MIDDLE CRETACEOUS (CENOMANIAN) OSTRACODA FROM THE WASIA FORMATION OF SAUDI ARABIA

ALI A. F. AL-FURAIH
Department of Geology, King Saud University, Riyadh, Saudi Arabia

Abstract.—Five ostracode species, Metacytheropteron pleura sp. nov., Glenocythere triangularis Al-Abdul-Razzaq, Glenocythere bahreinensis Al-Abdul-Razzaq, Limburgina arabica sp. nov., and Phyrocysthera streblolophata (Al-Abdul-Razzaq), are recorded from test wells ST-23 and ST-33 in the Middle Cretaceous of Saudi Arabia. These ostracodes are useful for stratigraphical correlation within the Arabian Gulf region.

Cenomanian ostracodes of the Middle East are known mainly through the works of Grosdidier (1973), Rosenfeld and Raab (1974), Al-Abdul-Razzaq (1979), and Al-Abdul-Razzaq and Grosdidier (1981). Ostracode genera and species reported here from the Wasia Formation (Cenomanian-?Turonian) of Saudi Arabia were previously recorded in strata of the same age in Kuwait and Bahrain by Al-Abdul-Razzaq (1979) and Al-Abdul-Razzaq and Grosdidier (1981), and in Iran by Grosdidier (1973). This supports the suggestion of Al-Abdul-Razzaq and Grosdidier (1981) that these ostracodes are useful for correlation of Cenomanian beds in the Arabian Gulf region.

According to Powers and others (1966) and Powers (1968), the Wasia Formation is a highly variable succession of rocks of continental and shallow-marine origin. It represents deposits of rapidly changing and widely shifting transgressive and regressive cycles. The Wasia Formation is divided from top to bottom into the Mishrif, Rumaila, Ahmadi, Wara, Mauddud, Safaniya, and Khafji members. The lowest five members are named after formations in southeastern Kuwait. The lowest two members are named after areas in Saudi Arabia where they have greatest economic significance. These two lowest members can also be traced northward, where together they are equivalent to the Burgan Formation throughout Kuwait and the Nahr Umr Formation in southeastern Iraq. The Wasia Formation contains commercial oil at several levels in the fields of Safaniya and Dammam in Saudi Arabia. Equivalent units are also important producers of oil in...
Material for this study consists of subsurface cutting samples from test wells ST-23 (lat 23°36' N., long 51°17' E.) and ST-33 (lat 25°46' N., long 48°53' E.), drilled by the Arabian American Oil Company (Fig. 1).

Repository.—All figured specimens are deposited with collections of the Geology Department, King Saud University, Riyadh, Saudi Arabia.

Acknowledgments.—Roger L. Kaesler critically read the typescript of this paper and placed his collection at my disposal. Abdullah Al-Shamlan (Deputy Ministry of Petroleum for Technical Affairs, Saudi Arabia) arranged for the well samples. The Deputy Ministry of Petroleum for Technical Affairs and Companies of Saudi Arabia provided the well samples and permitted publication of this paper. The Department of Geology, University of Kansas, provided research facilities during my appointment as adjunct associate scientist. King Saud University provided financial support.

**SYSTEMATIC PALEONTOLOGY**

Order **PODOCOPIDA** Müller, 1894
Suborder **PODOCOPINA** Sars, 1866
Superfamily **CYTHERACEA** Baird, 1850
Family **CYTHERURIDAE** Müller, 1884
Subfamily **CYTHEROPTERINAE** Hanai, 1957

Genus **METACYTHEROPTERON** Oertli, 1957

*Metacytheropteron pleura* sp. nov.
Plate 1, figures 1, 2

*Metacytheropteron parnesi* Sohn; Grosdidier, 1973, pl. 6, fig. 54a-e.

*Derivation of name.*—Greek, rib, with reference to ribbing pattern.

*Diagnosis.*—Small carapace with longitudinal ridges. Prominent, lightly raised ventrolateral ridge extending from anterioventral margin to caudal process. Ventral area of carapace flattened.

*Holotype.*—Male carapace (Pl. 1, fig. 1), KSU.G.OS. 160.

*Material.*—Seven specimens from ST-23 (depth 4,655-4,870 ft), 2 specimens from ST-33 (depth 4,170-4,175 ft).

*Type locality and horizon.*—ST-23, sample 4,865-4,870 feet below surface, Wasia Formation, Cenomanian.

*Dimensions (mm).*—Holotype, male carapace: length, 0.51; height, 0.24; width, 0.24. Paratype, female carapace (KSU.G.OS. 161): length, 0.46; height, 0.25; width, 0.27.

*Description.*—Carapace elongate, ovoid, tapering posteriorly. Dorsal and ventral margins converging posteriorly to form caudal process. Dorsal margin strongly arched in female morph. Left valve slightly larger than right. Sexual dimorphism rather marked; males more elongate, less high and wide than females. Shell surface ornamented with longitudinal ridges. Marginal denticulations not observed. Eye spot faintly developed. Internal features not seen.
Remarks.—Although external details of *M. pleura* sp. nov. are typical of *Metacytheropteron*, it is referred to the genus with some doubt owing to lack of internal details, which are, in my opinion, important in differentiating genera of the Cytheruridae. Grosdidier (1973) figured representatives of this species as *Metacytheropteron parnesi* Sohn (1968); however, *M. pleura* differs from *M. parnesi* in details of outline and ridge arrangement. *M. haupettenis* Grosdidier (1964) is easily differentiated from *M. pleura* by rib arrangement, and the left valve overreaches the right valve strongly along the dorsal margin.

Family TRACHYLYBERIDIDAE Sylvester-Bradley, 1948
Subfamily TRACHYLYBERIDINAE Sylvester-Bradley, 1948

Genus GLENOCYTHERE Al-Abdul-Razzaq, 1979

Glenocythere triangularis Al-Abdul-Razzaq, 1979

Plate 1, figure 3

Glenocythere triangularis Al-Abdul-Razzaq, 1979, p. 928-930, pl. 2, fig. 5-8; pl. 3, fig. 4.

Material.—Four specimens from ST-23 (depth 4,865-4,870 ft).

Locality and horizon.—ST-23, sample 4,865-4,870 feet below surface, Wasiaa Formation, Cenomanian.

Dimensions (mm).—Female carapace (KSU. G.OS. 162): length, 0.90; height, 0.55; width 0.51. Female carapace (KSU. G.OS. 164): length, 0.90; height, 0.55; width 0.51.

Remarks.—This species has been fully described by Al-Abdul-Razzaq (Al-Abdul-Razzaq, 1979; Al-Abdul-Razzaq and Grosdidier, 1981). I do not share their opinion that *Cythereis IRC*2 Grosdidier (1973) is identical to *Glenocythere bahreinensis*. *Cythereis IRC*2 differs in having a more triangular posterior end that is pointed ventrally, particularly in the right valve (see Grosdidier, 1973, pl. 8, fig. 65a,d). Although the two species differ in arrangement of ridges, they appear to be closely related.

Genus LIMBURGINA Deroo, 1966

Limburgina arabica sp. nov.

Plate 1, figures 6, 7

Derivation of name.—From its occurrence in Arabia.

Diagnosis.—Species of Limburgina with a massive, posterior, cardinal process. Surface reticulate with thick muri. Prominent, short, median, longitudinal ridge in posterior part of valve.

Holotype.—Male carapace (Pl. 1, fig. 6), KSU. G.OS. 165.

Material.—Seventeen specimens from ST-23 (depth 4,655-4,870 ft).

Type locality and horizon.—ST-23, sample 4,655-4,660 feet below surface, Wasiaa Formation, Cenomanian.

Dimensions (mm).—Holotype, male carapace (KSU. G.OS. 165): length, 0.69; height, 0.33; width, 0.32. Paratype, female carapace (KSU.G.OS. 166): length, 0.66; height, 0.32; width, 0.33.

Description.—Carapace subrectangular in lateral view, with broadly rounded anterior margin, parallel dorsal and ventral margins, and triangular posterior end. Dorsal margin straight, appearing sinuous because of projecting tubercles. Anterior margin with double row of small denticles. Carapace surface reticulate, fossae with thick muri. Subcentral tubercle distinct, with sulcus posterior to it. Eye tubercle distinct. Ventrolateral ridge well developed; prominent, short, median, longitudinal ridge on posterior part of valve. Posterior cardinal
process massive, with small tubercle anterior to it. Left valve slightly larger than right, overlapping it posteriordorsally. Sexual dimorphism apparent, more elongate forms interpreted as males. Internal characters not seen.

Remarks.—Representatives that are here assigned to this species have been reported by Sayyab (1956) from the Middle Cretaceous of the Arabian Gulf area. Limburgina aurora Neale (1975) from the Upper Cretaceous of Gingin, Western Australia, bears some similarity to L. arabica but differs in having a less prominent median ridge. L. arabica is easily distinguished from L. formosa Bate (1972) by having a more triangular posterior end, particularly in the left valve; moreover, the line of greatest length passes slightly below the midpoint instead of slightly above it. Cythereis fabrioni Bischoff (1963) from the Albian of Lebanon differs in having an elongate dorsal ridge and less distinctly tapered posterior end.

**Genus PHYROCYTHERE Al-Furaih, 1980**

*Phyrocythere strebholophata* (Al-Abdul-Razzaq), 1981

Plate 1, figures 8-10

Ostracode C2 Glintzboeckel and Magné, 1959, pl. 3, fig. 27.

*Cythereis C3* (Glintzboeckel and Magné), Grekoff, 1969, p. 232, pl. 1, fig. 5.

*Cythereis IR3* Grosdidier, 1973, pl. 8, fig. 67a-c.

*Cythereis strebholophata* Al-Abdul-Razzaq and Grosdidier, 1981, p. 183-185, pl. 1, fig. 7-10; pl. 2, fig. 6-8.

*Veeniacythereis strebholophata* (Al-Abdul-Razzaq), Bismuth and others, 1981, p. 233, pl. 1, fig. 3-4.

**Material.**—Nine specimens from ST-23 (depth 4,655-4,870 ft).

**Locality and horizon.**—ST-23, sample 4,655-4,660 feet below surface, Wasiaa Formation, Cenomanian.

**Dimensions (mm).**—Male carapace (KSU.G.OS. 167): length, 0.69; height, 0.37; width, 0.32. Male carapace (KSU.G.OS. 168): length, 0.71; height, 0.38; width, 0.34. Female carapace (KSU.G.OS. 169): length, 0.68; height, 0.39; width, 0.37.

Remarks.—*Phyrocythere strebholophata* closely resembles *P. irrigata* Al-Furaih (1980) but is differentiated by its more prominently developed posterior cardinal angle. Furthermore, *P. irrigata* has a more pronounced subcentral tubercle, heavier ridges, and high rims, particularly the ventral rim. Representatives of this species from the Middle Cretaceous of the Arabian Gulf area have been reported by Sayyab (1956) as *Cythereis arabica*. Glintzboeckel and Magné (1959) and Grekoff (1969) found *P. strebholophata* in Cenomanian rocks of eastern Algeria and Tunisia. Grosdidier (1973) found identical forms in Albian and Lower Cenomanian rocks of the Coastal Fars, Iran. Al-Abdul-Razzaq and Grosdidier (1981) described this species from the lower Ahmadi Formation of early Cenomanian age in Kuwait; Bismuth and others (1981) reported *P. strebholophata* from Upper Cenomanian rocks of Tunisia.

---

**EXPLANATION OF PLATE 1**

**FIGURE**

1. *Metacytheropteron pleura* sp. nov.—1. Male carapace, holotype, right-lateral view, x 118, KSU.G. OS. 160.

2. Female carapace, paratype, left-lateral view, x 130, KSU.G. OS. 161.


6-7. *Limburgina arabica* sp. nov.—6. Male carapace, holotype, left-lateral view, x 86, KSU.G. OS. 165.—7. Female carapace, paratype, right-lateral view, x 90, KSU.G. OS. 166.

REFERENCES

Al-Abdul-Razzaq, S. Kh., 1979, Glenocythere, a new ostracode genus from the Ahmadi Formation (Cretaceous) of Kuwait: J. Paleontol., v. 53, p. 920-930, 2 text-fig., 3 pl.


Sohn, I. G., 1968, Palaeographical implications of non-marine Lower Cretaceous Cyprideinae in Israel (Palestine), and Metacytheropteron parnesi n. sp. (Ostracoda, Crust.): Isr. J. Earth-Sci., v. 16, p. 120-131, 1 pl.
RECENT PUBLICATIONS

MONOGRAPHS ISSN 0278-9744

1 Sprinkle, James (ed.). Echinoderm faunas from the Bromide Formation (Middle Ordovician) of Oklahoma, x + 370 p., 42 pl., 113 fig., 41 tables, 1982 .................................................. $15.00

ARTICLES ISSN 0075-5044


63 Hakes, W. G. Trace fossils and depositional environment of four clastic units, Upper Pennsylvanian megacyclotemst, northeast Kansas, 60 p., 13 pl., 11 fig., 5 tables, 1976 .................................................. 5.00

64 Mapes, R. H. Carboniferous and Permian Bactritoida (Cephalopoda) in North America, 120 p., 41 pl., 14 fig., 1979 .................................................. 15.00

65 Stanley, G. D., Jr. Paleocology, structure, and distribution of Triassic coral buildups in western North America, 72 p., 10 pl., 11 fig., 13 tables, 1979 .................................................. 10.00

PAPERS ISSN 0075-5052

83 Zidek, Jiri, Kansas Hamilton Quarry (Upper Pennsylvanian) Acanthodes, with remarks on the previously reported North American occurrences of the genus, 48 p., 7 pl., 15 fig., 2 tables, 1976 .................................................. $ 5.00

84 Fry, H. C., & R. J. Cuffey. Filinamurina kretaphilia—a new genus and species of biolitie tubulobryozaean (Ectoprocta) from the Lower Permian Wreford megacyclothem of Kansas, 12 p., 2 pl., 3 fig., 1976 .................................................. 2.00

85 Baxter, R. W., & R. W. Baxendale. Corrypteris incolucrata, sp. nov., a new fercile form of possible zygopetalid affinities from the Pennsylvanian of Kansas, 16 p., 7 pl., 1 fig., 1976 .................................................. 2.00

86 Stanley, G. D., Jr., & Curt Teichert. Lamellorthoceratids (Cephalopoda, Orthoceridea) from the Lower Devonian of New York, 18 p., 2 pl., 2 fig., 1 table, 1976 .................................................. 2.00


88 Creek, R. E. Morphological variations in the amoninite Scaphites of the Blue Hill Member, Carlile Shale, Upper Cretaceous, Kansas, 30 p., 2 pl., 7 fig., 1978 .................................................. 4.00

89 Chorn, John, E. A. Reavis, J. D. Stewart, & K. N. Whetstone. Fossil fish studies, 20 p., 8 fig., 1978 .................................................. 3.00

[90, 91 in one cover]

90 Jewell, P. A., & R. A. Robison. Revision of a late Middle Cambrian trilobite fauna from northwestern Queensland, 26 p., 9 pl., 2 fig. .................................................. 4.00

91 Robison, R. A. Origin, taxonomy, and homoeomorphs of Dorygnathus (Cambrian TriLOBita), 12 p., 2 pl., 3 fig. .................................................. 4.00

No. 90, 91, 1978

92 Marks, R. H., Jr. Palaeoecology of Ca-

nina torquata (Owen) from the Beil Limestone Member (Pennsylvanian, Virgilian), Kansas, 24 p., 2 pl., 12 fig., 1978 .................................................. 3.00


94 Baxter, R. W., Sphenophris sellandii, a problematical perisierp from the Permian of Kansas, 8 p., 4 fig., 1978 .................................................. 1.00

95 Harrison, J. A. Revision of the Carmeliae (Artiodactyla, Tylododa) and description of the new genus Alpomia, 28 p., 7 pl., 3 fig., 5 tables, 1979 .................................................. 3.00

96 Tway, L. E. Pennsylvanian ichthyoliths from the Shawnee Group of eastern Kansas, 24 p., 2 pl., 9 fig., 1 table, 1979 .................................................. 3.00

97 Krancr, A. E. Revision of the Mesozoic nanofossil genera Bidiscus, Biscutum, and Discorhabdos, 12 p., 3 pl., 1980 .................................................. 2.00

98 Rowell, A. J. Inarticulate brachiopods of the Lower and Middle Cambrian Pioche Shale of the Pioche District, Nevada, 34 p., 8 pl., 12 fig., 3 tables, 1980 .................................................. 4.00

99 Miller, J. F. Taxonomic revisions of some Upper Cambrian and Lower Ordivician conodonts with comments on their evolution, 44 p., 2 pl., 6 fig., 1980 .................................................. 5.00

100 Peterson, R. M., & R. L. Kaesler. Distribution and diversity of ostracode assemblages from the Hamlin Shale and the Americus Limestone (Permian, Wolfcampian) in northeastern Kansas, 26 p., 11 fig., 4 tables, 1980 .................................................. 3.00

101 Simmons, A. H., & R. J. Cuffey. Fenestratae, pinnate, and ctenostome bryozoans and associated barnacle borings in the Wreford megacyclothem (Lower Permian) of Kansas, Oklahoma, and Nebraska, 36 p., 11 fig., 9 tables, 1980 .................................................. 4.00

[102, 103 in one cover]

102 Martin, L. D. The early evolution of the Cricetidae in North America, 42 p., 26 fig. .................................................. 5.00

103 Martin, L. D., & R. G. Corner. A new genus of cricetid rodent from the Hemingfordian (Miocene) of Nebraska, 6 p., 2 fig. No. 102, 103, 1980 .................................................. 5.00


[107, 108 in one cover]

107 Al-Furayi, A. A. F. Paleocene and Lower Eocene Ostracoda from the Wusum er Radhuma Formation of Saudi Arabia, 10 p., 3 pl., 1 fig., 1 table. No. 107, 108, 1983 .................................................. 2.00