

# FOSSIL HOLOTHUROIDEA FROM KUTCH, INDIA—PART IV

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## ABSTRACT

The fossil holothurian sclerites recovered from the rocks of Khadir and Goradongar Formations of Middle Jurassic (? Callovian) age and exposed in Khadir and Patchham Islands, Kutch, India are systematically described and illustrated. The fossil suite belongs to families Priscopedatidae Frizzell and Exline and Protocaudinidae Deflandre and is represented by *Fletcherina acuta* Soodan, *Fletcherina godpurensis* Soodan, *Fletcherina pentaradiata* Soodan, *Sastriella pentaradiatus* Gorka; *Protocaudina elliptica* sp. nov. and *Protocaudina khadirensis* sp. nov. This is the first record of fossil holothurian sclerites from the rocks of Jurassic age exposed in the Island belt of Kutch and genus *Protocaudina* Croneis, 1932 from the rocks of Middle Jurassic age.

## INTRODUCTION

During the course of foraminiferal studies of the Mesozoic rocks exposed at Jumara and Jhurio Domes, Kutch mainland the author recorded a rich assemblage of fossil holothurian sclerites from the Jurassic rocks. Fossil sclerites of genera *Stueria* Schlumberger, 1888 and *Jumaraina* Soodan, 1973 of family Theellidae Frizzell & Exline, 1955; genus *Achistrum* Etheridge, 1881 of family Achistridae Frizzell & Exline, 1955 and genera *Feddenella* Soodan, 1975, *Fletcherina* Soodan, 1975 and *Sastriella* Soodan, 1975 of family Priscopedatidae Frizzell & Exline, 1955 revised Soodan, 1975 were systematically described by the author (SOODAN, 1972; 1973a, b; 1974; 1975a, b).

Upper Jurassic rocks encountered in the subsurface of Godpur shallow-well yielded seven species of fossil holothurian sclerites belonging to genera *Achistrum* and *Fletcherina* (SOODAN, 1975a).

This prompted the author to see the sclerite contents of the nearby Mesozoic rocks exposed in Khadir and Patchham Islands. The data are presented in this paper.

## DISCUSSIONS

The fossil holothurian sclerites were examined from the Mesozoic rocks exposed in Jumara and Jhurio Domes on the Kutch mainland, subsurface of Godpur shallow-well drilled in the south-west of Patchham Island and Khadir Island.

It has been observed that the Jurassic rocks exposed in Jumara and Jhurio Domes on Kutch mainland are rich in sclerite contents. Twenty-four species of fossil sclerites belonging to six genera and three families have been recorded (SOODAN, 1972; 1973a, 1973b; 1974; 1975b). The Jurassic deposits met in the subsurface in Godpur shallow-well yielded six species of fossil sclerites belonging to two genera and two families (SOODAN, 1975a).

The Jurassic rocks of Khadir and Patchham Islands have yielded six species of fossil sclerites belonging to three genera and two families which form the text of this paper.

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*Fletcherina acuta* has earlier been recorded from Jumara Dome and *F. godpurensis* and *F. pentaradiata* from Godpur shallow-well (SOODAN, 1975a). *Sastriella pentaradiatus* (GORKA, 1969) has not been so far reported from these areas.

The presence of *Protocaudina elliptica* sp. nov. and *Protocaudina khadirensis* sp. nov. in the rocks of Jurassic age is important because, so far, the genus *Protocaudina* Croneis, 1932, has not been reported from the rocks younger than Permian (Palaeozoic) in age.

This suite of sclerites is assigned Middle Jurassic (? Callovian) age on the basis of the presence of characteristic foraminifera and ostracoda studied by DR. PRATAP SINGH, Scientific Officer, Institute of Petroleum Exploration, Oil and Natural Gas Commission, Dehra Dun.

#### DISTRIBUTION AND STRATIGRAPHIC SIGNIFICANCE

In India, so far, very little work has been done on this group. The only record of some fossil holothurian sclerites are from the Cretaceous of Trichinopoly, S. India (GOWDA, 1954) and the Mesozoic rocks exposed in the Jumara and Jhurio Domes regions of Kutch (SOODAN, 1972; 1973a,b; 1974; 1975b).

This is the first record of fossil sclerites from the Island belt region of Kutch. These studies, if extended to other areas, will be of great help in the stratigraphic correlation of the Mesozoic rocks exposed in various Islands and the Mainland, Kutch.

#### SYSTEMATIC DESCRIPTIONS

Phylum—ECHINODERMATA

Class—HOLOTHUROIDEA

Family—PRISCOPEMATIDAE Frizzell & Exline, 1955 *rev.* Soodan, 1975

Genus—**Fletcherina** Soodan, 1975

##### **Fletcherina acuta** Soodan, 1975 (Figs. 11—14)

*Remarks*—The species recorded from Khadir Island differs from the holotype described from Jhurio Formation (Bathonian-Callovian), Jumara Dome, Kutch in its greater size, unequal length of the arms; length varies from 0.35 mm to slightly more than 0.40 mm (due to the broken nature of the arms actual length could not be measured).

*Type Material*—The illustrated specimens are hypotypes with numbers I.P.E. B04/04/179 (Figs. 11-12) and I.P.E. /B04/04/180 (Figs. 13-14).

*Locality*—Khadir Island (70°20'15" : 23°56'15" and 70°22'30" : 23°52'06"), Kutch India.

*Distribution*—Lower part of Khadir Formation (?Callovian).

##### **Fletcherina godpurensis** Soodan, 1975 (Figs. 7-8, 15-16)

*Remarks*—The specimens recorded from Goradongar Formation show quite a bit variation in the size of the sclerite. Accordingly the size of the central perforations, diameter of the arms, the nature of the stirrup too varies according to the overall size. The specimen shown in figures 7 and 8 is from lower horizon. These specimens differ from the holotype described from the Jurassic rocks encountered in Godpur well (SOODAN, 1975a) in their large size, bigger central perforation and bigger diameter of the arms.

*Type Material*—The specimens illustrated in this paper are hypotypes with numbers I.P.E./B04/04/181 (Figs. 7-8) and I.P.E./B04/04/182 (Figs. 15-16)

*Locality*—Khavda (23°50'38" : 69°46'24"), Patchham Island, Kutch, India.

*Distribution*—Goradongar Formation (?Callovian).

**Fletcherina pentaradiata** Soodan, 1975 (Figs. 5-6)

*Remarks*—The specimens recorded from Khadir Formation, as in other cases, are bigger than the holotype described from the Jurassic rocks encountered in Godpur well (SOODAN, 1975a). The present specimen is more than double in size from the holotype. Accordingly the size of the central perforation, diameter of the arms and the size of the stirrup is also increased. The size of the specimen is 0.45 mm (partly broken specimen).

*Type Material*—The illustrated specimen is hypotype number I.P.E./B04/04/183

*Locality*—Khadir Island (70°20'15" ; 23°56'15" and 70°22'30" : 23°52'06") Kutch, India.

*Distribution*—Lower part of Khadir Formation (? Callovian)

**Sastriella pentaradiatus** Gorka, 1969 (Figs. 9-10)

*Remarks*—The species from Khadir Formation, Kutch, India differs from the holotype described by GORKA (1969) from Polish Jurassic in general outline of the sclerites, distribution of perforations of the arms and smaller size. Diameter 0.20 mm.

*Type Material*—The illustrated specimen is hypotype number I.P.E./B04/04/184.

*Locality*—Khadir Island (70°20'15" : 23°56'15" and 70°22'30" : 23°52'06"), Kutch, India.

*Distribution*—Lower part of Khadir Formation (?Callovian).

Family—PROTOCAUDINIDAE Deflandre-Rigaud, 1962

Genus—**Protocaudina** Croneis, 1932

**Protocaudina elliptica** sp. nov. (Figs. 3-4)

*Diagnosis*—Sclerite in the form of medium-sized concave-convex wheel, elliptical outline ; periphery regular ; eight short and wide spokes tapering towards the rim ; interspoke-space somewhat triangular ; rim inclined to the plane of the wheel, curved upwards and inwards, inner margin dentate ; central part of the sclerite large with four perforations, two perforations large and nearer than the smaller ones ; diameters 0.17 mm and 0.20 mm.

*Type Material*—Holotype number I.P.E./H04/04/185.

*Locality*—Khadir Island (70°20'15" : 23°56'15" & 70°22'30" : 23°52'06"), Kutch, India.

*Distribution*—Lower part of Khadir Formation (?Callovian).

*Comparison*—This species differs from *Protocaudina khadirensis* sp. nov. and other species of the genus in having elliptical wheel.

*Derivation of name*—After the elliptical nature of the sclerite.

**Protocaudina khadirensis** sp. nov. (Figs. 1, 2)

*Diagnosis*—Sclerite in the form of medium-sized concavo-convex wheel ; periphery scalloped, scallops opposite the interspoke-space ; eight spokes, short, broad near the centre, thinner towards the periphery ; interspoke-space almost triangular with outer margins arched along the scallops ; rim inclined to the plane of wheel, curved upwards and inwards, inner margin finely dentate ; central part of the sclerite large with four perforations, two large and nearer than the smaller which are widely spaced, diameter 0.25 mm.

*Type Material*—Holotype number—I.P.E./H04/04/186.

*Locality*—Khadir Island (70°20'15" : 23°56'15" and 70°22'30" : 23°52'06"), Kutch, India.

*Distribution*—Lower part of Khadir Formation (? Callovian).

*Comparison*—*Protocaudina khadirensis* sp. nov. seems to be quite similar to *Protocaudina mortensteini* Deflandre-Rigaud, 1946 in outline but differs in the absence of a clear stirrup and coarse teeth.

*Derivation of name*—This species is named after Khadir Island of Kutch, India, from where recorded.

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#### EXPLANATION OF PLATE 1

All the specimens have been deposited in the Palaeontology Laboratory, Institute of Petroleum Exploration, Oil and Natural Gas Commission, Dehra Dun, India.

- 1, 2. *Protocaudina khadirensis* sp. nov. Holotype No. I.P.E./HO4/04/186; 1 dorsal and 2 ventral views. ×96.
- 3, 4. *Protocaudina elliptica* sp. nov. Holotype No. I.P.E./HO4/04/185; 3 dorsal and 4 ventral views. ×112.
- 5, 6. *Fletcherina pentaradiata* Soodan, 1975 (Hypotype No. I.P.E./BO4/04/183; 5 dorsal views. ×111. 6 ventral view ×109.
- 7, 8; 15, 16. *Fletcherina godpurensis* Soodan, 1975 Hypotypes Figures 7, 8 No. I.P.E./BO4/04/181; 7 dorsal and 8 ventral views. ×102. Figures 15, 16 No. I.P.E./BO4/04/182; 15 dorsal and 16 ventral view. ×105.
- 9, 10. *Sastriella pentaradiatus* (Gorka, 1969) Hypotype No. I.P.E./BO4/04/184; 9 dorsal and 10 ventral views. ×105.
- 11-14. *Fletcherina acuta* Soodan, 1975 Hypotypes. Figures 11, 12 No. I.P.E./BO4/04/179; 11 dorsal and 12 ventral views. ×103. Figures 13-14 No. I.P.E./BO4/04/180; 13 dorsal and 14 ventral views. ×110. and ×105 respectively.

