

THE UNIVERSITY OF KANSAS
PALEONTOLOGICAL CONTRIBUTIONS

October 23, 1975

Paper 78

QUATERNARY FRESHWATER OSTRACODA FROM THE
GREAT SALT LAKE BASIN, UTAH¹

KENNETH H. LISTER

Department of Geology, The University of Kansas, Lawrence;
present address: 317 Via Anita, Redondo Beach, California

ABSTRACT

Ostracodes are described from two cores, each more than 200 m long taken in Quaternary sediments of the Great Salt Lake Basin, Utah. Thirty-one species of Ostracoda in thirteen genera have been identified. Most species belong to typically freshwater genera: *Candona*, *Cyclocypris*, *Physocypris*, *Cyprinotus*, *Eucypris*, *Cypridopsis*, *Potamocypris*, *Ilyocypris*, *Pelocypris*, *Cytherissa*, *Limnocythere*, and *Darwinula*. One species of the genus *Cyprideis* is more typical of brackish water. Three new species are named: *Candona camuramarginis*, *C. adunca*, and *C. pronopa*.

INTRODUCTION

As part of a study concerned with changes in relative abundance of ostracode taxa, two long cores taken in Quaternary sediments of the Great Salt Lake Basin, Utah, were sampled. About 700 samples were examined and from these a large number of specimens were procured. Descriptions of thirty-one species of Ostracoda in 13 genera make up the bulk of this work. Although descriptions of many of the species have been previously published, some based on Recent specimens lack details of carapace morphology. New species are described herein: *Candona camuramarginis*, *C. adunca*, and *C. pronopa*.

The volume of recent work on the systematics of freshwater ostracodes is not great. Delorme (1970a, b, c, d; 1971) prepared an excellent monograph of freshwater ostracodes of Canada that builds on the pioneering work of Furtos (1933)

and Hoff (1942). The literature on Pleistocene freshwater ostracodes is somewhat less extensive than that on living forms. Lack of soft parts has made identification difficult in some cases and has allowed some confusion between adults and immature instars. Revisions of the genera *Candona* and *Limnocythere* are badly needed.

During the late Cenozoic, freshwater ostracodes were, in general, evolutionarily conservative. All of the previously described species from the Great Salt Lake Basin occur in Recent and Pleistocene ostracode faunas. The climatic fluctuations of the Pleistocene apparently had little effect on the evolution of North American species of freshwater ostracodes. This probably was a consequence of the fact that many freshwater ostracodes were able to migrate with relative ease from one lake or stream to another (Van Mork-

¹ Manuscript received September 1, 1974.

hoven, 1962, p. 139). Migration throughout the Pleistocene in response to changing climatic conditions most likely caused genetic homogenization within species, and thus worked against speciation, which probably requires initially isolated, small populations (Eldridge and Gould, 1972).

Current knowledge of the environmental tolerances of freshwater ostracode species is rather limited. Some data on Recent occurrences of the species found in the Great Salt Lake Basin fauna are summarized in Table 1. The most common members of the Quaternary assemblage from the cores studied are: *Candonia rawsoni*, *Cyprinotus glaucus*, *Cypridopsis vidua*, *Limnocythere friabilis*, *Limnocythere itasca*, *Physocypris pustulosa*, *Ilyocypris biplicata*, and *Ilyocypris gibba*. The abundance of these species may indicate that at

most times the basin was occupied by a fairly large lake with extensive shallow areas whose waters contained low to moderate amounts of dissolved minerals. The regional climate at times of high lake level was probably cool, and the area probably received more moisture than it does today. Moist, cool periods are thought to be correlative with glacial stages in the Pleistocene (Eardley and Gvosdetsky, 1960) that alternated with drier periods during which the lake shrank or completely disappeared. The nature of the ostracode fauna indicates that at certain times the lake waters were more saline than usual. During these times, *Cyprideis salebrosa* and *Limnocythere staplini* were common. More details of the ecological history of the basin have been described elsewhere (Lister, 1974).

STUDY AREA AND SAMPLING PROCEDURE

During glacial stages, as moist climates replaced prevailing arid conditions in most of southwestern North America, lakes developed in many closed basins. The Great Salt Lake is a remnant of what was, at times, the largest of these lakes. The area which encompasses Salt Lake Valley, Utah Valley, the Bonneville Salt Flats, and Sevier Valley was the site of successive Pleistocene lakes which developed during glacio-pluvial periods.

The latest and probably the most extensive of the Pleistocene lakes to occupy the Great Salt Lake Basin was named Lake Bonneville by Gilbert (1890), and the sediments deposited in this lake, Lake Bonneville Group. Hunt (1953) divided the Lake Bonneville Group into three formations: Alpine, Bonneville, and Provo. Morrison (1965) noted that as originally defined these formations were: 1) based on inferred lake history rather than on lithology; 2) not tied to any specific type localities; 3) not separated by unconformities; 4) correlated with a given lake stage (water level) and thus did not include volumetrically important transgressive and regressive deposits. Morrison expanded the Lake Bonneville Group to include two major lacustrine episodes and named two corresponding formations: Little Cottonwood and Draper. The Little Cottonwood Formation, which includes the Alpine,

Bonneville, and Provo as members, comprises gravel, sand, silt, and clay and is up to 100 m thick. It is bounded stratigraphically by soils: the Dimple Dell below and the Graniteville above, the latter separating the Little Cottonwood Formation from the Draper Formation. The Draper Formation consists of sand and gravel tongues interbedded with lacustrine silt and clay and is up to 50 m thick. The Draper Formation is overlain by the Midvale Soil, which in turn, is overlain by Recent alluvium and lake deposits. Formations older than the Little Cottonwood have not been named. These older formations make up the bulk of the strata sampled in the present study.

In five places lacustrine sediments of the Great Salt Lake Basin were cored under the direction of the late Armand J. Eardley. The cores are: Saltair (depth 200 m, taken 1956), section 28 (236 m, 1960), Wendover (171 m, 1960), Knolls (152 m, 1960), and Burmester (307 m, 1970). Only the Saltair core taken in the SE $\frac{1}{4}$ sec. 25, T. 1 N., R. 3 W., at an elevation of 4,205 feet and the section 28 core taken in SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 28, T. 1 N., R. 2 W., at an elevation of 4,218 feet were sampled for the present study. Their location in Utah and in relation to the shoreline of the Lake Bonneville high-stand is shown in Figure 1. The Saltair and section 28

TABLE 1. Summary of Environmental Preferences of Recent Representatives of Species of Ostracodes Found in Great Salt Lake Basin Sediments. From Various Sources, Including Delorme (1970a, b, c, d; 1971).

SPECIES	HABITS
<i>Candonia acutula</i>	Shallow water, lakes, nearctic.
<i>C. camuramarginis</i>	Temporary ponds, nearctic.
<i>C. caudata</i>	Streams and deeper parts of lakes, cosmopolitan.
<i>C. crogmaniana</i>	Permanent and temporary ponds, nearctic.
<i>C. adunca</i>
<i>C. pronopa</i>	Ponds and lakes, tolerant of moderately high amounts of dissolved minerals, nearctic.
<i>C. rawsoni</i>	Wide tolerance, ponds and lakes, nearctic.
<i>Cyclocypris ampla</i>	Wide tolerance, ponds and lakes, nearctic.
<i>C. serena</i>	Wide tolerance, ponds and lakes, nearctic.
<i>Physocypris pustulosa</i>	Lakes and ponds, not found in very cold water, holarctic.
<i>Cyprinotus glaucus</i>	Lakes, not found in very cold water, holarctic.
<i>Eucypris serrata</i>	Lakes and ponds, not found in very cold water, holarctic.
<i>Cypridopsis vidua</i>	Lakes and ponds, in weeds, cosmopolitan.
<i>Potamocypris granulosa</i>	Lakes and ponds, holarctic.
<i>P. pallida</i>	Springs, holarctic.
<i>P. smaragdina</i>	Lakes and ponds, not found in arid regions, holarctic.
<i>P. unicaudata</i>	Lakes and ponds, holarctic.
<i>Ilyocypris biplicata</i>	Streams and lakes, holarctic.
<i>I. gibba</i>	Streams and lakes, holarctic.
<i>Pelocypris tuberculata</i>	Playa lakes, nearctic, possibly neotropical.
<i>Cyprideis salebrosa</i>	Tolerant of saline water, lakes and ponds, neotropical and nearctic.
<i>Cytherissa lacustris</i>	Cold, deep lakes, holarctic.
<i>Limnocythere ceriotuberosa</i>	Lakes, nearctic.
<i>L. friabilis</i>	Lakes, nearctic.
<i>L. illinoiensis</i>	Cool lakes, nearctic.
<i>L. itasca</i>	Cool lakes, nearctic.
<i>L. paraornata</i>	Streams, nearctic.
<i>L. parascutariense</i>	Streams and lakes, nearctic.
<i>L. pseudoreticulata</i>	Lakes and permanent ponds, nearctic.
<i>L. staplini</i>	Lakes, tolerant of moderate to high salinities, nearctic.
<i>Darwinula stevensoni</i>	Large, cool lakes, cosmopolitan.

cores are the most complete and longest of the four cores taken before 1970 and available at the time the study began.

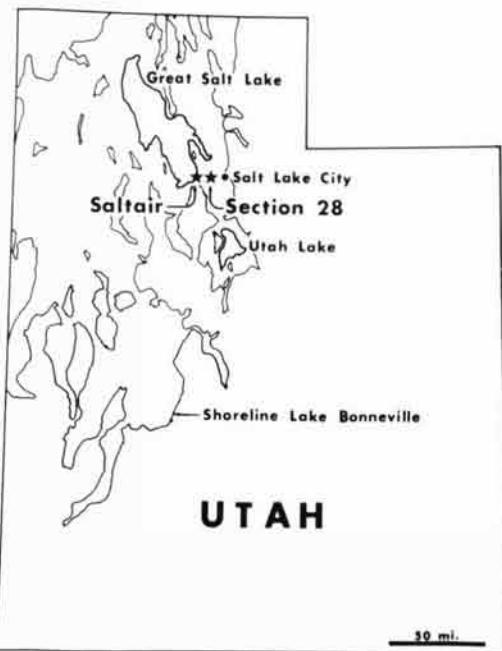


FIG. 1. Index map of Utah showing location of cores used in this study (designated by stars) and the shoreline of Lake Bonneville at its maximum extent.

The type of sediments within the cores indicates that lacustrine conditions prevailed in the basin alternating with periods during which the lake shrank and dried. Since major lake episodes and associated silty sediments probably correlate to times of glacial advance in northern continental North America, periods of soil formation most likely correspond to interglacial stages. However, some soils may have formed during short-term glacial retreats or developed locally during moist periods. Low water levels may also be recognized by the presence of plant root tubes, coarse clastics, reddish coloration of sediments, brine shrimp fecal pellets, and ooids (Eardley and Gvosdetsky, 1960; Eardley, *et al.*, 1973).

For the present study samples 2.5 cm long were sawed from the 2 cm diameter Saltair and section 28 cores. Samples taken from the Saltair core were spaced 10 to 20 cm apart where core recovery was complete, whereas samples from the section 28 core were spaced 20 to 40 cm apart. The sediment was soaked in a cold, dilute solution of sodium carbonate and most samples had disaggregated within a day. The material then was washed through 20-, 40-, 60-, and 80-mesh

screens. Material retained on the screens was dried, and ostracodes were removed. The ostracode specimens proved to be in an excellent state of preservation and showed no signs of solution or recrystallization, and very little evidence of crushing. Adult and immature instars were found in abundance in most samples. Abundances of ostracode species found in the Saltair and section 28 cores are outlined in Table 2.

TABLE 2. *Numbers of Specimens of Ostracodes of Each Species Examined from the Saltair and Section 28 Cores.*

SPECIES	SALTAIR	SECTION 28
<i>Candonia acutula</i>	971	623
<i>C. camuramarginis</i>	85	0
<i>C. caudata</i>	2,391	356
<i>C. crogmaniana</i>	34	2
<i>C. adunca</i>	2,400	350
<i>C. pronopa</i>	290	0
<i>C. rawsoni</i>	9,650	988
<i>Cyclocypris ampla</i>	211	27
<i>C. serena</i>	57	0
<i>Physocypris pustulosa</i>	152	17
<i>Cyprinotus glaucus</i>	646	19
<i>Eucypris serrata</i>	1	2
<i>Cypridopsis vidua</i>	503	30
<i>Cypridopsis</i> sp.	8	1
<i>Potamocypris granulosa</i>	44	3
<i>P. pallida</i>	33	0
<i>P. smaragdina</i>	1	0
<i>P. unicaudata</i>	0	1
<i>Potamocypris</i> sp.	5	1
<i>Ilyocypris bisplicata</i>	244	27
<i>I. gibba</i>	85	2
<i>Pelocypris tuberculata</i>	63	12
<i>Cyprideis salebrosa</i>	3,860	418
<i>Cytherissa lacustris</i>	1	0
<i>Limnocythere ceriotuberosa</i>	830	74
<i>L. friabilis</i>	728	56
<i>L. illinoiensis</i>	1,091	208
<i>L. itasca</i>	537	2
<i>L. paraornata</i>	175	47
<i>L. parascutariense</i>	64	31
<i>L. pseudoreticulata</i>	894	109
<i>L. staplini</i>	4,697	65
<i>Darwinula stevensoni</i>	4	0

All photographs in this report were made with the aid of an International Scientific Instruments Mini Scanning Electron Microscope. Use of the scanning electron microscope permitted greater depth of field to be obtained than was possible with conventional light-photographic techniques and allowed greater definition of fine surface detail on generally unornamented freshwater ostracodes.

Line drawings were made from camera lucida tracings of temporary mounts of specimens observed with a Leitz Orthoplan Microscope with transmitted light. The inclusion of line drawings as well as photographs was deemed necessary in order to illustrate all of the internal and surface detail of the ostracode carapace. On the line drawings, the letter *t* signifies the location of an exterior tubercle, and the letter *s* the location of an exterior sulcus.

ACKNOWLEDGMENTS

I wish to thank the members of my doctoral committee, Drs. R. L. Kaesler (chairman), C. Teichert, W. M. Merrill, E. E. Angino, and W. J. O'Brien, for their constructive criticism and for supervision of this research. I would like to thank the faculty, staff, and students of the Department of Geology of The University of Kansas for their continued assistance and academic comradeship during my tenure in the department.

I am grateful to the faculty and staff of the Department of Geological and Geophysical Sciences of The University of Utah, and in particular Drs. R. T. Shuey, J. F. Miller, and the late Dr. A. J. Eardley, for their assistance in obtaining access to the Salt Lake cores during the summers of 1972 and 1973. I would also like to thank Dr. J. S. Levinton, of the Department of Earth and Space Sciences of The State University of New York, Stony Brook, for providing initial guidance in the study of changes in diversity. In addition, I would like to thank Dr. R. C. Whatley of Aberystwyth University, Wales, for his assistance and encouragement in dealing with the taxonomy of freshwater ostracodes. Finally, I would like to acknowledge the advice of Dr. L. N. Stout of the Missouri Geological Survey concerning Pleistocene ostracodes.

Partial support for this study was provided by Sigma Xi Grant-in-Aid of Research, 1971; Summer Fellowship in Systematics and Evolutionary Biology of The National Science Foundation (principal investigator: Dr. R. S. Hoffman, Department of Systematics and Ecology, The University of Kansas), 1972; and The Geological Society of America Grant-in-Aid, 1973. General financial assistance was provided by the Department of Geology, The University of Kansas; Phillips Petroleum Company; and The University of

Kansas through a Dissertation Fellowship.

I appreciate loans of type specimens by The Illinois State Geological Survey; The United States National Museum; and the Geological Sur-

vey of Canada, Saskatchewan. Specimens of the Great Salt Lake Basin ostracodes studied have been deposited with The University of Kansas Museum of Invertebrate Paleontology (KUMIP).

SYSTEMATIC PALEONTOLOGY

Subclass OSTRACODA Latreille, 1806

Order PODOCOPIDA Müller, 1894

Suborder PODOCOPINA Sars, 1866

Superfamily CYPRIDACEA Baird, 1845

Family CANDONIDAE Kaufmann, 1900

Genus CANDONA Baird, 1845

Candonia Baird, 1845, p. 152.

Siphlocandonia Brady, 1910, p. 210.

Arunella Brady, 1913, p. 232.

Eucandonia Daday, 1900, p. 242; Swain, 1961, p. Q234.

Type species.—*Cypris candida* Müller, 1776, p. 199.

Description.—Shape variable: reniform, triangular, elongate-ovate; maximum height posteriorly or medially. Carapace elliptical in dorsal view, moderately inflated to compressed. Valves smooth to slightly rough, hyaline; normal pores simple, scattered, inner lamella narrow to moderately wide, anterior and posterior vestibulum present, anterior larger; selvage usually inconspicuous except at high magnification; marginal area moderately wide to narrow; marginal pore canals numerous, usually simple, sometimes funnel shaped, regularly spaced. Central muscle scars prominent, consisting of a group of five closely spaced adductor muscles topped by an elongate sixth scar; two mandibular scars present anteroventrally from central group; one frontal scar located anterodorsally of central group; several elongate dorsal muscle scars are usually visible near the dorsal margin. Hinge simple, adont; dorsal margin of smaller valve fits into groove in larger valve. Eye spots absent. Left valve usually larger than right. Sexual dimorphism generally pronounced.

Remarks.—Subsequent to his naming of the genus *Candonia*, Baird (1846) designated *Cypris reptans* as the type species. In 1889, Brady and Norman designated *Cypris reptans* the type species of the genus *Erpetocypris* and *Cypris candida* the type species of the genus *Candonia*. Presumably Brady and Norman were unaware of Baird's earlier paper. Since Baird's designation of

Cypris reptans as the type species of *Candonia* takes precedence over selection of this species by Brady and Norman as the type for *Erpetocypris*, *Erpetocypris* and *Herpetocypris* would necessarily be objective junior synonyms of *Candonia* (Swain, 1961). Since the name "*Candonia*" has been used for over 100 years to designate a well known and important genus a ruling on this subject by the International Commission of Zoological Nomenclature was requested by Sylvester-Bradley (1956). Action by the Commission (1958, Opinion 533), through application of its plenary powers, designated *Cypris candida* as the type species of *Candonia*; *Eucandonia* then became a junior subjective synonym (Gutentag and Benson, 1962).

CANDONA ACUTULA Delorme, 1967

Figure 2; Plate 1, figures 1-4

Candonia acutula Delorme, 1967, p. 358.

Diagnosis.—*Candonia acutula* can be distinguished from other species of the genus *Candonia* by the shape of its posterodorsal margin.

Description.—Female: Valves subreniform to subtriangular in side view; greatest height posteromedially, greater than half of the length; dorsal margin arched, margin inflexed slightly at anterior end of hinge, posterior margin nearly straight, sloping downward so that posterodorsal margin has a truncated appearance, making an angle of about 45 degrees with ventral margin. Carapace elliptical in dorsal view; anterior extremity pointed, posterior flattened at end. Surface of valves smooth, translucent; normal pores simple, scattered, numerous. Muscle scars as in genus. Inner lamella broad anteriorly and posteriorly, sloping inward steeply in midventral region, less steeply posteroventrally; vestibulum widest anteriorly; marginal pore canals numerous anteriorly and ventrally, simple, straight; flange present, prominent anteriorly, a weak selvage is developed. Hinge simple, adont.

Male: Dimorphism pronounced, male larger than female, posterior margin more rounded, ventral margin more concave, posterodorsal part of vestibulum larger.

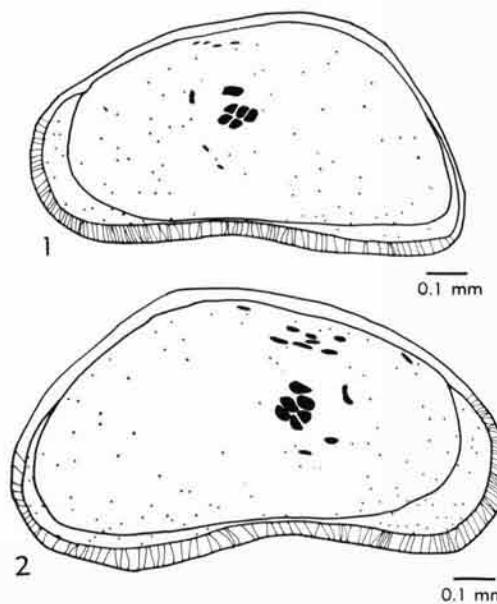


FIG. 2. *Candona acutula* Delorme; 1) female, 2) male.

Remarks.—*Candona acutula* was first described from lakes in east-central Saskatchewan. Delorme (1970c) has reported it from other areas of Canada as well as from Canadian Pleistocene sediments. Although types were not examined, specimens from the Great Salt Lake Basin appear identical to the Canadian material.

Occurrence.—This species is moderately common in the Saltair core from the bottom to the 12 meter level.

Dimensions.—Dimensions of specimens studied are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Female right, Pl. 1, fig. 1	1.15	0.57	1,007,922
Female left, Pl. 1, fig. 2	1.10	0.58	1,007,923
Male left, Pl. 1, fig. 3	1.18	0.68	1,007,924
Male left, Pl. 1, fig. 4	1.17	0.63	1,007,925

CANDONA CAUDATA Kaufmann, 1900

Figure 3; Plate 1, figures 5-7

Candona elongata Brady and Norman, 1889, p. 100.

Candona acuminata Brady and Norman, 1889, p. 104 (*non* Fisher, 1854).

Candona caudata Kaufmann, 1900a, p. 365.

Candona elongata Müller, 1912, p. 140 (*non* Herrick, 1879).

Candona novacaudata Benson and MacDonald, 1963, p. 15.

Diagnosis.—*Candona caudata* is distinguished from other species of the genus *Candona* by its

size and by the presence of a blunt, hooklike posterovenital projection. It is distinguished from *C. adunca* by the bluntness of the posterovenital projection and by the shape of the posterodorsal margin.

Description.—Female: Valves subreniform in side view, greatest height posteriorly of middle, less than half of the length; dorsal margin broadly arched, ventral margin concave medially, anterior margin rounded, posterior margin inflexed dorsally, convex posteriorly, meeting ventral margin to form a rounded point, making an angle of about 80°. Carapace elliptical in dorsal view; anterior extremity pointed, posterior extremity rounded. Surface of valves smooth, transparent to translucent; normal pores moderately numerous, small, simple, scattered. Muscle scars as in genus. Inner lamella moderately broad, sloping inward steeply in midventral region; vestibulum widest anteriorly, posterior vestibulum does not extend around margin dorsally; marginal pore canals numerous, simple, straight, some funnel shaped; flange present, no selvage developed. Hinge simple, adont.

Male: Dimorphism pronounced, male same size as female, more rounded posteriorly, ventral margin more concave.

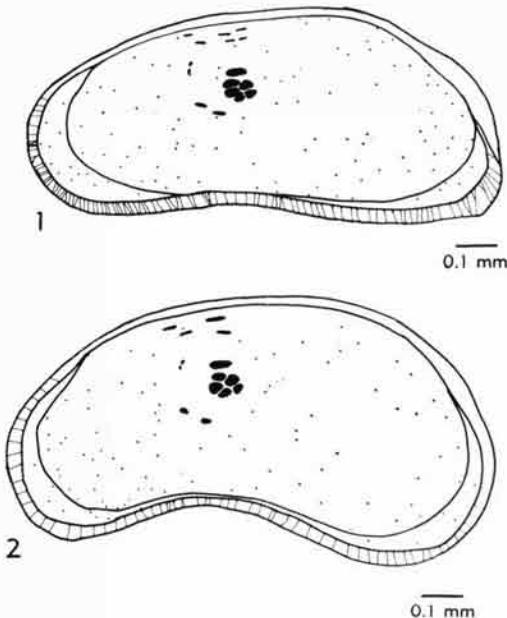


FIG. 3. *Candona caudata* Kaufmann; 1) female, 2) male.

Remarks.—*Candona caudata* apparently was common in the late Pleistocene of North America. It has been reported from Illinois (Staplin, 1963a), Indiana (Winkler, 1962), and Lake Erie (Benson and MacDonald, 1963). In the Recent it has a cosmopolitan distribution and is a common constituent of lacustrine ostracode assemblages.

Occurrence.—*Candona caudata* is common throughout the Saltair and section 28 cores. Immature instars are especially common. Males are rare.

Dimensions.—Dimensions of specimens studied are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Female left, Pl. 1, fig. 5	1.18	0.58	1,007,926
Female right, Pl. 1, fig. 6	1.18	0.58	1,007,927
Male right, Pl. 1, fig. 7	1.25	0.67	1,007,928

CANDONA sp. cf. C. CROGMANIANA Turner, 1894

Figure 4; Plate 1, figures 8, 9

Candona crogmaniana Turner, 1894, p. 20.

Candona crogmani Turner, 1895, p. 300.

Diagnosis.—*Candona* sp. cf. *C. crogmaniana* is distinguished from other species of the genus *Candona* by its subtriangular shape and by the thinness of calcification of its carapace.

Description.—Immature: Valves subreniform to subtriangular in side view; greatest height posteromedially, less than half of the length; dorsal margin arched, ventral margin concave, anterior margin broadly rounded, posterior margin narrowly rounded. Carapace elliptical in dorsal view; extremities pointed; somewhat compressed in anteromedial region. Valves thin, surface smooth, hyaline, transparent; normal pores numerous, small, simple, scattered. Muscle scars as in genus. Inner lamella narrow, poorly developed; vestibula narrow; marginal pore canals few, simple, straight. Hinge simple, adont.



FIG. 4. *Candona crogmaniana* Turner; immature.

Remarks.—Only immature specimens of this species were found. They are tentatively assigned to *Candona crogmaniana* because of similarity in shape to this species. Type specimens were not examined. *C. crogmaniana* is widespread in North America and occurs commonly in temporary ponds in warmer regions.

Occurrence.—Occurs rarely in Saltair core, usually in lower diversity faunas dominated by *Candona adunca*.

Dimensions.—Dimensions of specimens are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Immature left, Pl. 1, fig. 8	0.85	0.43	1,007,929
Immature left, Pl. 1, fig. 9	0.93	0.46	1,007,930

CANDONA RAWSONI Tressler, 1957

Figure 5; Plate 1, figures 12-17; Plate 2, figures 19, 20

Candona sp.; Bronstein, 1930, p. 144.

Candona obtusa Bronstein, 1947, p. 252 and 321 (*non* Müller, 1900).

Candona sp. aff. *Cypris pubera* Müller, 1776; Swain, 1947, pl. 76.

Candona rawsoni Tressler, 1957, p. 420.

Candona nyensis Gutentag and Benson, 1962, p. 37.

Candona swaini Staplin, 1963a, p. 785.

Candona obtusa Bronstein, 1947; Delorme, 1967, p. 792.

Diagnosis.—*Candona rawsoni* is distinguished from other species of the genus *Candona* by the shape of the posterodorsal margin of the female and the inflated, reniform shape of the carapace of the male.

Description.—Female: Valves subreniform to subquadrate in side view; greatest height medially, more than half the length; dorsal margin broadly arched, ventral margin concave medially, anterior margin rounded, posterior margin truncated, posterodorsal margin of left valve projecting outward, no projection in right valve but there is an angle in this area; angle formed by dorsal and posterior margins is about 130 degrees, between ventral and posterior margins about 100 degrees. Carapace elliptical in dorsal view, anterior extremity pointed, posterior extremity more rounded. Surface of valves smooth to slightly rough, translucent; normal pores moderately numerous, small, simple, scattered. Muscle scars as in genus. Inner lamella moderately broad, sloping inward steeply in midventral region, less steeply in posterior region; vestibulum widest anteriorly, posterior vestibulum extending to dorsoventral angle; inner margins semicircular; mar-

ginal pore canals numerous, simple or bifurcating, straight, funnel shaped; flange present, possible development of selvage, from which inner lamella slopes inward. Hinge simple, adont; weakly developed anterior hinge tooth in right valve fits into half socket in left valve.

Male: Dimorphism pronounced, male slightly longer than female, higher, reniform in side view, more rounded posteriorly, ventral margin more concave, pronounced anteroventral corner, dorsal margin more arched.

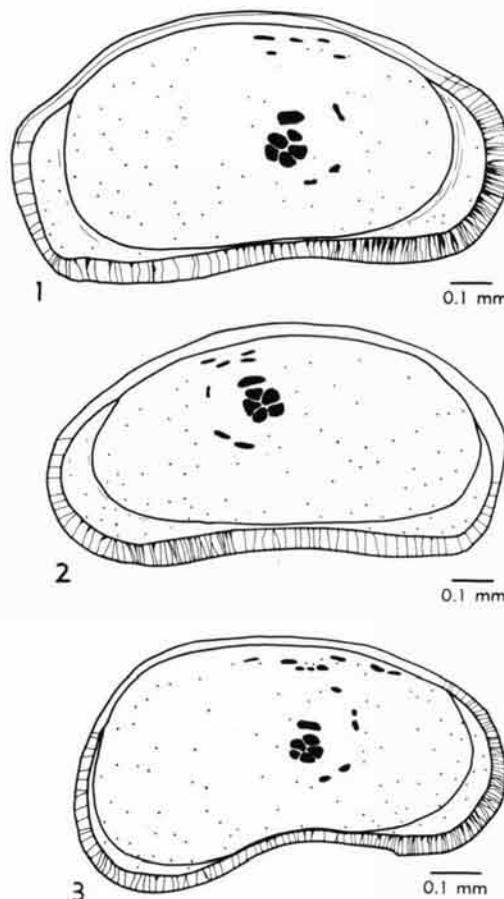


FIG. 5. *Candona rawsoni* Tressler; 1) female, left, 2) female, right, 3) male.

Remarks.—There has been some confusion in the literature concerning the correct name of this species. In assigning the Utah specimens to *Candona rawsoni*, I am following Delorme (1960c). Dealing with fossil material it may be

difficult to separate *C. rawsoni* from *C. patzcuaro* Tressler (1954). The principal difference between these forms is in the genitalia (Delorme, 1967). Differences in genital shape probably effectively isolate breeding populations and without evidence to the contrary these characters must be considered as specific. Carapace shape differs principally in that the left valve of the female of *C. rawsoni* has a prominent protrusion at the posteroventral angle. Specimens from the Great Salt Lake Basin are assigned to *C. rawsoni* on the basis of the shape of the left valve of the female and on the shape of the male, which differs slightly from that of *C. patzcuaro*. The posterior margin of the right valve of the female of the specimens found are slightly more quadrate than is typical of *C. rawsoni*. It is possible that there are subspecific differences between previously described material and the Salt Lake assemblages. Some of the valves found may belong to *C. patzcuaro*. In the absence of soft parts, it is probably impossible to be sure whether all specimens do indeed belong to *C. rawsoni*.

Occurrence.—*Candona rawsoni* occurs commonly throughout the Saltair and section 28 cores. Immature instars are common as well.

Dimensions.—Dimensions of specimens are as follows:

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Female right, Pl. 1, fig. 12	1.15	0.62	1,007,933
Female right, Pl. 1, fig. 13	1.05	0.60	1,007,934
Female left, Pl. 1, fig. 14	1.13	0.58	1,007,935
Female left, Pl. 1, fig. 15	1.13	0.60	1,007,936
Male right, Pl. 1, fig. 16	1.23	0.71	1,007,937
Male left, Pl. 1, fig. 17	1.22	0.71	1,007,938
Immature right, Pl. 2, fig. 19	0.68	0.37	1,007,931
Immature left, Pl. 2, fig. 20	0.67	0.33	1,007,932

CANDONA PRONOPA Lister, n. sp.

Figure 6; Plate 1, figures 10, 11

Etymology.—*Pronopa* (Greek): stooping forward; in reference to the forward slope of the dorsal margin.

Diagnosis.—This species can be distinguished from other species of the genus *Candona* by the shape of the anterodorsal margin, the compressed nature of the carapace, and by the small size.

Description.—**Female:** shape subtriangular to subreniform in side view; greatest height postero-medially, about half the length; dorsal margin humpshaped, ventral margin concave medially, anterior margin rounded, posterior margin nar-

rowly rounded; there are distinctly concave margins in the anterodorsal and posterodorsal regions. Carapace elliptical in dorsal view, anterior extremity pointed, posterior less sharply so. Surface of valves smooth, transparent to translucent, normal pores moderately numerous, small, simple, scattered. Muscle scars as in genus. Inner lamella narrow to moderately broad, sloping inward steeply in midventral region; vestibulum widest anteriorly, posterior vestibulum narrower, extending to posterodorsal concavity; inner margins semicircular; marginal pore canals numerous, simple, straight, some funnel shaped; flange present. Hinge, simple, adont.

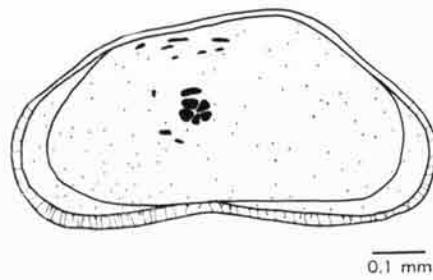


FIG. 6. *Candona pronopa* Lister, n. sp.

Remarks.—The description above is based on female specimens. *Candona pronopa* is somewhat similar in shape to *C. distincta* Furtos (1933), but the species described here differs in being 20 percent smaller, being less pronouncedly triangular in shape, having a more broadly rounded posterior margin, and having a more pronounced ventral concavity. Types of *C. distincta* were not examined. Two hundred ninety specimens of *C. pronopa* from the Great Salt Lake Basin were examined.

Occurrence.—*Candona pronopa* occurs but not commonly throughout the Saltair core and rarely in the section 28 core. Immature instars have been found but no males were identified.

Dimensions.—Dimensions of specimens are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Right valve (paratype), Pl. 1, fig. 10	0.80	0.40	1,007,941
Right valve (paratype), Pl. 2, fig. 11	0.84	0.44	1,007,942
Left valve (holotype)	0.83	0.43	1,008,012

CANDONA CAMURAMARGINIS Lister, n. sp.

Figure 7; Plate 1, figures 18, 19

Candona renoensis Delorme, 1970c, p. 1116 (non Gutentag and Benson, 1962).

Etymology.—*Camur* (Latin): bent inward; *margo* (Latin): margin; in reference to the situation of the anterior inner margin.

Diagnosis.—*Candona camuramarginis* is distinguished from other species of the genus *Candona* by its subtriangular shape, by the lateral compression of its carapace, and by the configuration of the anterior inner margin.

Description.—Female(?): Valves subreniform to subtriangular in side view; greatest height posteromedially, more than half of length; dorsal margin broadly arched, ventral margin nearly straight, concave medially, anterior margin rounded, posterior margin broadly rounded. Carapace elliptical in dorsal view, widest posteromedially, anterior region compressed; anterior extremity pointed, posterior extremity rounded. Surface of valves smooth to slightly rough, translucent; normal pores numerous, small, simple, scattered. Muscle scars as in genus. Inner lamella moderately broad to narrow, sloping inward steeply in midventral region, less steeply in anteroventral region; vestibulum wide anteriorly, margin broadly sinuate, posterior vestibulum narrow; marginal pore canals numerous, simple, straight, flange poorly developed. Hinge simple, adont, as in genus.

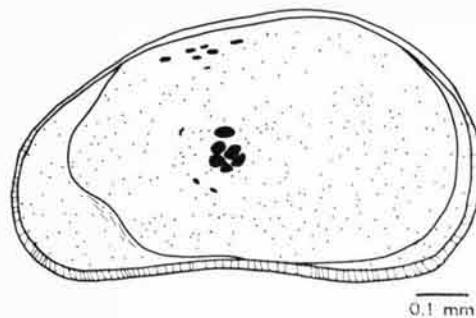


FIG. 7. *Candona camuramarginis* Lister, n. sp.

Remarks.—Although types were not examined, *Candona camuramarginis* seems to be identical with specimens figured by Delorme (1970c) as *C. renoensis*. *C. renoensis* as originally described by Gutentag and Benson (1962) appears to be conspecific with *C. compressa* (Koch). The holotype of *C. renoensis* was examined and found

to be significantly different from *C. camuramarginis* and also appeared different from Delorme's description of *C. renoensis* in outline, size, and shape of inner lamella. Eighty-five specimens of *C. camuramarginis* from the Great Salt Lake Basin were examined.

Occurrence.—*Candonia camuramarginis* occurs rarely in the Saltair and section 28 cores.

Dimensions.—Dimensions of specimens are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Right valve (paratype), Pl. 1, fig. 18	0.91	0.54	1,007,943
Right valve (paratype), Pl. 1, fig. 19	0.88	0.53	1,007,944
Right valve (holotype)	0.88	0.51	1,008,013

CANDONA ADUNCA Lister, n. sp.

Figure 8; Plate 1, figures 20, 21

Candonia caudata Benson and MacDonald, 1963, p. 12
(non Kaufmann, 1900).

Etymology.—*Aduncus* (Latin): hook-shaped; in reference to the shape of the posteroventral outer margin.

Diagnosis.—*Candonia adunca* can be distinguished from *C. caudata* by the more pronounced posteroventral projection of the margin and by the less well-developed posterodorsal hump. *C. adunca* can be distinguished from other species of the genus *Candonia* by its large size and elongate, posteriorly pointed shape.

Description.—Female: shape elongate, reniform in side view; greatest height posteromedially, less than half of the length; dorsal margin broadly arched, ventral margin concave, anterior margin broadly rounded, posterior margin distinctly pointed. Carapace subelliptical in dorsal view, sloping toward anterior extremity for anterior third of length; anterior extremity pointed, posterior more rounded. Surface of valves smooth, transparent to translucent; normal pores moderately numerous, small, simple, straight. Muscle scars as in genus. Inner lamella moderately broad, sloping inward steeply in midventral region; vestibula equally wide anteriorly and posteriorly; anterior inner margin semicircular, posterior inner margin sickle shaped; marginal pore canals numerous, simple, straight, some are false marginal canals; flange present, no selvage developed. Hinge simple, adont, as in genus; part of the posterodorsal margin of the left valve is developed into a flap that overlaps the right valve.

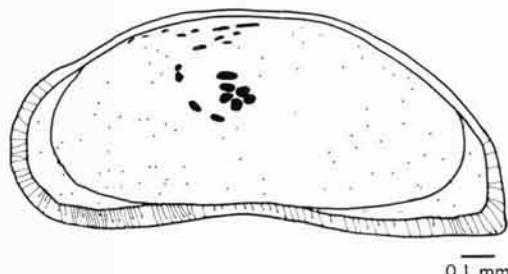


FIG. 8. *Candonia adunca* Lister, n. sp.

Remarks.—*Candonia adunca* is similar in shape to specimens figured by Benson and MacDonald (1963) as *C. caudata*, but differs slightly in that the posteromarginal projection is somewhat more pronounced in *C. adunca*. Benson and MacDonald's specimens were not examined by the author and therefore their identity with *C. adunca* is tentative. A total of 2,750 specimens of *C. adunca* from the Great Salt Lake Basin were examined.

Occurrence.—*Candonia adunca* occurs abundantly at restricted horizons of the Saltair and section 28 cores. Immature instars are common, and as in the adults, exhibit a posteromarginal projection. No males were identified.

Dimensions.—Dimensions of specimens are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Right valve (paratype), Pl. 1, fig. 20	1.45	0.68	1,007,945
Right valve (paratype), Pl. 1, fig. 21	1.40	0.67	1,007,946
Left valve (holotype)	1.47	0.68	1,008,014

Family CYCLOCYPRIDIDAE Kaufmann, 1900

Genus CYCLOCYPRIS Brady and Norman, 1889

Cyclocypris Brady and Norman, 1889, p. 70.

Type species.—*Cypris globosa* (Sars), 1863, p. 27.

Description.—Subovate in side view; greatest height medially, about two-thirds the length; dorsal, anterior, and posterior margins broadly rounded; carapace subspherical in dorsal view, inflated; extremities rounded. Surface smooth, valves thinly calcified; small to medium in size; normal pores moderately numerous, small, simple, scattered. Inner lamella widest anteriorly; anterior vestibulum wide, posterior narrower; inner lamella meets margin at two places ventromedially; lists developed; marginal pore canals moderately

numerous, straight, simple. Hinge adont, dorsal border of smaller valve fits groove in larger valve. Central muscle scars consist of anterior row of three, two other scars are located posteriorly of these, and the group of five is capped by one elongate scar; there is a single, elongate frontal scar located anterodorsally of the central group and two mandibular scars located anteroventrally. Eye spots absent. Sexual dimorphism unknown.

CYCLOCYPRIS AMPLA Furtos, 1933

Figure 9; Plate 3, figures 1, 2

Cyclocypris ampla Furtos, 1933, p. 461.

Diagnosis.—*Cyclocypris ampla* can be distinguished by its symmetrical shape, its inflated carapace, its muscle scars, its smooth surface, and the configuration of the ventral margin. Distinguished from other species of the genus *Cyclocypris* found in the Great Salt Lake Basin deposits by its symmetrical shape and by its flat venter.

Description.—Adult: Shape subcircular to subovate in side view; greatest height medially, two-thirds to three-fourths of the length; dorsal, anterior and posterior margins broadly rounded, ventral margin flat, anterodorsal margin slightly less convex than posterodorsal margin. Carapace subcircular in dorsal view; anterior extremity pointed, posterior rounded. Surface of valves smooth, transparent to translucent; normal pores moderately numerous, small, simple, scattered. Muscle scars as in genus; posterior hindmost central muscle scar larger than other posterior central scar. Inner lamella narrow to moderately broad, sloping inward everywhere except in anteriormost region where it is roughly parallel to margin; vestibulum widest anteriorly; inner margins semicircular; marginal pore canals numerous, simple,

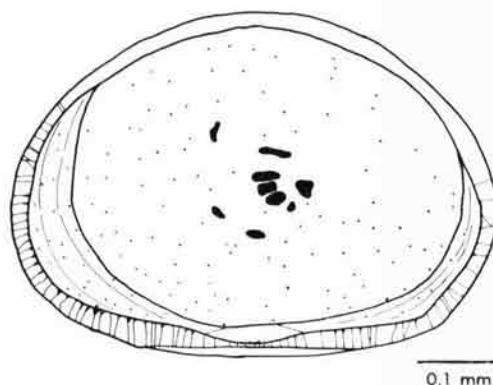


FIG. 9. *Cyclocypris ampla* Furtos.

straight, some funnel shaped; flange present, lamellar striae present. Hinge simple, adont, as in genus.

Remarks.—Although types were not examined, specimens of this species found in the Great Salt Lake Basin appear identical to those described by Delorme (1970b). The original description of *Cyclocypris ampla* was based on a somewhat larger specimen. Apparently there is a wide range of size possible in adults of this species (Delorme, 1970b).

Occurrence.—Occurs rarely throughout the Saltair and section 28 cores.

Dimensions.—Dimensions of specimens are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Right valve, Pl. 3, fig. 1	0.62	0.45	1,007,947
Left valve, Pl. 3, fig. 2	0.63	0.46	1,007,948

CYCLOCYPRIS SERENA (Koch), 1838

Figure 10; Plate 3, figures 3, 4

Cypris serena Koch, 1838, species 22.

Cypris ovum Jurine, 1820; Daday, 1882, p. 237.

Cypris serena (Koch), 1838; Brady and Norman, 1889, p. 70.

Cyclocypris serena (Koch), 1838; Sars, 1890, p. 55.

Diagnosis.—*Cyclocypris serena* can be distinguished by its subcircular, inflated carapace and smooth surface. Distinguished from other species

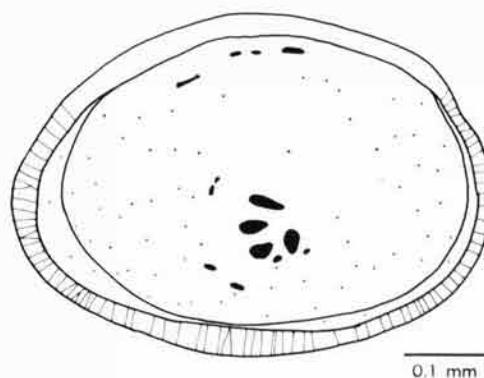


FIG. 10. *Cyclocypris serena* (Koch).

of the genus *Cyclocypris* found in the Great Salt Lake Basin by the posteromarginal concavity of the right valve, elongate shape, and thicker carapace.

Description.—Adult: Shell subcircular to ellipsoidal in side view; greatest height medially,

two-thirds to three-fourths of the length; dorsal margins broadly rounded, ventral margin convex in right valve, concave in left valve, anterior and posterior margins rounded, posterodorsal margin of right valve concave to flat. Carapace subcircular to elliptical in dorsal view; anterior extremity bluntly pointed, rounded posteriorly. Surface of valves smooth, transparent to translucent; normal pores moderately numerous, small, simple, scattered. Muscle scars as in genus; hindmost central muscle scar smaller than other posterior scar, lowermost of anterior row of central muscle scars not well developed. Inner lamella narrow, sloping inward everywhere except in anterior region where it is roughly parallel to margin of valve for half of its breadth; vestibulum widest anteriorly; inner margin subcircular; marginal pore canals numerous, simple, straight; flange present, selvage developed in right valve. Hinge simple, adont.

Remarks.—Although types were not examined, specimens found in the Great Salt Lake Basin appear identical to those described by Delorme (1970b).

Occurrence.—*Cyclocypris serena* is found rarely throughout the Saltair core.

Dimensions.—Dimensions of specimens are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Left valve, Pl. 3, fig. 3	0.63	0.43	1,007,949
Right valve, Pl. 3, fig. 4	0.63	0.44	1,007,950

Genus PHYSOCYPRIA Vavra, 1898

Physocypris Vavra, 1898, p. 7.

Type species.—*Physocypris bullata* Vavra, 1898.

Description.—Approximately semicircular in side view; anterior and posterior margins broadly rounded, dorsal margin broadly arched, ventral margin flat to weakly concave; greatest height medially about two-thirds of length. Carapace subelliptical to subovate in dorsal view, compressed. Valves smooth to finely punctate, fragile; normal pores very small, few, scattered, simple. Inner lamella narrow; anterior vestibulum wider than posterior; small tubercles situated along all or part of the anterior, ventral, and posterior outer margins; marginal pore canals observable in left valve only, few, short, straight, simple. Central muscle scars consisting of an anterior vertical row of four muscle scars and a posterior row of two scars, the lowest scar in each row small; two

mandibular scars located anterodorsally of central group. Hinge adont, right valve fitting into groove in left valve. Eye spots absent. Left valve larger than right; right valve higher dorsally. Sexual dimorphism not pronounced; males smaller.

PHYSOCYPRIA PUSTULOSA Sharpe, 1897

Figure 11; Plate 3, figures 5, 6

Cypris pustulosa Sharpe, 1897, p. 461.

Cypris (Physocypris) pustulosa Sharpe, 1897; Sharpe, 1903, p. 994.

Physocypris pustulosa Sharpe, 1897; Furtos, 1933, p. 470.

Physocypris globula Furtos, 1933, p. 468.

Diagnosis.—*Physocypris pustulosa* can be distinguished from other species of ostracodes found in the Great Salt Lake Basin by its semicircular, laterally compressed carapace, by its size, by its lack of a marginal area in the right valve, and by the marginal tubercles on the right valve.

Description.—Female: Shape semicircular to subovate in side view; greatest height medially, about two-thirds of the length; dorsal margin broadly rounded, ventral margin flat, anterior and posterior margins rounded; small tubercles are present on the anterior margin of the right valve. Carapace elliptical in dorsal view, anterior extremity bluntly pointed, posterior more rounded.

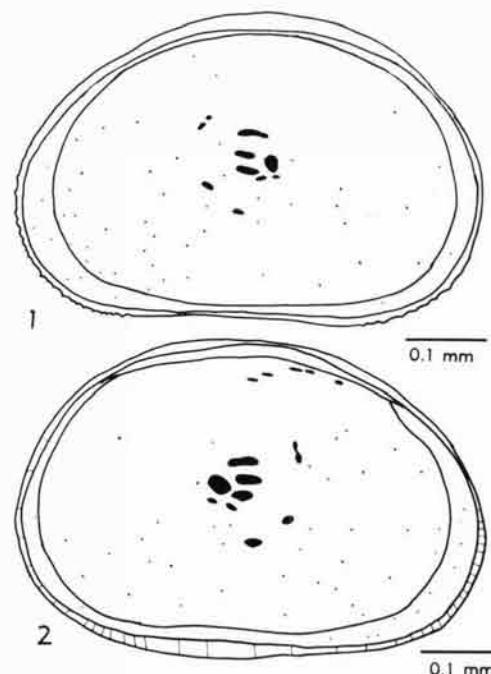


FIG. 11. *Physocypris pustulosa* Sharpe; 1) right, 2) left.

Surface of valves smooth, translucent; valves thinly calcified; normal pores few, very small, simple, scattered but more common in anterior and central regions. Muscle scars as in genus; smaller of the central muscle scars often difficult to observe. Inner lamella narrow, sloping inward; vestibulum widest anteriorly; inner margins semicircular; marginal pore canals few to moderate in number, simple, straight, not visible in right valve; flange present. Hinge simple, adont.

Remarks.—The specimens found in the Great Salt Lake Basin differ from what is said to be typical of the genus *Physocypria* in that the dorsal margin of one of the valves is not significantly higher than that of the other valve. There is some confusion in the literature over which valve should be higher dorsally, the right (Van Morkhoven, 1962, p. 71) or the left (Delorme, 1970b). It is the opinion of some authors that *Physocypria* should not be separated from the genus *Cypria* Zenker (Staplin, 1963b). The slight differences in carapace morphology of *Physocypria* (marginal tubercles on right valve and one valve dorsally higher) do not seem to be reflected by differences in the soft parts (Van Morkhoven, 1962).

Occurrences.—Occurs, but not commonly, throughout the Saltair and section 28 cores.

Dimensions.—Dimensions of specimens are shown below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Left valve, Pl. 3, fig. 5	0.55	0.37	1,007,951
Left valve, Pl. 3, fig. 6	0.60	0.41	1,007,952

Family CYPRIDIDAE Baird, 1845

Subfamily CYPRIDINAE Baird, 1845

Genus CYPRINOTUS Brady, 1886

Cypris Müller, 1776; Ramdohr, 1808, p. 84 (in part).

Monoculus Jurine, 1820, p. 1 (in part).

Cyprinotus Brady, 1886, p. 301.

Cypridonotus [sic] Brady, 1886; Claus, 1893, p. 197.

Microcypris Kaufmann, 1900, p. 132.

Hemicypris Sars, 1903, p. 24.

Type species.—*Cyprinotus cingalensis* Brady, 1886.

Description.—Subovate to subtriangular in side view; dorsal margin arched, ventral margin concave, anterior and posterior margins broadly rounded; smaller valve commonly has numerous, small tubercles along anterior and posterior margin; greatest height medially to posteromedially. Carapace somewhat compressed, elliptical in dor-

sal view. Valves smooth or punctate; normal pores numerous, small, scattered, simple. Inner lamella moderately wide; anterior vestibulum wider than posterior; marginal zone narrow; weak selvage developed, inner lamella concentrically striate; marginal pore canals numerous, short, simple, straight. Central muscle scars consist of an anterior vertical row of four scars and two posterior scars, hindmost scar is small; two mandibular scars are located anteroventrally of central group; one elongate frontal scar is located anterodorsally of central group. Hinge adont, the dorsal margin of the smaller valve fits into a groove in the dorsal area of the large valve. Right valve usually smaller than left. Eye spots absent. Sexual dimorphism unknown.

CYPRINOTUS GLAUCUS Furtos, 1933

Figure 12; Plate 2, figures 1-4

Cyprinotus glaucus Furtos, 1933, p. 444.

Diagnosis.—*Cyprinotus glaucus* can be distinguished from other species of ostracode found in the Great Salt Lake Basin by its subtriangular shape and moderately compressed valves. It is distinguished from other species of the genus *Cyprinotus* by its size and subtriangular shape.

Description.—Adult: Shape subtriangular to subovate in side view; greatest height medial; dorsal margin arched, somewhat more angular in

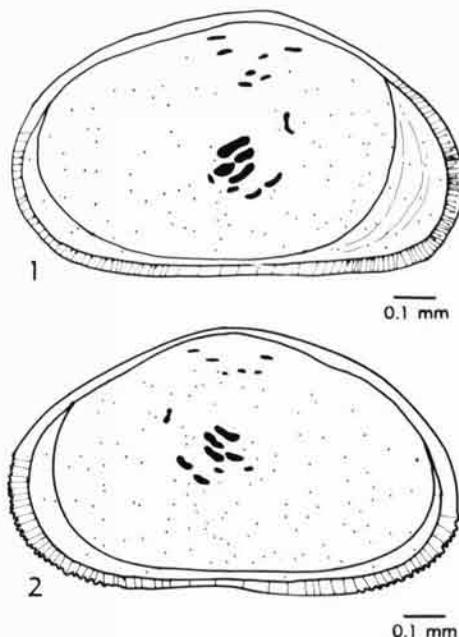


FIG. 12. *Cyprinotus glaucus* Furtos; 1) right, 2) left.

right valve, ventral margin concave in right valve, flat in left valve, anterior and posterior margins broadly rounded. Carapace elliptical in dorsal view; greatest width posteromedially, anterior extremity pointed, posterior extremity bluntly pointed; right valve compressed in anterior region adjacent to margin. Surface of valves smooth except in anteromarginal region of right valve where several concentric striae are visible; normal pores numerous, small, simple, scattered. Muscle scars present. Inner lamella moderately wide to wide, sloping inward; vestibulum widest in anterior of left valve, less wide in anterior of right valve and posterior of left valve, narrowest in posterior of right valve; inner margins semicircular; marginal pore canals numerous, straight, some funnel shaped, some false marginal canals, marginal area difficult to observe in right valve; flange developed in left valve, selvage not noted, concentric striae developed. Hinge simple, adont.

Remarks.—*Cyprinotus glaucus* occurs commonly throughout the Saltair and section 28 cores.

Dimensions.—Dimensions of specimens are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Right valve, Pl. 2, fig. 1	0.97	0.58	1,007,953
Right valve, Pl. 2, fig. 2	1.00	0.60	1,007,954
Left valve, Pl. 2, fig. 3	1.03	0.60	1,007,955
Left valve, Pl. 2, fig. 4	1.07	0.62	1,007,956

Genus EUCYPRIS Vavra, 1891

Cypris Müller, 1776, p. 198 (in part).

Erpetocypris Brady and Norman, 1889, p. 89 (in part).

Eucypris Vavra, 1891, p. 90.

Cypris Müller, 1776; Turner, 1895, p. 319 (in part).

Cypris Müller, 1776; Sharpe, 1897, p. 439 (in part).

Cypris (*Eucypris*) (Vavra), 1891; Alm, 1915, p. 46.

Type species.—*Monoculus virens* Jurine, 1820.

Description.—Subtriangular in side view; greatest height anteromedially, rarely less than half the length; dorsal margin arched, sloping toward posterior, ventral margin straight or weakly convex, anterior margin broadly rounded, posterior margin rounded. Carapace elliptical in dorsal view, somewhat compressed. Valves smooth, thinly calcified; normal pores numerous, small, scattered, simple. Inner lamella moderately wide to wide; anterior vestibulum wider than posterior; marginal zone narrow; selvage situated near outer margin; marginal pore canals numerous, short, simple, straight. Central muscle scars consist of vertical row of four scars anteriorly,

lowermost of which may be small or weakly developed, posterior group of two scars, one of which may be small, two mandibular scars are located anteroventrally of central group and close to it; two small frontal scars are located anterodorsally of central group. Hinge adont, dorsal margin of right valve fitting into groove in left valve. Left valve larger than right. Eye spots absent. Sexual dimorphism unknown.

EUCYPRIS SERRATA (Müller), 1900

Figure 13; Plate 2, figure 15

Cypris clavata Baird, 1837, p. 137.

Cypris lienenklausi serrata Müller, 1900, p. 70.

Eucypris serrata (Müller), 1900; Alm, 1915, p. 58.

Diagnosis.—*Eucypris serrata* can be distinguished from other species of ostracode found in the Great Salt Lake Basin by its large size and the fact that the greatest height of its subtriangular carapace is anteromedial. It can be distinguished from other species of the genus *Eucypris* by its shape.

Description.—Adult: Shape subtriangular in side view; greatest height anteromedially, about one-half of the length; dorsal margin arched; posteroventral margin straight, sloping to rear, ventral margin straight, anterior margin broadly rounded, posterior margin rounded. Carapace elliptical in dorsal view; greatest width medially, somewhat compressed, area adjacent to anterior margin is compressed; anterior extremity pointed, posterior extremity bluntly pointed. Surface of valves smooth, slightly wavy in area adjacent to anterior margin, transparent to translucent; normal pores numerous, small, simple, scattered. Muscle scars present. Inner lamella moderately broad to broad; vestibulum widest anteriorly; inner margins semicircular; marginal pore canals numerous, simple, straight, short; selvage developed, situated close to outer margin. Hinge simple, adont.

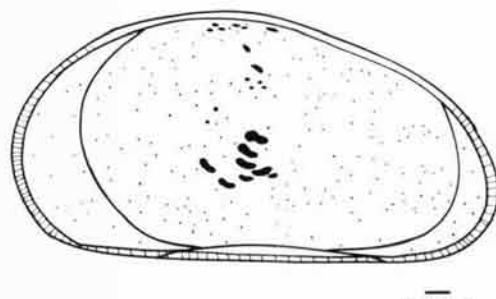


FIG. 13. *Eucypris serrata* (Müller).

Remarks.—Though types were not examined, specimens described above are nearly identical in size and shape to those described by Delorme (1970a).

Occurrence.—*Eucypris serrata* occurs rarely in the Saltair core. One immature specimen has also been recovered.

Dimensions.—Dimensions of specimen are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Right valve, Pl. 2, fig. 15	1.91	0.99	1,007,057

Subfamily CYPRIDOPSISNAE Kaufmann, 1900

Genus CYPRIDOPSIS Brady, 1868

Cypridopsis Brady, 1868, p. 117.

Pionocypris Brady and Norman, 1896, p. 725.

Proteocypris Brady, 1905, p. 335.

Type species.—*Cypris vidua* Müller, 1776.

Description.—Subcircular to subreniform to elongate-ovate in side view; greatest height medially; dorsal margin arched, ventral margin flat to weakly concave, anterior and posterior margins rounded. Carapace elliptical in dorsal view, inflated; anterior and posterior extremities rounded to bluntly pointed. Valves smooth or punctate or rough; moderately thinly calcified; normal pores numerous, small, scattered, simple. Inner lamella moderately wide; marginal zone narrow; anterior vestibulum wider than posterior; weak selvage and several striae developed; marginal pore canals numerous, short, simple, straight. Central muscle scars consist of an anterior row of four scars of ventrally decreasing size, posteriorly of these are two other scars; two mandibular scars are located anteroventrally of central group; one elongate frontal scar is located anterodorsally of central group. Hinge adont, dorsal margin of right valve fits into groove in left valve. Eye spots absent. Left valve larger than right. Sexual dimorphism unknown.

CYPRIDOPSIS VIDUA (Müller), 1776

Figure 14; Plate 3, figures 7, 8

Cypris vidua Müller, 1776, p. 199.

Monoculus vidua (Müller), 1776; Jurine, 1820, p. 175.

Cypris strigata Koch, 1841, species 19.

Cypris sella Baird, 1846, p. 414.

Cypridopsis vidua (Müller), 1776; Brady, 1868, p. 375.

Cypridopsis obesa Brady and Robertson, 1869, p. 364.

Cypridopsella tumida Kaufmann, 1900a, p. 313.

Pionocypris vidua (Müller), 1776; Scott, 1906, p. 272.

Cypridopsis concolor Daday, 1900, p. 212.

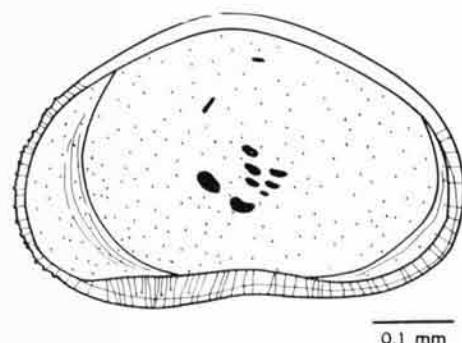


FIG. 14. *Cypridopsis vidua* (Müller).

Cypridopsis pustulosa Furtos, 1933, p. 431.

Cypridopsis canadensis Ferguson, 1959, p. 64.

Diagnosis.—*Cypridopsis vidua* can be distinguished from other ostracodes of the Great Salt Lake Basin by its ovate, inflated shape, wide anterior vestibulum, pitted surface, and size. Distinguished from other species of the genus *Cypridopsis* by its size and the surface texture of the valves.

Description.—Adult: Shape subovate in side view; greatest height medially, two-thirds to three-quarters of length; dorsal margin arched, ventral margin straight, anterior and posterior margins rounded. Carapace elliptical in dorsal view, inflated; anterior extremity bluntly pointed, posterior rounded. Surface of valves appears pitted, translucent; normal pores numerous, small, simple, scattered, difficult to distinguish because of surface sculpturing. Muscle scars as in genus. Inner lamella wide, sloping inward; vestibulum widest anteriorly; inner margins broadly rounded; marginal pore canals numerous, very short, difficult to observe; flange present, large valve pronouncedly overlaps smaller valve ventrally, selvage developed, several striae usually visible on inner lamellae. Hinge simple, adont.

Remarks.—*Cypridopsis vidua* is a common Northern Hemisphere swimming ostracode.

Occurrence.—*Cypridopsis vidua* is common and occurs throughout the Saltair and section 28 cores.

Dimensions.—Dimensions of specimens are given below.

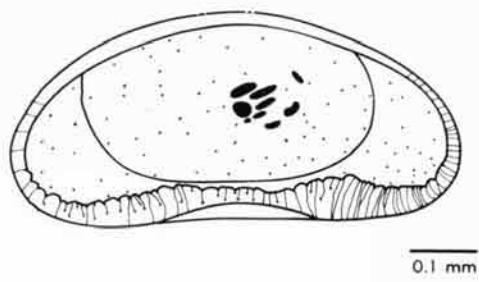
DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Left valve, Pl. 3, fig. 7	0.72	0.43	1,007,958
Left valve, Pl. 3, fig. 8	0.72	0.45	1,007,959

CYPRIDOPSIS sp.

Figure 15; Plate 3, figures 9, 10

Diagnosis.—*Cypridopsis* sp. can be distinguished from other species of ostracodes found in the Great Salt Lake Basin by its wide inner lamella, its shape, its size, and the configuration of its marginal pore canals.

Description.—Adult: Shape elongate-subreniform in side view; greatest height medially, less than half of the length; dorsal margin arched, ventral margin weakly concave to straight, anterior and posterior margins rounded. Carapace elliptical in dorsal view; greatest width medially; anterior and posterior extremities pointed. Surface of valves smooth, transparent to translucent; normal pores numerous, small, simple, scattered. Muscle scars as in genus. Inner lamella broad, sloping inward, steeply in midventral region, less steeply anteriorly and posteriorly; vestibula of almost equal width; inner margins curved; marginal pore canals numerous, prominent, line of concrescence irregular where it meets canals, canals straight to slightly curved, simple, many are false marginal pore canals; several striae can be seen on inner margin especially near the innermost edge. Hinge simple, adont.

FIG. 15. *Cypridopsis* sp.

Remarks.—This species exhibits the general characteristics of the genus *Cypridopsis* and is similar in size and shape to figures given by Absolon (1973) as *C. subterranea* Wolf, but types of this species were not examined and it is considered unlikely that specimens of this European cave-dwelling ostracode would be found in North American lacustrine deposits.

Occurrence.—*Cypridopsis* sp. occurs rarely in the Saltair and section 28 cores.

Dimensions.—Dimensions of specimens are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Right valve, Pl. 3, fig. 9	0.66	0.32	1,007,960
Right valve, Pl. 3, fig. 10	0.59	0.29	1,007,961

Genus POTAMOCYPRIS Brady, 1870*Potamocypris* Brady, 1870, p. 365.*?Candonella* Claus, 1891, p. 7.*Paracypridopsis* Kaufmann, 1900b, p. 131.*Cypridopsis* (*Potamocypris*) (Brady), 1867; Alm, 1915, p. 83.*Cypridopsella* Sars, 1928, p. 142.**Type species.**—*Bairdia fulva* Brady, 1868.

Description.—Carapace reniform in side view; greatest height usually anteromedially; dorsal margin broadly rounded, ventral margin usually pronouncedly concave, anterior margin rounded, posterior margin less broadly rounded. Carapace elliptical in dorsal view; compressed. Valves smooth or lightly punctate; normal pores numerous, small, scattered, simple. Inner lamella moderately wide to narrow, anterior vestibulum usually wider than posterior; marginal zone narrow; selvage usually close to outer margin; marginal pore canals numerous, short, simple, straight, may be difficult to observe in right valve. Central muscle scars consist of a group of five or six diagonally elongate scars; two mandibular scars located anteroventrally of the central group; two small frontal scars may be visible anterodorsally of the central group. Hinge adont, dorsal margin of right valve fits into shallow groove in left valve. Right valve normally higher than left, left valve may be longer. Eye spots absent. Sexual dimorphism negligible.

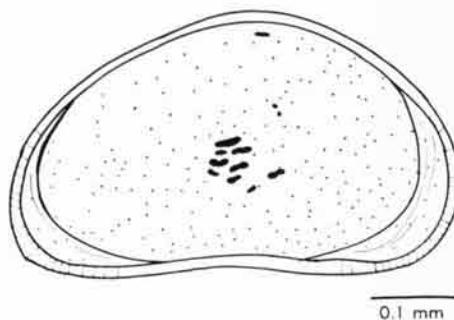
POTAMOCYPRIS GRANULOSA Daday, 1902

Figure 16; Plate 3, figures 11, 12

Potamocypris granulosa Daday, 1902, p. 293.

Diagnosis.—*Potamocypris granulosa* is distinguished from other species of the genus *Potamocypris* by its size and by the granular texture of its surface.

Description.—Adult: Shape reniform in side view; greatest height anteromedially, greater than half of the length; dorsal margin arched, ventral margin concave, anterior margin rounded, posterior margin more sharply rounded. Carapace elliptical in dorsal view, compressed; greatest width approximately medially; anterior extremity pointed, posterior extremity bluntly pointed. Surface of valves pitted or granular, pits seem to be arranged in horizontal rows, translucent; normal pores numerous, small, simple, scattered. Muscle

FIG. 16. *Potamocypris granulosa* Daday.

scars as in genus. Inner lamella narrow, inner portion of anterior and posterior lamellae sloping inward, outer portion parallel to margin, inner lamella sloping inward in ventral region; vestibula approximately equally wide; inner margins rounded; marginal pore canals numerous, simple, straight, short, difficult to observe; weak selvage present. Hinge simple, adont.

Remarks.—This is one of the few species of *Potamocypris* without a smooth surface. Though types were not examined, specimens from the Great Salt Lake Basin are similar to those described by Delorme (1970b).

Occurrence.—*Potamocypris granulosa* occurs uncommonly in the Saltair and section 28 cores.

Dimensions.—Dimensions of specimens are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Left valve, Pl. 3, fig. 11	0.58	0.34	1,007,962
Left valve, Pl. 3, fig. 12	0.53	0.33	1,007,963

POTAMOCYPRIS PALLIDA Alm., 1914

Figure 17; Plate 2, figures 17, 18.

Potamocypris pallida Alm., 1914, p. 470.

Diagnosis.—*Potamocypris pallida* can be distinguished from other species of the genus *Potamocypris* by its elongate shape, its size, and the similarity in shape of the two valves.

Description.—Adult: Shape elongate-reniform in side view; greatest height anteromedially, about half of the length; dorsal margin arched, ventral margin concave, anterior margin rounded, posterior margin more narrowly rounded. Carapace elliptical in dorsal view, compressed; anterior and posterior extremities pointed. Surface of valves smooth, translucent; normal pores moderately numerous, small, simple, scattered. Muscle scars

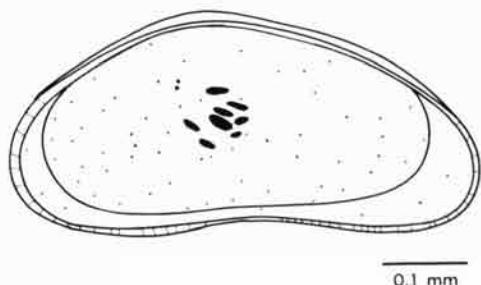
as in genus. Inner lamella moderately broad, sloping inward, steeply in ventral region; vestibula about equal in width, posterior vestibulum does not extend as far dorsally; inner margins roughly semicircular; marginal pore canals numerous but difficult to observe in right valve, simple, straight; flange present, selvage not clearly present. Hinge simple, adont.

Remarks.—Although types were not examined, the specimens of this species found in the Great Salt Lake Basin are similar in size and shape to *Potamocypris pallida* described by Delorme (1970b). Specimens described here differ in that they are slightly more elongate.

Occurrence.—*Potamocypris pallida* occurs sparsely throughout the Saltair core and rarely in the section 28 core.

Dimensions.—Dimensions of specimens are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Left valve, Pl. 2, fig. 17	0.64	0.32	1,007,964
Left valve, Pl. 2, fig. 18	0.63	0.33	1,007,965

FIG. 17. *Potamocypris pallida* Alm.

POTAMOCYPRIS SMARAGDINA (Vavra), 1891

Figure 18

Cypridopsis smaragdina Vavra, 1891, p. 80.

Potamocypris smaragdina (Vavra), 1891; Sharpe, 1903, p. 992.

Diagnosis.—*Potamocypris smaragdina* can be distinguished from other species of the genus *Potamocypris* by its size and shape.

Description.—Shape reniform in side view; greatest height medially, more than half of the length; dorsal margin broadly rounded, sloping more gently toward anterior margin, ventral margin concave, anterior margin rounded, posterior margin broadly rounded. Carapace elliptical in dorsal view, compressed; greatest width medially; anterior and posterior extremities pointed.

Surface of valves smooth, translucent; normal pores small, simple, scattered. Muscle scars as in genus. Inner lamella moderately wide, anteriorly and posteriorly sloping gently inward, sloping steeply inward in ventral region; vestibulum widest anteriorly; inner margins rounded; marginal pore canals numerous, simple, straight, short, somewhat difficult to observe; weak selvage present. Hinge simple, adont.

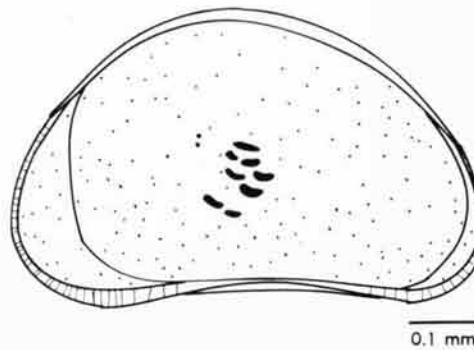


FIG. 18. *Potamocypris smaragdina* (Vavra).

Remarks.—Although types were not examined, specimens described from the Great Salt Lake Basin are similar to those described by Delorme (1970b).

Occurrence.—*Potamocypris smaragdina* occurs rarely in the Saltair core.

Dimensions.—Dimensions of specimen are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Right valve, Fig. 18	0.72	0.45	1,007,966

POTAMOCYPRIS UNICAUDATA Schäfer, 1943

Figure 19; Plate 2, figure 16

Potamocypris unicaudata Schäfer, 1943, p. 212.

Diagnosis.—*Potamocypris unicaudata* can be distinguished from other species of the genus *Potamocypris* by its large size and by its great height to length ratio.

Description.—Adult: Shape subreniform to subtriangular in side view; greatest height anteromedially, more than half of the length; dorsal margin broadly arched, ventral margin concave, anterior margin broadly rounded, posterior margin narrowly rounded. Carapace elliptical in dorsal view; anterior and posterior extremities pointed. Surface of valves smooth, transparent to translucent; normal pores numerous, small, sim-

ple, scattered. Muscle scars as in genus. Inner lamella narrow, sloping inward steeply in midventral region; vestibulum widest anteriorly, posterior vestibulum only slightly narrower; inner margins semicircular; marginal pore canals numerous, simple, straight, some appear to be false marginal pore canals. Hinge simple, adont.

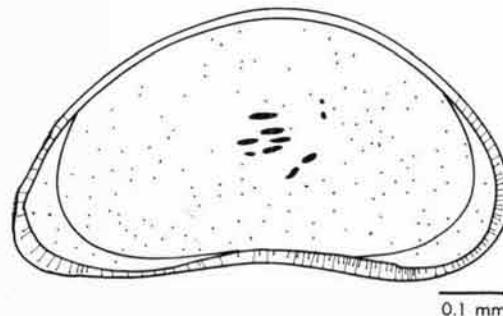


FIG. 19. *Potamocypris unicaudata* Schäfer.

Remarks.—Although types were not examined, specimens of this species from the Great Salt Lake Basin are similar in morphology to *Potamocypris unicaudata* described by Delorme (1970b).

Occurrence.—*Potamocypris unicaudata* occurs rarely in the Saltair core. Unlike the case of Delorme's Canadian fauna, *P. unicaudata* is not the most common species of the genus *Potamocypris* found in the Great Salt Lake Basin.

Dimensions.—Dimensions of specimen are given below.

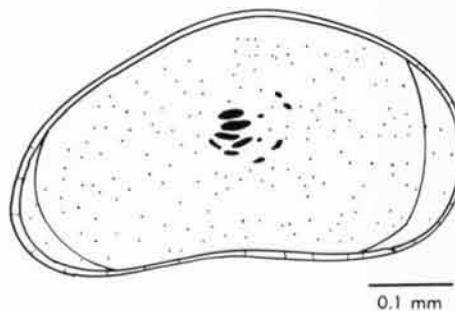
DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Left valve, Pl. 2, fig. 16	0.76	0.42	1,007,967

POTAMOCYPRIS sp.

Figure 20; Plate 3, figures 13, 14

Diagnosis.—*Potamocypris* sp. can be distinguished from other species of the genus *Potamocypris* by its small size, its subtriangular shape, and the pitted surface of its valves.

Description.—Adult: Shape subtriangular to subreniform in side view; greatest height anteromedially, more than half of the length; dorsal margin arched, ventral margin concave, anterior margin rounded, posterior margin narrowly rounded. Carapace elliptical in dorsal view, moderately compressed; greatest width medially; anterior and posterior extremities pointed. Surface

FIG. 20. *Potamocypris* sp.

of valves appears smooth at low power but at high power it is seen to be densely covered by minute pits arranged in a random fashion; valves translucent to transparent; normal pores numerous, small, simple, scattered. Muscle scars as in genus. Inner lamella not observed. Hinge simple, adont.

Remarks.—Specimens of *Potamocypris* sp. differ from the other Great Salt Lake Basin species of *Potamocypris*. It is possible that these specimens are immatures of *P. granulosa*, but the irregular pattern of surface pits as well as their great number suggests that this is not the case. I believe the specimens are not complete enough or numerous enough to be able to match with described species or to allow description of a new species.

Occurrence.—Specimens of this species of *Potamocypris* occur rarely in the Saltair and section 28 cores.

Dimensions.—Dimensions of specimens are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Left valve, Pl. 3, fig. 13	0.60	0.33	1,007,968
Right valve, Pl. 3, fig. 14	0.58	0.33	1,007,969

Family ILYOCYPRIDIDAE Kaufmann, 1900

Subfamily ILYOCYPRIDINAE Kaufmann, 1900

Genus ILYOCYPRIS Brady and Norman, 1889

Ilyocypris Brady and Norman, 1889, p. 106.

Ilyocypris Daday, 1900, p. 237.

Ilyocypris Brady and Norman, 1889; Daday, 1900, p. 234.

Ilyocypris Masi, 1906, p. 261.

Type species.—*Cypris gibba* Ramdohr, 1808.

Description.—Subquadrate in side view; greatest height anteriorly, about half of the length; dorsal margin straight, ventral margin concave, anterior and posterior margins broadly rounded.

Carapace ovate in dorsal view; two prominent sulci in anterodorsal portion of shell; often with several hollow tubercles projecting laterally. Valves punctate, occasionally spinose, moderately heavy calcification; normal pores not numerous, small, scattered, simple. Inner lamella moderately wide; anterior vestibulum wider than posterior; Marginal zone narrow; inner lamella provided with a prominent list; marginal pore canals numerous, short, simple, straight. Central muscle scars located within posterior sulcus, generally consist of an anterior vertical row of four scars, posteriorly usually one or sometimes two scars are found; two mandibular scars are located in external pits anteroventrally of central group; one small frontal scar is located in the anterior sulcus anterodorsally of the central group; body scars are usually visible near the uppermost parts of the sulci. Hinge adont, dorsal border of the right valve fits into a shallow, straight groove in the left valve. Left valve larger than right. Eye spots absent. Sexual dimorphism not pronounced.

ILYOCYPRIS BIPLICATA (Koch), 1838

Figure 21; Plate 2, figures 5, 6

Cypris bispinata Koch, 1838, species 16.

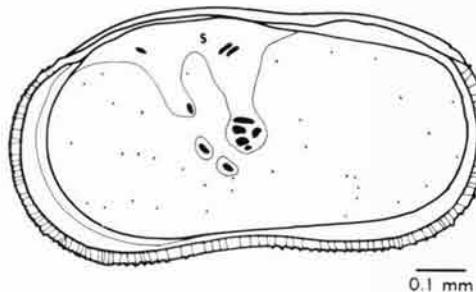
Ilyocypris bispinata (Koch), 1838; Scourfield, 1904, p. 34.

Ieicypris bispinata (Koch), 1838; Dubowsky, 1927, p. 113.

Diagnosis.—*Ilyocypris bispinata* can be distinguished from other species of the genus *Ilyocypris* by its size and by its lack of tubercles.

Description.—Adult: Shape subquadrate in side view; greatest height anteriorly, greater than half of the length; dorsal margin straight, ventral margin concave, anterior and posterior margins broadly rounded; anterior and posterior marginal areas provided with minute tubercles of varying degrees of development; two very weakly developed posterior hollow tubercles may be present. Carapace elliptical-ovate in dorsal view; anterior extremity pointed, posterior extremity rounded. Surface of valves punctate, whitish, opaque to translucent; normal pores not numerous, small, simple, scattered. Muscle scars as in genus. Inner lamellae moderately broad, sloping steeply inward in midventral area, sloping gently inward in anterior and posterior areas; vestibulum widest anteriorly; inner margins semicircular; marginal area narrow; marginal pore canals numerous, simple, straight, short; flange present, list present on free part of inner lamella. Hinge simple, adont.

Remarks.—The specimens of this species found in the Great Salt Lake Basin exhibit a wide

FIG. 21. *Ilyocypris biplicata* (Koch).

range of sizes (length ranging from 0.92 mm to 1.10 mm). Some authors probably would place some of the smaller specimens in *Ilyocypris bradyi* Sars (1890), although size alone is not a good criterion for differentiating these species. Studies indicate there is a size overlap between *I. biplicata* and *I. bradyi* (Delorme, 1970d). It has been noted that *I. biplicata* exhibits less prominent marginal denticles than *I. bradyi*. In specimens examined here it was seen that there is a continuous variation in size of denticles from barely visible to visible under low power. It is unlikely that denticle size makes a good characteristic for separating species.

Occurrence.—*Ilyocypris biplicata* occurs with moderate frequency throughout the Saltair and section 28 cores. It is somewhat more common, on the whole, than *I. gibba*.

Dimensions.—Dimensions of specimens are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Left valve, Pl. 2, fig. 5	0.92	0.52	1,007,970
Left valve, Pl. 2, fig. 6	0.99	0.52	1,007,971

ILYOCYPRIS GIBBA (Ramdohr), 1808

Figure 22; Plate 2, figures 7, 8

Cypris gibba Ramdohr, 1808, p. 91.

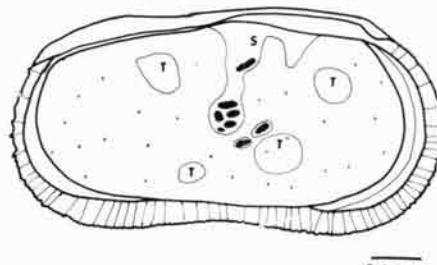
Ilyocypris gibba (Ramdohr), 1808; Brady and Norman, 1889, p. 107.

Ilyocypris gibba (Ramdohr), 1808; Müller, 1900, p. 88.

Diagnosis.—*Ilyocypris gibba* can be distinguished from *I. biplicata* by the presence of lateral hollow tubercles on the carapace. The size ranges of specimens of the two species from the Great Salt Lake Basin overlap.

Description.—Adult: Shape subquadrate in side view; greatest height anteriorly, greater than half of the length; dorsal margin straight, ventral

margin concave, anterior and posterior margins broadly rounded. Carapace elliptical-ovate in dorsal view; anterior extremity pointed, posterior extremity rounded. Surface of valves punctate, whitish, opaque to translucent; carapace provided with three or four hollow tubercles, the postero-dorsal of which is the largest and points rearward; normal pores not numerous, often obscured by surface ornament, small, simple, scattered. Muscle scars as in genus. Inner lamella moderately broad, sloping inward steeply in ventral region, gently in anterior area marginward of list, steeply inward of list; vestibulum widest anteriorly; inner margins broadly rounded; marginal area moderately broad; marginal pore canals numerous, simple, straight; flange present, list well developed about midway on anterior free inner lamella. Hinge simple, adont.

FIG. 22. *Ilyocypris gibba* (Ramdohr).

Remarks.—It is not clear whether the hollow tubercles on certain species of the genus *Ilyocypris* are genotypic or ecophenotypic. The answer to this question will probably have to await studies involving laboratory cultures of *Ilyocypris*.

Occurrence.—*Ilyocypris gibba* is moderately common throughout the Saltair and section 28 cores.

Dimensions.—Dimensions of specimens are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Left valve, Pl. 2, fig. 7	0.97	0.52	1,007,972
Right valve, Pl. 2, fig. 8	0.92	0.48	1,007,973

Genus PELOCYPRIS Klie, 1939

Pelocypris Klie, 1939, p. 85.

Pseudoilocypris Ferguson, 1967, p. 244.

Type species.—*Pelocypris lenzi* Klie, 1939.

Description.—Subquadrate in side view; great-

est height anteriorly, more than half of the length; dorsal margin straight, ventral margin concave, anterior and posterior margins broadly rounded. Carapace ovate in dorsal view; one or two sulci in anterodorsal portion of shell; margins with many mammary pustules. Valves punctate, spinose, heavily calcified; normal pores not numerous, small, scattered, simple. Inner lamella moderately wide, anterior vestibulum much wider than posterior one; marginal zone moderately broad; marginal pore canals numerous, simple, straight; inner lamella not provided with a list. Central muscle scars generally consist of an anterior vertical row of four elongate scars, with another scar situated posteriorly; two elongate mandibular scars are located anterodorsally of central group; no frontal scar has been observed by the author. Hinge adont, dorsal margin of right valve fits into groove in left valve. Eye spots absent. No pronounced sexual dimorphism noted; male may be smaller.

PELOCYPRIS TUBERCULATUM (Ferguson, 1967)

Figure 23; Plate 2, figures 9, 10

Pseudoiyocyparis tuberculatum Ferguson, 1967, p. 244.

Diagnosis.—*Pelocypris tuberculatum* can be distinguished from other species of ostracodes found in the Great Salt Lake Basin by its large size, by its prominent surface ornamentation, and by its subquadrate shape. It can be distinguished from other species of the genus *Pelocypris* by its size and tuberculate ornamentation.

Description.—Adult: Shape subquadrate in side view; greatest height anteriorly, more than half of the length; dorsal margin straight, bowed in slightly in region of posterior part of sulcus, ventral margin concave, anterior and posterior margins broadly rounded. Carapace elliptical-ovate in dorsal view; anterior and posterior extremities bluntly pointed. Surface of valve punctate, whitish, opaque to translucent; with several lateral and marginal mammary tubercles; anterior, posterior, and ventral margins bordered by a row of closely spaced denticles. Normal pores obscured by surface detail. Muscle scars as in genus. Inner lamella moderately broad, sloping inward steeply; vestibulum widest anteriorly, posterior vestibulum much smaller; inner margins semicircular; marginal area moderately broad; marginal pore canals numerous, simple, straight; flange well developed, no lists developed. Hinge simple, adont.

Remarks.—Ferguson's (1967) genus *Pseudo-*

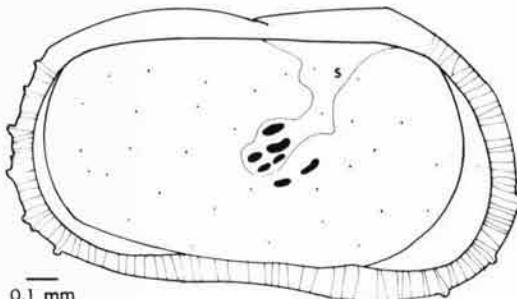


FIG. 23. *Pelocypris tuberculatum* (Ferguson).

Ilyocypris apparently is synonymous with *Pelocypris*. *Pelocypris tuberculata* differs from species of *Ilyocypris* in having no list, in showing weaker development of sulci, in not having the mandibular scars indicated by external pits on the valves, and in the more pustulate surface of the valves. Although types were not examined, specimens found in the Great Salt Lake Basin appear similar to *Pseudoiyocyparis tuberculatum* of Ferguson. Some specimens from the Great Salt Lake Basin are somewhat larger than Ferguson's specimens but exhibit a broad range of sizes. Judging by the written descriptions and figures, *P. tuberculatum* differs from the type species *P. lensi* mainly in surface ornamentation, and slightly in shape.

Occurrence.—*Pelocypris tuberculatum* occurs uncommonly in the Saltair and section 28 cores.

Dimensions.—Dimensions of specimens are shown below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Right valve, Pl. 2, fig. 9	1.93	1.12	1,007,974
Right valve, Pl. 2, fig. 10	1.67	0.97	1,007,975

Superfamily CYTHERACEA Baird, 1850

Family CYTHERIDEIDAE Sars, 1925

Subfamily CYTHERIDEINAE Sars, 1925

Genus CYPRIDEIS Jones, 1857

Cyprideis Jones, 1857, p. 20.

Anomocytheridea Stephenson, 1938, p. 141.

Amonocythere Sohn, 1951, p. 64.

Type species.—*Candona torosa* Jones, 1850.

Description.—Shape ovate-reniform in side view; greatest height anteromedially, greater than half of the length; dorsal margin weakly convex, ventral margin concave anteriorly, anterior margin broadly rounded, posterior margin rounded to subquadrate. Carapace ovate in dorsal view; greatest width posteromedially; anterior and posterior

extremities bluntly pointed or rounded. Surface of valves smooth or lightly pitted, translucent to opaque; phenotypic hollow tubercles may be present; normal pores numerous, of varying size, sieve type, sieve area often elongate on outside, scattered. Central muscle scars consist of vertical row of four subequal scars; v-shaped frontal scar is located anteriorly of uppermost of central group; prominent mandibular fulcral point located between uppermost of central group and frontal scar; one mandibular scar is located anteroventrally of central group, the other mandibular scar is located ventrally of the central group. Inner lamella moderately broad; inner margin and line of concrescence coincide, marginal area moderately broad; marginal pore canals numerous, simple or bifurcating, straight; selvage developed. Hinge amphidont; median hinge element subdivided.

CYPRIDEIS SALEBROSA van den Bold, 1963

Figure 24; Plate 2, figures 11-14

Cyprideis locketti (Stephenson), 1935; Swain, 1955, p. 615 (in part).

Cyprideis torosa (Jones), 1857; Swain, 1955, p. 616.

Cyprideis littoralis (Brady), 1870; Byrne, LeRoy, and Riley, 1959, p. 241.

Cyprideis littoralis Brady, 1870; Gutentag and Benson, 1962, p. 47.

Cyprideis salebrosa van den Bold, 1963, p. 377.

Diagnosis.—*Cyprideis salebrosa* can be distinguished from other species of ostracodes in the Great Salt Lake Basin by its cytherid muscle scars, the thickness of its valves, its shape, and its size. It can be distinguished from other species of the genus *Cyprideis* by its shape (especially of the male), by its elongate upper mandibular scar, and by the lack of marginal denticulations and posteroventral spine.

Description.—Female: Shape ovate to subquadrate in side view; greatest height anteromedially, more than half of the length; dorsal margin broadly arched, sloping down posteriorly toward posterodorsal angle, anterior margin broadly rounded, posterior margin rounded to truncated. Carapace subovate to subtriangular in dorsal view; greatest width posteromedially, distinct posterior swelling; anterior extremity bluntly pointed, posterior extremity rounded. Surface of valves with shallow pits, translucent to opaque; normal pores moderately numerous, small, ovate, sieve type. Muscle scars as in genus, upper mandibular scar elliptical. Inner lamella moderately

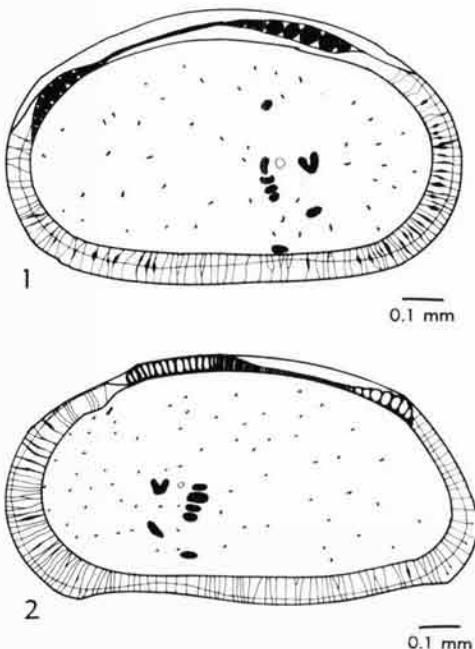


FIG. 24. *Cyprideis salebrosa* van den Bold; 1) female,
2) male.

broad, sloping inward gently; line of concrescence and inner margin coincide; inner margin subparallel to outer margin; marginal pore canals numerous, simple or bifurcating, straight, some with medial thickenings; flange and selvage developed. Hinge as in genus; nearly straight, with elongate anterior element.

Male: More elongate and more compressed carapace than female; more prominent ventral concavity and posteroventral angle.

Remarks.—The specimens of *Cyprideis salebrosa* found in the Great Salt Lake Basin appear to be identical to those described as *C. salebrosa* by Sandberg (1964). Hollow tubercles were present on some specimens found; most often these were juveniles.

Occurrence.—*Cyprideis salebrosa* occurs abundantly at certain horizons within the Saltair and section 28 cores. It probably indicates moderately saline conditions within the basin at times corresponding to these deposits. Specimens of this species described by Gutentag and Benson as *C. littoralis* occur in the Pleistocene of Kansas associated with a fauna similar to that of the Great Salt Lake Basin.

Dimensions.—Dimensions of specimens studied are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Female left, Pl. 2, fig. 11	0.92	0.53	1,007,976
Female left, Pl. 2, fig. 12	0.95	0.53	1,007,977
Male right, Pl. 2, fig. 13	1.00	0.53	1,007,978
Male right, Pl. 2, fig. 14	1.00	0.52	1,007,979

Subfamily NEOCYTHERIDEIDINAE Puri,
1957

Genus CYTHERISSA Sars, 1925

Acanthopus Vernet, 1878 (non Klug, 1807), p. 506.

Cytherissa Sars, 1928, p. 152.

Alexandrella Schweyer, 1939, p. 93.

Type species.—*Cythere lacustris* Sars, 1863.

Description.—Shape ovate-elongate to subtrapezoidal in side view; greatest height anteriorly, dorsal margin straight, ventral margin concave anteriorly, anterior margin broadly rounded, posterior margin rounded. Carapace ovate in dorsal view, somewhat inflated; anterior and posterior extremities rounded to bluntly pointed. Surface of valves covered with low-relief reticulation or pits, translucent to opaque; phenotypic hollow tubercles may be present; valves moderately heavily calcified; normal pores large, sieve type, often arranged in small groups. Central muscle scars consist of vertical row of four adductor scars; a V-shaped frontal scar is located anteriorly of the topmost adductor scar; with fulcral point present between the two; two mandibular scars are located anteroventrally and ventrally of central group. Inner lamella narrow; inner margin and line of concrescence coincide except in anterior region, marginal area narrow; marginal pore canals not numerous, widely spaced, simple, straight; selvage developed. Hinge merodont/lophodont; terminal elements smooth, median element smooth or faintly crenulate.

CYTHERISSA LACUSTRIS (Sars), 1863

Figure 25

Cythere lacustris Sars, 1863, p. 222.

Cytheridea lacustris (Sars), 1863; Brady, 1868, p. 427.

Acanthopus resistans Vernet, 1878, p. 509.

Cytherissa lacustris (Sars), 1863; Sars, 1928, p. 153.

Diagnosis.—*Cythere lacustris* can be distinguished from other species of ostracodes in the Great Salt Lake Basin by its shape and by the presence of the cytherid muscle scar pattern. This species can be distinguished from other species of the genus *Cythereissa* by its size, shape, and surface ornamentation.

Description.—Immature: Shape subtrapezoidal in side view; greatest height anteriorly, more

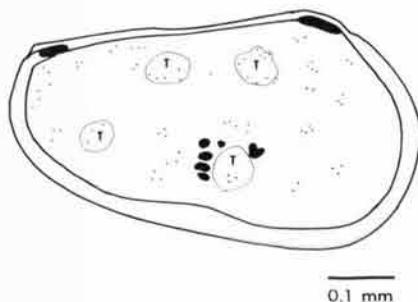


FIG. 25. *Cythereissa lacustris* (Sars).

than half of the length; dorsal margin straight, ventral margin straight to weakly convex, anterior margin broadly rounded, posterior margin rounded. Carapace elliptical in dorsal view; anterior and posterior extremities bluntly pointed. Surface of valves shallowly pitted, translucent; four low, hollow tubercles are present on the surface; normal pores few in number, small, sieve type, arranged in groups of three to five over the surface. Muscle scars as in genus; mandibular scars not visible on specimen examined. Inner lamella narrow; no vestibula observed; no marginal pore canals observed; selvage present but weakly developed. Hinge as in genus, not fully developed.

Remarks.—Even though the specimen described above is not an adult, it is easily recognizable as *Cythereissa lacustris* by its shape and the hollow tubercles protruding laterally from its carapace.

Occurrence.—*Cythereissa lacustris* occurs very rarely near the top of the Saltair core.

Dimensions.—Dimensions of the specimen are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Immature left, Fig. 25	0.66	0.39	1,007,980

Family LIMNOCYTHERIDAE Sars, 1925

Genus LIMNOCYTHERE Brady, 1968

Limnocythere Brady, 1868a, p. 121.

Limnicythere [sic] Brady, 1868b, p. 419.

Limnicytheridea Müller, 1912 (non Forel, 1894), p. 342.

Type species.—*Cythere inopinata* Baird, 1843.

Description.—Shape subquadrate to subreniform in side view; greatest height may be anteriorly or posteriorly of middle; dorsal margin straight, ventral margin concave, anterior and

posterior margins rounded to square. Carapace ovate to elliptical in dorsal view, compressed anteriorly and posteriorly; anterior and posterior extremities usually pointed. Surface of valves smooth or pitted, often reticulate, translucent; valves thinly calcified; often with anterior subcentral sulcus and laterally projecting hollow tubercles or spines; normal pores moderately numerous, small, sieve type, irregularly scattered. Central muscle scars consist of vertical row of four subequal adductor scars; frontal scar located anteriorly of topmost adductor scar, V-shaped to kidney-shaped to oval; one mandibular scar is usually visible anteroventrally of central group. Inner lamella moderately wide to wide; line of concrescence and inner margin coincide or nearly coincide throughout, subparallel to outer margin; marginal pore canals few, straight or weakly sinuous, simple, some may be false marginal pore canals; selvage not strongly developed, faint striae may be visible on inner lamella. Hinge lophodont; weakly developed, smooth terminal teeth in right valve, connected by shallow groove. Eye spots absent. Left valve usually slightly larger than right. Sexual dimorphism usually present.

LIMNOCYTHERE CERIOTUBEROSEA Delorme, 1967

Figure 26; Plate 4, figures 13-16

Limnocythere ceriotuberosa Delorme, 1967, p. 360.

Diagnosis.—*Limnocythere ceriotuberosa* is distinguished from other species of the genus *Limnocythere* by its subtrapezoidal shape (especially in the male), its prominent surface reticulation, its prominent alae, and its large size.

Description.—Female: Shape subrectangular to subtrapezoidal in side view; greatest height anteriorly, more than half of the length; dorsal margin straight, ventral margin straight to weakly concave, anterior margin broadly rounded, posterior margin rounded. Carapace elliptical in dorsal view; greatest width posteriorly; anterior and posterior extremities bluntly pointed. Surface of valves strongly reticulate, transparent to translucent; bisulcate, sulci deep; strongly developed, elongate alae; normal pores few, small, sieve type, difficult to observe because of surface reticulation. Muscle scars as in genus. Inner lamella moderately broad, sloping inward; inner margin and line of concrescence coincide; anterior and posterior inner margins semicircular; marginal pore canals few, simple, nearly straight; one or two

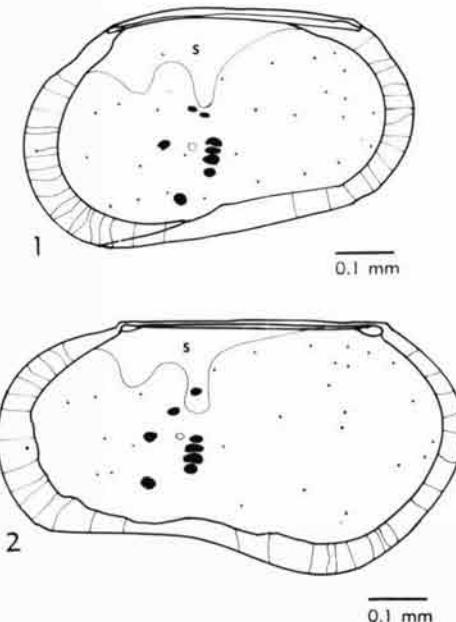


FIG. 26. *Limnocythere ceriotuberosa* Delorme; 1) female,
2) male.

concentric striae may be developed on inner margin. Hinge as in genus.

Male: Differs from female in being more elongate, in having a more concave ventral margin, in having the posterior margin more angular, in having the posteroventral margin pronouncedly downwarped, and in having its greatest height posteriorly.

Remarks.—Specimens of *Limnocythere ceriotuberosa* found in the Great Salt Lake Basin appear nearly identical to Delorme's types of *L. ceriotuberosa* which were examined. The specimens described here differ in the greater development of the alae and the slightly more pronounced posteroventral downwarp in the males.

Occurrence.—*Limnocythere ceriotuberosa* occurs, but not commonly, throughout the Saltair and section 28 cores.

Dimensions.—Dimensions of specimens are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMP NO.
Female right, Pl. 4, fig. 13	0.65	0.38	1,007,981
Female right, Pl. 4, fig. 14	0.65	0.38	1,007,982
Male left, Pl. 4, fig. 15	0.77	0.42	1,007,983
Male left, Pl. 4, fig. 16	0.78	0.43	1,007,984

LIMNOCY THERE FRIABILIS Benson and MacDonald, 1963

Figure 27; Plate 4, figures 9-12.

Limnocythere friabilis Benson and MacDonald, 1963, p. 24.
Limnocythere chippewaensis Staplin, 1963b, p. 1192.

Diagnosis.—*Limnocythere friabilis* can be distinguished from other species of the genus *Limnocythere* by its subreniform shape, by its small size, by the posteromarginal spines of left valves, and by the configuration of the surface reticulation.

Description.—Female: Shape subrectangular to subreniform; greatest height anteriorly, greater than half of the length; dorsal margin weakly convex, ventral margin weakly concave, anterior margin broadly rounded, posterior margin rounded. Carapace elliptical in dorsal view, anteriorly compressed; anterior extremity pointed, posterior extremity rounded. Surface of valves reticulate, raised areas narrow but prominent, transparent to translucent; some specimens have a low ventrolateral tubercle; bisulcate, anterior sulcus very weakly developed, posterior sulcus shallow, extending from dorsum almost to venter; low, wide node present between sulci; posteroventral margin of left valve with small spines; normal pores few, small, sieve type, scattered. Muscle scars as in genus, some dorsal scars may be visible. Inner lamella narrow, sloping inward, inner margin and

line of concrescence coincide; anterior and posterior inner margins semicircular; marginal pore canals very few, simple, straight; no lamellar striae noted. Hinge as in genus.

Male: Differs from female in its more elongate shape, somewhat broader anterior inner lamella, straighter dorsal margin, and larger size.

Remarks.—Specimens of this species from the Great Salt Lake Basin appear identical to a lectotype of Benson and MacDonald (1963), which was examined, except for the somewhat greater development of the ventrolateral tubercle and somewhat less pronounced marginal spines in some specimens from the Great Salt Lake Basin.

Occurrence.—*Limnocythere friabilis* occurs throughout the Saltair and section 28 cores. It is not found concentrated at any horizons.

Dimensions.—Dimensions of specimens studied are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Female right, Pl. 4, fig. 9	0.48	0.27	1,007,985
Female left, Pl. 4, fig. 10	0.52	0.28	1,007,986
Male left, Pl. 4, fig. 11	0.53	0.25	1,007,987
Male right, Pl. 4, fig. 12	0.58	0.28	1,007,988

LIMNOCY THERE ILLINOISENSIS Sharpe, 1897

Figure 28; Plate 5, figures 1-3.

Limnocythere illinoiensis Sharpe, 1897, p. 425.
Limnocythere illinoiensis Sharpe, 1897; Müller, 1912, p. 331.

Diagnosis.—*Limnocythere illinoiensis* is distinguished from other species of the genus *Limnocythere* by size, shape of the posteroventral margin of the male, and surface sculpturing.

Description.—Female: Shape subreniform in side view; greatest height anteriorly, more than half of the length; dorsal margin straight, ventral margin concave, anterior margin broadly rounded, posterior margin rounded. Carapace elliptical in dorsal view, anterior compressed; anterior extremity pointed, posterior extremity bluntly pointed. Surface of valves reticulate, transparent to translucent; bisulcate, weakly developed alae; normal pores very few, small, sieve type, scattered. Muscle scars as in genus. Inner lamella moderately broad, sloping inward; line of concrescence and inner margin coincide; inner margins semicircular, somewhat sinuous; marginal pore canals few, simple, straight; one or two striae developed on inner margin. Hinge as in genus.

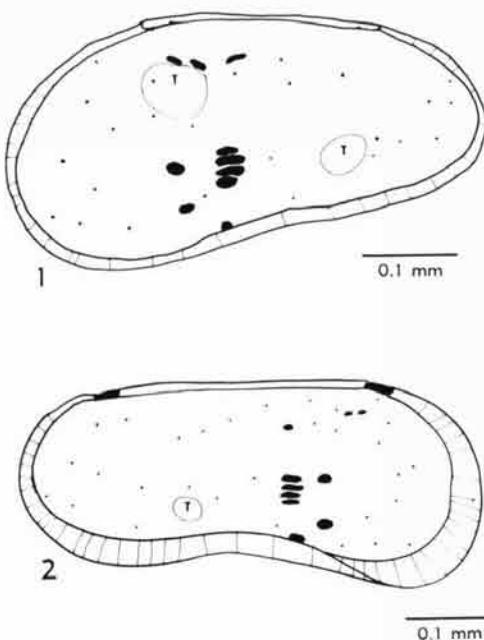


FIG. 27. *Limnocythere friabilis* Benson and MacDonald; 1) female, 2) male.

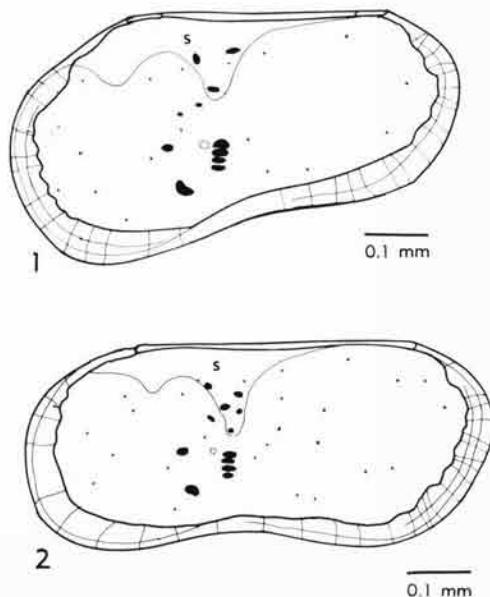


FIG. 28. *Limnocythere illinoiensis* Sharpe; 1) female, 2) male.

Male: Differs from female in being more elongate, having anterior and posterior portions of carapace of about equal height, and having slightly more prominent alae.

Remarks.—Although types were not examined, specimens found in the Great Salt Lake Basin appear identical to the specimens of *Limnocythere illinoiensis* described by Delorme (1971). The specimens described here are slightly smaller.

Occurrence.—*Limnocythere illinoiensis* occurs, but not commonly, in the Saltair and section 28 cores. It may be found associated with *Candida adunca*.

Dimensions.—Dimensions of specimens are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Female left, Pl. 5, fig. 1	0.71	0.36	1,007,989
Female right, Pl. 5, fig. 2	0.71	0.36	1,007,990
Male left, Pl. 5, fig. 3	0.78	0.36	1,007,991

LIMNOCY THERE ITASCA Cole, 1949

Figure 29; Plate 4, figures 5-8

Limnocythere itasca Cole, 1949, p. 351.

Limnocythere trapeziformis Staplin, 1963b, p. 1199.

Diagnosis.—*Limnocythere itasca* can be distinguished from other species of the genus *Limnocythere* by its size, subtrapezoidal shape, and

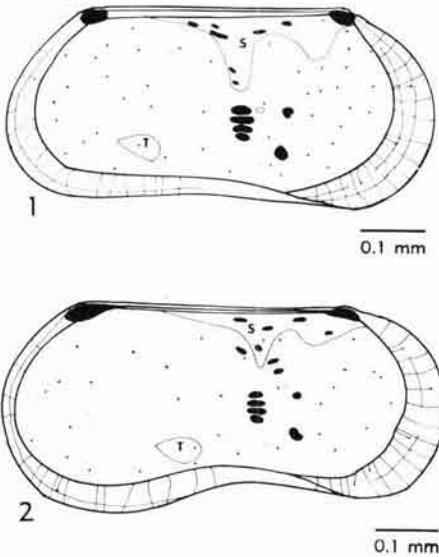


FIG. 29. *Limnocythere itasca* Cole; 1) female, 2) male.

presence of a posteriorly projecting ventrolateral spine.

Description.—Female: Shape subtrapezoidal in side view; greatest height anteromedially, about half of the length; dorsal margin straight, ventral margin concave, anterior margin broadly rounded, posterior margin subrounded to truncated, posteroventral margin produced into an angle. Carapace elliptical in dorsal view, compressed anteriorly; anterior extremity pointed, posterior extremity rounded. Surface of valves reticulate; bisulcate, prominent ventrolateral hollow spine, pointing posteriorly; normal pores few, small, sieve type, scattered. Muscle scars as in genus. Inner lamella moderately broad, sloping inward; line of concrecence and inner margin coincide; inner margins semicircular; marginal pore canals few, simple, straight, a few are false marginal pore canals; one weakly developed concentric striation was noted in some specimens. Hinge as in genus.

Male: Differs from female in that it is more elongate, has its greatest height posteriorly, has a more rounded posterior margin, and has a more concave ventral margin.

Remarks.—Although types were not examined, specimens of this species found in the Great Salt Lake Basin differ from *Limnocythere itasca* as described by Delorme (1971) only in being slightly more elongate. The size range for specimens of *L. itasca* found here falls within that given by Delorme.

Occurrence.—*Limnocythere itasca* occurs commonly throughout the Saltair and section 28 cores. Females were found to be more common than males.

Dimensions.—Dimensions of specimens examined are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Female left, Pl. 4, fig. 5	0.67	0.33	1,007,992
Female right, Pl. 4, fig. 6	0.65	0.32	1,007,993
Male left, Pl. 4, fig. 7	0.66	0.32	1,007,994
Male left, Pl. 4, fig. 8	0.67	0.32	1,007,995

LIMNOCY THERE PARASCUTARIENSE Delorme, 1971

Figure 30; Plate 5, figures 4-6

Limnocythere parascutariense Delorme, 1971, p. 50.

Diagnosis.—*Limnocythere parascutariense* is distinguished from other species of the genus *Limnocythere* by the shape of the female (particularly in the posteroventral margin), by its wide anterior inner lamella, by its lack of tubercles and alar projections, and by its size.

Description.—Female: Shape subrectangular to subreniform in side view; greatest height posteriorly, about one-half of the length; dorsal margin straight, ventral margin concave, anterior and posterior margins broadly rounded, posteroventral margin downwarped. Carapace elliptical to subovate in dorsal view; compressed anteriorly; anterior extremity pointed, posterior extremity

rounded. Surface of valves reticulate, transparent to translucent; bisulcate; normal pores few, small, sieve type, scattered. Muscle scars as in genus. Inner lamella broad anteriorly, moderately broad posteriorly, sloping inward; inner margin and line of concrescence coincide; anterior and posterior inner margins semicircular; marginal pore canals few, simple, straight to slightly curving, about one-third of the anterior pores are false marginal pore canals; one concentric striation usually visible on the inner margin.

Male: Differs from female in being more elongate, having less prominent posteroventral angle, and being larger.

Remarks.—Although types were not examined, specimens described here appear identical to specimens described by Delorme (1971) as *Limnocythere parascutariense*.

Occurrence.—*Limnocythere parascutariense* occurs, but not commonly, throughout the Saltair and section 28 cores.

Dimensions.—Dimensions of specimens are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Female left, Pl. 5, fig. 4	0.65	0.37	1,007,996
Male right, Pl. 5, fig. 5	0.83	0.37	1,007,997
Male left, Pl. 5, fig. 6	0.83	0.37	1,007,998

LIMNOCY THERE PARAORNATA Delorme, 1971

Figure 31; Plate 4, figures 1-4

Limnocythere ornata Furtos, 1933; Delorme, 1967, p. 1281
(non Furtos, 1933).

Limnocythere paraornata Delorme, 1971, p. 50.

Diagnosis.—*Limnocythere paraornata* is distinguished from other species of the genus *Limnocythere* by its size, its shape and the distribution of surface tubercles and alae. This species is very similar in carapace morphology to *L. ornata* Furtos and to *L. iowensis* Danforth (1948). The principal differences are in soft part morphology. The most useful criteria for distinguishing these species in the fossil state are the blocky shape of the female of *L. paraornata*, the more rounded posterior of the male of this species, the distinctive appearance of the alae, the bluntness of the lateral tubercles, and the size.

Description.—Female: Shape subrectangular in side view; greatest height anteriorly, more than half of the length; dorsal margin straight, ventral margin concave, anterior and posterior margins broadly rounded. Carapace subelliptical to sub-

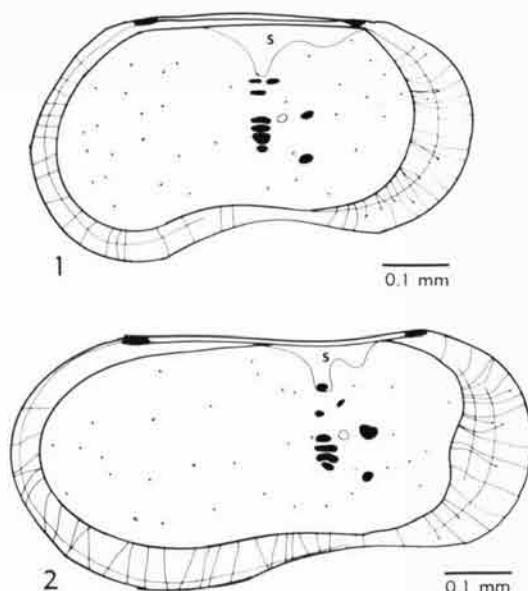


FIG. 30. *Limnocythere parascutariense* Delorme; 1) female, 2) male.

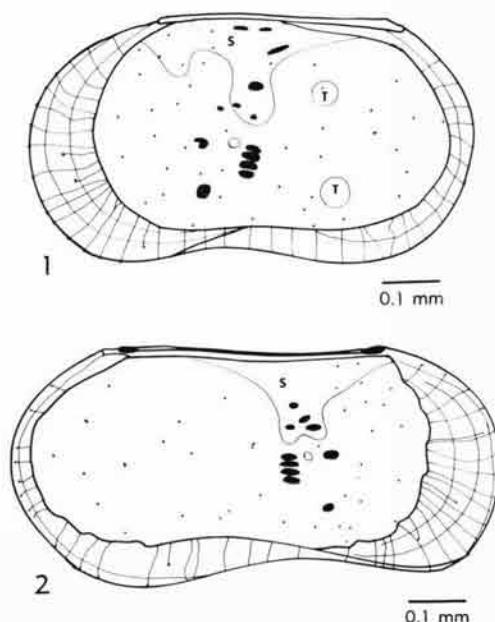


FIG. 31. *Limnocythere paraornata* Delorme; 1) female,
2) male.

triangular in side view; greatest width posteromedially, anterior compressed; anterior extremity pointed, posterior extremity rounded. Surface of valves reticulate; alae and tubercles developed, bisulcate; normal pores few, small, sieve type, scattered. Muscle scars as in genus. Inner lamella broad, sloping inward; line of concrescence and inner margin coincide; inner margins semicircular; marginal pore canals few, simple, straight to slightly curved, some are false marginal pore canals; two concentric striations developed on anterior inner lamella, one on posterior. Hinge as in genus.

Male: Differs from female in its more elongate shape, less prominent lateral surface features, and size.

Remarks.—Type specimens were not examined, but on the basis of carapace morphology, the specimens from the Great Salt Lake Basin are best assigned to *Limnocythere paraornata*. A detailed study of the valves of all three species mentioned above would possibly reveal differences which could be used in distinguishing them. Differences in size between *L. paraornata* and *L. ornata* are minimal. Also, the description and illustrations of *L. ornata* by Furtos (1933) do not permit unquestionable differentiation.

Occurrence.—*Limnocythere paraornata* occurs throughout the Saltair and section 28 cores but is not common at any horizon.

Dimensions.—Dimensions of specimens are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Female right, Pl. 4, fig. 1	0.85	0.50	1,007,999
Female left, Pl. 4, fig. 2	0.85	0.50	1,008,000
Male right, Pl. 4, fig. 3	0.95	0.47	1,008,001
Male left, Pl. 4, fig. 4	0.95	0.47	1,008,002

LIMNOCY THERE PSEUDORETICULATA Staplin, 1963

Figure 32; Plate 5, figures 11-14

Limnocythere pseudoreticulata Staplin, 1963b, p. 1195.

Diagnosis.—*Limnocythere pseudoreticulata* can be distinguished from other species of the genus *Limnocythere* by the subrectangular shape of its carapace, the opaqueness of its valves, the prominent node between the sulci, and its size.

Description.—Female: Shape subrectangular to subreniform in side view; greatest height anteriorly, more than half of the length; dorsal margin straight to slightly convex, ventral margin weakly concave, anterior margin broadly rounded, posterior margin rounded. Carapace elliptical-ovate in dorsal view; greatest width posteromedially; anterior extremity pointed, posterior extremity

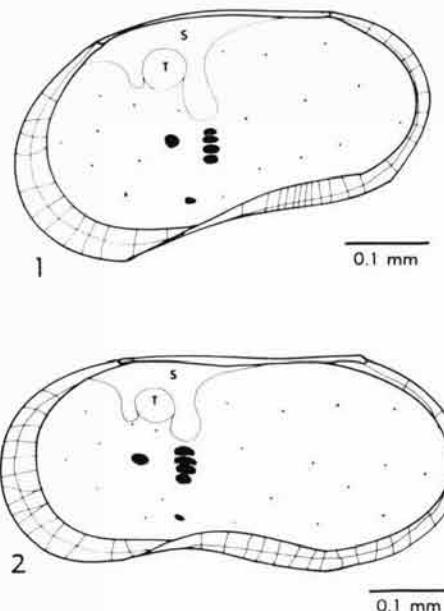


FIG. 32. *Limnocythere pseudoreticulata* Staplin; 1) female, 2) male.

ity rounded. Surface of valves densely reticulate, opaque to translucent; bisulcate; prominent, hemispherical node between sulci; normal pores few, small, scattered, sieve type, difficult to observe because of surface reticulation. Muscle scars as in genus. Inner lamella moderately broad anteriorly, narrow posteriorly, sloping inward; line of concrescence and inner margin coincide; inner margins semicircular anteriorly and posteriorly; marginal pore canals few, simple, straight; one striation may be visible on inner lamella. Hinge as in genus.

Male: Differs from female in being more elongate and in having the height roughly equal anteriorly and posteriorly.

Remarks.—Specimens of this species found in the Great Salt Lake Basin are identical to Staplin's holotype and allotype of *Limnocythere pseudoreticulata*, which were examined.

Occurrence.—*Limnocythere pseudoreticulata* occurs throughout the Saltair and section 28 cores. It is not found concentrated at any horizons.

Dimensions.—Dimensions of specimens are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Female left, Pl. 5, fig. 11	0.53	0.31	1,008,003
Female right, Pl. 5, fig. 12	0.58	0.33	1,008,004
Male right, Pl. 5, fig. 13	0.58	0.30	1,008,005
Male left, Pl. 5, fig. 14	0.58	0.30	1,008,006

LIMNOCY THERE STAPLINI Gutentag and Benson, 1962

Figure 33; Plate 5, figures 7-10

Limnocythere staplini Gutentag and Benson, 1962, p. 51.

Diagnosis.—*Limnocythere staplini* can be distinguished from other species of the genus *Limnocythere* by its size, its reniform shape, its lack of surface ornamentation, and the thinness of its valves.

Description.—Female: Shape reniform in side view; greatest height anteriorly, greater than half of the length; dorsal margin arched, sloping posteriorly, ventral margin concave, anterior margin broadly rounded, posterior margin rounded. Carapace elliptical in dorsal view; anterior extremity pointed, posterior extremity bluntly pointed. Surface of valves smooth, very faint reticulation may be visible by transmitted light, transparent to translucent; normal pores few, small, sieve type, scattered. Muscle scars as in genus. Inner lamella narrow; line of concrescence and inner margin coincide; inner margins semi-

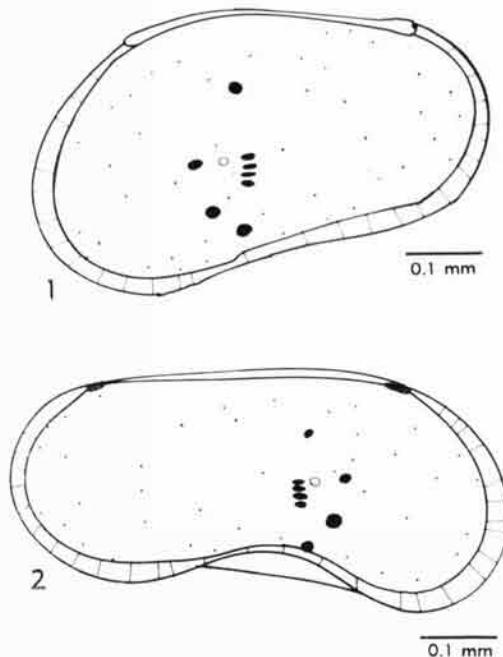


FIG. 33. *Limnocythere staplini* Gutentag and Benson; 1) female, 2) male.

circular; marginal pore canals few, simple, straight, short. Hinge as in genus.

Male: Differs from female in being more elongate, having a straighter dorsal margin, and having a more concave ventral margin.

Remarks.—The holotype of *Limnocythere staplini* was examined and found to be nearly identical with specimens described here. Specimens of *L. staplini* from different horizons within the Great Salt Lake Basin sediments differ in their degree of calcification and consequently in the prominence of their surface reticulation. This may be the result of environmental effects.

Occurrence.—*Limnocythere staplini* occurs abundantly at certain horizons in the Saltair and section 28 cores. It is most commonly associated with *Cyprideis salebrosa*.

Dimensions.—Dimensions of specimens are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Female left, Pl. 5, fig. 7	0.65	0.37	1,008,007
Female right, Pl. 5, fig. 8	0.60	0.33	1,008,008
Male left, Pl. 5, fig. 9	0.62	0.33	1,008,009
Male right, Pl. 5, fig. 10	0.65	0.33	1,008,010

Superfamily DARWINULACEA Brady and Norman, 1889

Family DARWINULIDAE Brady and Norman, 1889

Genus DARWINULA Brady and Robertson, 1885

Polycheles Brady and Robertson, 1870, p. 24 (*non* Müller, 1865).
Darwinella Brady and Robertson, 1872, p. 50 (*non* Heller, 1862).
Darwinula Brady and Robertson, in Jones, 1885, p. 346.
Cyprione Jones, 1885, p. 343.

Type species.—*Polycheles stevensoni* Brady and Robertson, 1870.

Description.—Shape elongate-ovate in side view; greatest height posteriorly; dorsal margin broadly arched, ventral margin weakly concave, anterior margin rounded, posterior margin broadly rounded to weakly angular. Carapace elliptical to subtriangular in dorsal view; greatest width posteriorly; anterior extremity bluntly pointed, posterior extremity rounded. Surface of valves smooth, transparent to translucent; thinly calcified; normal pores not numerous, extremely small, scattered. Central muscle scars form a "rosette" made up of a variable number of individual scars arranged on both sides of a central division; a mandibular scar is usually visible anteroventrally of the central group. Inner lamella extremely narrow, little detail known. Hinge adont; dorsal margin of the smaller valve fits into a shallow groove in the dorsal margin of the larger valve. Left valve usually larger than right. Eye spots absent. Sexual dimorphism has not been described.

DARWINULA STEVENSONI (Brady and Robertson), 1870

Figure 34; Plate 3, figure 15

Polycheles stevensoni Brady and Robertson, 1870, p. 25.
Argilloccia ? aurea Brady and Robertson, 1870, p. 16.
Darwinella stevensoni (Brady and Robertson), 1870; Brady and Robertson, 1872, p. 50.
Darwinula stevensoni (Brady and Robertson), 1870; Brady and Norman, 1889, p. 122.
Darwinula improvisa Turner, 1895, p. 336.

Darwinula aurea (Brady and Robertson), 1870; Müller, 1912, p. 240.

Darwinula aurea (Brady and Robertson), 1870; Staplin, 1963b, p. 1191.

Diagnosis.—*Darwinula stevensoni* can be distinguished from other species of ostracodes found in the Great Salt Lake Basin by the ovate shape of its carapace, the thinness of the valves, its muscle scar pattern, and its size.

Description.—Adult: Shape elongate-ovate in side view; greatest height posteriorly, less than half of the length; dorsal margin broadly arched, ventral margin weakly concave, anterior margin rounded, posterior margin broadly rounded. Carapace elliptical in dorsal view, inflated, greatest width posteriorly; anterior extremity bluntly pointed, posterior extremity rounded. Surface of valves smooth, transparent to translucent, thinly calcified; normal pores not observed. Central muscle scars not clearly observed on specimens examined. Inner lamella narrow, details not observed. Hinge as in genus.

Remarks.—Although types were not examined, specimens described here were easily identifiable as *D. stevensoni*.

Occurrence.—*Darwinula stevensoni* occurs rarely in the Saltair and section 28 cores.

Dimensions.—Dimensions of specimen are given below.

DESCRIPTION	LENGTH (mm)	HEIGHT (mm)	KUMIP NO.
Left valve, Pl. 3, fig. 15	0.63	0.25	1,008,011

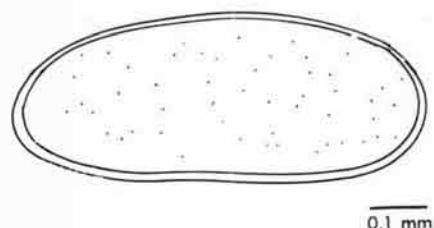


FIG. 34. *Darwinula stevensoni* (Brady and Robertson).

REFERENCES

- Absolon, A., 1973, Ostracoden aus einigen Profilen spät- und postglazialer Karbonatablagerungen in Mitteleuropa: Bayerische Staatsamml. Paläont. Hist. Geologie, Mitteil., v. 13, p. 47-94.
 Alm, G., 1914, Beschreibung einiger neuer Ostracoden aus

- Schweden: Zool. Anziger, v. 43, p. 468-475.
 —, 1915, Monographie der schwedischen Süßwasser-Ostracoden nebst systematischen Besprechungen des Tribus Podocopa: Zool. Bidrag Uppsala, v. 4, p. 1-247.
 Baird, W., 1837-38, The natural history of the British

- Entomostraca: Mag. Zool. Bot., v. 1, p. 35-41, 514-526; v. 2, p. 132-144.
- , 1845, Arrangement of the British Entomostraca, with a list of species, particularly noticing those which have as yet been discovered within the bounds of the Club: Berwickshire Naturalist's Club, Proc., v. 2, p. 145-158.
- , 1846, Description of some new genera and species of British Entomostraca: Ann. Mag. Nat. History, ser. 1, v. 17, p. 410-416.
- , 1850, Description of several new species of Entomostraca: Zool. Soc. London, Proc., v. 18, p. 254-257.
- Benson, R. H., and MacDonald, H. C., 1963, Postglacial (Holocene) ostracodes from Lake Erie: Univ. Kansas Paleont. Contrib., Arthropoda, Art. 4, p. 1-26.
- Bold, van den, W. A., 1963, Upper Miocene and Pliocene Ostracoda of Trinidad: Micropaleontology, v. 9, p. 361-424.
- Brady, G. S., 1868a, A synopsis of the recent British Ostracoda: Intellectual Observer, v. 12, p. 110-130.
- , 1868b, A monograph of the Recent British Entomostraca: Linnean Soc. London, Trans., v. 26, pt. 2, sec. 9, p. 353-495.
- , 1870, Notes on Entomostraca taken chiefly in the Northumberland and Durham district: Soc. Nat. Hist. Northumberland and Durham, Trans., v. 3, p. 361-373.
- , 1886, Notes on Entomostraca collected by Mr. A. Haly in Ceylon: Linnean Soc. Zoology, v. 19, no. 114, pt. 2, p. 293-316.
- , 1905, On Copepoda and other Crustacea taken in Ireland and on the north coast of England: Soc. Nat. Hist. Northumberland and Durham, Trans., ser. 2, v. 1, p. 335.
- , 1910, A revision of the British species of ostracode Crustacea belonging to the subfamilies Candoninae and Herpetocypridinae: Zool. Soc. London, Proc. 1910, p. 194-220.
- , 1913, On two British Entomostraca belonging to the orders Copepoda and Ostracoda: Zool. Soc. London, Proc. 1913, p. 231-234.
- , and Norman, A. M., 1889, A monograph of the marine and fresh-water Ostracoda of the North Atlantic and of north-western Europe: Royal Dublin Soc., Sci. Trans., ser. 2, v. 4, pt. 2, p. 63-270.
- , and —, 1896, A monograph of the marine and freshwater Ostracoda of the North Atlantic and of north-western Europe: Royal Dublin Soc., Sci. Trans., ser. 11, v. 5, pt. 12, p. 621-784.
- , and Robertson, D., 1869, Notes on a weeks dredgings in the west of Ireland: Ann. Mag. Nat. History, ser. 4, v. 3, p. 353-374.
- , and —, 1870, The Ostracoda and Foraminifera of tidal rivers: Ann. Mag. Nat. History, ser. 4, v. 6, p. 1-33.
- , and —, 1872, On the distribution of British Ostracoda: Ann. Mag. Nat. History, ser. 4, v. 9, p. 48-70.
- Bronstein, Z. S., 1930, Beiträge zur Kenntnis der ostracoden Fauna des Baikalsees: Comm. étude Lac Bajkal, Travaux, v. 3, p. 117-157.
- , 1947, Fauna de l'URSS, Crustacés, ostracodes des eaux douces: Inst. Zool. Acad. Sci. URSS, v. 2, p. 1-339.
- Byrne, J. V., LeRoy, D. O., & Riley, C. M., 1959, The Chenier Plain and its stratigraphy, southwestern Louisiana: Gulf Coast Assoc. Geol. Soc., Trans., v. 9, p. 237-266.
- Claus, C., 1891, Das Medianauge der Crustaceen: Zool. Inst. Univ. Wien, Zool. Sta. Triest, Arb., v. 9, p. 225-266.
- , 1893, Beiträge zur Kenntnis der Süßwasser-Ostracoden: Zool. Inst. Univ. Wien, Zool. Sta. Triest, Arb., v. 10, p. 147-216.
- Cole, G. A., 1949, A new cytherid ostracode from Minnesota: Am. Microscop. Soc., Trans., v. 68, p. 350-354.
- Daday, J. von, 1882, Koeslémények a Kolozsvári M. Kir. Tudomány-egyetem állat- és ocszszhasonló-oboncztani intézetében, part 2. Adatok Kolozsvár és koerneyke Crustacea-Faunájának ismeretéhez: Orvos Természettudományi Ertesítő, v. 7, p. 211-258.
- , 1900, A Magyarországi Kagylósrákók magánrajza: Ostracoda Hungariae: Budapest Magyar Tudományos Akas., p. 1-130.
- , 1902, Mikroskopische Süßwassertiere aus Patagonien: Természettudományi Füzetek, v. 25, p. 201-310.
- Danforth, W. A., 1948, A list of Iowa ostracods with descriptions of three new species: Iowa Acad. Sci., Proc., v. 55, p. 351-359.
- Delorme, L. D., 1967, New freshwater Ostracoda from Saskatchewan, Canada: Canadian Jour. Zoology, v. 45, p. 357-363.
- , 1970a, Freshwater ostracodes of Canada. Part I. Subfamily Cypridinae: Canadian Jour. Zoology, v. 48, p. 153-168.
- , 1970b, Freshwater ostracodes of Canada. Part II. Subfamily Cypridopsinae and Herpetocypridinae and family Cyclocyprididae: Canadian Jour. Zoology, v. 48, p. 253-266.
- , 1970c, Freshwater ostracodes of Canada. Part III. Family Candonidae: Canadian Jour. Zoology, v. 48, p. 1099-1127.
- , 1970d, Freshwater ostracodes of Canada. Part IV. Families Illyocyprididae, Notodromadidae, Darwinulidae, Cytherideidae, and Entocytheridae: Canadian Jour. Zoology, v. 48, p. 1251-1259.
- , 1971, Freshwater ostracodes of Canada. Part V. Families Limnoocytheridae, Loxoconchidae: Canadian Jour. Zoology, v. 49, p. 43-64.
- Dickinson, K. A., and Swain, F. M., 1967, Late Cenozoic freshwater Ostracoda and Cladocera from northeastern Nevada: Jour. Paleontology, v. 41, p. 335-350.
- Dubowsky, N. W., 1927, Material toward the understanding of the freshwater Ostracoda of the Ukraine: Soc. Naturalistes Charkow, Travaux, v. 50, no. 2, p. 107-120.
- Eardley, A. J., and Gvosdetsky, V., 1960, Analysis of Pleistocene core from Great Salt Lake, Utah: Geol. Soc. America, Bull., v. 71, p. 1323-1344.
- , Shuey, R. T., Gvosdetsky, V., Nash, W. P., Picard, M. D., Grey, D. C., and Kukla, G. J., 1973, Lake cycles in the Bonneville Basin, Utah: Geol. Soc. America, Bull., v. 84, p. 211-216.
- Eldredge, N., and Gould, S. J., 1972, Punctuated equilibria: an alternative to phyletic gradualism: in T. J. M. Schopf (ed.), Models in paleobiology: p. 82-115. Freeman, Cooper, and Co. (San Francisco).

- Ferguson, E., Jr., 1959, A synopsis of the ostracod genus *Cypridopsis* with the description of a new species: Biol. Soc. Washington, Proc., v. 72, p. 59-68.
- , 1967, New ostracods from the playa lakes of eastern New Mexico and western Texas: Am. Microscop. Soc., Trans., v. 86, p. 244-250.
- Furtos, N. C., 1933, The Ostracoda of Ohio: Ohio Biol. Survey, Bull. 29, no. 6, p. 413-524.
- Gilbert, G. K., 1890, Lake Bonneville: U.S. Geol. Survey, Mon. 1, 438 p.
- Gutentag, E. D., and Benson, R. H., 1962, Neogene (Plio-Pleistocene) freshwater ostracodes from the central High Plains: Geol. Survey Kansas, Bull. 157, pt. 4, p. 1-60.
- Hoff, C. C., 1942, The ostracods of Illinois, their biology and taxonomy: Illinois Biol. Mon., 19, no. 1-2, p. 1-196.
- Hunt, C. B., 1953, General geology: in C. B. Hunt, H. D. Varnes, and H. E. Thomas, Lake Bonneville—geology of northern Utah Valley, Utah: U.S. Geol. Survey, Prof. Paper 257-A, p. 11-45.
- International Commission of Zoological Nomenclature, 1958, Opinion 533, Designation under the plenary powers of a type species for the genus "*Candonia*" Baird, (1846), in harmony with accustomed usage and validation under the same powers to "*Herpetocypris*" of the generic name "*Erpetocypris*" Brady & Norman, 1889 (Class Crustacea, Order Ostracoda): Opinions and Declarations, v. 19, pt. 22, p. 377-394.
- Jones, T. R., 1857, A monograph of the Tertiary Entomostraca of England: Palaeontograph. Soc. London, Mon., 68 p.
- , 1885, On the Ostracoda of the Purbeck Formation; with notes on the Wealden species: Geol. Soc. London, Quart. Jour., v. 41, p. 311-353.
- Jurine, L., 1820, Histoire des Monocles, qui se trouvent aux environs de Genève: 260 p., J. J. Paschoud (Genève).
- Kaufmann, A., 1900a, Cypriden und Darwinuliden der Schweiz: Rev. Suisse Zoologie, v. 8, p. 209-423.
- , 1900b, Neue Ostracoden aus der Schweiz: Zool. Anzeiger, v. 23, p. 131-133.
- Klie, W., 1939, Süßwasserostracoden aus Nordostbrasiliens, part 1: Zool. Anzeiger, v. 128, p. 84-91.
- Koch, C. L., 1838, Deutschlands Crustaceen, Myriapoden und Arachniden. Ein Beitrag zur deutschen Fauna: no. 21, Pustet, Regensburg (not seen).
- , 1841, Deutschlands Crustaceen, Myriapoden und Arachniden. Ein Beitrag zur deutschen Fauna: no. 36, Pustet, Regensburg (not seen).
- Lister, K. H., 1974, Paleoecology of Ostracoda from Quaternary sediments from the Great Salt Lake Basin, Utah: Unpubl. Ph.D. Thesis, Univ. Kansas, 327 p.
- Masi, L., 1906, Contributo allo sistematica delle Ilyocyprinace: Soc. Zool. Italiana, Boll., ser. 2, v. 6, p. 133-146, 249-268.
- Morrison, R. B., 1965, Lake Bonneville: Quaternary stratigraphy of eastern Jordan Valley, south of Salt Lake City, Utah: U.S. Geol. Survey, Prof. Paper 477, p. 1-80.
- Müller, G. W., 1900, Deutschlands Süßwasser-Ostracoden: Zoologica, v. 12, no. 30, p. 1-112.
- , 1912, Ostracoda, in F. E. Schulze (ed.), Das Tierreich: pt. 31, 434 p., Friedländer und Sohn (Berlin).
- Müller, O. F., 1776, Zoologiae Danicae prodromus, seu animalium Dianae et Norvegiae indigenarum, characteres, nomina, et synomina in primis popularium: 282 p., Typis Hallageris (Havniae).
- Ramdohr, F. A., 1808: Über die Gattung *Cypris* Müller und drei zu derselben gehörige neue Arten: Gesell. Naturforsch. Freunde Berlin, Mag. 2, pt. 12, p. 83-93.
- Sandberg, P. A., 1964, The ostracod genus *Cyprideis* in the Americas: Stockholm Contrib. Geology, v. 12, p. 1-178.
- Sars, G. O., 1863, Beretning om en i sommeren 1862 foretagen zoologisk reise i Christianias og Trondhjems stifter: Nyt. Mag. Naturv., v. 12, p. 218-223, 249-252 (not seen).
- , 1890, Översigt af Norges crustaceer, med foreløbige bemærkninger over de nye eller mindre bekjendte arter: Christiania Vidensk. Selskab Forhandl., v. 1, p. 15-21, 53-76.
- , 1903, Fresh-water Entomostraca from China and Sumatra: Arch. Math. Naturv., v. 25, no. 8, p. 1-44.
- , 1928, An account of the Crustacea of Norway: Bergens Museums, v. 9, p. 1-277.
- Schäfer, H. W., 1943, Über zwei neue deutsche Arten der Süßwasser-Ostracoden: Zool. Anzeiger, v. 143, no. 9/10, p. 210-216.
- Schweyer, A. W., 1939, The results of the study of the Mesozoic and Cenozoic Ostracoda of the USSR: Geol. Oil Inst. Trans., v. 116, p. 93-103 (not seen).
- Scott, T., 1906, A catalogue of land, fresh-water, and marine Crustacea found in the basin of the river Forth and its Estuary, part 2. The Ostracoda, Copepoda, and Cirripedia: Royal Phys. Soc. Edinburgh, Proc., v. 16, p. 267-382.
- Scourfield, D. J., 1904, Synopsis of the known species of British freshwater Entomostraca, part 3. Ostracoda, Phyllopoda, and Branchiura: Quckett Microscop. Club, Jour., ser. 2, v. 9, no. 54, p. 29-44.
- Sharpe, R. W., 1897, Contribution to a knowledge of the North American freshwater Ostracoda included in the families Cytheridae and Cyprididae: Illinois State Lab Nat. History, Bull., v. 4, p. 414-482.
- , 1903, Report of the fresh-water Ostracoda of the United States National Museum including a revision of the subfamilies and genera of the family Cyprididae: U.S. Natl. Museum, Proc., v. 26, p. 969-1001.
- Sohn, I. G., 1951, Check list of salinity tolerance of post-Paleozoic fossil Ostracoda: Washington Acad. Sci., Jour., v. 41, p. 64-66.
- Staplin, F. L., 1963a, Pleistocene Ostracoda of Illinois, part I. Subfamilies Candoninae, Cyprinac, general ecology, morphology: Jour. Paleontology, v. 37, p. 758-797.
- , 1963b, Pleistocene Ostracoda of Illinois, part 2. Subfamilies Cyclocyprinac, Cypridopinac, Ilyocyprinac; families Darwinulidae and Cytheridae. Stratigraphic ranges and assemblage patterns: Jour. Paleontology, v. 37, p. 1164-1203.
- Stephenson, M. B., 1938, Miocene and Pliocene Ostracoda of the genus *Cytheridea* from Florida: Jour. Paleontology, v. 12, p. 127-148.

- Swain, F. M., 1947, Tertiary non-marine Ostracoda from the Salt Lake Formation, northern Utah: Jour. Paleontology, v. 21, p. 518-528.
- _____, 1955, Ostracoda of San Antonio Bay, Texas: Jour. Paleontology, v. 29, p. 561-646.
- _____, 1961, Family Eucandonidae: in Treatise on Invertebrate Paleontology, Part Q, R. C. Moore, ed., p. Q234-Q239, Geol. Soc. America & Univ. Kansas Press (New York; Lawrence, Kans.).
- _____, 1963, Pleistocene Ostracoda from the Gubik Formation, Arctic Coastal plain, Alaska: Jour. Paleontology, v. 37, p. 798-834.
- Sylvester-Bradley, P. C., 1956, Proposed use of the plenary powers to designate for the genus *Candonia* Baird (1846), a type species in harmony with accustomed usage and validation of emendation to "Herpetocypris" of the generic name "Erpetocypris" Brady & Norman, 1899 [sic] (Class Crustacea, Order Ostracoda): Bull. Zoological Nomenclature, v. 12, p. 206-212.
- Tressler, W. L., 1954, Freshwater Ostracoda from Texas and Mexico: Washington Acad. Sci., Jour., v. 44, p. 138-149.
- _____, 1957, The Ostracoda of Great Slave Lake: Washington Acad. Sci., Jour., v. 47, p. 415-423.
- Turner, C. H., 1894, Notes on American Ostracoda with descriptions of new species: Denison Univ. Bull. Sci. Lab., v. 8, pt. 2, p. 13-25.
- _____, 1895, Fresh-water Ostracoda of the United States: in C. L. Herrick and C. H. Turner (ed.), Synopsis of the Entomostraca of Minnesota, Geol. Nat. History Survey Minnesota, Zool., ser. 2, pt. 3, p. 277-337.
- Van Morkhoven, F. P. C. M., 1962-63, Post-Paleozoic Ostracoda; their morphology, taxonomy, and economic use: v. 1 (1962), General, 204 p.; v. 2 (1963), Generic descriptions, 478 p., Elsevier (Amsterdam).
- Vávra, W., 1891, Monographie der Ostracoden Böhmens: Archiv. Naturw. Landesdurchforschung Böhmen, v. 8, no. 3, p. 1-118 (not seen).
- _____, 1898, Die Süßwasser-Ostracoden Deutsch-Ost-Afrikas: Tierwelt Ost-Afrikas und der Nachbargebiete; v. 4, p. 1-28 (not seen).
- Vernet, H., 1878, *Acanthopodus* un nouveau genre d'ostracodes: in F. A. Forel (ed.), Matériaux pour servir à l'étude de la faune profonde de lac Léman, Soc. Vaudoise Sci. Natur., Bull., v. 15, no. 80, p. 497-538.
- Winkler, E. M., 1962, Two late Pleistocene (Cary) freshwater Ostracode faunas: Jour. Paleontology, v. 36, p. 1021-1034.

Kenneth H. Lister
317 Via Anita
Redondo Beach, California 90277

APPENDIX

Locality information of figured specimens is presented below. SA indicates Saltair core; S28 indicates section 28 core. Number following core designation indicates depth in core in feet and inches below top.

TEXT-FIGURE	CORE	DEPTH	TEXT-FIGURE	CORE	DEPTH
2-1	SA	485' 11"	19	S28	126' 4"
2-2	SA	40' 0"	20	SA	646' 5"
3-1	SA	483' 6"	21	SA	621' 2"
3-2	SA	485' 11"	22	SA	465' 7"
4	SA	2' 0"	23	SA	621' 2"
5-1	SA	485' 11"	24-1	SA	509' 7"
5-2	SA	539' 1"	24-2	SA	173' 1"
5-3	SA	539' 1"	25	SA	3' 11"
6	SA	174' 5"	26-1	SA	144' 2"
7	SA	347' 3"	26-2	SA	136' 11"
8	SA	2' 0"	27-1	SA	31' 9"
9	SA	486' 7"	27-2	SA	31' 9"
10	SA	364' 3"	28-1	SA	1' 7"
11-1	SA	527' 11"	28-2	SA	1' 7"
11-2	SA	64' 1"	29-1	SA	93' 9"
12-1	SA	468' 9"	29-2	SA	30' 0"
12-2	SA	25' 8"	30-1	SA	93' 9"
13	SA	269' 10"	30-2	SA	135' 7"
14	S28	115' 6"	31-1	SA	135' 7"
15	SA	68' 11"	31-2	SA	81' 5"
16	SA	76' 1"	32-1	SA	81' 5"
17	SA	298' 7"	32-2	SA	446' 5"
18	SA	81' 11"	33-1	SA	446' 5"
			33-2	SA	419' 11"
			34	SA	419' 11"
			PLATE	CORE	DEPTH
				SA	647' 5"
				SA	40' 0"

PLATE	CORE	DEPTH	TEXT-FIGURE	CORE	DEPTH
1-5	SA	483' 11"	2-18	SA	30' 11"
1-6	SA	406' 3"	2-19,20	SA	136' 11"
1-7	SA	485' 6"	3-1,2	SA	485' 6"
1-8	SA	2' 0"	3-3,4	SA	333' 7"
1-9	SA	0' 11"	3-5,6	SA	64' 1"
1-10	SA	396' 0"	3-7,8	SA	175' 0"
1-11	SA	317' 8"	3-9	SA	42' 4"
1-12,13	SA	485' 6"	3-10	SA	364' 6"
1-14	SA	485' 11"	3-11,12	SA	76' 1"
1-15,16,17	SA	485' 6"	3-13,14	SA	135' 11"
1-18	SA	40' 9"	3-15	SA	127' 1"
1-19	SA	317' 8"	4-1,2	SA	483' 11"
1-20,21	SA	2' 0"	4-3,4	SA	63' 8"
2-1,2	SA	417' 2"	4-5,6	SA	135' 7"
2-3,4	SA	417' 6"	4-7,8	SA	35' 6"
2-5,6	SA	558' 5"	4-9,10,11,12	SA	32' 6"
2-7,8	SA	545' 0"	4-13,14,15,16	SA	42' 11"
2-9,10	SA	334' 8"	5-1,2,3	SA	2' 0"
2-11,12,13,14	SA	558' 5"	5-4,5,6	SA	93' 9"
2-15	SA	269' 10"	5-7,8,9,10	SA	32' 11"
2-16	SA	126' 4"	5-11,12,13,14	SA	35' 6"
2-17	SA	32' 4"			

EXPLANATION OF PLATES

PLATE 1

All figures $\times 30$.

FIGURE

- 1-4. *Candonia acutula* Delorme; female (1,2), male (3,4).
- 5-7. *C. caudata* Kaufmann; female (5,6), male (7).
- 8,9. C. sp. cf. *C. crogmaniana* Turner; immature.
- 10,11. *C. pronopa* Lister, n. sp.; adult.
- 12-17. *C. rawsoni* Tressler; female right (12,13), female left (14,15), male (16,17).
- 18,19. *C. camuramarginis* Lister, n. sp.; adult.
- 20,21. *C. adunca* Lister, n. sp.; adult.

PLATE 2

Figures 1-15, $\times 30$; figures 16-20, $\times 60$.

FIGURE

- 1-4. *Cyprinotus glaucus* Furtos; adult right (1,2), adult left (3,4).
- 5,6. *Ilyocypris biplicata* (Koch); adult.
- 7,8. *I. gibba* (Ramdohr); adult.
- 9,10. *Pelocypris tuberculata* (Ferguson); adult.
- 11-14. *Cyprideis salebrosa* van den Bold; female (11,12), male (13,14).
- 15. *Eucypris serrata* (Müller); adult.
- 16. *Potamocypris unicaudata* Schäfer; adult.
- 17,18. *Potamocypris pallida* Alm; adult.
- 19,20. *Candonia rawsoni* Tressler; immature.

PLATE 3

All figures $\times 60$.

FIGURE

- 1,2. *Cyclocypris ampla* Furtos; adult.

FIGURE

- 3,4. *Cyclocypris serena* (Koch); adult.
- 5,6. *Physocypris pustulosa* Sharpe; adult.
- 7,8. *Cypridopsis vidua* (Müller); adult.
- 9,10. *Cypridopsis* sp.; adult.
- 11,12. *Potamocypris granulosa* Daday; adult.
- 13,14. *Potamocypris* sp.
- 15. *Darwinula stevensoni* (Brady & Robertson); adult.

PLATE 4

All figures $\times 60$.

FIGURE

- 1-4. *Limnocythere paraornata* Delorme; female (1,2), male (3,4).
- 5-8. *L. itacea* Cole; female (5,6), male (7,8).
- 9-12. *L. friabilis* Benson & MacDonald; female (9,10), male (11,12).
- 13-16. *L. ceriotuberosa* Delorme; female (13,14), male (15,16).

PLATE 5

All figures $\times 60$.

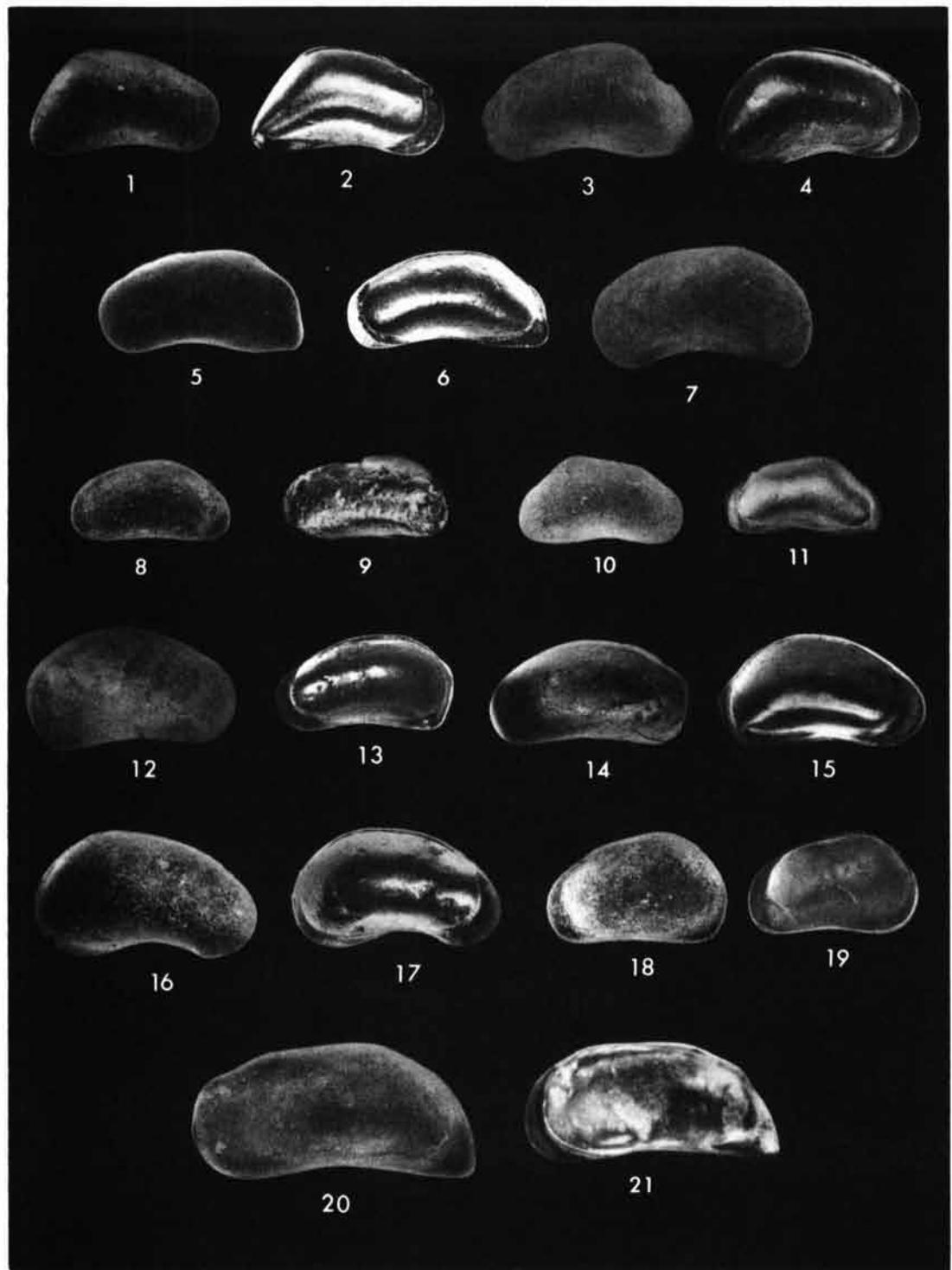
FIGURE

- 1-3. *Limnocythere illinoiensis* Sharpe; female (1,2), male (3).
- 4-6. *L. parascutariense* Delorme; female (4), male (5,6).
- 7-10. *L. staphlini* Gutentag & Benson; female (7,8), male (9,10).
- 11-14. *L. pseudoreticulata* Staplin; female (11,12), male (13,14).

THE UNIVERSITY OF KANSAS PALEONTOLOGICAL CONTRIBUTIONS

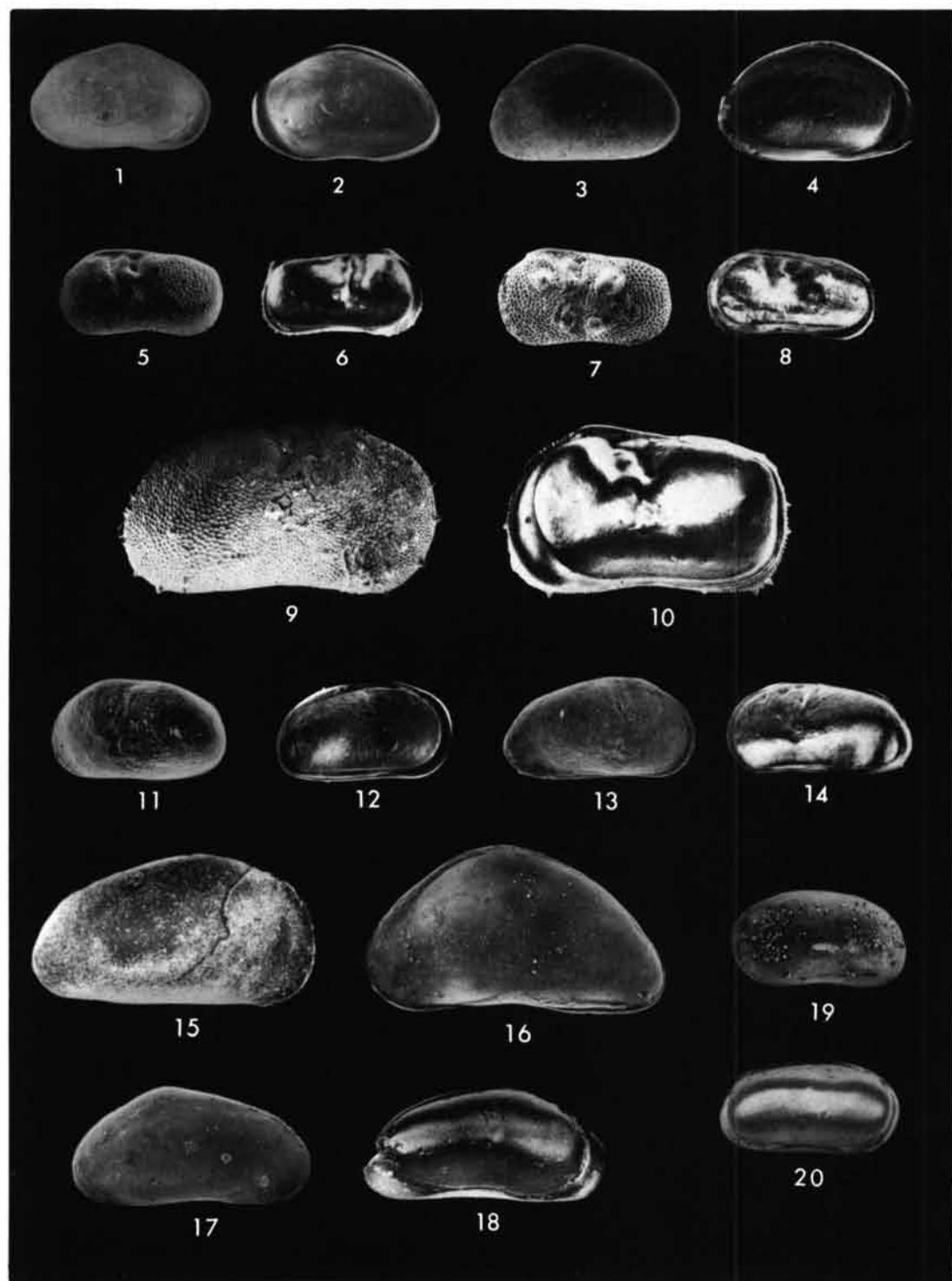
Lister—Quaternary Ostracoda from Utah

Paper 78, Plate 1



THE UNIVERSITY OF KANSAS PALEONTOLOGICAL CONTRIBUTIONS
Paper 78, Plate 2

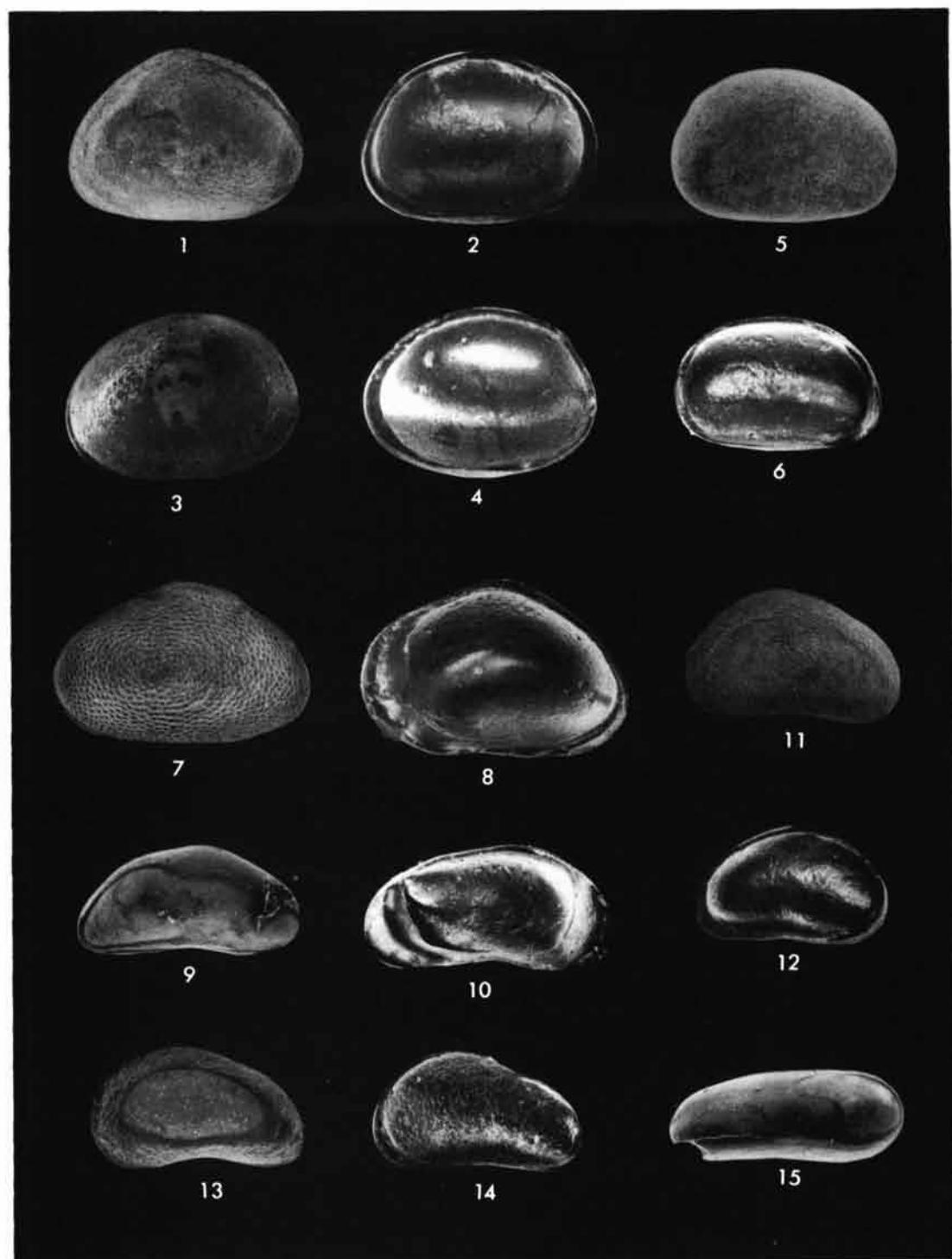
Lister—Quaternary Ostracoda from Utah



THE UNIVERSITY OF KANSAS PALEONTOLOGICAL CONTRIBUTIONS

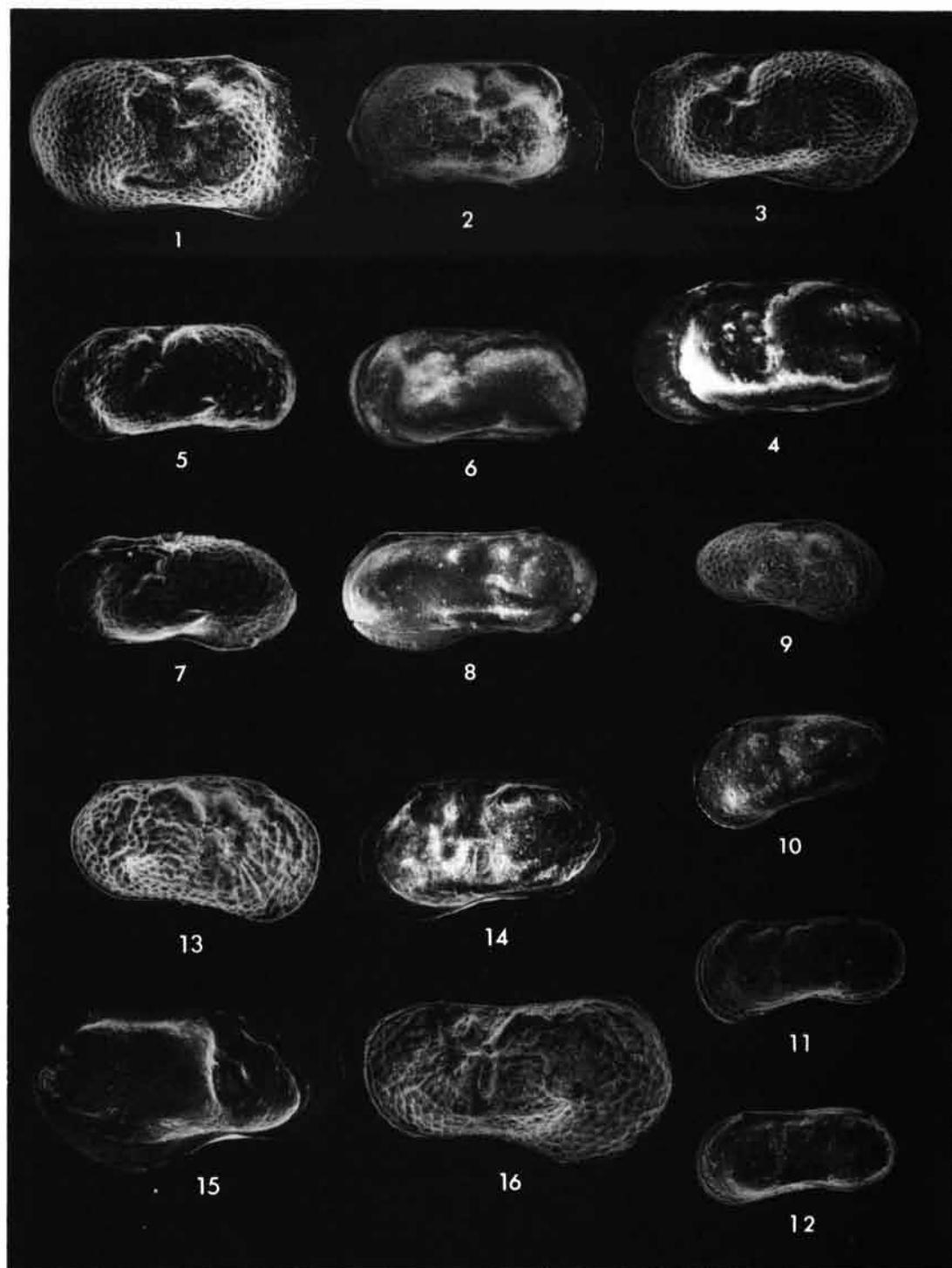
Lister—Quaternary Ostracoda from Utah

Paper 78, Plate 3



THE UNIVERSITY OF KANSAS PALEONTOLOGICAL CONTRIBUTIONS
Paper 78, Plate 4

Lister—Quaternary Ostracoda from Utah



THE UNIVERSITY OF KANSAS PALEONTOLOGICAL CONTRIBUTIONS
Lister—Quaternary Ostracoda from Utah

Paper 78, Plate 5

