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SHORT COMMUNICATION

A NEW REGULAR ECHINOID FROM THE MIDDLE EOCENE OF KACHCHH, WESTERN INDIA

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ABSTRACT

A phymosomatoid echinoid genus *Kachchhia* n. gen. (referable to *K. krohi* n. sp.) is described and illustrated from the middle Eocene rocks of south western Kachchh, India.

Keywords: Regular echinoid, Phymosomatoida, middle Eocene, Kachchh

INTRODUCTION

The richly fossiliferous middle Eocene successions are well developed in the western part of Kachchh, Gujarat, India. They consist of two lithostratigraphic units: the lower Harudi Formation and the Upper Fulra Limestone, which are referable to late middle Eocene (Biswas, 1992). Rich assemblages of larger and smaller foraminifers characterize the upper part of the Harudi Formation and the Fulra Limestone in association with diverse macroinvertebrate community comprising bivalves, gastropods, nautiloids, echinoids, etc. Of these, the echinoids are well represented. Several species of both regular and irregular echinoids have been described from the upper part of the Fulra Limestone which truly represents the nummulitic deposit of the Tethyan region (d'Archiac and Haime, 1853; Duncan and Sladen, 1883; Roy and Das Gupta, 1970; Tandon and Srivastava, 1980; Srivastava, 1981; Srivastava, 1982; Srivastava, 1988; Srivastava, 2004; Srivastava and Singh, 1999; Srivastava and Singh, 2001; Srivastava and Srivastava, 1990). Present note reports the presence of a new regular echinoid from the upper part of the Fulra Limestone exposed along a stream about 3 km SSE of Harudi village on Baranda-Waior Road, southwestern Kachchh (Fig. 1). The GPS location of this section is 23° 29'21.6"N : 68°41'48.9"E.

The Fulra Limestone is equivalent to the Nummulitic Group of Wynne (1872). It is a thick sequence of massive to bedded, white and cream coloured foraminiferal limestone with intercalations of dirty white to cream coloured marls and is best developed in Rodasar, Harudi, Lakhmirani and Waghopadar. The limestones are mainly biomicrites and biomicrosparites (Hardas and Biswas, 1973). The lower part is dominated by *Discocyclina*, dominant, whereas the upper part is bioturbated and characterized by *Alveolina* and *Nummulites* in abundance and a large number of macroinvertebrates, of which echinoids are prominent.

In the studied section, a sequence of about 8 m consisting of thickly bedded limestone and marl is exposed. It is characterized by age-diagnostic species of *Nummulites*, *Discocyclina* and *Alveolina*, smaller benthic and planktic foraminifera and calcareous nannoplankton (Sen Gupta, 1964; Tandon, 1978; Samanta and Lahri, 1985; Singh and Singh, 1986; Samanta *et al.*, 1990; Jauhri, 1981, 1991, 1994; Rai, 1997; Samanta, 1998; Saraswati *et al.*, 2000). Based on biostrtigraphic indices of these microfossil groups, the Fulra Limestone has been dated as corresponding to Zone NP17 Zone (Martini, 1971) emended by Rai (1988) to include the upper part of Zone NP16 (*Discoaster tani nodifer* Zone) which is equivalent to part of both the zones P13 and P14, Bartonian, late middle Eocene (Rai, 1997; Singh, 1980).

SYSTEMATIC PALAEONTOLOGY

(Fell and Pawson, 1966)

Class **Echinoidea** Leske, 1778
Order **Phymosomatoida** Mortensen, 1904
Family **Phymosomatoidae** Pomel, 1883
Genus ***Kachchhia*** n. gen.
(Type species: *Kachchhia krohi* n. sp.)

Material: One specimen, partly broken; preservation excellent (Holotype – LUGD*/I/2028).
(*Lucknow University Geology Department).

Derivation of name: The genus has been named after the district Kachchh (area of its occurrence), Gujarat, India.

Diagnosis: Test large, low hemispherical. Apical disc small (not preserved). Ambulacra straight, polyporous and uniserial; ambulacral with phymosomatoid plates which are occluded both on aboral and oral sides; each with a single imperforate, crenulated primary tubercle situated near pore-pairs. The number of pore-pairs in an ambulacral plate on both aboral and oral sides almost same. Each interambulacral plate with a single primary imperforate, crenulated tubercle at the middle of the plate. Aboral interradial naked zone broad, depressed. Peristome large with peristomial notches and thickened lip.

Description: Test large, low hemispherical, aboral surface slightly convex while oral surface flat. Apical disc small (not preserved). Ambulacra straight, polyporous; ambulacral plates compounded in phymosomatoid type which are occluded both on aboral and oral sides; each plate has a single imperforate and crenulated primary tubercle which is situated near pore pairs; a few small secondary tubercles and granules are also present. Poriferous zone uniserial consisting of 5-7 pore-pairs per ambulacral plate on aboral side and 6-7 pore-pairs per plate on oral side. Interambulacral plates are wider than tall, each with a single imperforate, crenulated primary tubercle at the

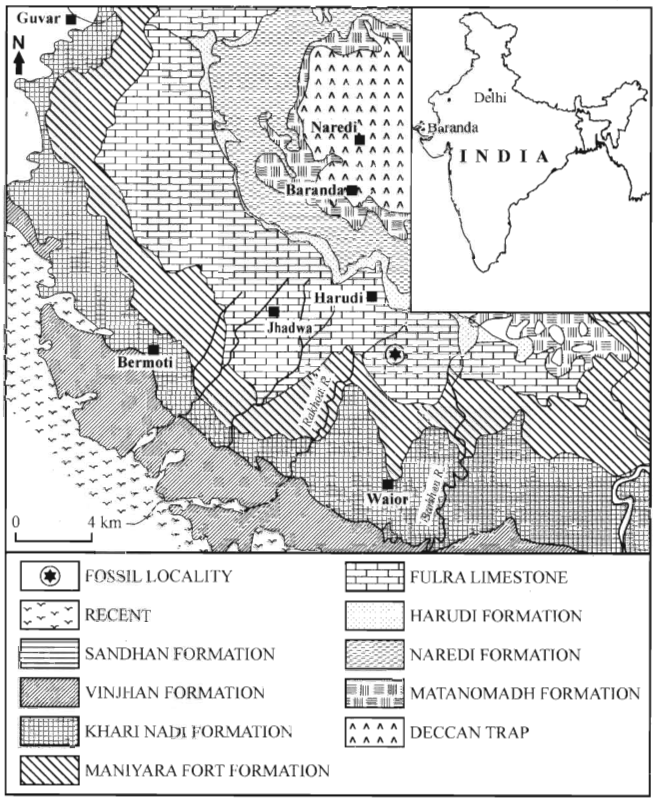


Fig. 1. Location and the geological map of the study area, southwestern Kachchh. Gujarat, India (Inset), (modified after Biswas, 1992)

middle of the plate, besides a few small secondary tubercles and granules. Aboral interradial naked zones broad and slightly depressed. Peristome sunken, larger than the apical disc, circular in shape with peristomial notches and thickened lip; a row of tubercles present along the adradial suture near peristome.

Remarks: *Kachchhia* n. gen. resembles *Dixieus Cooke*, 1941 (Smith, 2007) in shape but it differs from the latter in having uniserial and almost identical number of pore-pairs per plate (5-7 pore-pairs) both on aboral and oral sides. *Dixieus* Cooke, 1941 is characterized by 10-12 biserial pore pairs per plate on aboral side and 5-6 biserial pore-pairs per plate on the oral side. The new genus is easily distinguishable from all other known phymosomatoid genera by its uniserial and less number of pore-pairs throughout the poriferous zone on both aboral and oral sides, besides, the presence of a row of tubercles along the adradial sutures near peristome.

Type Locality: Three km SSE of Harudi Village, Kachchh, Gujarat, India.

Type Horizon: Fulra Limestone (late middle Eocene).

Kachchhia krohi n. sp.

(Pl. I, figs. 1-9)

Material: One specimen, partly broken; preservation excellent (Holotype – LUGD/I/2028).

Derivation of name: The species has been named in honour of Dr. Andreas Kroh, Natural History Museum, Vienna, Austria for his contribution to fossil echinoids.

Diagnosis: Test large, low hemispherical. Apical disc small (not preserved). Ambulacra straight, polyporous, uniserial; ambulacral with phymosomatoid plates which are occluded both on aboral and oral sides; each plate characterized by a single imperforate and crenulated primary tubercle. 5-7 pore-pairs per ambulacral plate on both aboral and oral sides. Interambulacral plates wider than tall, each with a single primary imperforate, crenulated tubercle. Aboral interradial naked zones broad and depressed. Peristome sunken, large with peristomial notches and thickened lip.

Description: Test large, low hemispherical, aboral surface slightly convex, oral surface flat. Apical disc small (not preserved). Ambulacra straight, polyporous; ambulacral plates compounded in phymosomatoid type which are occluded both on aboral and oral sides; each plate with a single imperforate, crenulated primary tubercle which is situated near pore-pairs; a few small secondary tubercles and granules also present. Poriferous zone uniserial, consisting of 5-7 pore pairs on aboral side and 6-7 pore pairs on oral side. Interambulacral plates wider than tall, each with a single imperforate, crenulated primary tubercle at the middle of the plate, a few small secondary tubercles and granules also present. Aboral interradial naked zones broad and slightly depressed. Peristome sunken, larger than the apical disc, circular in shape, with peristomial notches and thickened lip. A prominent row of tubercles extending up to a short distance from the peristome, has been observed on each side of adradial suture which later merges with the tubercles of the interambulacral plates.

Measurements: Maximum diameter of the test: 59.84 mm.

Type Locality: Three km SSE of Harudi Village, Kachchh, Gujarat, India.

Type Horizon: Fulra Limestone (late middle Eocene).

DISCUSSION

The proposed new genus, though presently represented by a single specimen only, is quite distinct from other known phymosomatoid genera. The closest resemblance of this form is with *Dixieus* Cooke, 1941 which shows 10+ pore-pairs with biserial arrangement on aboral side and 6-7 biserial pore-pairs on oral side. The new form, however, is distinguished by 5-7 uniserial pore-pairs on both aboral and oral sides. Though it

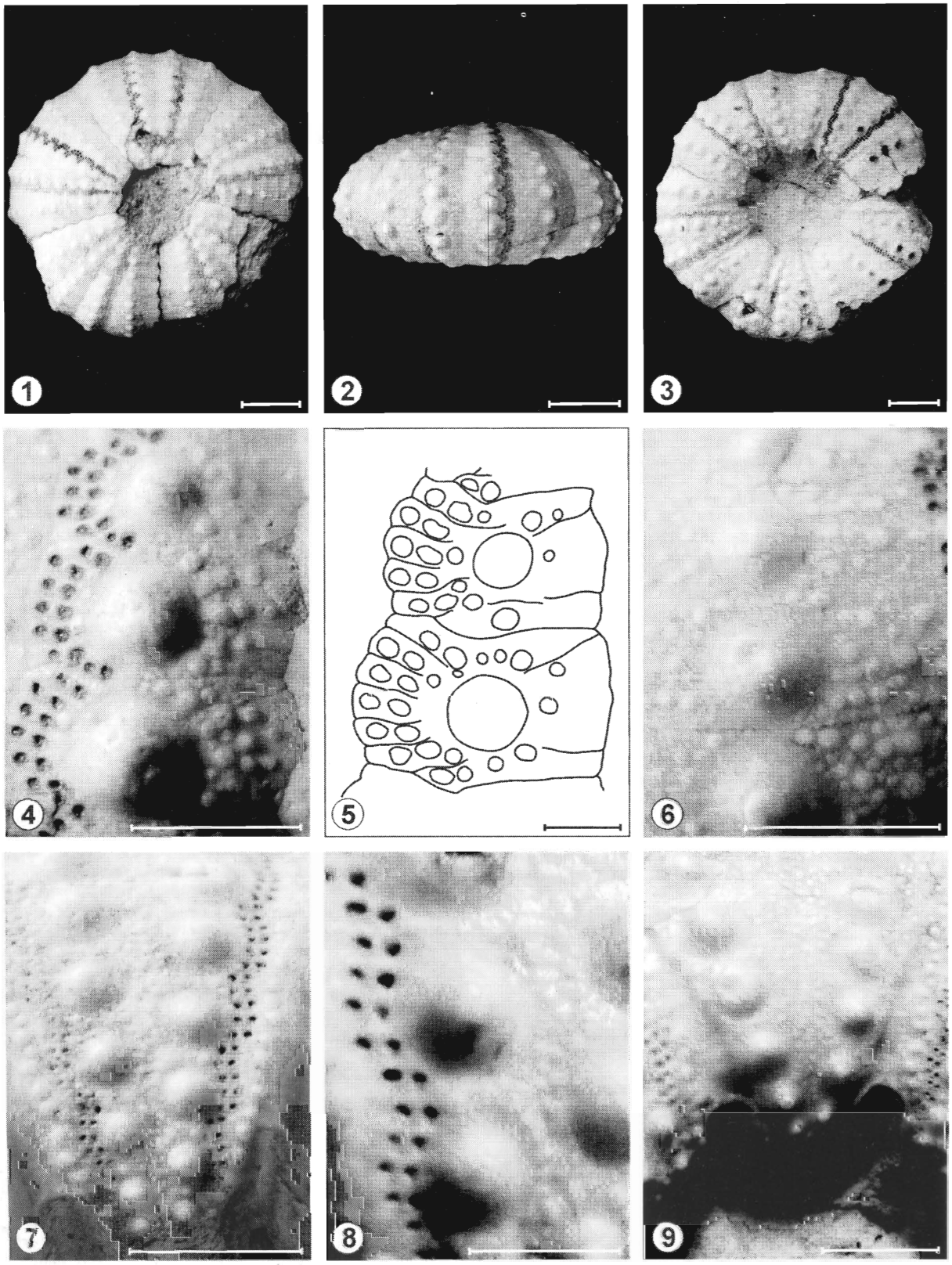
EXPLANATION OF PLATE I

(Bar represents 5.00 mm otherwise as stated)

1-9. ***Kachchhia krohi*** n. sp. (Holotype No. LUGD/I/2028)

1. Aboral view (Bar represents 10.00 mm).
2. Lateral view (Bar represents 10.00 mm).
3. Oral view (Bar represents 10.00 mm).
4. Part of ambulacra showing plates and tubercles.
5. Line drawing showing phymosomatoid compounding of ambulacral plates (Bar represents 2.00 mm).
6. Part of interambulacra showing plates and tubercles.
7. Ambulacral plates near peristome showing row of tubercles along the adradial suture.
8. Part of ambulacral plates near the peristome (Bar represents 2.5 mm).
9. Interambulacra near the peristome showing the peristomial notches.

Plate I



is not possible to work out the range of characters in our study, the present specimen is established as *Kachchhia* n. gen. assigned to *Kachchhia krohi* n. sp. because of its quite distinctive character of uniserial arrangement of pore-pairs, a feature not found in other known phymosomatoids.

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