C. sulense*, but the Late Pleistocene – Holocene sediments from the western Laptev Sea are dominated by *C. pseudomontrosiense*. At the same time, specimens of another morphotype are always present in small amounts. Since publications of Lev (1972, 1983) are in

Russian, they are not widely known abroad. Therefore, both morphotypes in foreign publications are named *C. pseudomontrosiense* (or *C. montrosiense*). Despite this fact we consider them as separate species (according with Whatley, pers. comm., 2003, and Briggs, pers. comm., 2003). Therefore, subtriangular specimens are referred to as *C. pseudomontrosiense*, and subovate and trapeziform ones - as *C. sulense*.

Fossil distribution.—Pliocene of Greenland; Quaternary: North Sea, Pechora Sea; Pleistocene: Great Britain, Norway, Champlain Sea; Pleistocene-Holocene: Norwegian Sea, western Laptev Sea (Fig. 13).

Modern distribution.—East Siberian Sea, Beaufort Sea, Baffin Sea, Spitsbergen coast (Fig. 13).

Material.—Fifty-three valves and 2 carapaces from Late Pleistocene to Holocene deposits of the western Laptev Sea.

Cytheropteron sulense Lev, 1972
Pl. II, Figs. 26-29

- 1868 *Cytheropteron montrosiense* Brady, Crosskey and Robertson - Brady, 1868b, Pl. 5, Figs. 4-5 (not Pl. 5, Figs. 1-3).
- 1963 *Cytheropteron montrosiense* Brady, Crosskey and Robertson - Swain, p. 817, Pl. 97, Fig. 21 (not Pl. 95, Fig. 14).
- 1972 *Cytheropteron sulense* Lev, p. 18, Pl. 1, Figs. 14-17.
- 1983 *Cytheropteron sulense* Lev, Pl. XVI, Figs. 12, 13.
- 1986 *Cytheropteron montrosiense* Brady, Crosskey and Robertson - McDougall *et al.*, Pl. 12, Figs. 1, 2, 4, 6 (not Pl. 12, Figs. 3, 5, 7).
- 1988 *Cytheropteron montrosiense* Brady, Crosskey and Robertson - Siddiqui, Pl. 2, Fig. 4.
- 1991 *Cytheropteron* cf. *C. montrosiense* Brady, Crosskey and Robertson - Brouwers *et al.*, Pl. 2, Fig. 5.
- 1991 ?*Cytheropteron* sp. 3 - Brouwers *et al.*, Pl. 2, Fig. 7.
- 1999 *Cytheropteron montrosiense* Brady, Crosskey and Robertson - Schoning & Wastegård, Pl. 1, Fig. 4.
- 2003 *Cytheropteron sulense* Lev - Stepanova *et al.*, 2003a, Pl. I, Figs. 12, 13.

Holotype.—Collection stored at VNIIOkeangeologiya, St. Petersburg, N1183-66; adult right valve; Russia, Arkhangel'sk Region, Malozemel'skaya tun-

dra, Sula River, Kotkino, Late Pliocene-early Pleistocene.

Description.—Carapace medium, trapeziform to ovate in lateral view, with flattened anterior and posterior margins. Dorsal margin almost straight, slightly concave in posterior part, gradually beveled towards anterior and posterior margins. Dorsal margin passes into anterior margin very gradually. Ventral margin straight, slightly concave in anterior third. Anterior margin arcuately rounded. Posterior margin lower than anterior, caudate. Greatest length slightly higher of mid-height, greatest height at anterior hinge edge. Valves differ in outline: right valves with more convex (distinct) cardinal angles, and left valves with gradually sloping cardinal angles. Caudal process in posteroventral part slightly convex in left valves, and slightly concave in right valves. Rounded laterally inflated expansion above ventral margin. Surface is reticulate, fossae distributed concentrically; in the central part of valve fossae rounded, on margins elongated. Above ventral margin fossae muri merge into ribs contouring lateral expansion.

Measurements, mm.—

	L	H
N1183-68 (collection of O.M. Lev, VNIIOkeangeologiya)	0.51	0.3
N1183-69 (collection of O.M. Lev, VNIIOkeangeologiya)	0.42	0.23
MSU292/135	0.44	0.27
MSU292/179	0.47	0.23

Variability.—The degree of reticulation is variable. Usually fossae are well expressed.

Comparison.—For comparison with morphologically similar species see description of *C. montrosiense* given above.

Remarks.—See remarks to *C. pseudomontrosiense*. *Cytheropteron sulense* was often confused with both *C. montrosiense* and *C. pseudomontrosiense*. Here we consider the specimens given in McDougall, 1986 (Pl. 13, Figs. 1, 2, 4, 6) from the Late Pleistocene – Holocene deposits of the Beaufort shelf as *C. sulense*, because all these specimens demonstrate solely subovate lateral outline.

Fossil distribution.—Pliocene of Greenland; Late Pliocene-Pleistocene of Malozemel'skaya tundra; Holocene of the eastern Laptev Sea; Late Pleistocene-Holocene of the Baltic Sea, Beaufort Sea (Fig. 14).

Modern distribution.—Novaya Zemlya coast, Kara Sea, eastern Laptev Sea, Chukchi Sea, Hudson Bay, Canadian Arctic, Beaufort Sea, Baffin Sea (Fig. 14).

Material.—One hundred twenty-five valves and 18 carapaces from Holocene deposits and Recent surface sediments of the Laptev Sea.

Cytheropteron suzdalskyi Lev, 1972
Pl. II, Figs. 30, 31

- 1972 *Cytheropteron suzdalskyi* Lev, p. 19, Pl. 1, Figs. 1-5.
1975 *Cytheropteron* cf. *nodosum* Brady - Neale & Howe, Pl. 7, Fig. 5.
1983 *Cytheropteron suzdalskyi* Lev, Pl. XV, Figs. 13, 14.
1989 *Cytheropteron* cf. *suzdalskyi* Lev - Cronin, Pl. IV, Fig. 8.
1994 *Cytheropteron suzdalskyi* Lev - Brouwers, p. 35, Pl. 18, Figs. 4, 5.
1999 *Cytheropteron suzdalskyi* Lev - Kupriyanova, Pl. 2, Fig. 4.
2003 *Cytheropteron suzdalskyi* Lev - Stepanova *et al.*, 2003a, Pl. I, Fig. 11.

Holotype.—Collection VNIIOkeangeologiya, N1183-87; adult right valve, Russia, Arkhangel'sk Region, Lower Severnaya Dvina River, Ust'-Pinega; early Late Pleistocene.

Description.—Carapace medium, trapeziform in lateral view, with flattened posterior margin. Dorsal margin slightly convex, almost straight, gradually beveled towards margins. Ventral margin straight, parallel to dorsal margin. Anterior margin arcuately rounded and bent towards ventral margin. Posterior margin lower than anterior, caudate, slightly upturned towards dorsal margin. Greatest length at upper third of valve, greatest height at anterior hinge edge. Right valves higher and shorter, with more convex dorsal margin. Caudal process in postero-ventral part in left valves straight, and slightly concave in right ones. Broad lateral bipartite wing-like expansion, subdivided by depression into two massive nodes. Another two massive nodes in dorsal part are restricted to hinge margins, they are slightly bigger than ala nodes. Valve surface, except for posterior part of valve, reticulate. Fossae arranged in rows. Fossae subvertically elongated at anterior and posterior margins and rounded in central part of valve. Fossae punctate in base. On ventral margin high fossae muri form several ribs parallel to it and contouring ala outline.

Measurements, mm.—

	L	H
MSU292/49	0.54	0.32
MSU292/267	0.55	0.3
MSU292/143	0.53	0.3

Variability.—Reticulation may vary in its degree; sometimes fossae are not developed, but puncta are always present.

Comparison.—*Cytheropteron suzdalskyi* differs from *C. nodosum* Brady, 1868 from Recent marine sediments around Great Britain and Ireland (Brady, 1868a, p. 448, Pl. XXXIV, Figs. 31-34) in having more pronounced reticulation and considerably more massive nodes on the dorsal side of valve.

Fossil distribution.—Quaternary: Kola Peninsula, Cheshskaya Bay coast, Lower Severnaya Dvina River, Lower Pechora River, Taimyr Peninsula; Late Pleistocene of the Champlain Sea; Holocene: eastern Kara Sea, Laptev Sea, Gulf of Alaska (Fig. 15).

Modern distribution.—Eastern Laptev Sea, Kara Sea, Beaufort Sea, Novaya Zemlya (Fig. 15).

Material.—One hundred twenty-six valves and 9 carapaces from Holocene deposits and Recent surface sediments of the Laptev Sea.

Cytheropteron tumefactum Lev, 1972
Pl. II, Figs. 34-37

- 1874 *Cytheropteron montrosiense* Brady, Crosskey and Robertson - Brady *et al.*, p. 205, Pl. 14, Figs. 13-16 (not Pl. 8, Figs. 28-36).
1972 *Cytheropteron tumefactum* Lev, p. 17, Pl. 1, Figs. 12-13.
1977 *Cytheropteron montrosiense* Brady, Crosskey and Robertson - Cronin, Pl. III, Fig. 17.
1979 *Cytheropteron simplex* Whatley & Masson, p. 252, Pl. 2, Figs. 11, 12, 19-21.
1980 *Cytheropteron montrosiense* juv. - Lord, Pl. 2, Figs. 7-8.
1981 *Cytheropteron simplex* Whatley & Masson - Cronin, p. 406, Pl. 6, Figs. 6, 8.
1983 *Cytheropteron tumefactum* Lev, p. 118, Pl. XV, Fig. 9, Pl. XVI, Fig. 14.
1983 *Cytheropteron punctatum* Brady - Lev, p. 120-121, Pl. XVI, Figs. 6-7.
1989 *Cytheropteron simplex* Whatley & Masson - Cronin, Pl. V, Fig. 1.
1991 *Cytheropteron simplex* Whatley & Masson - Brouwers *et al.*, Pl. 2, Fig. 3.

- 1993 *Cytheropteron simplex* Whatley & Masson - Lord *et al.*, Pl. 3, Fig. 3.
 1996 *Cytheropteron simplex* Whatley & Masson - Whatley *et al.*, Pl. 3, Fig. 4.
 1999 *Cytheropteron tumefactum* Lev - Kupriyanova, Pl. 2, Fig. 6.
 1999 *Cytheropteron punctatum* Brady - Kupriyanova, Pl. 2, Fig. 7.
 2003 *Cytheropteron simplex* Whatley & Masson - Stepanova *et al.*, 2003a, Pl. II, Fig. 12.

Holotype.—Collection VNIIOkeangeologiya, N1183-74; adult right valve, Russia, Arkhangel'sk Region, Pechora River, Khongurei; Late Pliocene-Early Pleistocene.

Description.—Carapace medium, rounded-triangular, strongly inflated, with flattened anterior and posterior margins. Dorsal margin slightly convex, bent towards posterior margin. Ventral margin straight, slightly concave in anterior third. Anterior margin arcuately rounded. Posterior margin lower than anterior, caudate, slightly downturned towards ventral margin. Greatest length at lower third, greatest height at anterior hinge edge. Lateral wing-like inflation above ventral margin. Several fine ribs extend along the inflation and contour it. Their extension on anterior and posterior margins form weakly developed elongated fossae. The whole valve surface unevenly punctate.

Measurements, mm.—

	L	H
From sample N2302, Lower Severnaya Dvina River, <i>C. punctatum</i> (collection of O.M. Lev, VNIIOkeangeologia)	0.43	0.24
From sample N2302, Lower Severnaya Dvina River, <i>C. tumefactum</i> (collection of O.M. Lev, VNIIOkeangeologia)	0.43	0.27
MSU292/60	0.41	0.27
MSU292/68	0.45	0.28

Variability.—Number of puncta is variable; central parts of some specimens are practically devoid of them. Besides, smoother specimens are larger and more rounded, while more punctate specimens are lower and almost triangular in shape.

Remarks.—Diverse intraspecific morphological variability has led to a confusing taxonomy. Lev described smooth forms as a new species *C. tumefactum* in 1972. Punctate forms she attributed to *C. punctatum* Brady, 1868.

We studied Lev's collection stored at VNIIOkeangeologia (St. Petersburg) and came to the conclusion that her "*C. punctatum*" does not correspond to G.S. Brady's description (1868a, p. 449, Pl. XXXIV, Figs. 45-48). Whatley & Masson in 1979 included both (punctate and smooth) morphotypes into a single species that they described as new and named it *Cytheropteron simplex*. Whatley & Masson (1979) mentioned strong intraspecific variability, but did not describe smooth and punctate forms separately. We consider both morphotypes to be a single species and, according to ICZN, name it *C. tumefactum* Lev 1972 (also according with Briggs, pers. comm., 2003).

Comparison.—*Cytheropteron tumefactum* differs from *Cytheropteron montrosiense* in having a more laterally inflated carapace, and a caudal process downturned towards ventral margin. The valve surface of *C. tumefactum* bears puncta and fine ribs at posterior, ventral and anterior margins, while *C. montrosiense* is strongly reticulate.

Fossil distribution.—Pliocene of Greenland; Quaternary: North Sea, Scotland, Cheshskaya Bay coast, Lower Severnaya Dvina River, Lower Pechora River, Lower Yenisei River; Pleistocene of Norway, Champlain Sea, Goldthwait Sea; Late Pleistocene-Holocene of the western Laptev Sea; Holocene: Gulf of Alaska, eastern Kara Sea (Fig. 16).

Modern distribution.—Greenland Sea, Great Britain, Norwegian Sea, Kara Sea, western Laptev Sea, Beaufort Sea (Fig. 16).

Material.—One hundred nine valves and 22 carapaces from Holocene deposits and Recent surface sediments of the Laptev Sea.

Cytheropteron laptevensis Stepanova sp. nov.
Pl. II, Figs. 38-41

1979 *Cytheropteron? sedovi* Schneider - Whatley & Masson, p. 251, Pl. 7, Figs. 15-19.

1983 *Cytheropteron ex gr. sedovi* Schneider - Lev, p. 121, Pl. XV, Figs. 10-12.

1990 *Cytheropteron sedovi* Schneider - Penney, Pl. 1, Fig. 1.

Derivation of Name.—From its findings in the Laptev Sea.

Holotype.—Collection stored at the Geological Department, Moscow State University, MSU292/280; adult left valve, Laptev Sea; core PS51-154, Lat. 77°16'61"N, Long. 120°36'03"E, core depth 129 cm; Holocene.

Description.—Carapace medium, subrhomboidal in lateral view, with flattened anterior and posterior mar-

gins. Dorsal margin almost straight, with obtuse cardinal angles, gradually beveled towards anterior and posterior margins. Ventral margin slightly convex in posterior half and slightly concave in anterior third. Anterior margin evenly arcuately rounded. Posterior margin caudate, slightly upturned towards dorsal margin, lower than anterior margin. Left valves have more smoothed cardinal angles, and right valves have prominent cardinal angles and more convex dorsal margin. Caudal process in postero-dorsal part in left valves straight or slightly convex, in right valves concave. Greatest length at mid-height, greatest height at anterior hinge edge. Above anterior margin wing-like process, with straight anterior edge and subvertical posterior. The anterior part of the ala has a rounded swelling, and subvertically elongated socket behind it (0.02 x 0.015 mm). Surface reticulate, fossae irregularly shaped, mostly subvertically elongated. Solum of fossae punctate.

Measurements, mm.—

	L	H
MSU292/220	0.36	0.19
MSU292/234	0.41	0.25
MSU292/253	0.38	0.23
MSU292/278	0.4	0.22
MSU292/280	0.36	0.18

Variability.—Reticulation varies in its degree, but usually fossae are well developed.

Comparison.—*Cytheropteron laptevensis* differs from *C. sedovi* from Recent sediments of the Central Arctic Ocean (Schneider, 1962, p. 104, Pl. XII, Fig. 1) in having subrhomboidal instead of subtriangular outline, absence of ribs and presence of fossae. *C. sedovi* bears distinct parallel subvertical ribs on posterior margin. Its lateral valve surface is nearly completely covered with subvertical rows of puncta. Ala morphology is also different: *C. sedovi* has rounded anterior edge of ala and subvertical posterior, and it bears a subvertical row of four puncta, while ala of *C. laptevi* has a straight anterior edge and a swelling at its anterior base, behind which there is a socket.

Remarks.—Whatley & Masson (1979) questionably referred several specimens to *Cytheropteron? sedovi* Schneider, 1962 and pointed out that they failed to find the original description of Schneider. We studied illustrations given in Schneider (1962) and came to the conclusion, that specimens in publications of Whatley & Masson (1979) and Penny (1990), and those from our samples, do not correspond to the original descrip-

tion of *C. sedovi* Schneider and, therefore, it is necessary to distinguish a new species *C. laptevensis*.

Fossil distribution.—Pleistocene: Ireland, North Sea, Lower Pechora River, Lower Ob River; Late Pleistocene and Holocene of the western Laptev Sea (Fig. 17).

Material.—Thirteen adult and 1 juvenile valve from the Late Pleistocene-Holocene deposits of the western Laptev Sea.

ACKNOWLEDGEMENTS

This research was funded by the BMBF (Otto Schmidt Laboratory for Polar and Marine Sciences, 03PL026A) and the Russian Ministry for Industry, Science and Technology. It is also part of the Russian-German cooperative project "Laptev Sea System 2000" and RFBR project 03-05-65018. We are indebted to E. M. Tesakova and A. S. Alekseev (MSU) for their assistance in taxonomic studies and useful comments. We would like to thank P. Frenzel (Rostock University), W. M. Briggs (NAMPRO, Boulder, Colorado), R.C. Whatley (University of Wales) and T.M. Cronin (USGS) for valuable discussions. Especially, we are thankful to N.V. Kupriyanova (VNIIOkeangeologiya) who kindly agreed to help us with studying the O. M. Lev collection in St. Petersburg.

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MANUSCRITO RECIBIDO: 10 septiembre, 2003

MANUSCRITO ACEPTADO: 15 enero, 2004