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UPPER TRIASSIC AND MIDDLE JURASSIC OSTRACODS FROM THE ORDOS BASIN

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The material described in this paper was collected from the Upper Triassic and Middle Jurassic formations of Tungchuan, Liulingchuan, Yenhe-Xixingzihe and Dalihe in the Ordos Basin of Shensi Province by the members of the Geological Expedition of the Institute of Geology of Lanchow, Academia Sinica, in April, 1961.

A considerable number of ostracods have been discovered nearly from all formations in many parts of China, yet the Triassic ostracods are comparatively rare. As far as the writer is aware, only a few species have been known from the Lower Triassic of Sinkiang Province. The discovery of the ostracods in the non-marine Upper Triassic of the Ordos Basin is therefore of interest both from the stratigraphical and from the palaeontological point of view.

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Stratigraphy

The Upper Triassic Yenchang Qun in northern and northwestern China which is overlain by the Yenan Qun and is underlain by the Zhifang Qun is widely distributed in the Ordos Basin. A complete section of the Yenchang Qun has been taken at the vicinity of Tungchuan. According to the lithological characters, it can be divided into five divisions, in descending order:

5. (T_3y^5): sandy yellowish green, greyish black mudstone intercalated with sandstone and a few black shales, containing ostracods: *Darwinula medialis* Zhong, *D. shensiensis* Zhong, *D. liulingchuanensis* Zhong, *D. opinabilis* Zhong, *D. cucurbitiformis* Zhong, *Gomphocythere? reticulata* Zhong, *G.? costata* Zhong, *G.? pulchra* Zhong, *Tungchuania houae* Zhong, *T. aurita* Zhong, *T. perelegana* Zhong. 234m
4. (T_3y^4): the lower part consists of yellowish green siltstone intercalated with mudstone and fine sandstone; the upper part consists of yellowish green, greyish black mudstone and sandstone, containing ostracods: *Darwinula* spp., *Tungchuania aurita* Zhong. 170m
3. (T_3y^3): yellowish green, greyish black sandstone intercalated with mudstone and siltstone, containing ostracods: *Tungchuania houae* Zhong, *T. aurita* Zhong. 272m
2. (T_3y^2): the lower part consists of greyish black mudstone intercalated with siltstone, containing ostracods: *Darwinula* spp., *Tungchuania houae* Zhong, *T. aurita* Zhong, *T. agrestata* Zhong; the upper part consists of greyish white siltstone intercalated with variegated clay and black oil shale. 211m
1. (T_3y^4): massive greyish green sandstone intercalated with mudstone and argillaceous siltstone, containing ostracods: *Darwinula medialis* Zhong, *D. shensiensis* Zhong, *Gomphocythere? praecipua* Zhong. 327m

The fossil plants of the Yenchang Qun have been studied by C. H. Pan (1936), H. C. Sze (1956), and H. C. Sze, T. Y. Chow (1962); they considered that the age of

this formation is Upper Triassic. The ostracods of the Yenchang Qun do not add a great deal of information concerning the age of the formation. The species of the ostracods seem to bear a regular variation from the basal part (T_3y^1) to the uppermost part (T_3y^5) of the Yenchang Qun. The ostracods are abundant in T_3y^5, not only in species, but also in individuals. The strata of T_3y^5 belong to the lower part of the former Wayaopu Coal Series. The upper part of the Wayaopu Coal Series has been assigned by many geologists to the lower part of the Yenan series.

The Jurassic deposits are also widely distributed in the Ordos basin. The main character of the Jurassic section in Xixingzihe is given below (in descending order):

3. Anding Qun: the lower part consists of oil shale, black shale and grey marl, containing *Darwinula contracta* Galeeva, *D. sarytirmenensis* Sharapova, *Timiriasevia shensiensis* Zhong, *T. humilis* Zhong, *T. armeniacumiformis* Zhong; the upper part consists of greyish yellow, dark red mudstone. 47.5m
2. Chihlo Qun: the middle-lower part consists of grey, greyish green sandstone intercalated with siltstone and silty mudstone; the upper part consists of greyish black, dark grey mudstone intercalated with sandstone and siltstone. 122m
1. Yenan Qun: the lower part consists of greyish white, greyish green sandstone intercalated with black, green mudstone and shale; the upper part consists of greyish white, yellowish green coarse sandstone. 310.5m

It appears that the ostracods are confined to the Anding Qun; the great mejority of fossils seem to belong to new species. The genera *Darwinula* and *Timiriasevia* are important characteristic fossils of Middle Jurassic of Sinkiang, Szechuan, as well as of Mangychlak (Мангышлак) Peninsula of Central Asia, U. S. S. R. The old species *Darwinula sarytirmenensis* Sharapova is hitherto only known in the Middle Jurassic. The Anding Qun has been considered by many geologists as belonging to the Upper Jurassic. On the evidence of ostracods, this formation should be appropriately placed in the Middle Jurassic.

Description of species

Order Ostracoda Latreille

Family Darwinulidae Brady and Robertson, 1872

Genus *Darwinula* Brady and Norman, 1889

Darwinula opinabilis Zhong (sp. nov.)

(Pl. 1, Figs. 1—2)

Description: Valve of small size, subelliptical in lateral view; greatest height at the center; posterior end higher than anterior end; anterior margin narrowly rounded; posterior margin broadly rounded; dorsal margin arched; ventral margin straight. Surface smooth.

Dimensions (in mm)

Cat. No.	Valve	Length	Hight	H:L (%)
0001	Right	0.56	0.32	57
0002	Left	0.48	0.28	58

Remarks: The species is closely similar to *Darwinula globosa* (Duff.) from the

Lower Triassic of the Kuznets Basin, U. S. S. R., but differs from the latter in its larger size, in the regularly rounded anterior and posterior margins, in the broader posterior end, and in the greatest height at the center.

Occurrence: Upper Triassic Yenchang Qun of Tungchuan.

Holotype: Cat. No. 0001. Paratype: Cat. No. 0002.

Darwinula medialis Zhong (sp. nov.)

(Pl. 1, Figs. 3—5)

Description: Valve irregularly sulliptical in lateral view; greatest height at posterior end; greatest thickness at the centro-posterior part; posterior end higher than anterior end; anterior margin narrowly rounded; posterior margin broadly and regularly rounded; dorsal margin arched, sloping to the anterior end; ventral margin straight and slightly concave at one-third from anterior end to posterior end. Surface smooth.

Dimensions (in mm)

Cat. No.	Valve	Length	Height	H:L (%)
0003	Right	0.72	0.36	50
0004	Right	0.70	0.36	51
0005	Right	0.58	0.29	50

Remarks: This species is similar to *Darwinula sobela* Kashevarova from the Upper Permian of South Timan and Volga-Ural, U. S. S. R. and to *Darwinula monitoria* Mandelstam of the Upper Permian of Kuznets, but it may be distinguished from them by its higher valve and shorter anterior end.

Occurrence: Upper Triassic Yenchang Qun of Tungchuan and Liulingchuan.

Holotype: Cat. No. 0003. Paratypes: Cat. Nos. 0004, 0005.

Darwinula bella Zhong (sp. nov.)

(Pl. 1, Figs. 6—7)

Description: Carapace wedge-shaped in lateral view, gradually narrowing toward anterior end; greatest thickness posterior to the center; greatest height at posterior end; anterior end narrowly rounded, but truncated above, slightly lower than posterior end; posterior end broadly rounded, forming an obliquely obtuse postero-ventral angle with the ventral margin; dorsal margin straight or slightly arched, sloping to anterior end; ventral margin slightly concave near anterior end. Left valve larger than the right one, overlapping the latter all around. Surface smooth.

Dimensions (in mm)

Cat. No.	Valve	Length	Height	Width	H:L (%)	W:L(%)
0007	Complete	0.62	0.24	0.21	38	34

Remarks: The species recalls *Darwinula stevensoni* (Brady & Robertson) from recent fresh-water sediment of Sweden, Britain, Isles, France, Switzerland and North

America, but *D. stevensoni* differs from our species in its rather shorter anterior end, in the convex carapace, and in the reversely overlapping of the carapace.

Occurrence: Upper Triassic Yenchang Qun of Tungchuan.

Holotype: Cat. No. 0007.

Darwinula liulingchuanensis Zhong (sp. nov.)

(Pl. 1, Figs. 16—18)

Description: Carapace elongate-elliptical in lateral view; greatest thickness and height at posterior end; posterior end higher than the anterior end; anterior end narrowly rounded, and truncated above; posterior end rounded and oblique below; dorsal margin straight or slightly convex, sloping to the anterior end; ventral margin concave at one-third from the anterior end. Left valve larger than the right one, overlapping the latter along the free margins, notably on the ventral margin. Surface smooth.

Dimensions (in mm)

Cat. No.	Valve	Length	Height	Width	H:L (%)	W:L(%)
0008	Complete	0.66	0.30	0.20	45	30
0009	Complete	0.68	0.30	0.22	44	30

Remarks: *Darwinula liulingchuanensis* is similar to *D. angusta* Mandelstam of the Upper Permian from South Timan and Volga-Ural regions, U. S. S. R., but differs from this species in having larger size, in the rather high anterior end, in the obliquely lower part of the posterior margin, and in the distinctly overlap of the valve.

Occurrence: Upper Triassic Yenchang Qun of Tungchuan and Liulingchuan.

Holotype: Cat. No. 0008. Paratype: Cat. No. 0009.

Darwinula cucurbitiformis Zhong (sp. nov.)

(Pl. 1, Figs. 19—22)

Description: Carapace of small size, strongly convex, irregularly triangular in lateral view; the thickness of the carapace is larger than the height; greatest thickness at posterior end; greatest height anterior to the center; posterior end higher than the anterior end; anterior margin broadly rounded, forming a right angle with the ventral margin; posterior margin regularly rounded; dorsal margin arched and angled at anterior to the center; ventral margin concave. A narrow and shallow depression in postero-central area. Carapace subcucurbitaceous in dorsal view; postero-central area contracted; greatest thickness near the posterior end; anterior end gradually sharped. Carapace rounded in posterior end view. Left valve larger than the right one, overlapping a greater part of ventral margin. Hinge and muscle scars unobserved. Surface smooth.

Dimensions (in mm)

Cat. No.	Valve	Length	Height	Width	H:L (%)	W:L(%)
0010	Complete	0.60	0.28	0.30	47	50
0011	Complete	0.58	0.28	0.30	48	52

Remarks: This species is similar to *Darwinula lucida* Mandelstam from the Lower Triassic of the Kuzents Basin, U. S. S. R., but differs from the latter in having a distinct dorsal angle, in the narrowly rounded posterior end in dorsal view, and in rather small ratio of the thickness of the anterior end to the posterior end.

Occurrence: Upper Triassic Yenchang Qun of Tungchuan.

Holotype: Cat. No. 0010. Paratype: Cat. No. 0011.

Darwinula shensiensis Zhong (sp. nov.)

(Pl. 1, Figs. 23—26)

Description: Valve subelliptical in lateral view; greatest height at one-fourth from posterior to anterior of the carapace; greatest thickness at posterior end; posterior end higher than the anterior end; anterior margin narrowly rounded, and truncated above; posterior margin irregularly and broadly rounded; dorsal margin straight or slightly convex, sloping to the anterior end; ventral margin straight, but slightly concave at the center. Surface smooth.

Height of left valve somewhat higher than right valve; anterior end of the right valve rather narrow. Height of two ends of young form nearly equal.

Dimensions (in mm)

Cat. No.	Valve	Length	Height	H:L(%)
0012	Left	0.68	0.36	54
0013	Left	0.64	0.34	53
0014	Right	0.62	0.32	51
0015	Left	0.44	0.24	54

Remarks: This species is closely related to *Darwinula paralleloformis* Belous. from the Upper Permian of Kama River Basin, U. S. S. R., but differs from the latter in its higher valve, in the narrowly rounded anterior end, and in its small size.

Occurrence: Upper Triassic Yenchang Qun of Tungchuan and Liulingchuan.

Holotype: Cat. No. 0012. Paratypes: Cat. Nos. 0013, 0014, 0015.

Darwinula dubia Zhong (sp. nov.)

(Pl. 1, Figs. 39—40)

Description: Valve of large size, slightly convex; semi-ovate in lateral view; greatest height at posterior end; anterior end lower than posterior end; anterior margin narrowly rounded; posterior margin broadly rounded; dorsal margin arched, sloping anteriorly; ventral margin concave. Surface smooth.

Dimensions (in mm)

Cat. No.	Valve	Length	Height	H:L (%)
0023	Left	1.12	0.64	57
0024	Right	1.10	0.56	51

Remarks: This species is related to *Darwinula ordinata* Belous. from the Lower Permian of center Kazakhstan of U. S. S. R., but differs from the latter in its larger size, in the slightly convex valve, in the rounded antero-ventral margin, and in the concave ventral margin.

Occurrence: Middle Jurassic of Dalihe.

Holotype: Cat. No. 0023. Paratype: Cat. No. 0024.

Darwinula sp. A (indet.)

(Pl. 1, Fig. 10)

Description: Valve subtriangular in lateral view; greatest thickness at posterior end; greatest height at the center; both ends nearly equal and evenly rounded, or anterior end somewhat lower than posterior end; dorsal margin strongly arched; ventral margin straight, but concave at the center. Surface smooth.

Dimensions (in mm)

Cat. No.	Valve	Length	Height	H:L (%)
0025	Right	0.64	0.36	56

Remarks: This form closely recalls *Darwinula radezenko* Mandelstam from the Lower Triassic of the Kuznets Basin, U. S. S. R., but differs from the latter in its evenly rounded ends. Only one right valve was found and the specimen is not well preserved.

Occurrence: Upper Triassic Yenchang Qun of Tungchuan.

Described specimen: Cat. No. 0025.

Darwinula sp. B (indet.)

(Pl. 1, Figs. 11—12)

Description: Carapace subovate in lateral view; greatest height and thickness at posterior end; anterior end evidently lower than posterior end; anterior margin narrowly rounded; posterior margin evenly and broadly rounded; dorsal margin arched, sloping to the anterior end; antero-dorsal margin rounded; ventral margin slightly concave. Surface smooth.

Dimensions (in mm)

Cat. No.	Valve	Length	Height	Width	H:L (%)	W:L (%)
0026	Complete	0.68	0.32	0.24	47	35

Remarks: A single specimen of this form was gathered. It is similar to *Darwinula serpula* Belous. from the Permian of Kama River Basin, U. S. S. R., but differs from the latter in the greatest height at posterior end, in the rather wide carapace and in the slightly concave ventral margin.

Occurrence: Upper Triassic Yenchang Qun of Liulingchuan.

Described specimen: Cat. No. 0026.

Darwinula sp. C (indet.)

(Pl. 1, Figs. 13—14)

Description: Carapace subelongate in lateral view; greatest height and thickness at posterior end; anterior end lower than posterior end; anterior margin irregularly and narrowly rounded; posterior margin broadly rounded, but slightly oblique dorsally; dorsal margin convex, sloping to anterior end; ventral margin straight or slightly concave. Surface smooth.

Dimensions (in mm)

Cat. No.	Valve	Length	Height	Width	H:L(%)	W:L(%)
0027	Complete	0.72	0.32	0.28	44	39

Remarks: This form is similar to *Darwinula procesa* Mandelstam from the Upper Permian of South Timan and Volga-Ural regions, U. S. S. R., but differs from the latter in the lower anterior end, in the obliquely rounded postero-dorsal margin, and in the greatest height at posterior end.

Occurrence: Upper Triassic Yenchang Qun of Dalihe.

Described specimen: Cat. No. 0027.

Darwinula sp. D (indet.)

(Pl. 1, Fig. 8—9)

Description: Valve irregularly suboblong-ovate in lateral view; postero-ventral portion convex, forming the greatest thickness of the valve; greatest height at one-third of the distance from posterior end; posterior end evidently higher than anterior end; anterior margin narrowly rounded, sloping above and slightly declining below; dorsal margin straight, sloping to anterior end: ventral margin slightly concave. Surface smooth.

Dimensions (in mm)

Cat. No.	Valve	Length	Height	H:L(%)
0028	Left	0.76	0.40	53

Remarks: The specimen can not be identified with any other known forms, but

is too imperfectly preserved for the creation of a new species.

Occurrence: Upper Triassic Yenchang Qun of Tungchuan.

Described specimen: Cat. No. 0028.

Darwinula sp. E (sp. nov.)

(Pl. 1, Fig. 15)

Description: Valve of small size, wedge-shaped in lateral view; greatest height and thickness at posterior end; anterior end lower than posterior end; anterior margin narrowly rounded; posterior margin evenly and broadly rounded; dorsal margin slightly convex, sloping to anterior end; ventral margin slightly concave at the middle. Surface smooth.

Dimensions (in mm)

Cat. No.	Valve	Length	Height	H:L (%)
0029	Right	0.56	0.24	42

Remarks: this form closely resembles *Darwinula bella,* but differs from the latter in the smaller size, and in the evenly rounded ends.

Occurrence: Upper Triassic Yenchang Qun of Liulingchuan.

Described specimen: Cat. No. 0029.

Darwinula sp. F (indet.)

(Pl. 1, Fig. 32)

Description: Valve elongate in lateral view; greatest thickness central; greatest height at posterior end; anterior end rounded, slightly lower than posterior end; posterior end obliquely rounded; dorsal margin straight or slightly convex; ventral margin straight, nearly parallel to the dorsal margin, and slightly concave at one-third of the distance from anterior end. Surface smooth.

Dimensions (in mm)

Cat. No.	Valve	Length	Height	H:L (%)
0006	Right	0.78	0.32	41

Remarks: This form resembles *D. ovate* Galeeva of the Lower Cretaceous from Mongolia, but differs from the latter in its rather narrow carapace, in the regularly rounded ends. All the specimens are not well preserved.

Occurrence: Upper Triassic Yenchang Qun of Liulingchuan.

Described specimen: Cat. No. 0006.

Family Cytheridae Baird, 1850
Subfamily Timiriasevinae Mandelstam, 1947
Genus *Timiriasevia* Mandelstam, 1947
Timiriasevia shensiensis Zhong (sp. nov.)

(Pl. II, Figs. 1—7)

Description: Carapace subelliptical in lateral view; greatest thickness and height posterior to the center; anterior and posterior ends nearly equal or anterior end somewhat lower than posterior end; both ends rounded; dorsal margin slightly convex; in internal view, ventral margin slightly concave at one-third of the distance from anterior end. Left valve larger than right valve, overlapping the latter along the antero-dorsal, postero-dorsal, posterior and ventral margins. Surface ornamented with inconspicuous lines. Hinge structure of left valve consists of two semi-mooned sockets on the extremities, and a thin board-like flange on the middle. Hinge structure of right valve consists of two semi-mooned teeth on the extremities, and a smooth furrow on the middle part.

Anterior end of young form higher than posterior end.

Dimensions (in mm)

Cat. No.	Valve	Length	Height	Width	H:L(%)	W:L(%)
0030	Complete	0.66	0.44	0.28	66	42
0031	Complete	0.60	0.40	0.24	66	40
0032	Complete	0.50	0.32	0.20	64	40
0033	Left	0.68	0.44	—	64	—
0034	Right	0.60	0.40	—	66	—

Remarks: This species is similar to *Timiriasevia catenularia* Mandelstam from the Middle Jurassic of Mangychlak Peninsula, U. S. S. R., it is distinguished by its slightly convex dorsal margin and the left valve conspicuously overlaps the right valve along antero-dorsal, postero-dorsal, posterior and ventral margins. This species is also related to *Timiriasevia concinna* Mandelstam from the Lower Cretaceous of Mongolia, but the carapace of *T. shensiensis* is slightly convex, and the anterior end somewhat lower than the posterior end. In dorsal view, it has no elliptical depression in the dorsal area.

Occurrence: Middle Jurassic Anding Qun of Dalihe and Xixingzihe.

Holotype: Cat. No. 0030. Paratypes: Cat. Nos. 0031—0034.

Timiriasevia armeniacumiformis Zhong (sp. nov.)

(Pl. II, Figs. 8—13)

Description: Carapace subelliptical in lateral view; moderately convex; greatest thickness and height posterior to the center; both ends nearly equal or anterior end somewhat lower than posterior end; anterior and posterior margins evenly rounded; dorsal margin slightly convex; ventral margin slightly concave at one-third of the distance from anterior end. Carapace subfusiform in dorsal view; hinge line formed a slit-like

furrow. Surface ornamented with inconspicuous lines. Hinge structure unobserved.

Muscle scar-pattern consists of four long spots in one row, situated in front of and below the centre area.

Dimensions (in mm)

Cat. No.	Valve	Length	Height	Width	H:L(%)	W:L(%)
0035	Complete	0.70	0.48	0.36	68	51
0036	Complete	0.64	0.44	0.32	68	50
0037	Complete	0.56	0.36	0.28	64	50
0038	Complete	0.42	0.28	0.22	66	50

Remarks: This species is similar to *Timiriasevia concinna* Mandelstam from Lower Cretaceous of Mongolia, but differs from the latter in the following features: 1. the anterior end is somewhat lower than the posterior end; 2. the overlapping of the antero- and postero-dorsal margins is inconspicuous; 3. hinge line forms a slit-like furrow. *T. armeniacumiformis* may be distinguished from *T. shensiensis* by its convex valve, and by the inconspicuous overlapping.

Occurrence: Middle Jurassic Anding Qun of Dalihe and Xizingzihe.

Holotype: Cat. No. 0035. Paratypes: Cat. Nos. 0036—0038.

Timiriasevia humilis Zhong (sp. nov.)

(Pl. II, Figs. 14—16)

Description: Carapace suboblong in lateral view; greatest thickness posterior to the center; greatest height near the center; posterior end somewhat higher than anterior end; anterior and posterior margins rounded; dorsal margin straight or slightly convex; ventral margin slightly concave at one-third of the distance from anterior end. Left valve more or less larger than the right one, overlapping the latter along antero-dorsal margin, postero-dorsal margin, postero-dorsal, and medio-ventral margins. In ventral view, contact margin of the valves concave, forming an elliptical depression at ventral area. Surface ornamented with inconspicuous lines. Hinge structure and muscle scars unobserved.

Dimensions (in mm)

Cat. No.	Valve	Length	Height	Width	H:L(%)	W:L(%)
0039	Complete	0.62	0.36	0.32	58	51

Remarks: The external character of this species is closely resemble above described two species, namely *T. shensiensis* and *T. armeniacumiformis* but *T. humilis* is distinguished by its rather low carapace.

Occurrence: Middle Jurassic Anding Qun of Dalihe.

Holotype: Cat. No. 0039.

Subfamily Limnocytherinae G. O. Sars, 1925
Genus *Gomphocythere* G. O. Sars, 1924
Gomphocythere? reticulata Zhong (sp. nov.)

(Pl. II, Figs. 17—27)

Description: Valve subelongate-oblong in lateral view; greatest thickness at posterior end; anterior and posterior ends nearly equal; anterior margin rounded, but truncated above, forming an antero-dorsal angle with dorsal margin; posterior margin rounded; dorsal margin straight and thin, overhanging the hinge line; ventral surface interiorly reflected; ventral contact line concave at the middle. A shallow furrow present at anterior to the middle of the valve, extending from the dorsal margin to one-half the height of the valve; a distinct bar-like projection present at the ventral side, occupying about three-fourths of the length of valve, and nearly parallel to the long axis of carapace; distinct parallel stripes occuring on the intero-ventral reflected part. Surface ornamented with reticulation.

Anterior end of the right valve of this species higher than posterior end. In the complete form, dorsal margin of the left valve somewhat higher than the right, forming a slit-like trough in dorsal area; a broad and shallow depression in ventral area. Left valve larger than the right one, overlapping the latter along the middle of the ventral margin.

Hinge line straight. Hinge structure of the left valve consists of two terminal sockets, and an intermediate, thin board-like flange. Hinge structure of the right valve consists of two terminal teeth and an intermediate slit-like furrow.

Pore canal zone observed at the anterior margin.

In the young form, the anterior end is higher than the posterior. The furrow of the valve is distinct, straight, and long, about two-thirds of the height of the valve.

Dimensions (in mm)

Cat. No.	Valve	Length	Height	Width	H:L(%)	W:L(%)
0040	Left	0.52	0.30	—	58	—
0041	Right	0.50	0.28	—	56	—
0042	Complete	0.60	0.34	0.28	57	47
0043	Complete	0.58	0.32	0.26	55	45
0044	Complete	0.54	0.30	0.24	56	44
0045	Right	0.42	0.24	—	57	—

Remarks: The external character of this species strongly recalls the male form of the recent species *Gomphocythere obtusata* (G. O. Sars) from the fresh-water lakes of Salt River, near Cape Town (Union of South Africa). Our new species differs from *G. obtusata* in the following features: 1. the valve is rather small and rather short; 2. the postero-dorsal margin is rounded; 3. dorsal margin overhangs the hinge line, the dorsal margin of the left valve is higher than the right, forming a slit-like trough in dorsal area; 4. left valve is larger than right valve, overlapping the latter along the ventral margin; 5. the hinge structure of our specimen may be observed, but the hinge structure of the recent species of *Gomphocythere* is unknown.

Occurrence: Upper Triassic Yenchang Qun of Tungchuan.
Holotype: Cat. No. 0040. Paratypes: Cat. Nos. 0041—0045.

Geomphocythere? costata Zhong (sp. nov.)

(Pl. II, Figs. 28—30)

Description: Valve rather high, subquadrate in lateral view; height of valve about two-thirds of the length; greatest thickness at posterior portion; anterior and posterior ends nearly equal; anterior margin broadly rounded; posterior margin oblique from dorsal to ventral; dorsal margin straight and thin, angled at the posterior end; ventral part interiorly reflected; the middle part of ventral contact margin concave. Surface ornamented with reticulation. A narrow, long furrow at anterior to the middle of the valve, about three-fourths of the height of valve. A prominent carina at ventral side, becoming a board-like projection toward posteriorly, its length nearly equal to the length of carapace. Distinct longitudinal and coarse stripes on the intero-ventral reflected part.

Hinge line straight. Hinge structure of left valve consists of two terminal, distinct sockets and an intermediate, thin, board-like flange. Hinge structure of right valve consists of two teeth and a narrow furrow.

Pore canal zone may be observed at the anterior and posterior margins.

Anterior end of the young form is higher than the posterior end, forming a sharp antero-dorsal angle with the dorsal margin.

Dimensions (in mm)

Cat. No.	Valve	Length	Height	H:L (%)
0047	Left	0.58	0.38	65
0048	Left	0.46	0.28	60
0049	Right	0.36	0.18	60

Remarks: This species resembles *G.? reticulata,* but differs from the latter in its higher size, and in the narrow and long furrow of valve. The ventral carina of this species is coarser and longer, becoming a board-like projection at the posterior portion.

Occurrence: Upper Triassic Yenchang Qun of Tungchuan.
Holotype: Cat. No. 0047. Paratypes: Cat. Nos. 0048, 0049.

Geomphocythere? pulchra Zhong (sp. nov.)

(Pl. II, Figs. 31—37)

Description: Carapace subreniform in lateral view; greatest thickness at posterior end; greatest height at the center; anterior margin broadly rounded; posterior margin blunt, forming about a right postero-ventral angle with the ventral margin; dorsal margin slightly convex, bending roundly along antero- and postero-dorsal margins; dorsal margin overhanging the hinge line; dorsal margin of left valve higher than that of right valve, forming a slit-like trough in dorsal area; ventral surface interiorly reflected;

ventral margin convex in external view; the middle part of ventral commissure line concave; anterior, antero- and postero-ventral margins compressed. A shallow depression at the middle of valve, about one half of the height. Surface ornamented with reticulation; distinct parallel ridge-like stripes on the intero-ventral reflected part. Left valve larger than right valve, overlapping the latter along the ventred margin.

In the young form of this species, the anterior end is higher than the posterior end; anterior margin is truncated above and forming a prominent antero-dorsal angle with the dorsal margin; dorsal margin straight, sloping to the posterior.

Dimensions (in mm)

Cat. No.	Valve	Length	Height	Width	H:L (%)	W:L(%)
0050	Complete	0.56	0.36	0.26	64	46
0051	Right	0.52	0.32	—	61	—
0052	Left	0.40	0.24	—	60	—
0053	Right	0.36	0.24	—	66	—

Remarks: The external character of this species resembles the male form of the recent species *Gomphocythere expansa* (G. O. Sars) from the fresh-water lakes of the Cape Flags (Union of South Africa). It differs from the latter in the following features: 1. the outline is shorter and higher, its greatest height about two-thirds of the length; 2. dorsal margin is slightly convex, and rounded bending at the ends; 3. the dorsal margin of left valve higher than the right, forming a slit-like trough in dorsal area; 4. left valve larger than right valve, overlapping the latter along the ventral margin.

This species can be distinguished from *G.? reticulata* and *G.? costata* in having compressed anterior, antero- and postero-ventral margins, in the prominent postero-ventral angle, and in rather short ventral ridge.

Occurrence: Upper Triassic Yenchang Qun of Dalihe.

Holotype: Cat. No. 0050. Paratypes: Cat. Nos. 0051—0053.

Geomphocythere? praecipua Zhong (sp. nov.)

(Pl. II, Figs. 38—43)

Description: Valve irregularly subround in lateral view; greatest thickness and height posterior to the central; both anterior and posterior ends rounded; dorsal margin convex; and rounded bending at the extremities; ventral surface interiorly reflected, forming a wing-like projection at ventral side. Surface indistinctly reticulated; distinct parallel stripes at the intero-ventral part.

Anterior margin of right valve of this species rounded below and truncated above, forming a distinct angle with dorsal margin; posterior margin rounded; dorsal margin straight. Dorsal margin of left valve overhanging the hinge line; a thin board-like flange may be observed in the middle part of the hinge line of left valve. The hinge structure of the right valve unobserved.

The complete form of this species are all compressed. The dorsal margin of left valve is distinctly higher than that of the right valve.

In the young form, the anterior end of right valve is higher than the posterior end.

Dimensions (in mm)

Cat. No.	Valve	Length	Height	H:L (%)
0054	Left	0.56	0.38	67
0055	Right	0.56	0.34	60
0056	Left	0.54	0.40	72
0057	Right	0.46	0.28	60
0058	Left	0.36	0.26	72

Remarks: This species differs from the other species of this genus in having sharply wing-like projection at ventral side, in the strongly convex dorsal margin of left valve. In addition, the dorsal margin of left valve of the complete form is much higher than that of right valve.

Occurrence: Upper Triassic Yenchang Qun of Tungchuan.

Holotype: Cat. No. 0054. Paratypes: Cat. Nos. 0055—0059.

incertae familiae

Genus *Tungchuania* Zhong (gen. nov.)

Genotype: *Tungchuania houae* Zhong (gen. et sp. nov.)

Description: Valve subovate-elongate in lateral view; anterior and posterior parts convex, slightly concave near the middle of the valve; gratest height and thickness at posterior end; posterior end broadly rounded, higher and much broader than anterior end; anterior end narrowly rounded; dorsal margin straight, sloping to the anterior end; cardinal angles obtuse, postero-cardinal angle distinct; ventral margin strongly convex in the posterior part, but concave in the middle or in one-third of the distance from anterior end. Surface of valves smooth or with reticulation.

Hinge straight and simple, occupying about two-thirds of the entire length of the valve, a narrow trough in the right valve, and a sharp ridge in the left valve.

Muscle scar-pattern somewhat in front of and below the centre of the valve, and consists of a row of three spots.

Remarks: In regard to the outline, external character, hinge structure and muscle scar-pattern, this genus is not similar to any other known genera of the Ordos Basin as well as of any other regions.

Only three long spots can be observed in the muscle scar-pattern of this genus; these spots lie somewhat in front of and below the centre of valve, forming a vertical or a posteriorly curved row. This genus can not be assigned temporarily to any other families.

Geological Range: Upper Triassic, Ordos Basin of Shensi.

***Tungchuania houae* Zhong (gen. et sp. nov.)**

(Pl. III, Figs. 19—21)

Description: Valve of small size; subovate in lateral view; uniformly convex;

greatest thickness in the posterior half of the valve; greatest height at postero-cardinal angle, about one-fourth of the distance from posterior end; anterior end lower and evidently narrower than posterior end; anterior margin narrowly and regularly rounded; posterior margin broadly and regularly rounded; dorsal margin straight, sloping to the anterior end; antero-cardimal angle obtuse; postero-cardinal angle prominent; ventral margin projected at posterior part concave in one-third of the distance from anterior end. Surface indistinctly reticulated, the reticulation arranged in a concentric pattern along the margins.

Hinge line straight, about two-thirds of the length of the valve, a narrow trough in the right valve, and a sharp ridge in the left valve.

Muscle scar-pattern lies at anterior end to middle of the valve, only three long spots in one row can be seen.

The valve of the young form is high; the ratio of the height of anterior end to posterior end is rather large, the curvature of the ends is rather small.

Dimensions (in mm)

Cat. No.	Valve	Length	Height		H:L (%)
			Anterior	Posterior	
0060	Right	0.98	0.44	0.60	61
0061	Left	0.90	0.44	0.56	62
0062	Left	0.62	0.40	0.48	64

Remarks: This species is similar to *Tungchuania aurita,* but differs from the latter in smaller and shorter size and in evenly convex valve.

Occurrence: Upper Triassic Yenchang Qun of Liulingchuan, in the Ordos Basin. Holotype: Cat. No. 0060. Paratypes: Cat. Nos. 0061, 0062.

Tungchuania agrestata Zhong (gen. et sp. nov.)

(Pl. III, Figs. 1—2)

Description: Valve rather large, slightly convex; irregularly subelliptical and very elongate in lateral view; greatest thickness posterior to the center; greatest height at postero-cardinal angle; anterior end lower and evidently more narrow than posterior end; anterior margin narrowly rounded; posterior end broadly rounded, truncated above, and extending to posterior end; dorsal margin straight, sloping to anterior end; ventral margin convex in the posterior part, but concave in one-third of the distance from anterior end; cardinal angles obtuse, postero-cardinal angle distinct. Surface smooth. Hinge straight and simple, occupying about two-thirds of the entire length.

Dimensions (in mm)

Cat. No.	Valve	Length	Height		H:L (%)
			Anterior	Posterior	
0065	Left	1.50	0.60	0.88	58
0066	Right	1.50	0.60	0.84	56

Remarks: This form differs from the other species of *Tungchuania* in its elongate shape of the valve, in the distinctly straight, oblique upper part of the anterior end and in the slightly convex valve.

Occurrence: Upper Triassic Yenchang Qun of Tungchuan and Liulingchuan.

Holotype: Cat. No. 0065. Paratype: Cat. No. 0066.

Tungchuania aurita Zhong (gen. et sp. nov.)

(Pl. III, Figs. 12—18)

Description: Valve rather large; suboblong in lateral view; greatest height near one-fourth of the distance from posterior end; posterior part evenly convex, forming the greatest thickness of the valve; a faint depression in front of the greatest convex of the valve; anterior part slightly convex and flattened anteriorly; anterior end narrowly and regularly rounded, lower than posterior end; posterior end broadly and regularly rounded, with a strong concavity just below the postero-cardinal angle; dorsal margin straight, sloping to the anterior end; ventral margin convex at the posterior part, but concave at the middle to the anterior end; cardinal angles distinct; antero-cardinal angle obtuse; posterocardinal angle obtuse; postero-cardinal angle protruded, forming a prominently ear-shaped angle with dorsal margin. Surface ornamented with inconspicuous reticulation.

Hinge straight and simple, occupying about two-thirds of the entire length of the valve.

Muscle scar-pattern in front of and below the centre of the valve, only three spots can be seen.

Young form subelliptical in lateral view; anterior and posterior margins rounded; dorsal margin arched; cardinal angles poorly developed; ventral surface convex.

Dimensions (in mm)

Cat. No.	Valve	Length	Height		Width	H:L (%)	W:L(%)
			Anterior	Posterior			
0067	Right	1.36	0.76	0.84	—	61	—
0068	Complete	1.44	0.72	0.84	0.52	58	36
0069	Left	1.16	0.60	0.74	—	63	—
0070	Left	0.98	0.52	0.60	—	61	—
0071	Right	0.56	0.32	0.38	—	68	—

Remarks: The outline of this species recalls *Tungchuania houae,* but differs from the latter in having larger and higher size, in the strongly convex posterior margin and in the prominently ear-shaped postero-cardinal angle.

Occurrence: Upper Triassic Yenchang Qun of Tungchuan and Liulingchuan.

Holotype: Cat. No. 0067. Paratypes: Cat. Nos. 0068—0071.

Tungchuania perelegana Zhong (gen. et sp. nov.)

(Pl. III, Figs. 7—11)

Description: Valve suboblong in lateral view; an elliptical depression at anterior end to the center of the valve, both sides of the depression convex; greatest height and thickness at posterior end; anterior end lower than the posterior end; anterior margin

rounded; posterior margin truncated above and rounded below; dorsal margin straight, sloping to anterior end; ventral margin slightly convex at posterior part and concave at anterior end to the center; antero-cardinal angle acute; postero-cardinal angle rather conspicuous. Surface marked by longitudinal stripes.

Hinge straight and simple, about four-fifths of the entire length of the valve.

Muscle scar-pattern situated on the interior of the depression, only three spots in one row can be seen.

Dimensions (in mm)

Cat. No.	Valve	Length	Height		H:L(%)
			Anterior	Posterior	
0072	Left	0.88	0.48	0.52	59
0073	Right	0.88	0.44	0.52	59
0074	Left	0.88	0.40	0.48	54
0075	Left	0.82	0.44	0.48	57
0076	Left	0.78	0.40	0.44	56

Remarks: The outline of this species resembles *Tungchuania houae,* but differs from the latter in having a depression at anterior end to the center, in the convexity of the valve and in the presence of the longitudinal stripes on the surface.

There are two forms within this species, one is rather short and rather high, the other is rather elongate and rather narrow. It is possible that these forms may represent varieties of a single species. The young forms of this species are unknown.

Occurrence: Upper Triassic Yenchang Qun of Liulingchuan.

Holotype: Cat. No. 0072. Paratypes: Cat. Nos. 0073—0076.

Tungchuania callida Zhong (gen. et sp. nov.)

(Pl. III, Figs. 3—6)

Description: Valve slightly convex, irregularly subtrapezoidal in lateral view; greates height at one-fourth of the distance from posterior end; greatest thickness at posterior end; anterior end lower than posterior end; anterior margin distinctly truncated above and narrowly rounded below; posterior margin broadly rounded; dorsal margin short and straight, sloping to anterior end; ventral margin convex at the posterior part and slightly concave at one-third of the distance from anterior end. Antero- and postero-cardinal angles obtuse. Surface smooth.

A few complete internal moulds of this species have been found. The left valve of moulds is larger, overlapping the right valve along the ventral margin.

Hinge simple. Muscle scar-pattern in front of and below the center of the valve, only three spots can be seen.

Dimensions (in mm)

Cat. No.	Valve	Length	Height	Width	H:L(%)	W:L(%)
0077	Right	0.74	0.48	—	64	—
0078	Right	0.76	0.48	—	63	—
0079	Complete	0.72	0.44	0.28	61	38

Remarks: This form differs from the other species of this genus in its small size, in its short and high valve, in its straight and short dorsal margin, and in the distinctly truncated upper part of anterior margin.

Occurrence: Upper Triassic Yenchang Qun of Liulingchuan.

Holotype: Cat. No. 0077. Paratypes: Cat. Nos. 0078, 0079.

Tungchuania sp. A (indet.)

(Pl. III, Fig. 22)

Description: Carapace suboblong in lateral view; greatest thickness posterior to the center; the height of anterior and posterior ends nearly equal; anterior margin truncated above and rounded below: posterior margin sloping; dorsal and ventral margins straight and nearly parallel; antero- and postero-cardinal angles conspicuous. A long, narrow furrow at the middle of valve, extending to about three-fourths of the distance from dorsal margin, dividing the valve into anterior and posterior convex parts.

Since only one internal mould is gathered, the hinge structure and the ornamentation of the surface are unknown.

Dimensions (in mm)

Cat. No.	Valve	Length	Height	Width	H:L (%)	W:L(%)
0080	Complete	0.80	0.48	0.28	60	35

Occurrence: Upper Triassic Yenchang Qun of Tungchuan.

Described specimen: Cat. No. 0080.