

PAKISTANI ECHINODERMS - AN ILLUSTRATED OVERVIEW

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ABSTRACT

Any one who has been to the beach has probably seen starfish. The more intrepid beachcomber may find brittle stars, sea cucumbers, or sea urchins there. They all make up the Echinodermata, the largest phylum to lack any freshwater or land representatives.

The survey of various localities has revealed a rich coastal fauna. To date thirty seven species of echinoderms have been collected along Pakistan coast (northern Arabian Sea) belonging to 20 families and 26 genera. The present paper depicts a close look of each of the 37 species and its ecology/habitat and colour.

Key-words: Echinoderms, illustrated study, coastal fauna, distribution, Pakistan.

INTRODUCTION

Echinoderms are remarkable and beautiful members of the shallow water Arabian Sea biota. It is no wonder that they invariably fascinate scientists, students and even casual observers of marine life. There are very few published records of Pakistani echinoderms. Two records Hoque (1969) and Clark & Rowe (1971) are available. The recent published records are Tahera, 1993; 1995a; 1995b; 1996a; 1996b; 1997, 2001 and 2003 etc.

To date 37 species of echinoderm pertaining to all five classes (6 Asteroids, 11 Ophiuroids, 6 Echinoids, 12 Holothuroids and 2 of Crinoids) have been reported along Pakistan coast. They all are belonging to 20 families & 26 genera. A checklist of known echinoderm species collected along the coast of Pakistan was published by Tahera (1996). The species marked by an asterisk are not reported in the authors collection.

The present paper presents a close look of each species with a note on its ecology, habitat and colour. The echinoderm fauna of this region is most diverse of all the temperate waters of the world.

This study will serve as a reference and research guide to those who are working on the coast Pakistan and in the northern Arabian Sea.

MATERIALS & METHODS

The specimens reported herein were collected randomly from different coastal sites of Pakistan and the specimens housed in the MRC RC, University of Karachi which were collected over the last few years were also studied. Different preservation techniques were used to preserve the representative of all five classes.

Asteroids and Ophiuroids were relaxed by spreading them in seawater, aqueous $MgSO_4$ was sprinkled and fresh water was added gradually. The fully relaxed specimens were finally preserved in 70 percent alcohol.

Echinoids were treated with soap water or house hold bleach for removing the spine. The shells were then stored dry. The growth lines in echinoids were studied by scroching the plates and then dipped in xylene. The thin plates were examined by adding a drop of machine oil, care was taken not to pick sea urchin without wearing gloves.

The holothurians were either relaxed in sea water and chilled gradually for about half an hour so that the tentacles, papillae and the tube feet remained in an extended position. Holothurians were narcotized in 10 percent $MgSO_4$ for about twelve hours. 70 percent alcohol was then injected in the body. For identification permanent microscopic slides of spicules were prepared by adding house hold bleach ($NaOCl$). The slides were dried, rinsed and mounted. The same procedure is followed with few asteroids for pedicellariae.

Reference to authorities of species are not included in the reference..

RESULTS

Asteroidea

Luidia maculata Muller and Troschel, 1842
(Fig1.A)

Ecology/Habitat: Rare,subtidal,shallow water. There is a record of collection of the species up to the depth of 200 fathoms

Colour :When living, is mouse dorsally and yellowish white ventrally (Hoque,1969)

Astropecten indicus Doderlein,1888
(Fig. 1B)

Ecology/ Habitat : Common species ,sandy starfish, half buried in sand, exposed at low tide. Abundant after dredging up to 15 fms.

Colour :Aboral surface pale grey or yellow white, oral whitish, base of superomarginals yellowish orange.

Anthenea rudis Koehler, 1910
(fig. 1C)

Ecology/ Habitat: Uncommon species, collected from shallow water on sandy beds, remains attached to the rocks in the intertidal zone.

Colour; Live animals are greyish orange which turn orange after preservation in 70 % alcohol and later decolourized. Preserved specimens are creamy white.

Asterina lorioli (Koehler,1910)
(Fig. 1D)

Ecology/ Habitat: Commonly seen in tide pools exposed at low tide, littoral ,probably shallow water species on the Arabian coast.

Colour: Variable, either mottled or plain, may be shades of orange with blotches of mauve and red above and creamy white below .

Asterina burtoni (Gray,1840)
(Fig. 1E)

Ecology/ Habitat: Common, littoral, may be found under stone ,among algae *Zostera* and deep sea. (Hoque,1969)

Colour ; Mostly greyish - orange and light yellow orally.

Asterina sp.
(Fig. 1F)

Ecology/ Habitat: Collected from under rock or mud from Gawader (Mekran coast)

Colour: Preserved specimens creamy white.

OPHIUROIDEA

Macrophiothrix aspidota (Muller and Trochel, 1842)
(Fig. 2A)

Ecology/ Habitat: Found near low tide marks in tide pools under small rocks. According to Hoque (1969) it is common dweller of mud, under stone.

Colour: Live animal purple, with dark mauve spots on the disc and the arms; abactinal surface cream,arms are lighter or of a different hue from the disc.

Ophiothela danae(Verril,1969)

Ecology/Habitat: It is an epizoic species attached to gorgonia.

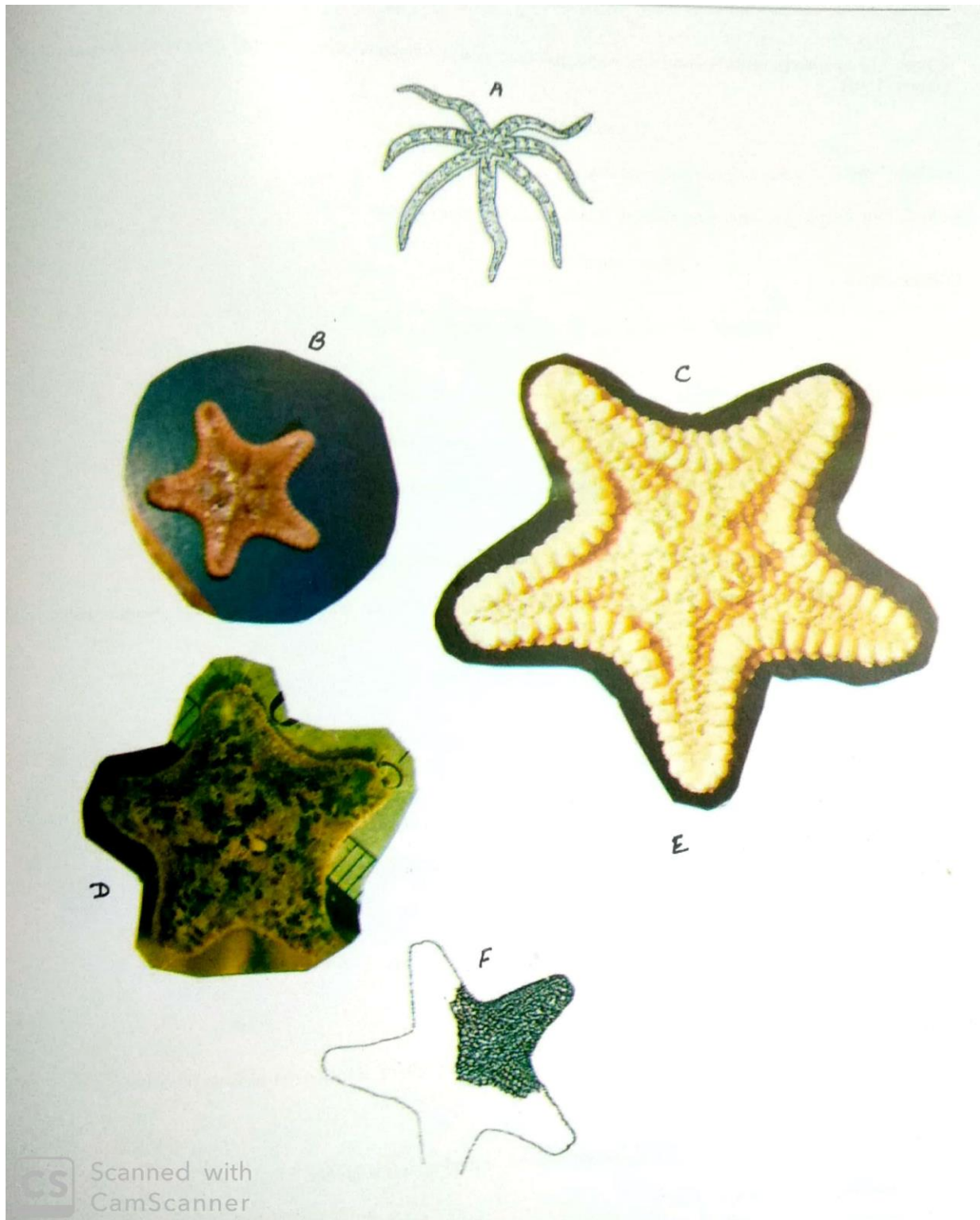


Fig.1(A-F) abactinal views of Asteroidea: A. *Luidia maculata* Muller and Troschel, 1842; B. *Astropecten indicus* Doderlein, 1888; C. *Anthenia rudis* Koehler, 1910; D. *Asterina lorioli* Koehler, 1910; E. *Asterina burtoni*, (Gray, 1840) and F. *Asterina* sp.

Colour: Live specimens variable in colours, orange, red maroon, blue with contrasting coloured spots is most common (see Tahera, 2001)

O. venusta (de Loriol, 1900)

Ecology/Habitat It is also an epizoic species attached to gorgoni.

Colour : Disc light purple , arms with purplish –black bands.(see Tahera, 2001)

O. hadra (Clark, 1915)

(see Tahera, 2001)

Ophioplocus imbricatus (Muller and Troschel, 1842)
(Fig. 2B)

Ecology/ Habitat: Common in tide pool near intertidal under small rocks and stone.

Colour: grey orally, cream and pale yellow aborally. Arms with transverse brown band.

Ophioneries dubia (Muller and Troschel, 1842)
(Fig. 2C)

Ecology/ Habitat: Uncommon, found under small rocks and stones found in tide pools near intertidal zone.

Colour: Disc grayish yellow with dark brown “Y” shaped open reticulation on oral side. Aboral side cream or pale yellow, arms with alternate bands of cream and brown.

Amphipholis squamata (Delle Chiaje, 1828)

(see Tahera, 2003)

Ophiopeza fallax (Peters, 1851)
(Fig. 2D)

Ecology/ Habitat: Commonly found in shallow water hiding under rock or buried in sandy muddy bottom.

Colour: Abactinal brownish grey, actinal pale cream , arms marked with alternate bands of sharply defined dark brown and cream.

O. (fallax) arabica (A.M. Clark, 1968)
(Fig. 2E)

Ecology/ Habitat: Uncommon, intertidal.

Colour: Specimens pale or dark brownish grey , often dappled with number of transverse bands on the arms.

Amphiura (Ophiopeltis) tenuis (H.L. Clark, 1938)
(Fig. 2F)

Ecology/Habitat: Rare, found in shallow water, buried in sand or mud of soft substrate.

Colour: Live animal pale yellow and cream.

Ophiactis savignyi (Muller and Trosche, 1842)

Ecology/ Habitat: Most common species, found in shallow water, intertidal, epizoic on gorgonia, also collected among weeds and from crevices of rocks.

Colour: Variable with various combinations of single mold greenish yellow, brown and cream or both surfaces variegated with a pattern of light and dark green spots.(see Tahera,2001)

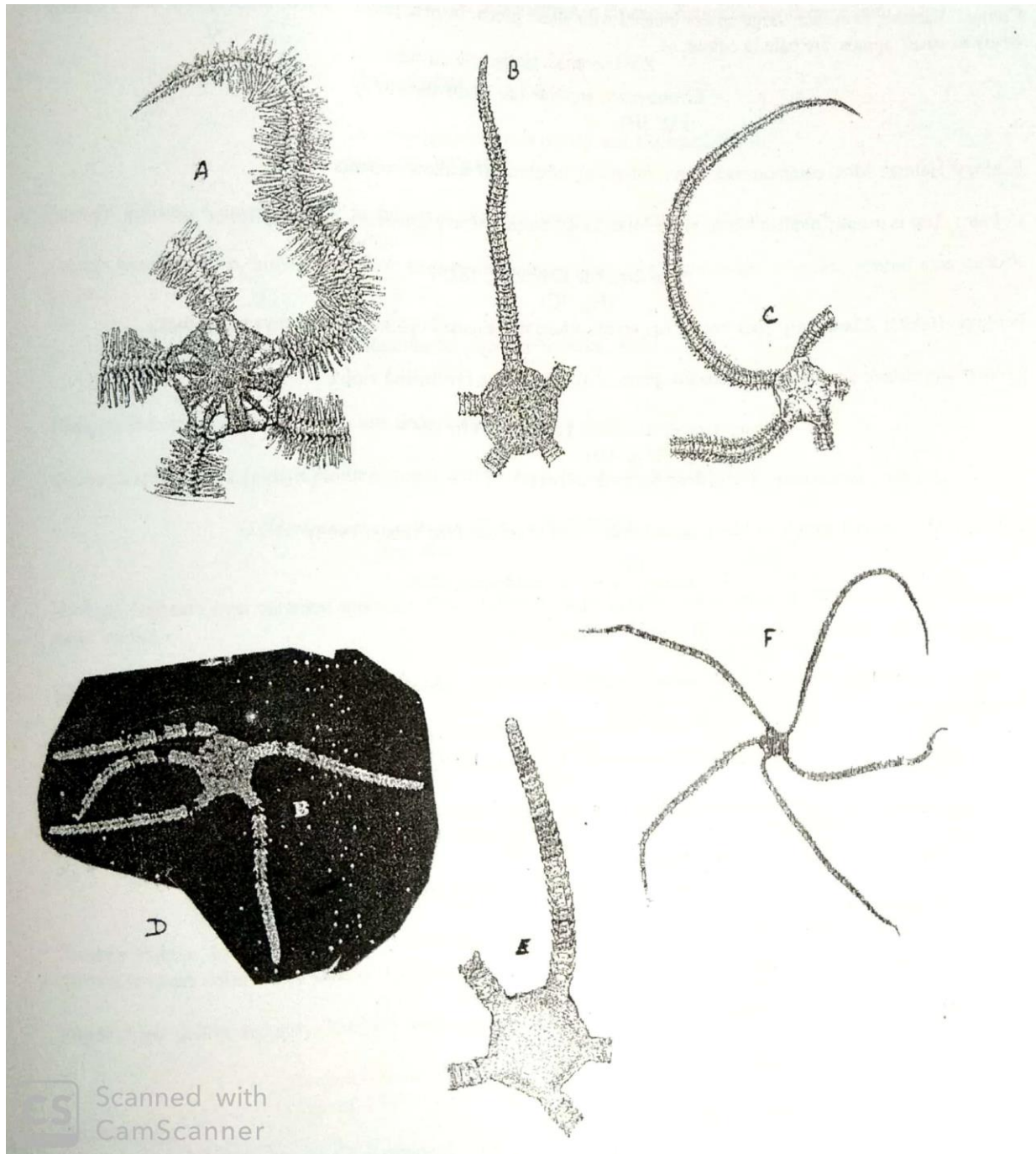


Fig. 2(A-F). Dorsal views of Ophiuroidea: A. *Macrophiothrix aspidota* (Muller and Troschel,1842); B. *Ophioplocus imbricatus* (Muller and Troschel,1842);C. *Ophionereis dubia* Muller and Troschel,1842; D. *Ophiopeza fallax* (Peters,1851); E. *Ophiopeza fallax arabica* (A.M.Clark,1968) ; F. *Amphiura (ophiopeltis) tenuis* (H.L.Clark,1938).

Echinoidea

Temnopleurus toreumaticus (Leske, 1778)
(Fig. 3A)

Ecology /Habitat: Uncommon, Lives in crevices of rocks or in mud under stones. Thousands of specimens were dredged during a day cruise on research vessel "P.N.S Behar paima" 19.5 miles away from shore.

Colour: Variable in colour large spines banded with white green, brown, purple or red, large spines faintly banded where as small spines are pale in colour.

Echinometra mathaei (de Blainville, 1825)
(Fig. 3B)

Ecology/ Habitat: Most common rock borer, intertidal, inhabits of shallow burrows.

Colour : Test is usually reddish black. Sometimes violet black, primary spines are dull purplish or greenish

E. molaris (de Blainville, 1825)
(Fig. 3C)

Ecology/ Habitat : Commonly rock boring sea urchin. adults make small cylindrical burrows in the rocks.

Colour: Specimens very dark with banded spines of alternate deep brown and violet

Stomopneustes variolaris Lamarck, 1816
(Fig. 3D)

Ecology/ Habitat : Commonly live in deep burrows in rocks

Colour: Alive animal purple or black , spines deep violet in colour. (see Tahera, 1993)

Clypeaster rarispinus de Meijere, 1902
(Fig. 3 E)

Ecology/ Habitat: common lives buried in sandy or muddy shore.

Colour: Preserved specimens are pale white ambulacral areas pale yellow. Spines greenish yellow in small and dull in large specimens.

* *Arachnoides placenta* Linnaeus, (1758)

Ecology/ Habitat: Rare , collected from sandy and muddy shore at low tide mark.

Colour; Colour of the test is grey. (See Hoque, 1968)

HOLOTHUROIDEA

Aslia forbesi (Bell, 1886)
(Fig. 4A)

Ecology/ Habitat: Uncommon species , found attached on rocks or crevices.

Colour: whitish , tentacles are dark brown.

Staurothyone rosacea Semper, 1886
(Fig. 4B)

Ecology/ Habitat: Common , collected from rocky shore

Colour: As the name indicates the body is red rose colour , tentacles are purple or yellow.

Stolus buccalis Stimpson,1855
(Fig. 4C)

Ecology/ Habitat :Common species ,found in stones where it remains attached to rocks.

Colour: Live are light purple ,becomes white on preservation in alcohol. Tentacles are deep brown.

Cucumaria. conjugens Semper,1868
(See Tahera,2004)

Actinopyga mauritian (Quoy and Gaimard,1883)
(Fig. 4D)

Ecology/ Habitat: Common ,found in the intertidal area, hiding under small rocks and stones.

Colour: Dorsal side is brown and olive brown with conspicuous black and white blotches, ventral side pinkish brown..

Holothuria (Lessonothuria) pardalis Selenka,1868
(Fig. 4E)

Ecology/ Habitat; common species, live under rocks in intertidal zone

Colour; Variable, live animals mottled brown .the species pale, tan and grey speckled.

H.(Mertensiothuria)leucospilota (Brandt,1835)
(Fig. 4F)

Ecology/ Habitat: Less common species, collected from tidal pools under small stones, with the posterior end tucked under stones.

Colour: Live animal blackish purple or black

H.(Platyperona) difficilis Semper ,1868
(See Tahera and Kazmi,1995)

H.(Thymiosycia) arenicola Semper,1868
(See Tahera and Tirmizi,1995)

* *Synapta inhaerens* Muller and Troschel

Ecology/ Habitat: Lives buried in sand, black mud, gravel, clear mud or in mixed soil.(sandy and muddy).This often exposes between tides Where sand is still wet.

Colour: Light yellow and grey.(Hoque,1969)

Synaptula recta Semper,1868
(See Tahera, 1997)

CRINOIDEA

Comanthus samoanus A.H.Clark,1909
(Fig. 4G)

Ecology / Habitat: Rare species (collected from the sandy beach of Jiwani)

Colour; Dark brown oral and aboral faces, cirri pale brown.

C.parvicirrus J.Muller,1841
(Fig. 4H)

Ecology / Habitat; Rare species, collected from Jiwani.

Colour: Colour of the species is chocolate deep brown or lighter brown.

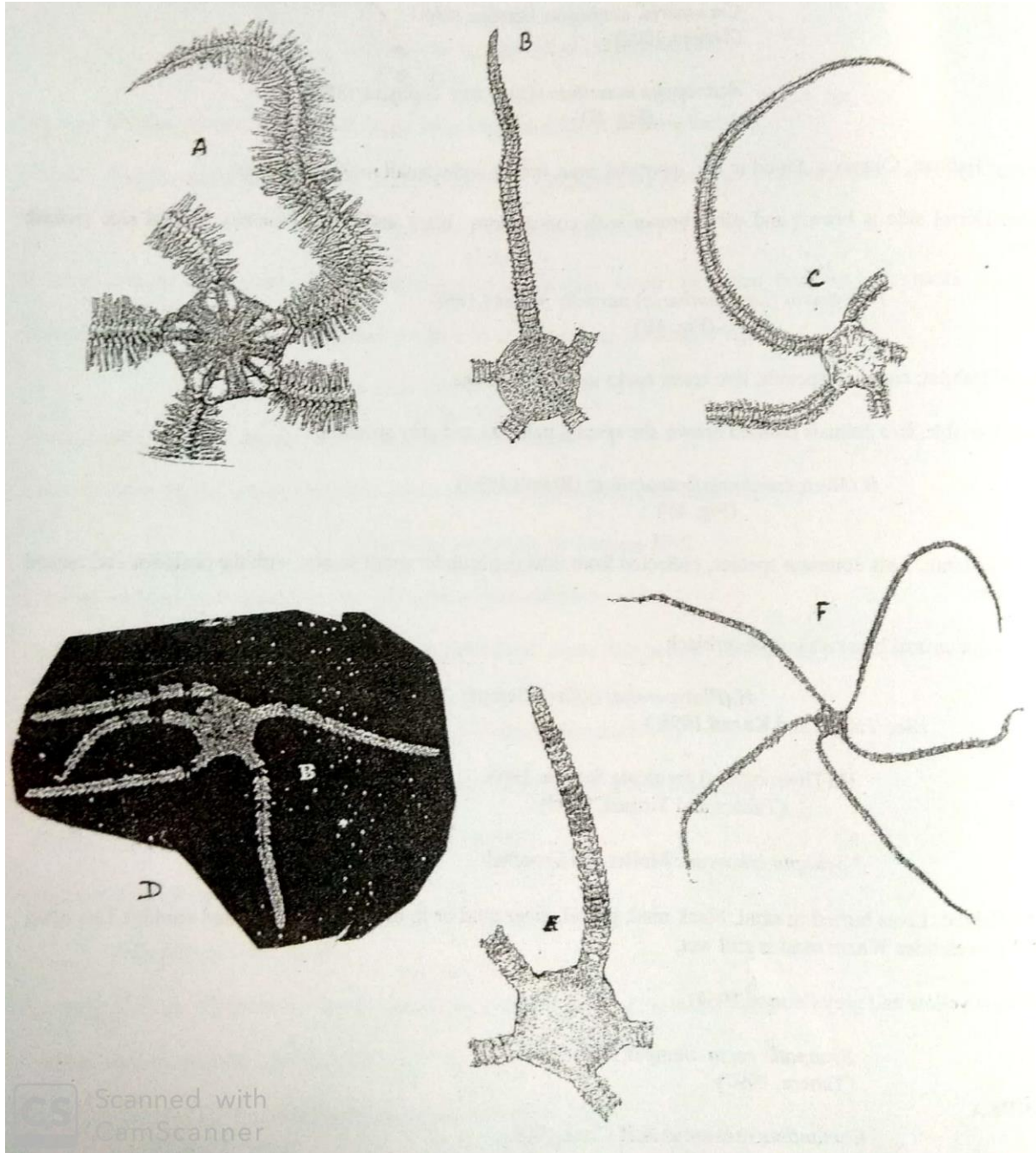


Fig. 3(A-E). Dorsal views of test: A. *Tmnopleurus toreumaticus* (Leske,1778); B. *Echinometra mathaei* (de Blainville,1825); C. *E. molaris* (de Blainville,1825); D. *Stomopneustes variolaris* Lamarck,1816; E. *Clypeaster rarispinus* de Meijere,1902.

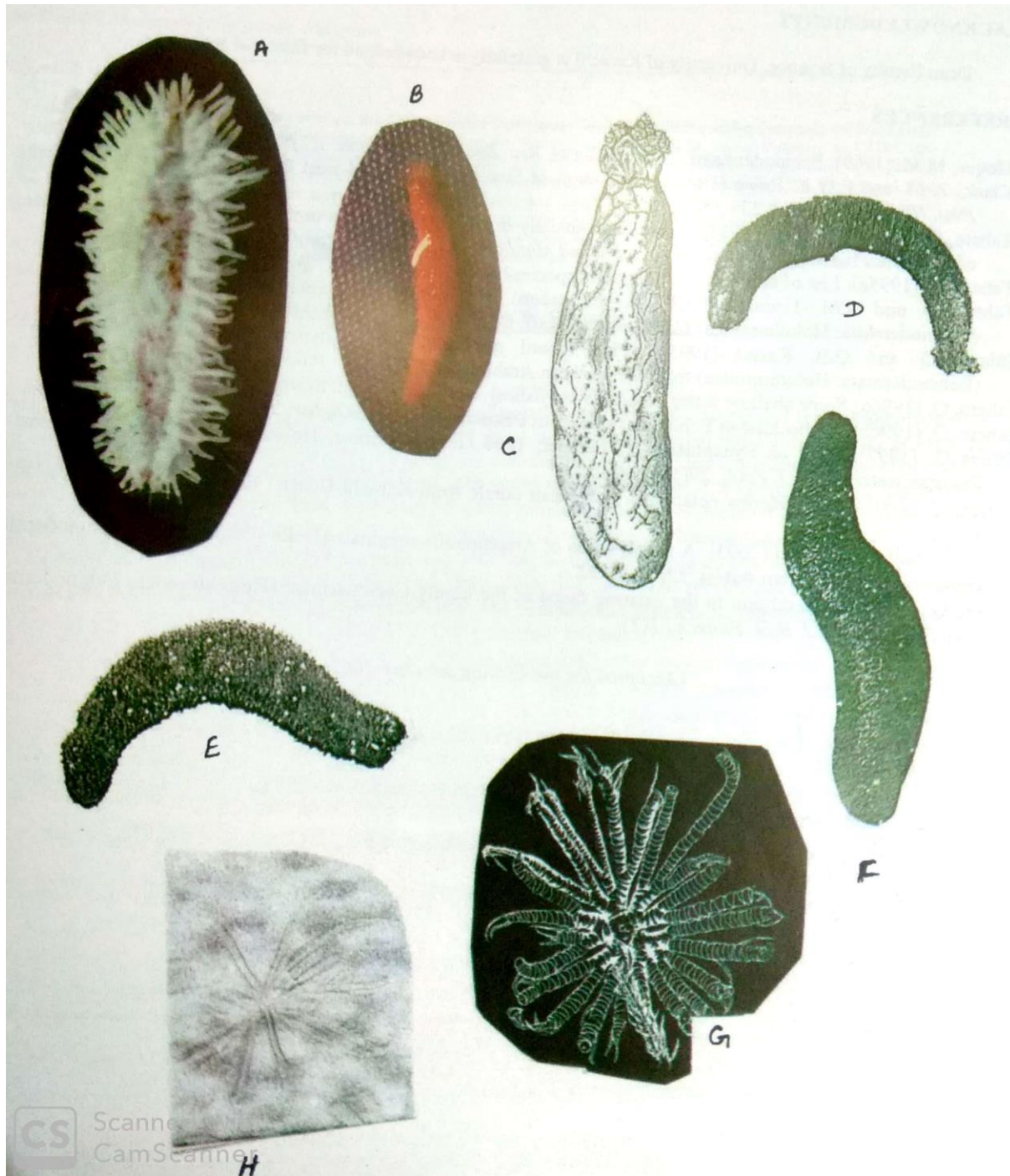


Fig. 4(A- H). Animal in dorsal views: A. *Aslia forbesi* (Bell,1886); B. *Staurothyoe rosaea* Semper,1886; C. *Stulus buccalis* Stimpson,1855;D. *Actinopyga mauritiana* (Quoy and Gaimard,1883); E. *Holothuria (Lessonothuria) pardalis* Selenka,1868; F. (*Mertensiothuria*) *leucospilota* (Brandt,1935); G. *Comanthus samoanus* A.H.Clark.1909 and H. *Comanthus parvicirrus*. J.Muller,1841

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