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Two New Holothurian Sclerite Genera from the Late Cretaceous of Jordan

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Abstract: Two new genera: *Septapedatus* and *Octopedatus* assigned to the family Priscopedatidae Frizzle and Exline, 1955, picked from the nodular limestone beds of the Shueib Formation (Late Cenomanian - Early Turonian) in Salhoub area, N Jordan. Related to these 2 new genera, 2 new species, *Septapedatus palestiniansis* and *Octopedatus densusmaculis* are illustrated and described in this study. The present material is recovered from the same locality and include 40 species, most of them are new.

Key words: Holothurian sclerites, late cretaceous, N. Jordan, Shueib Fm., Ajlun Group, late cenomanian, early turonian

INTRODUCTION

This study is considered as part three in a project started since 1998 to explore the preservation record and distribution of the holothurian sclerites of the Late Cretaceous sequence of Ajlun Group in N Jordan (Al-Tamimi *et al.*, 2001). Results of this project will examine the importance of this group of fossils as biostratigraphic tool for subdivision, local-regional-correlation.

In this work further studies on the early Late Cretaceous (Late Cenomanian - Early Turonian) of Shueib Formation in Salhoub area, N Jordan (Fig. 1), led to relatively abundant discovery of holothurian sclerites, which have been extracted from its carbonate sediments. The first association of these fossils were found in the nodular limestone beds of Shueib Formation at the base of the exposure (Fig. 2). This association is characterized by the frequent occurrence of representatives of the genera *Hexapriscopeidatus* Al-Tamimi *et al.* (2006)

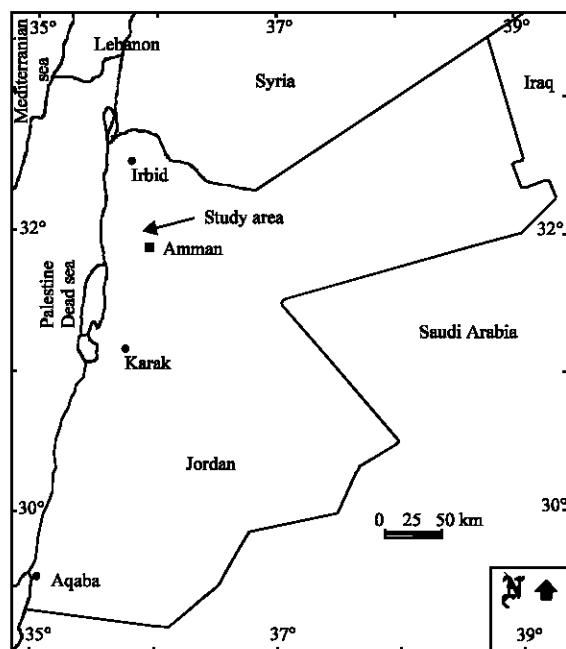


Fig. 1: Map of Jordan, showing location of the study area and sampling site about 24 km N of Amman alongside on the Amman Irbid highway

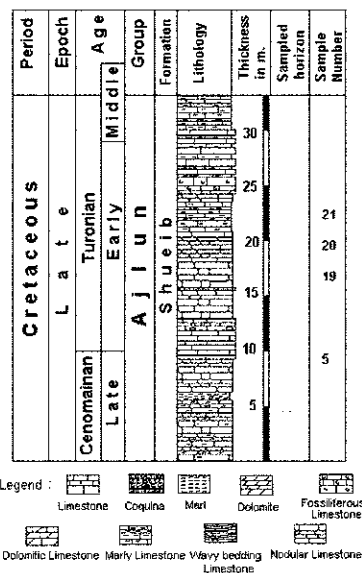


Fig. 2: Columnar section of the measured outcrops of the Shueib Fm., showing sampled horizons and the location of the 2 new genera bearing sample (No. 5)

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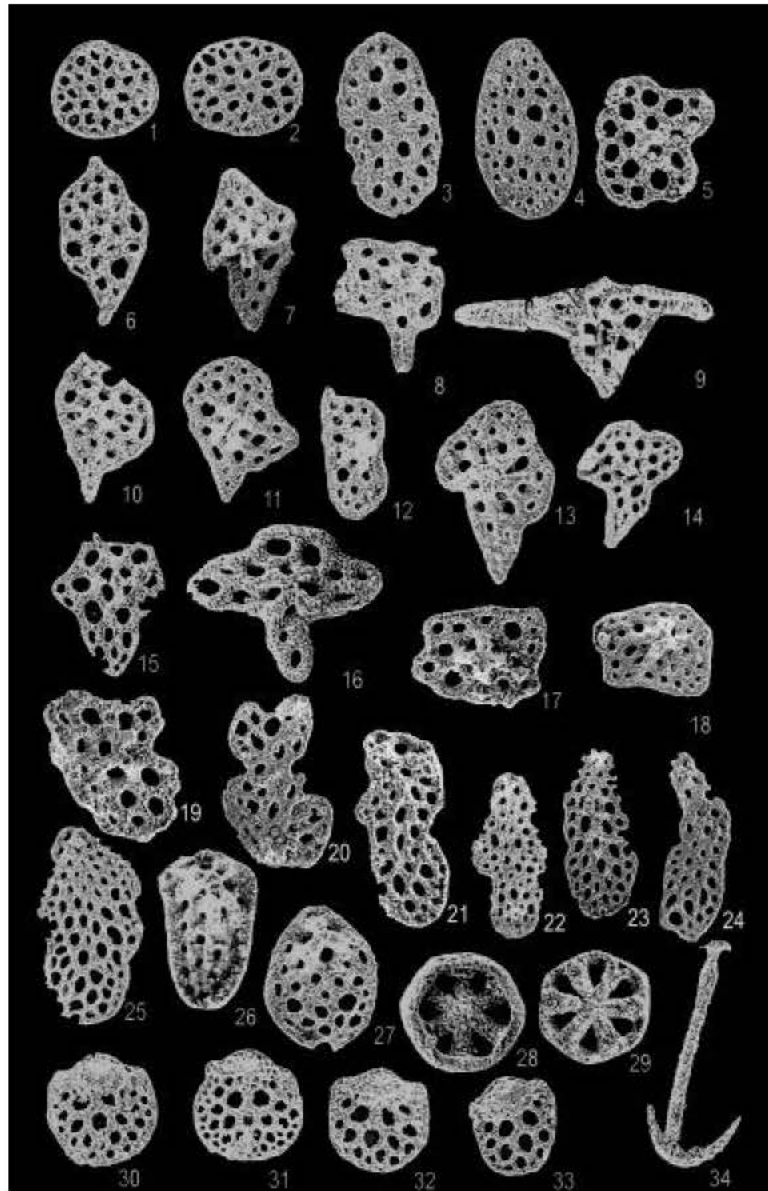


Fig. 3: (1,2): *Calclamna* n. sp., max. diameter 195-218 μm .; (3): *Calclamna* n.sp., length 244 μm .; (4): *Calclamna* n. sp., length 0.327 mm.; (5,19): *Prisculatrites* n.sp., 5: max. diameter 151 μm ; 19: max. diameter 189 μm ; (6,7): *Spinopriscopodatus vitoldi* Szejn, 1992, max. length with spines 244 μm ; (8-16): *Spinopriscopodatus* n.sp., 8: max. length with spines; 214 μm , 9: max. length 481 μm ; 10: max. length 212 μm , 11: max. length 130 μm , 12: max. length 200 μm , 13: max. length 270 μm , 14: max. length 236 μm , 15: max. length 207 μm , 16: max. length 296 μm ; (17): *Priscopodatus anceps* Schlumberger 1890, max. diameter 192 μm .; (18): *Priscopodatus* n.sp., max. diameter 148 μm ; (20-26): *Tripuscucumis* n.sp., 20: upper view, length 157 μm ; 21: upper view, length 303 μm ; 22: upper view (nearly complete specimen), length 309 μm ; 23: upper view, length 354 μm .; 24: upper view, length 309 μm ; 25: upper view (small part of the margin broken), length 363 μm ; 26: 173 μm ; (27): *Tripuscucumis solveigae* Reich 2003, upper view, length 162 μm ; (28,29): *Theelia* cf. *venusta* Müller, 1964; 28: upper view, max. diameter 145 μm ; 29: lower view.; (30-33): *Riquadites* n.sp.; 30: upper view, max. diameter 164 μm ; 31: upper view, max. diameter 170 μm ; 32: upper view, max. diameter 155 μm ; 33: upper view, max. diameter 148 μm ; (34): *Calcancora* n.sp., upper view max. length 376 μm

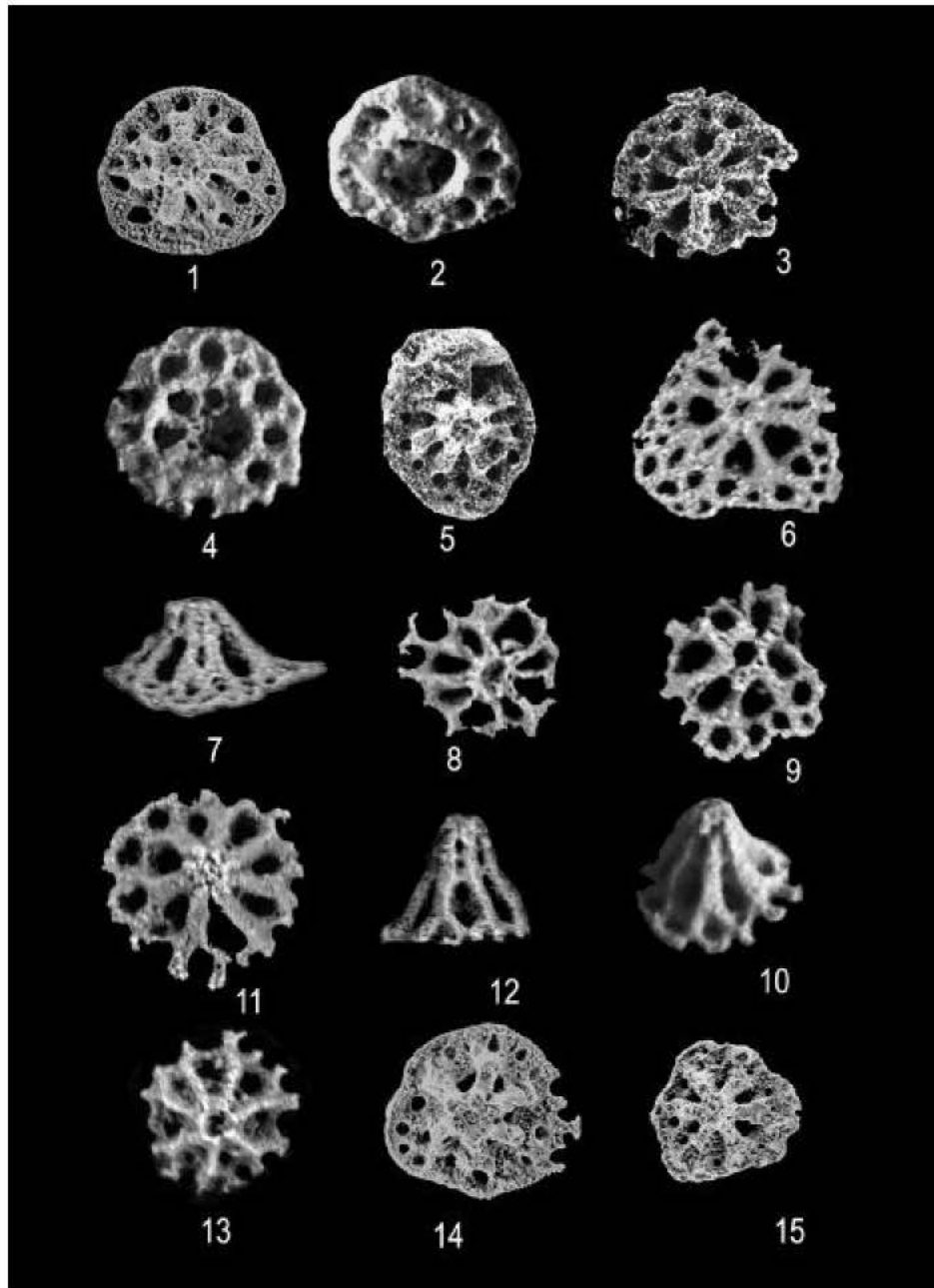


Fig. 4 (1-5): *Septapedatus palestiniensis* n.g., n.sp.; 1: upper view, 2: oblique lower view, max. diameter 145 μ m; 3: upper view, max. diameter 145 μ m; 4: oblique lower view (nearly complete, max. diameter 157 μ m); 5: upper view, max. diameter 150 μ m; (6,7): *Octopedatus densusmaculis* n.g., n.sp.; 6: upper view; max. diameter 163 μ m; 7: lateral view (nearly complete specimen), max. diameter 163 μ m; (8): *Octopedatus* sp. (incomplete specimen), upper view, 129 μ m; (9,10): *Septapedatus* sp.; 9: upper view, max. diameter 155 μ m; 10: lateral view, (nearly complete specimen), max. diameter 155 μ m; (11,12): *Septapedatus* sp.; 11: upper view, 12: lateral view (nearly complete specimen), max. diameter 153 μ m; (13): *Septapedatus* sp. (incomplete specimen), upper view; max. diameter 153 μ m; (14): *Hexapriscopepatus subcircularis* n.g., n.sp. Al-Tanimi *et al.* (in press), upper view, max. diameter 151 μ m; (15): *Hexapedatus reichi* n.g., n.sp. Al-Tanimi *et al.* (2006), upper view, max. diameter 148 μ m

(Fig. 4: 14,15), *Pentapriscopeidatus* Sadeddin and Saqqa (1997) *Septapedatus* n.g. (Fig. 4: 1-5,9-13), *Octopedatus* n.g. (Fig. 4: 6-8) and *Tripuscucumis* Reich, 1997 (Fig. 3: 20-27), which appear in the Late Cretaceous for the first time and *Calclamna* Frizzle and Exline, 1955 (Fig. 3: 1-4). The upper portion of this exposure is also characterized by the rich content of the representatives of the genera *Priscoopedatus* Schlumberger, 1890 (Fig. 3: 17,18), *Prisculatrites* Deflandre-Rigaud, 1962 (Fig. 3: 5,19), *Spinopriscopeidatus* Kozur and Sadeddin, 1990 (Fig. 3: 6-16), *Theelia* Schlumberger, 1891 (Fig. 3: 28,29), *Riguadites* Frizzle and Exline, 1957 (Fig. 3: 30-33) and the less frequent *Calcancora* Frizzle and Exline, 1955 (Fig. 3: 34). All specimens will be described and illustrated by Sadeddin and Al-Tamimi (in press). The Late Cretaceous (Late Cenomanian-Turonian) holothurian sclerites assemblage from Jordan, seem to be, with some differences, similar to those known from the Late Cretaceous (Maastrichtian) of the Isle Rügen (Baltic Sea) NW Germany (Müller, 1964) and from the Early Cretaceous of the Polish Lowlands (Sztejn, 1992; Reich, 1997, 2003). It is believed that the results of this study will adduce a good contribution to the Late Cretaceous stratigraphy.

MATERIALS AND METHODS

Based on the previous findings in Al-Tamimi *et al.* (2001), In press, a columnar section was recently selected for study at a new road-cut and located about 25 km NW of Amman near Salhoub village (Fig. 1). The measured section is presented in a graphic log as shown in Fig. 2. Twenty five rock samples were collected from a total thickness of about 21 m. The samples are named as GWA using prefix of the geographic locality name (Ghabat (Forest) Wasfi Al-Tall forest) in front of each sample number. The holothurian sclerites obtained after sample treatment with diluted (15%) acetic acid for carbonate samples and by using Hydrogen peroxide (H_2O_2) for soft material. Then sieving was carried out for all treated samples and the fraction 90-125 μm used for study were carefully studied under the binocular microscope. Photographing of holothurians was made by using Both the Cambridge-type Scanning Electron Microscope (SEM) at Mutah University and the Scanning Electron Microscope (SEM) at Yarmouk University. Most of the samples showed variable content of holothurian sclerites.

TAXONOMY

Family: Priscoopedatidae Frizzle and Exline, 1955

Genus: *Priscoopedatus* Schlumberger, 1890, emend. Kozur and Sadeddin, 1990

Septapedatus n.g.

Type species: *Septapedatus palestiniensis* n.g., n.sp. from Late Cretaceous (Late Cenomanian - Early Turonian) of Jordan.

Derivatio nominis: From having seven footed stirrup.

Diagnosis: Sclerites in form of a sieve plate; outline circular, subcircular, suboval, subquadratic or irregular, with large to very large central hole, covered mostly to largely by 7 footed conical, high to moderately high stirrup, surrounded by 15-20 holes, varying in size and shape.

Remarks: *Septapedatus* n.g. differs from all other genera of the family Priscoopedatidae in having 7 footed stirrup.

Distribution: Late Cenomanian - Early Turonian, N Jordan.

Septapedatus palestiniensis n. sp.

Holotype: The specimen on Fig. 4, No.1,2, rep.no. 1/XVII/10.

Derivatio nominis: After the name of Palestine.

Locus typicus: Salhoub area, N Jordan.

Stratum typicum: Nodular limestone beds of Shueib Formation (Late Cenomanian - Early Turonian), sample GHW 5.

Description: Sclerite in form of sieve plate, with stirrup (spire broken directly above the stirrup); outline circular to subcircular, periphery slightly undulated; plate pierced by one large to very large central hole with a marginal row of 13 holes (7 at the base of the feet) and 2 outside the row; the additional perforations are of different size and shape; central hole covered mostly to largely by a conical, high, seven footed stirrup, feet narrow to moderately wide; greatest diameter 178-157 μm .

Occurrence: Known only from the type locality.

Octopedatus n.g.

Type Species: *Octopedatus densusmaculis* n.g., n.sp. from Late Cretaceous (Late Cenomanian - Early Turonian) of Jordan.

Derivatio nominis: From having 8 footed stirrup.

Diagnosis: Sclerites in form of a sieve plate; outline circular, subcircular or irregular; plate pierced by one very large central hole, surrounded by 14-30 holes varying in

size, of rounded, subrounded, oval or elliptical shape, irregularly distributed or arranged in one ring around the central hole; central hole covered mostly by a high, conical 8 footed stirrup.

Remarks: *Octopedatus* n.g. differs from all other genera of the family Priscopedatidae in having 8 footed stirrup.
Distribution: Late Cenomanian - Early Turonian, N Jordan.

Octopedatus densusmaculis n.sp.

Holotype: The specimen on Fig. 4, No. 6,7, rep. No. 1/XVIII/4.

Derivatio nominis: Densumaculis, Latin: Densus = close, macula = mesh; from the close-meshed feet of the stirrup.
Locus typicus: Salhoub area, N Jordan.

Stratum typicum: Nodular limestone beds of Shueib Formation (Late Cenomanian - Early Turonian), sample GHW 5.

Description: Sclerite in a form of sieve plate with stirrup (spire broken), heart-shaped, with slightly undulated margin; plate pierced by one very large central hole, surrounded by 30 irregularly distributed holes, varying in size and shape; central hole covered partly by a high, conical 8 footed stirrup, some of the feet are close-meshed; greatest diameter 163 µm.

Occurrence: Known only from the type locality.

Nota bene: In reference to Reich (2003) remarks concerning the establishment of the genus *Priscoligula* Sadeddin (1996) which is in his opinion a younger synonym of *Calcligula* Frizzle and Exline (1955) and why it is erected within the family Priscopedatidae.

Frizzle and Exline (1955), in his original diagnosis of *Calcligula* and in the revised diagnosis (Frizzle and Exline, 1966: u 662) did not refer to the presence of a stirrup (elevation) which is a generic character of the representatives of the family Priscopedatidae. *Priscoligula* has a distinct stirrup. Therefore, the erection of a new genus within the family Priscopedatidae was justified. In our opinion, *Priscoligula* Sadeddin (1996) which consists of a perforated disk and one arm, is related to *Priscolongatus* (Górka and Luszczewka, 1969) which consists of a perforated disk with 2-4 arms, both seem to be an evolutionary stage within the family Priscopedatidae.

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