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APRIL 1989



MARINE LIVING RESOURCES OF THE UNION TERRITORY OF LAKSHADWEEP —

**An Indicative Survey
With Suggestions For Development**

**CENTRAL MARINE FISHERIES RESEARCH INSTITUTE
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Limited Circulation

11. ECHINODERMS OF LAKSHADWEEP AND THEIR ZOOGEOGRAPHY

D. B. James

Dr. Stanley Gardiner carried out an extensive survey in the Maldives and Minicoy Islands, the Southernmost of the Lakshadweep group of Islands. Echinoderms other than the holothurians were dealt by Bell (1902) who reported four species of starfishes from Minicoy Island. Corrections for some of the species have been given by A. M. Clark and Davies (1966). Koehler and Vaney (1908) reported three species of holothurians from the Lakshadweep. Holothurians of Gardiner's collection was dealt in a cursory manner by Pearson (1913, 1914). James (1969) recorded forty species of echinoderms from various Islands of the Lakshadweep. Naghabushanam and Rao (1972) reported 49 species of echinoderms from the Minicoy Island, the identity of some need to be checked. Mürty *et al.* (1979) reported the notorious starfish the crown of thorns *Acanthaster planci* from Minicoy Atoll. Recently Mukhopadhyay and Samanta (1983) reported twelve species of holothurians from the Islands of Androth, Kalpeni and Minicoy.

Material collected by the three teams of CMFRI during January to March, 1987 form the main basis for this paper. Collections made by Mr. M. Ali Manikfan from Minicoy and other Islands and also by Mr. K. C. S. Panicker from Kavaratti and Agatti have also been included. Throughout this account, references are kept to a minimum by citing only original references, references pertaining to Lakshadweep and one or two standard references.

SYSTEMATIC ACCOUNT

Echinoderms belonging to all the five classes have been collected. A single specimen of crinoid which was collected at Kadmat was broken to small bits rendering identification impossible.

Class ASTEROIDEA

Species belonging to two orders are reported from the Lakshadweep.

Key to the orders of the class

Conspicuous marginal plates in two rows bordering the disc and arms; pedicellariae sessile or alveolar type; tubefeet in two rows, with or without suckers.....PHANEROZONIA

Conspicuous marginal plates forming a broad verticle edge to the arm usually wanting; aboral skeleton reticulate or imbricate; tubefeet in two rows with suckers; pedicellariae rarely present....
..... SPINULOSA

ORDER : PHANEROZONIA

This order includes five suborders *viz.*, Pustulosa, Cribellosa, Paxillosa, Notomyota and Valvata. Members belonging to the suborder Pustulosa are completely extinct. Members belonging to the suborders Paxillosa and Valvata are known from the Lakshadweep.

Key to the suborders of the Order

Skeleton of dorsal surface with typical paxillae; tubefeet devoid of suckers.....PAXILLOSA

Skeleton of dorsal surface paxilliform or otherwise; tubefeet with suckers.....VALVATA

SUBORDER : PAXILLOSA

Species belonging to the Families Luidiidae and Astropectinidae are known from the Lakshadweep.

Key to Families of the Suborder

Long flexible arms with relatively small disc; arms 5-11 bordered with spiny fringe; supero-marginals reduced and appear identical with adjacent paxillae; infero-marginals much elongated transversely and cover greater part of the ventral sideLUIDIIDAE

Body stellate with conspicuous marginal, plates; marginal plates covered with little spines that increase in size at the margin
.....ASTROPECTINIDAE

Family : LUIDIIDAE

This family includes only one genus viz. *Luidia*.

Genus *Luidia* Forbes, 1839

Only one species viz., *Luidia maculata* Muller & Troschel is known from the Lakshadweep

Family : ASTROPECTINIDAE

Species belonging to the genus *Astropecten* are recorded from the Lakshadweep.

Genus *Astropecten* Gray, 1840

Three species are known from the Lakshadweep.

Key to the species of the genus

- 1. All the supero-marginal plates with long pointed spines; usually second plate small and spineless (sometimes plates 2-4 without spines) *A. Polyacanthus* Muller & Troschel, 1842
- 1'. All the supero-marginal plates with moderately developed spines.....2
- 2. Distal supero-marginal plate with a spine on the outer part of plate; tips of arms more or less blunt *A. indicus* Doderlier 1889
- 2'. Distal supero-marginal plates rarely with any large spines; only diminutive spines below the main infero-marginal plate..... *A. monacanthus* Sladen, 1883

SUB-ORDER VALVATA

Species belonging to two Families are known from the Lakshadweep. Species belonging to the Family Asteropidae is recorded for the first time in this work.

Key to the Families of the Sub-Order

- 1. Dorsal skeleton reticulate with secondary plates joining the primary ones and leaving conspicuous large poriferous areas in between; marginal plates well developed but not conspicuous (except in specimens of *Culcita*) and sometimes completely covered by thick skin.....OREASTERIDAE
- 1'. Dorsal skeleton not reticulate; dorsal side either covered by granules or by membrane2
- 2. Members with small disc, long flexible cylindrical arms with reduced and inconspicuous

marginal plates with smooth surface although some species are warty; armament usually granuliform, sometimes increasing in size or modified into tubercles; intermarginal plates if present occur only basally

.....OPHIDIASTERIDAE

- 2'. Dorsal surface is membraneous; marginal plates are exposed and are more or less overlapping..... ASTEROPIDAE

FAMILY : OREASTERIDAE

Members belonging to this Family are usually large with reticulate skeleton. Two genera are known under this Family. A third genus viz., *Halityle* is recorded for the first time.

Key to the genera of the Family

- 1. Arms well developed; only the primary plates of the upper side with elevations; pore areas well defined *Pentaceraster* Doderlein, 1916
- 1'. Body pentagonal or almost circular in outline.....2
- 2. Marginal plates clearly seen even in large specimens; tubercles absent on the dorsal side; pore areas well defined and triangular in shape; granules of the actinal plates markedly flattened and forming a smooth plastering following the contours of the plates *Halityle* Fisher, 1913
- 2'. Marginal plates concealed by thickened skin; some enlarged tubercles often present on the dorsal side; pore areas irregular and sometimes indistinct or more or less continuous; actinal granules mostly coarse and individually distinct, often obscuring the limits of the plates..... *Culcita* L. Agassiz, 1835

Genus *Pentaceraster* Doderlein, 1916

Under this genus only one species is collected.

Pentaceraster regulus (Muller & Troschel 1842)

Pentaceraster regulus Muller & Troschel, 1842, p. 51: Bay of Bengal.

Pentaceraster australis James, 1969, p. 52: Gulf of Mannar, Palk Bay Lakshadweep.

Pentaceraster regulus A.M. Clark & Rowe, 1971, pp. 34,55: Bay of Bengal, East Indies, North Australia, Philippines, China and

Southern Japan, South Pacific Islands (Distribution Table); James, 1986, p. 579: Lakshadweep & Maldives, Gulf of Mannar and Palk Bay along the South East coast of India (Distribution Table).

Material: Bitra, one specimen, depth one metre:

Remarks This species was collected from Bitra in 1968 and during the present survey not a single specimen was collected. It is very rare and was recorded for the first time from Lakshadweep by the author in 1969.

Genus *Halityle* Fisher, 1913

One species is collected under this genus for the first time from the Lakshadweep.

Halityle regularis Fisher
(Fig. 1)

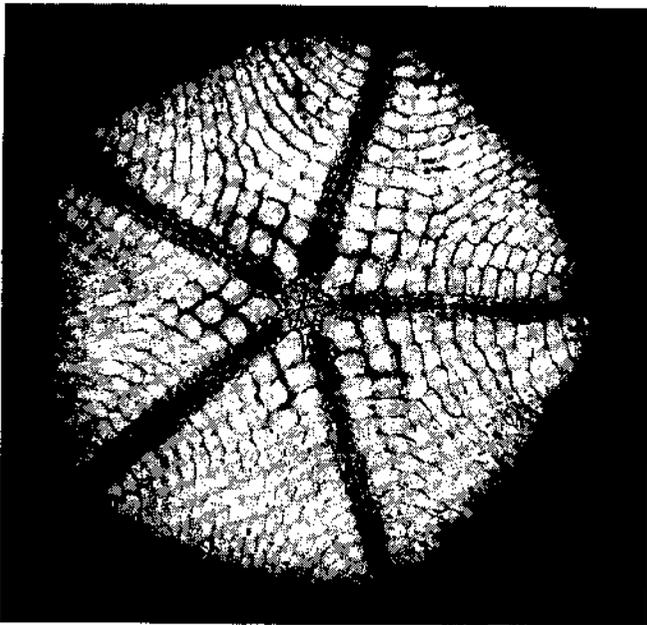


Fig. 1 *Halityle regularis*

Halityle regularis Fisher, 1913, p. 211: Philippines; James, 1973, p. 557: Gulf of Mannar; A. M. Clark & Rowe, 1971, pp. 34, 53: Philippines (Distribution Table)

Material: Kiltan, one specimen, washed ashore.

Remarks: It is a rare species and is recorded here for the first time from Lakshadweep.

Genus *Calcita* L. Agassiz, 1835

This genus is common in Lakshadweep. Only one species is known earlier, now a second species is recorded for the first time here

Key to the species of the genus

- No spines or spinlets on the pore areas.....
Calcita schmideliana (Retzius, 1805)
- Some spines or tubercles present within pore areas
Calcita novaeguineae Muller & Troschel, 1842

Calcita Schmideliana (Retzius 1805)
(Figs. 2 & 3)

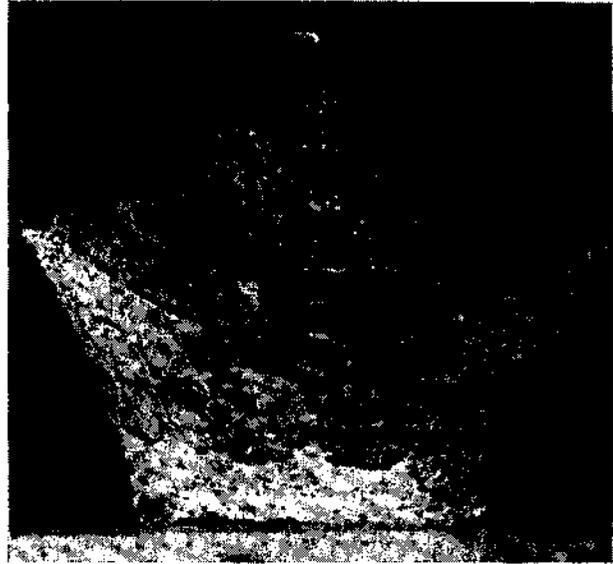


Fig. 2 *Calcita schmideliana* (Adult)

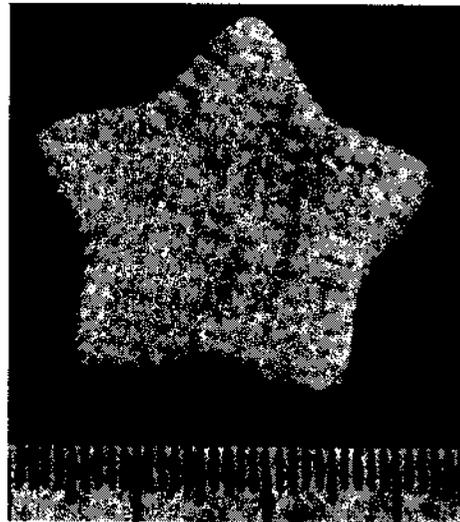


Fig. 3 *Calcita schmideliana* (Juvenile)

Asterias schmideliana Retzius, 1805; p. : Locality not known.

Calcita schmideliana A.M. Clark & Davies, 1986, p. 602: Maldives; A. M. Clark and Rowe, 1971, pp. 34, 53: Islands of Western Indian

Ocean, Mauritius, East Africa and Madagascar, S. E. Arabia, Maldives (Distribution Table); James, 1926, p. 579: Lakshadweep & Maldives area, Gulf of Mannar and Palk Bay along the South East Coast of India, Sri Lanka, Andaman and Nicobar Islands (Distribution Table)

Material: Kadamat, one specimen; Amini, two specimens; Kavaratti, one specimen, all collected from the lagoon, less than one metre in depth.

Remarks: This species is somewhat rare when compared to the other species *Culcita novaeguineae*.

Culcita novaeguineae Muller & Troschel

Culcita novaeguinea Muller & Troschel, 1842, p. 38: East Indies; H. L. Clark, 1921, p. 32: Torres Strait; A. M. Clark & Rowe, 1971, pp. 34, 54: Bay of Bengal, East Indies, North Australia, Philippines, China and Southern Japan, Pacific Islands, Hawaaiian Islands James, 1983, p. 89; Andaman and Nicobar Islands; (Distribution Table)

Material: Chetlat, one specimen; Kiltan, two specimens; Agatti, two specimens; Kavaratti, two specimens; Minicoy, one specimen, all collected from the lagoon, less than one metre in depth.

Remarks: One small specimens of R 10 mm collected from Kiltan looks like a Goniasterid.

Family OPHIDIASTERIDAE

This is large family of star fishes occurring commonly in shallow waters and particularly associated with corals and rock slabs. The small disc and long, often cylindrical, sub-cylindrical arms are characteristic of the Family. The colours in life are often bright, red, blue, purple and variegated forms are common. Six Genera are known from the Lakshadweep. Of these five are collected during the survey.

Key to the Genera of the Family

1. Abactinal plates more or less arranged in regular longitudinal series for the whole length of arm2
- 1'. Abactinal plates irregular in arrangement, though proximally there may be a tendency for regular arrangement.....4

2. Body entirely covered by thick smooth skin obscuring the limits of the plates
Leiaster Peters, 1852
- 2'. Granules or tubercles present on all the plates.....3
3. Armament restricted to a clustre of coarse granules or tubercles in the centre of each plate, the remaining surface covered with skin.....*Dactylosaster* Gray, 1840
- 3'. True granulation continuous all over the plates, skin not conspicuous, eight series of pore-areas*Ophidiaster* L. Agassiz, 1835
4. Adambulacral armament superficially appearing granuliform; arms cylindrical, disc small*Linckia* Nardoa, 1834
- 4'. Adambulacral armament spiniform, arms more or less flattened and wider basally...5
5. Papular pores present on the oral side, pores single, form more or less flattened, R rarely exceeding 40mm.....*Fromia* Gray, 1840
- 5'. No papular pores below the infero-marginals, Uniform granulation on the actinal, abactinal and supero-marginal plates; aboral reticulate skeleton not so well defined, marginal plates well defined*Paraferdina* James, 1973

Genus *Leiaster* Peters, 1852

Only two species are known from the Indian Seas.

Leiaster leachi (Gray)
(Fig. 4)



Fig. 4 *Leiaster leachi*

Ophidiaster leachi Gray, 1849, p. 284; Mauritius
Leiaster leachi H. L. Clark, 1921, pp. 73-74 :
 Torres Strait: A.M. Clark & Davies
 1966, p. 598; Maldives: James,
 1969, 53 Bitra Minicoy (Lakshadweep).

Africa, Maldives, East Indies, North Australia
 (Distribution Table) Nagabhushanam and Rao, 1972, p. 289:
 Minicoy Atoll, James, 1986, p. 579; Lakshadweep & Maldives,
 Sri Lanka (Distribution Table).

Material: Minicoy, one specimen R 172 mm;
 Bitra, one specimen, R 30 mm

Leiaster speciosus v. Martens, 1866, p. 70: East
 Indies; H. L. Clark, 1921, p. 74:
 Torres Strait; A.M. Clark & Rowe,
 1971, pp. 36, 58 : East Indies,
 North Australia, Philippines
 (Distribution Table).

Remarks: *Leiaster leachi* and *L. speciosus* are
 separated from each other by the presence of
 pedicellariae in case of *L. leachi* but this
 character is found to be highly variable. Also
 the colour of *L. leachi* is given as variegated,
 orange yellow and red whereas in *L. speciosus*
 it is given as uniformly crimson by H. L. Clark
 (1946). These two characters are not of
 specific value and therefore the two species are
 considered here as synonymous. Earlier workers
 like H. L. Clark (1921), Hayashi (1938), A. m.
 Clark (1967) and A. M. Clark and Rowe (1971)
 have also expressed doubt about the validity of
L. speciosus. James (1969). This species recorded
 for the first time from the Lakshadweep.

Genus *Dactylosaster* Gray, 1840

Only one species is known under this genus
 from the Indian Seas.

Dactylosaster cylindricus (Lamarck) (Fig. 5)

Asterias cylindrica Lamarck, 1816, p. 567.

Ophidiaster cylindrica Bell, 1902, p. 227: Mini-
 coy (Lakshadweep).

Dactylosaster cylindricus H. L. Clark, 1921, p.
 85: Hawaii; A. M. Clark and Davies, 1966,
 p. 598; Maldives; James, 1969, p. 53; Port
 Louis (Mauritius), Minicoy (Lakshadweep);
 A. M. Clark and Rowe, 1971, pp. 34, 59:
 Islands of Western Indian Ocean, Mascarene
 Islands, East Africa & Madagascar, S. E.



Fig. 5 *Dactylosaster cylindricus*

Arabia, Maldives, Sri Lanka, East Indies,
 South Pacific Islands, Hawaiian Islands
 (Distribution Table), Nagabhushanam and
 Rao, 1972, p. 289; Minicoy Atoll; James,
 1986 p. 579; Maldives & Lakshadweep, Sri
 Lanka (Distribution Table)

Material: Chetlat, several specimens; Kiltan,
 several specimens; Kadamat, two specimens;
 Amini, three specimens; Kavaratti, five speci-
 mens; Minicoy, several specimens, all collected
 from underside of coral stones.

Remarks: This is one of the common asteroids
 of Lakshadweep. One specimen collected from
 Kavaratti has seven arms. The arms are of
 dissimilar size in some specimens.

Genus *Linckia* Nardo, 1834

Three species are recorded from the Indian
 seas. All the three species are collected during
 the Survey.

Key to the species of the Genus

1. Subambulacral spines in two series; furrow
 spines not separated by granules
L. guildingi Gray, 1840
- 1'. Subambulacral spines in single series; furrow
 spines separated by verticle series of
 granules 2
2. Arms normally five in number with single
 madreporite; arms fairly stout and blunt at
 the tip *L. laevigata* (Linnaeus, 1758)
- 2'. Arms often irregular in length with two
 madreporites; arms slender and more or less
 pointed at the tip *L. multifora* (Lamarck,
 1816)

Linckia guildingi Gray

Linckia guildingi Gray, 1840, p. 285: St. Vincents; H. L. Clark, 1921: Bermuda, Bahamas, Florida, Cuba, St. Kitts, Tobago, Brazil, Lower Guinea, Zazibar, Queensland Society Islands, Tahiti; Ely, 1942, p. 18: Hawaii; A. M. Clark & Davies, 1966, p. 598: Maldives; A. M. Clark & Rowe, 1971, pp. 36, 61: Islands of Western Indian Ocean, Raserere Islands East Africa & Madagascar, S. E Arabia, Persian Gulf, Maldiverea, Sri Lanka area Bay of Bengal, East Indies, North Australia, Philippines, China & South Japan, South Pacific Island, Hawaiian Islands (Distribution Table); James 1986, p. 579; Lakshadweep & Maldives, Sri Lanka, Andaman & Nicobar Islands (Distribution Table).

Material: Chetlat, one specimen R 210 mm; Amini, one specimen, R 120 mm; collected from lagoon, depth less than a metre.

Remarks: This is a very rare species in Lakshadweep. It probably lives among live corals.

Linckia laevigata (Linnaeus)

Asterias laevigata Linnaeus, 1758, p. 662.

Linckia laevigata Bell, 1902, p. 226: Lakshadweep: A. M. Clark & Rowe 1971, pp. 36, 62; Islands of Western Indian Ocean. Mascarene Islands East Africa & Madagascar, Lakshadweep, Sri Lanka area Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands (Distribution Table); Nagabhushanam & Rao, 1972, p. 289: Minicoy Atoll; James 1986, p. 579: Lakshadweep & Maldives, Gulf of Mannar and Palk Bay on the South East Coast of India; Sri Lanka, Andaman and Nicobar Islands (Distribution Table)

Material: Bitra, one specimen; Amini, one specimen, Agatti, one specimen; Kavaratti, three specimens; Minicoy, several specimens, all from collected the lagoon, less than one metre in depth.

Remarks: Both the blue and brown forms are collected. The arms are longer and slender in brown forms.

Linckia multifora (Lamack)
(Figs. 6-9)



Fig. 6 *Linckia multifora* (Normal specimen)

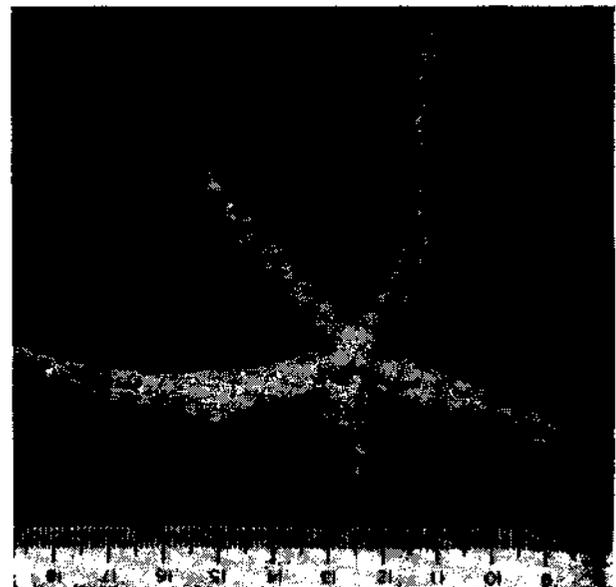


Fig. 7 *Linckia multifora* (with a bud)

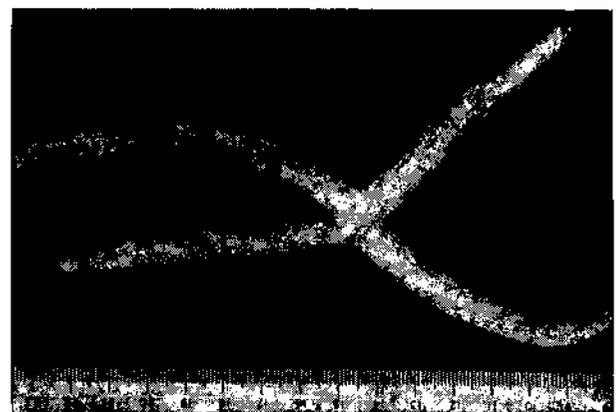


Fig. 8 *Linckia multifora* (With four arms)

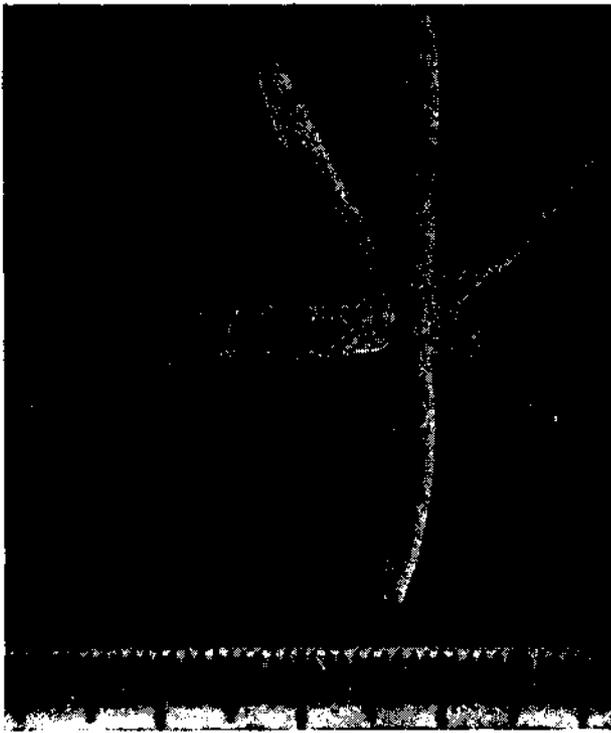


Fig. 9 *Linckia multifora* (With six arms)

Asterias multifora Lamarck, 1816, p. 565. Locality not known.

Linckia multiforis Bell, 1902, p. 226: Lakshadweep & Maldives.

Linckia multifora Ely, 1942, p. 19: Hawaii; A. M. Clark & Davies, 1966, p. 598: Maldives; James, 1969, p. 53: Gulf of Mannar, Red sea, Lakshadweep, Borneo; A. M. Clark & Rowe, 1971, pp. 36, 62: Islands of the Western Indian Ocean, Mascarene Islands, East Africa & Madagascar, Red Sea, S. E. Arabia, Persian Gulf, West India & Pakistan Maldivian area, Sri Lanka, East Indies, Philippines, China & S. Japan, South Pacific Islands, Hawaiian Islands (Distribution Table); Nagabhushanam & Rao, 1972, p. 289: Minicoy Atoll; James, 1986, p. 579: Lakshadweep & Maldives, Gulf of Mannar and Palk Bay along the South East coast of India, Sri Lanka (Distribution Table)

Material: Chetlat, two specimens; Bitra, one specimen; Kiltan, two specimens, Kadamat, several specimens; Amini, two specimens; Minicoy, several specimens, all specimens collected under coral stones.

Remarks: This is the most common starfish in the Lakshadweep. H. L. Clark (1941) has stated that the largest specimen known in the species has R 95 mm. The largest specimen in the

present series has R 110 mm. Some comet arms have been collected. One form looks exactly like a cross. One specimen is of particular interest. The five arms are dissimilar in size. On the smallest arm a bud has developed (Fig. 7) which has four arms. One of the arms is swollen due to the presence of a parasitic gastropod *Stilifer* sp.

Genus *Formia* Gray, 1840

Only one species is known from the Lakshadweep. Now a second species is collected for the first time. Small forms living under coral stones with R rarely exceeding 40 mm.

Key to the species of the Genus

1. Abactinal plates markedly unequal; actinal plates with short blunt spinelets or enlarged granules.....*F. indicus* (Perrier, 1869)
- 1'. Abactinal plates though irregular, similar in size; abactinal granulation even; aboral side flat; carinal series of plates not distinct*F. milleporella* (Lamarck, 1816)

Formia indica (Perrier)

Scytaster indicus Perrier, 1869, p. 235: Locality not known.

Formia indica Perrin, 1875, pp. 177-178; Koehler; 1910, p. 140; Hayashi, 1938, p. 59: Japan, James, 1969, p. 53: Andamans; A. M. Clark & Rowe, 1971, pp. 34, 62: Maldivian area, Sri Lanka, Bay of Bengal, East Indies, Philippines, China and Southern Japan; South Pacific Islands (Distribution Table), A. M. Clark & Davies, 1966, p. 602: Maldives; James, 1986, p. 579: Lakshadweep & Maldivian area, Sri Lanka, Andaman and Nicobar area (Distribution Table).

Material: Kavaratti, one specimen, under coral stones.

Remarks: This is very rare species in the Lakshadweep. Colour in the living condition is red.

Formia milleporella (Lamarck)

Asterias milleporella Lamarck, 1816, p. 564: Locality not known.

Formia milleporella H. L. Clark, 1921, p. 40: Torres Strait; A. M. Clark and Davies, 1966, p. 602: Maldives; A. M. Clark & Rowe, 1971, pp. 34, 63: Mascarene Islands, East Africa & Madagascar, Maldivian area, Sri Lanka, Bay of Bengal, East Indies, North

Australia, Philippines, China and Southern Japan, South Pacific Islands (Distribution Table); James, 1986, p. 579: Lakshadweep and Maldiva area, Sri Lanka (Distribution Table).

Material: Bitra, one specimen, collected from underside of coral stones.

Genus *Paraferdina* James, 1973

This new genus is reported from Minicoy in 1973. Since that time it has not been collected again.

Paraferdina laccadivensis James

Paraferdina laccadivensis James, 1973, pp. 556-559: Minicoy (Lakshadweep) James, 1986, 580: Lakshadweep & Maldiva area (Distribution Table).

Material: Minicoy, one specimen, collected from the lagoon, depth less than one metre.

Remarks: James (1973) gave a detailed description of the species. It has not been collected again since its first discovery.

FAMILY: ASTEROPIDAE

This is a small Family with a few genera. In the Lakshadweep one genus is collected during the present survey.

Genus *Asteropsis* Muller & Troschel, 1840

This well marked genus is widely distributed in the Indo-Pacific region.

Asteropsis carinifera (Lamarck)
(Fig. 10)

Asterias carinifera Lamarck, 1816, p. 556:
Locality not known.

Asterope carinifera H. L. Clark, 1921, p. 33:
Torres Strait.

Asteropsis carinifera James, 1969, p. 54:
Solomon Islands of Western Indian Ocean, East Africa & Madagascar, Red Sea, S. E. Arabia, Sri Lanka area, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands, Hawaiian Islands; (Distribution Table); James, 1986, p. 580: Sri Lanka (Distribution Table).

Material: Chetlat, several specimens; Kiltan, several specimens, all collected from the reef flat.

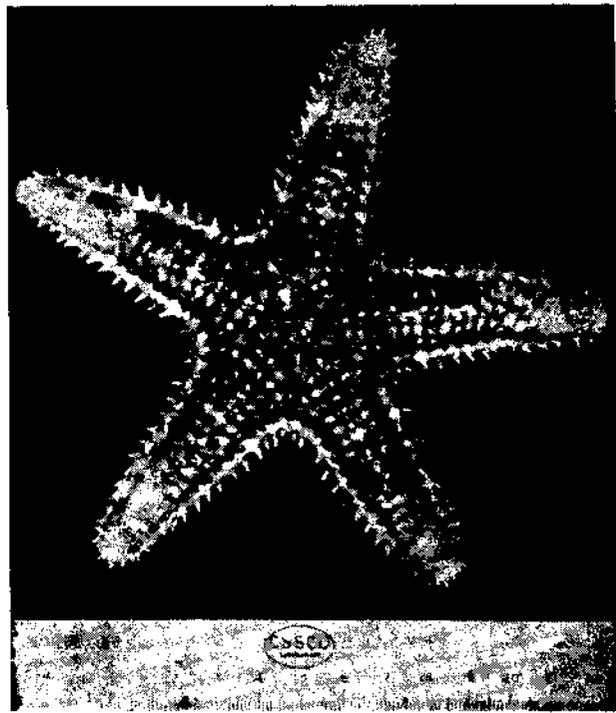


Fig. 10 *Asteropsis carinifera*

Remarks: R of the specimens collected varied from 58-110 mm. Though this species is common at Chetlat and Kiltan it is surprising that this species is not recorded from the Lakshadweep and even from Maldives so far. It is recorded here for the first time from the Lakshadweep.

ORDER: SPINULOSA

Members belonging to two Families are known from the Lakshadweep. Species belonging to a third Family are collected for the first time during the survey.

Key to the Families of the Order

1. Arms 10-20 with numerous madreporites, aboral armament with numerous large, pointed spines mounted singly on stalk-like pedicles; size large ACANTHASTERIAE
- 1'. Arms usually five or six, madreporite usually one though sometimes up to five present; size small to moderate 2
2. Arms short, body stellate or even sometimes pentagonal; aboral armament scale-like imbricating plates armed usually with fine spinelets or granules ASTERINIDAE
- 2'. Arms elongate, slender and cylindrical; aboral surface covered with thick skin; adambulacral spines few, usually three..... ECHINASTERIDAE

FAMILY : ACANTHASTERIDAE

This Family has only one genus *Viz.*, *Acanthaster*.

Genus *Acanthaster* Gervasis, 1841

Only one species is known from the Lakshadweep.

Acanthaster planci (Linnaeus)
(Fig. 11)

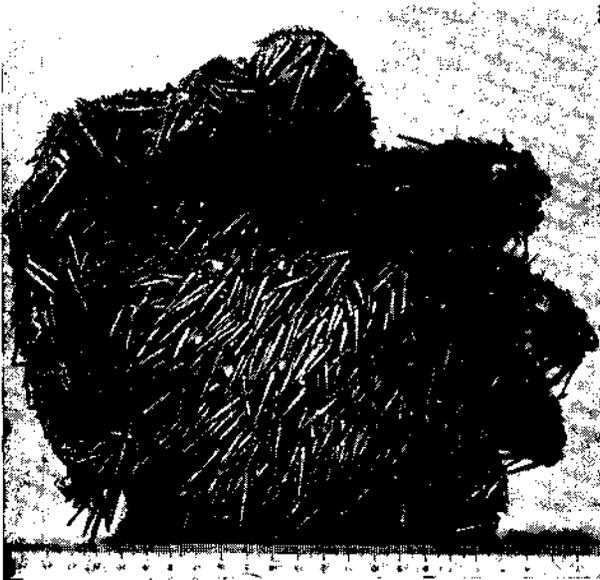


Fig. 11 *Acanthaster planci*

Asterias planci Linnaeus, 1758, p. 832

Acanthaster planci Madsen, 1955, pp. 181-187: Mauritius, Haarlem Island, Kei Island; James, 1969, p. 54: Lakshadweep, Nicobar, Solomon Islands; A. M. Clark and Rowe, 1971, pp. 38, 71: Islands of Western Indian Ocean, Mascarene Islands, East Africa & Madagascar, Red Sea, S. E. Arabia, Western India & Pakistan, Maldives area, Sri Lanka area, Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands, Hawaiian Islands; (Distribution Table). James, 1986, p. 580; Lakshadweep & Maldives area, Sri Lanka, Andaman & Nicobar Islands. (Distribution Table).

Material: Kadamat, one specimen; Agatti, two specimens; Kavaratti, two specimens; Kalpeni, one specimen; Minicoy, three specimens, all specimens collected from live corals from a depth of 1-2 metres.

Remarks: Fortunately the concentrations of this species is negligible in Lakshadweep and therefore they do not form a threat to the coral reefs at present.

FAMILY : ASTERINIDAE

Members belonging to this family are small, secretive and are found clinging to the underside of rock fragments or concealed in crevices but some occur on sandy bottom. Many species are brightly coloured but in some the colouration is diversified and variable. Three genera are recorded for the first time from the Lakshadweep.

Key to the Genera of the Family

1. Arms carinate, relatively long R/r 2.0/1 to 4.0/1.....*Tegulaster* Livingstone, 1933
- 1'. Arms not carinate, short and triangular R/r 1.2/1 to 2.0/1.....2
2. Abactinal plates of papular areas all of one kind not crescentic or notched for papulae.....*Asterina* Nardo, 1834
- 2'. Abactinal plates of papular areas of two kinds, the larger crescentic or notched for papulae.....*Patirilla* Verrill, 1913

Genus *Tegulaster* Livingstone, 1933

Only one species is known under this genus from the Indian Seas. This genus is recorded for the first time from the Lakshadweep.

Tegulaster Ceylanicus (Doderlein)
(Fig. 12)



Fig. 12 *Tegulaster ceylanicus*

Disasterina ceylanica Doderlein, 1889, p. 825: Sri Lanka.

Tegulaster ceylanicus A.M. Clark of Rowe, 1971, p. 67: Sri Lanka area (Distribution Table); James, 1986, P. 580: Lakshadweep & Maldiva area, Sri Lanka Andaman & Nicobar area (Distribution Table).

Material: Agatti, one specimen; Kavaratti, one specimen, both collected under coral stones.

Remarks: This is a little known species. Colour in the living condition is rose-red. It is a first record to the Lakshadweep.

Genus *Asterina* Nardo, 1834

Only one species is recorded for the first time from the Lakshadweep.

Asterina burtoni Gray, 1840

Asterina burtoni Gray, 1840, P. 289: Red Sea; A. M. Clark & Davies, 1966, p. 603: Maldives; A.M. Clark & Rowe 1971, pp. 38,68: Islands of Western Indian Ocean, Mauritius, East Africa & Madagascar, Red Sea, S. E. Arabia, Persian Gulf, Western India & Pakistan area, Maldiva area, Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands. (Distribution Table)

Asterina cepheus Bell, 1902, p. 227: Maldives.

Material: Amini, one specimen collected under coral stones

Remarks: This is one of the most widely distributed starfishes. Its small size and its habit to attach to underside of boats accounts for its wide distribution.

Genus *Patriella* Verrill, 1913

This genus is recorded for the first time from Lakshadweep. Only one species is collected.

Patriella pseudoexigua Dartnall, 1971

Asterias exigua Lamarck, 1816, p. 554: Locality not known.

Asterina exigua Koehler, 1910, p. 129: Andaman & Nicobar Islands; H. L. Clark, 1921, p. 97: Torres Strait, South Pacific Islands.

Patriella exigua Fisher, 1919, p. 416: Philippines, East Indies; A. M. Clark & Rowe, 1971, pp. 38,67: East Africa & Madagascar, Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands (Distribution Table)

Patriella pseudoexigua Dartnall, 1971, p. 43: Bay; James, 1986, p. 580: Sri Lanka, Andaman & Nicobar Islands (Distribution Table).

Material: Agatti, two specimens, collected under coral stones.

Remarks: This small species easily escapes observation. It is a new record to the Lakshadweep.

Family ECHINASTERIDAE

Under this family the genus *Cistina* is collected for the first time from the Lakshadweep.

Genus *Cistina* Gray, 1840

This is a little known genus with one species.

Cistina columbiae Gray, 1840
(Fig. 13 & 14)

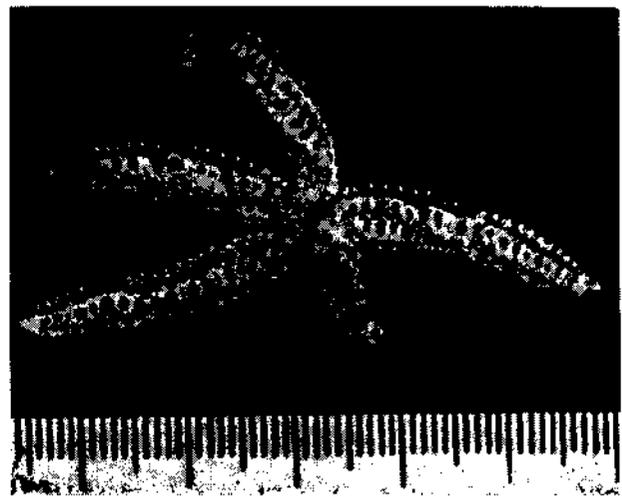


Fig. 13 *Cistina columbiae*

Cistina columbiae Gray, 1840, p. : Locality not known; A. M. Clark & Rowe, 1971, pp. 40, 72: Mascoure Islands, (Distribution Table).

Material: Chetlat, five specimens, under coral stones.

Remarks: The R of the specimens collected

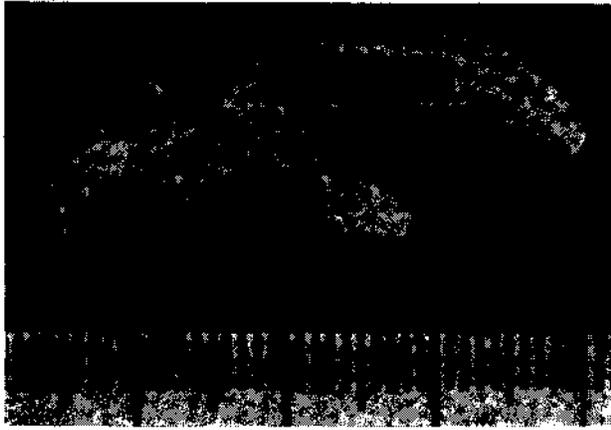


Fig. 14 *Cistina columbiae* (arms regenerating)

varied from 20-28 mm. [The arms are dissimilar in size and in one specimen (Fig. 14) it is in process of regeneration. It can easily be mistaken for *L. multifora* in the field. On closer observation the spinelets are seen. The colour in the living condition is rose-pink in patches on the dorsal side. It is so far recorded only from the Mauritius. According to Miss. A. M. Clark (personal communication) MS records are available from Peros Banhos in the Chagos Archipelago, Guam and Solomon Islands and Jangoux has recently recorded it from New Caledonia. It is recorded here for the first time from the Lakshadweep.

CLASS: OPHIUROIDEA

The brittle stars are the smallest of the echinoderms and most active of the group. Majority of them live among coral reefs and under coral stones. Fourteen species are collected of which six are new records.

Species belonging to six families are collected. Species belonging to three families recorded for the first time.

Key to the Families of the Class

- 1. Dorsal arm plates rudimentary and often fragmented; disc liable to considerable distortion when preserved
OPHIOMYXIDAE
- 1'. Dorsal arm plates clearly visible, not rudimentary and not fragmented2
- 2. A pair of regular infradental papillae at the apex of each jaw below the lowest tooth, which is usually wide and square
AMPHIURIDAE

- 2'. Apical papillae either multiple or single, rarely two3
- 3. Teeth broad and square-tipped with only a single papilla (or reduced tooth) if any, one or two distal oral papillae, usually well spaced from the apex of jaw; one fairly large rounded tentacle scale
OPHIACTIDAE

- 3'. Teeth rounded or conical with one or many superficial papillae, if oral papillae present they form a continuous series up the side of the jaw; often more than one tentacle scale, or if only one then this may be elongated and pointed4

- 4. No oral papillae, each jaw more or less crowned with more or less compact cluster of apical tooth papillae ...OPHIOTRICHIDAE

- 4'. Oral papillae present on the sides of the jaws, apically either a cluster of tooth papillae or one or a few larger oral papillae5

- 5. Both tooth papillae and oral papillae present, the former usually numerous
OPHIOCOMIDAE

- 5'. Only oral papillae present, usually only one apical papilla below the teeth, atmost two three; disc scales nakedOPHIURIDAE

Family OPHIOMYXIDAE

This is a small family with only one genus known from the Indian Seas. This genus is recorded for the first time from the Lakshadweep.

Genus *Ophiomyxa* Muller & Troschel. 1842

Though twenty species are known under this genus only one species is known from the the Indian Seas. This is recorded for the first time from the Lakshadweep.

Ophiomyxa australis Lutken, 1869

Ophiomyxa australis Lutken, 1869, p. 99: Locality not known: James, 1969, p. 54: Lakshadweep; A. M. Clark & Rowe, 1971, pp. 78, 92: Islands of Western Indian Ocean, Mascare Islands, East Africa & Madagascar, Sri Lanka area, Bay of Bengal, East Indies, North Australia, Philippines China & Southern Japan, South Pacific Islands; (Distribution Table), James, 1969, p. 581; Laksha-

dweep & Maldive area, Gulf of Mannar and Palk Bay along the S. E. coast of India, Sri Lanka, Andaman and Nicobar islands, (Distribution Table).

Material: Minicoy, one specimen, collected under coral stones.

Remarks: This species is very rare in the Lakshadweep. The colour in the living condition is brick red on the dorsal side and pink on the ventral side. It was recorded for the first time from the Lakshadweep by the author in 1969.

Family AMPHIURIDAE

This is large cosmopolitan family. Nearly all members of the family are secretive and inactive, living buried in mud and sand or in the crannies of dead coral, shells or irregular rock fragments. Only one genus is collected from the Lakshadweep.

Genus *Amphipholis* Ljungman, 1866

Only one species is known from the Indian Seas.

Amphipholis squamata (Delle Chiaje, 1829)

Asterias squamata Delle Chiaje, 1829, p. 74: Locality not known.

Amphipholis squamata H. L. Clark, 1921, p. 106: Torres Strait; Ely, 1942, p. 36. Hawaii, Thomas, 1962: Florida, James, 1969, p. 54: Gulf of Mannar, A. M. Clark, & Rowe, 1971, pp. 80, 99. Islands of Western Indian Ocean, East Africa & Madagascar, S. E. Arabia, Western India & Pakistan area, East Indies, Hawaiian Islands (Distribution Table); James, 1986, p. 581: Gulf of Mannar & Palk Bay along the South East coast of India, Andaman & Nicobar Islands (Distribution Table).

Material: Chetlat, two specimens, under coral stones.

Remarks: It has very wide distribution occurring in most of the Indo-Pacific region. Also reported from the Atlantic, St. Helena, Tobago and Bermuda. It is reported here for the first time from the Lakshadweep.

Family OPHIACTIDAE

It is a small family with a few genera. Only one genus is collected from the Lakshadweep.

Genus *Ophiactis* Lutken, 1856

Only two species are known from the Indian Seas. One species is collected from the Lakshadweep.

Ophiactis savignyi (Muller & Troschel, 1842)

Ophiopsis savignyi Muller & Troschel, 1842, p. 95: Egypt.

Ophiactis savignyi A. M. Clark & Davies, 1966, p. 599: Maldives; James, 1969, 55: Gulf of Mannar, Palk Bay, Lakshadweep; A. M. Clark & Rowe, 1971, pp. 82, 103: Islands of Western Indian Ocean, Mascarene Islands, East Africa & Madagascar, Red Sea, S. E. Arabia, Persian Gulf, Western India Pakistan, Maldiva area, Sri Lanka area, Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands, Hawaiian Islands; (Distribution Table). Nagabhushanam & Rao, 1972, p. 289: Minicoy Atoll; James, 1986, p. 581: Lakshadweep & Maldiva area, Gulf of Mannar & Palk Bay along the S.E. Coast of India; Sri Lanka, Andaman & Nicobar Area (Distribution Table).

Material: Minicoy, two specimens, collected from coral crevices.

Remarks: According to H. L. Clark (1946) this is the most common brittle star in the world. It is tropicopolitan in distribution.

Family OPHIOTRICHIDAE

This is a large family with several genera. Most of the species are associated with corals and sponges. Species belonging to two genera are collected.

Key to the genera of the family

Radial shields large; arms usually 9-20 times the disc diameter.....*Macrophiothrix* H.L. Clark, 1938

Radial shields small; arms four or five times the disc diameter.....*Ophiothrix* Muller & Troschel, 1840

Genus *Macrophiothrix* H.L. Clark, 1938

Only one species is collected under this genus. This is a new record to the Lakshadweep.

Macrophiothrix longipeda (Lamarck, 1816)

Ophiura longipeda Lamarck, 1816, p. 544: Mauritius.

Macrophiothrix longipeda H. L. Clark, 1938, p. 288: Australia; A. M. Clark & Davies, 1966, p. 648: Maldives; A. M. Clark, & Rowe, 1971, pp. 82, 114: Islands, of the Western Indian Ocean, Mascarene Islands, East Africa & Madagascar, Maldivian area, Sri Lanka area, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands, (Distribution Table)

Material: Chetlat, two specimens; Kiltan, two specimens; Kadmat, one specimen; Androth, one specimen, all collected under coral stones buried in sand.

Remarks: The length of the arms were 11.5 to 15 times the diameter of the disc. It is recorded here for the first time from the Lakshadweep.

Ophiothrix (Keystonea) nereidina (Lamarck 1840)

Ophiura nereidina Lamarck, 1840, p. 224: Australian Seas.

Ophiothrix nereidina Bell, 1902, p. 229: Lakshadweep, Maldives; Nagabhushanam & Rao, 1972, p. 289: Minicoy Atoll.

Ophiothrix (Keystonea) nereidina James, 1969, p. 55: Gulf of Mannar, Lakshadweep; A. M. Clark & Rowe, 1971, pp. 86, 107: Mascarene Islands, East Africa & Madagascar, Sri Lanka area, Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands (Distribution Table); James, 1986, p. 582: Gulf of Mannar and Palk Bay along the S. E. Coast of India, Sri Lanka (Distribution Table).

Material: Bitra, one specimen, collected from coral crevice.

Family OPHIOMIDAE

Members belonging to this Family are generally large with conspicuous colouration and active habits. Three genera are collected of which one is collected for the first time from Lakshadweep.

Key to the genera of the Family

1. Six armed fissiparous forms, size small; disc diameter rarely more than 5 mm, tentacle scale one.....*Ophiocomella* A. H. Clark, 1939
 - 1'. Normally five arms, most specimens large, even upto 30 mm. in disc diameter; usually two tentacle scales.....2
 2. Dorsal side of the disc with dense coat of rounded granules.....*Ophiocoma* Agassiz, 1836
 - 2'. Disc armed with spines, sometimes in combination with granules.....*Ophiomastix* Muller & Troschel 1842
- Genus *Ophiocomella* A. H. Clark, 1939

Only one species is known under this genus from the Indian Seas. This is recorded for the first time from the Lakshadweep.

Ophiocomella sexradia (Duncan, 1887)

Ophiocnida sexradia Duncan, 1887, p. 92: Mergui Archipelago.

Ophiocomella sexradia James, 1969, p. 56: Palk Bay, Lakshadweep, Andaman, A. M. Clark & Rowe, 1971, pp. 86, 118: Islands of Western Indian Ocean, East Africa & Madagascar, Red Sea, Maldivian area, Philippines, China & Southern Japan, South Pacific Islands, Hawaiian Islands (Distribution Table); James, 1986, p. 582: Lakshadweep & Maldives, Gulf of Mannar & Palk Bay along the S. E. Coast of India Sri Lanka Andaman Nicobar Area.

Material: Chetlat, two specimens, Bitra, one specimen; Kiltan, two specimens.

Remarks: This species easily escapes observation in the field because of its small size and cryptic habits. It is often found associated with algae. It was recorded for the first time from Lakshadweep by the author in 1969.

Genus *Ophiocoma* Agassiz, 1836

This is a well marked and conspicuous genus with several species on the coral reefs of India. Five species are collected from the Lakshadweep of which one is a new record.

Key to the species of the genus

1. Interbrachial areas on the ventral side with a number of conspicuous circular scales *O. anaglyptica* Ely, 1944
- 1'. Interbrachial areas on the ventral side with no enlarged circular scales 2
2. Disc marked with beautiful pattern of radiating golden lines on a dark background *O. pica* Muller & Troschel, 1842
- 2'. Disc either uniformly dark or variegated or light green 3
3. Disc sparsely covered by granules 4
- 3'. Disc densely covered by granules 5
4. Colour uniformly dark dorsally and ventrally *O. erinaceus* Muller & Troschel, 1842
- 4'. Colour variegated, sometimes dark brown dorsally but always lighter ventrally
O. scolopendrina Lamarck, 1816
5. Disc pale in colour (brown or light yellow) often with a shade of light green
O. brevipes Peters, 1851
- 5'. Colour of the disc either uniformly dark or variegated with reticulated pattern or spots *O. dentata* Muller & Troschel, 1842

Ophiocoma anaglyptica Ely, 1944

Ophiocoma anaglyptica Ely, 1944, 373: Canton Island; James, 1969, p. 56: Lakshadweep; A. M. Clark & Rowe, 1971, pp. 86, 118: South Pacific Islands (Distribution Table), James, 1986, p. 582: Lakshadweep and Maldivian area (Distribution Table).

Material: Chetlat, eight specimens from reef flat.

Remarks: This species can easily be mistaken for *O. scolopendrina* in the field. It is mostly associated with live corals. It was listed from the Lakshadweep for the first time by the author in 1969.

Ophiocoma pica Muller & Troschel 1842

Ophiocoma pica Muller & Troschel, 1842, p. 101: Locality not known; H. L. Clark, 1921, p. 127: Torres Strait; James, 1969, p. 56: Lakshadweep, Nicobar, Red Sea; A. M. Clark & Rowe, 1971, pp. 86, 118: Islands of Western Indian

Ocean, Mascarene Islands, East Africa & Madagascar, Red Sea, S. E. Arabia, Maldivian area, Sri Lanka area, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands, Hawaiian Islands; (Distribution Table). James 1986, p. 582: Lakshadweep & Maldivian Area, Sri Lanka (Distribution Table).

Material: Chetlat, one specimen; Kadamat, one specimen; Kavaratti, two specimens, all collected from live coral branches.

Remarks: This species appears to live beyond the low tide mark. It appears to live among live corals. One of the most beautiful brittle stars in the living condition.

Ophiocoma erinaceus Muller & Troschel, 1842

Ophiocoma erinaceus Muller & Troschel, 1842; p. 98: Red Sea; Bell, 1902, p. 228: Lakshadweep & Maldives; James, 1969, p. 56: Andamans, Lakshadweep, Mascarene Islands, Red Sea; A. M. Clark & Rowe, 1971, pp. 86, 119: Islands of Western Indian Ocean, Mauritius, East Africa & Madagascar, Red Sea, S. E. Arabia, Maldivian Area, Sri Lanka area, Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands, Hawaiian Islands (Distribution Table); James, 1986, p. 582: Lakshadweep & Maldivian Area, Gulf Mannar and Palk Bay along S. E. coast of India, Andaman and Nicobar Area. (Distribution Table); Nagabhushanam & Rao, 1972, p. 289: Minicoy Atoll.

Material: Chetlat, two specimens, Kiltan, one specimen; Kadamat, one specimen; Amini, two specimens; Androth, two specimens, all specimens, collected under coral stones.

Remarks: This species is usually found near the low water mark. It has very limited distribution in the intertidal region unlike *O. scolopendrina* which occurs from the supra-littoral zone to the infra littoral zone. This species does not exhibit autotomy to a marked degree like *O. scolopendrina*.

Ophiocoma scolopendrina (Lamarck)

Ophiocoma scolopendrina Lamarck, 1840, p. 223: Mauritius.

Ophiocoma scolopendrina Muller & Troschel, 1842, p. 101 : Locality not known
 Bell, 1902, p. 228: Lakshadweep; James, 1969, p. 56: Andamans, Lakshadweep, Red Sea, Mauritius; A.M. Clark & Rowe, 1971, pp. 86, 119: Islands of the Western Indian Ocean, Mascarene Islands, East Africa & Madagascar, Red Sea, S. E. Arabia, Persian Gulf, Maldive Area, Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands, Hawaiian Islands; Nagabhusanam & Rao, 1972, p. 289: Minicoy Atoll; James, 1986, p. 582 : Lakshadweep & Maldive Area, Gulf of Mannar & Palk Bay along the S.E. Coast of India, Sri Lanka, Andaman & Nicobar Islands (Distribution Table)

Material: Kiltan, several specimens; Kadamat, three specimens Amini, several specimens; Kalpeni, two specimens; Minicoy, several specimens.

Remarks: This is the most common species under the genus *Ophiocoma*: It occupies a very extended zone in the intertidal region from the supra-littoral region to the low water mark. It is some what gregarious.

Ophiocoma brevipes Peters
 (Fig. 15)

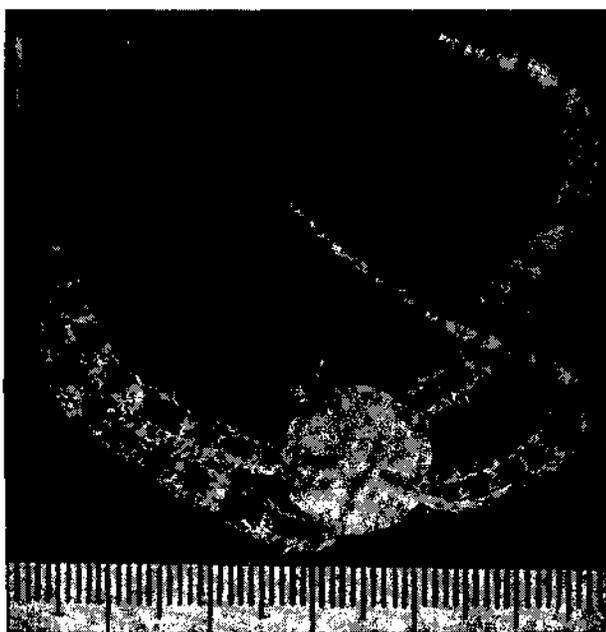


Fig. 15 *Ophiocoma brevipes*

Ophiocoma brevipes Peters, 1851, p. 465: Mozambique; Bell, 1902, p. 225; Maldives, Lakshadweep; James, 1969, p. 56; Andamans, Lakshadweep A. M. Clark & Rowe, 1971, pp. 86, 119 : Islands of the Western Indian Ocean, Mascarene Islands, East Africa & Madagascar, Maldive area, Sri Lanka area, Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands, Hawaiian Islands (Distribution Table); Nagabhusanam & Rao, 1972, p. 289: Minicoy Atoll; James 1986, p. 582: Lakshadweep & Maldive area, Andaman Nicobar Islands. (Distribution Table).

Material: Chetlat, two specimens; Kadamat, one specimen; Minicoy, two specimens, all collected under coral stones.

Remarks: It is much rarer species than others. It can draw all its arms and fold them closely over the disc and hide in a small crevice. The lowermost spines of the proximal arm segments are flat and help in digging in sand. It can withstand long hours of exposure for it is found near the high water mark. There is not much autotomy in this species.

Ophiocoma dentata Muller & Troschel, 1842
 (Fig. 16)

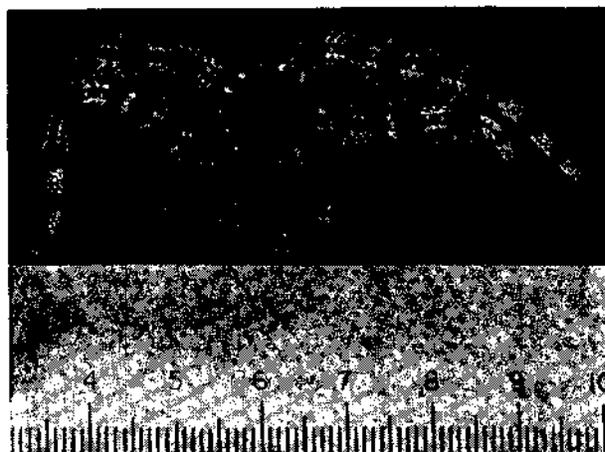


Fig. 16 *Ophiocoma dentata*

Ophiocoma dentata Muller & Troschel, 1842, p. 99: Locality not known; A. M. Clark & Rowe, 1971, pp. 86, 119: Islands of the Western Indian Ocean, Mascarene Islands, East Africa & Madagascar,

Maldive area, North Australia, Philippines, China & Southern Japan, South Pacific, Hawaiian Islands (Distribution Table); James, 1986, p. 582: Lakshadweep & Maldive Area, Andaman and Nicobar Area (Distribution Table).

Ophiocoma insularia Nagabhushanam & Rao, 1972, p. 289: Minicoy Atoll.

Ophiocoma brevipes var. *variegata* James, 1969, p. 56: Andamans & Lakshadweep.

Material: Chetlat, two specimens; Kiltan, several specimens; Kadamat, three specimens; Amini and Minicoy, several specimens, all specimens collected from underside of coral stones.

Remarks: This species is very common in Amini and Minicoy. Two colour forms, one with reticulated pattern on the disc and the other with black spots have been collected. Due to different colour patterns it was recorded under several names.

Genus *Ophiomastix* Muller & Troschel, 1842

One species is known from the Lakshadweep.

Ophiomastix annulosa (Lamarck, 1840)
(Fig. 17)

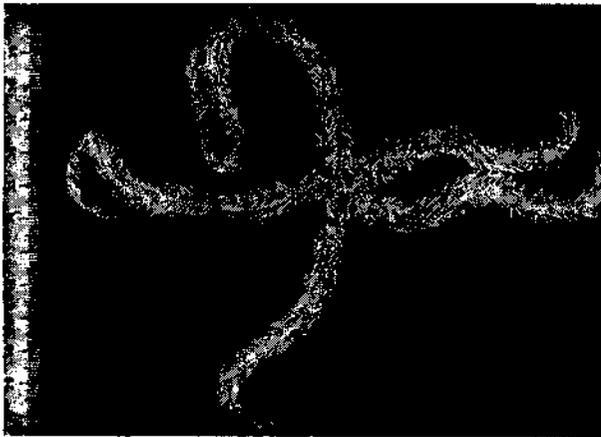


Fig. 17 *Ophiomastix annulosa* (Dried specimen)

Ophiura annulosa Lamarck, 1840, p. 222: Locality not known.

Ophiomastix annulosa Muller & Troschel, 1842, p. 107: Japan; Bell, 1902, p. 229: Lakshadweep; James, 1969, p. 56: Andamans, Lakshadweep; Nagabhushanam & Rao, 1972, p. 289: Minicoy

Atoll. A. M. Clark & Rowe, 1971, pp. 86, 120: Maldive area, Sri Lanka area, Bay Bengal, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands (Distribution Table)

Material: Minicoy, one specimen, collected under coral stones.

Remarks: This species appears to be very rare in Lakshadweep.

Family OPHIURIDAE

This is a large Family with several genera. The disc is covered by scales or plates and the arm spines are small and appressed which are characteristic of the family. From the Lakshadweep only two genera are recorded.

Key to the genera of the Family

The scales on the dorsal and ventral side of the disc and the dorsal arm plates are surrounded by small scales..... *Ophioelegans* James, 1981

The scales on the dorsal and ventral side of the disc and the dorsal arm plates are not surrounded by small scales..... *Ophiolepis* Muller & Troschel, 1842

Genus *Ophioelegans* James, 1981

This genus is described by James (1981). It has only one species.

Ophioelegans cincta (Muller & Troschel, 1842)

Ophiolepis cincta Muller & Troschel, 1842, p. 90: Red Sea; A. M. Clark, & Davies, 1966, p. 603: Maldives; A. M. Clark & Rowe, 1971 pp. 90, 129: Islands of Western Indian Ocean, Mascarene Islands. East Africa & Madagascar, Red Sea, S. E. Arabia, Maldives, Sri Lanka area, Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands (Distribution Table).

Ophioelegans cincta James, 1981, p. 15: Port Blair (South Andamans)

Material: Kavaratti, one specimen, collected under coral stones.

Remarks: This species is very rare and only one specimen could be collected. It is recorded

here for the first time from the Lakshadweep.

Ophiolepis superba H. L. Clark, 1938

Ophiolepis annulosa Muller & Troschel, 1842, p. 89: Locality not known.

Ophiolepis superba H. L. Clark, 1915, p. 89: Sri Lanka; A. M. Clark & Rowe, 1971, pp. 90, 126: Islands of Western Indian Ocean, Mascarene Islands. East Africa & Madagascar, Red Sea, S. E. Arabia, Maldives Sri Lanka Area, Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands. (Distribution Table); James, 1986, p. 582: Lakshadweep & Maldives, Sri Lanka, Andaman & Nicobar Islands. (Distribution Table).

Material: Kavaratti, one specimen, collected under coral stones.

Remarks: This inert brittle star is very beautiful in the living condition. It is recorded for the first time from the Lakshadweep.

CLASS ECHINOIDEA

Sea urchins are large and conspicuous element of the coral reefs. They live in diverse habitats. Some of them bore into coral rocks while some live buried under sand. Some of them with long pointed spines and large pedicellariae are dangerous to handle in the field. The roe of some species of sea urchins are considered as delicacy and have good market in Japan. This class is divided into two Sub-classes.

Key to the Sub-Class of the Class

Test globular, or spherical; anus inside the apical system of plates.....REGULARIA

Test heart-shaped or flattened; anus out side the apical system of plates.....IRREGULARIA

SUB-CLASS: REGULARIA

Members of sea urchins belonging to this sub-class have a round profile with the peristome and periproct occupying central positions at oral and aboral poles respectively. Members belonging to four Orders have been collected and reported in this present work.

Key to the orders of the sub-class

- 1. Primary spines large, widely separated, contranstrng markedly with numerous, small secondary spines.....CIDAROIDEA
- 1'. Primary and secondary spines not markedly contranstrng in size 2
- 2. Epiphyses of the Aristotle's lantern fused across the top of each pyramid teeth keeledCAMARODONTA
- 2'. Epiphyses of the Aristotle's lantern not fused across the top of each pyramid.3
- 3. Spines lack a cortex and are solid or provided with a narrow lumen;..... AULODONTA
- 3'. Spines are solid with or without cortex teeth unkeeled.....STIRODONTA

ORDER CIDAROIDEA

Only one Family is known under this Order

Family CIDARIDAE

Two genera are collected under this Family from the Lakshadweep.

Key to the genera of the family

Pores in adult specimens distinctly conjugate, collar of primary spines usually with red or purple spots or stripe
Prionocidaris A. Agassiz, 1863

Pores not conjugate or atleast sub-conjugate; collar of primary spines not spotted or stripped with red or purple: primary spines slender or coarse, usually not tapering; 'hairs' on the surface of the shaft anastomosing and forming a thick spongy coat*Eucidaris* Pomel; 1883

Genus *Prionocidaris* A. Agassiz, 1863

Only one species is collected under this genus.

Prionocidaris verticillata (Lamarck, 1816)
(Fig. 18)

Cidarites verticillata Lamarck; 1816, p. 56:
Locality not known.

Prionocidaris verticillata A. M. Clark & Rowe, 1971, pp. 140, 151: Islands of Western Indian ocean, Mascarene Islands, East Africa & Madagascar, Maldive area,

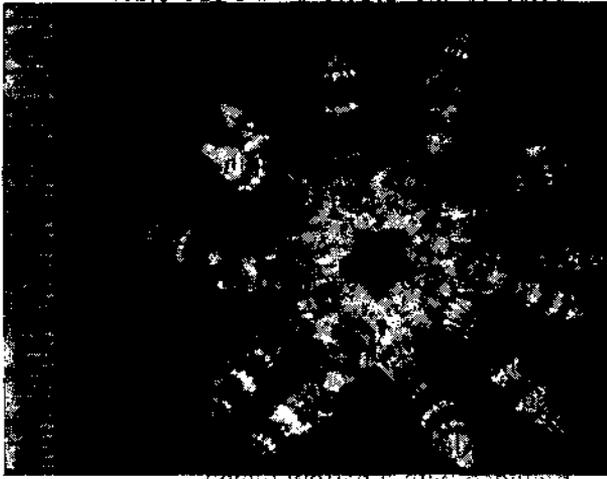


Fig. 18 *Prionocidaris verticellata*

Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan, Hawaiian Islands (Distribution Table); James, 1986, p. 583 Lakshadweep & Maldiva Area, Andaman & Nicobar Islands (Distribution Table)

Material: Chetlat, several specimens; Kiltan, three specimens, collected from dead coral branches.

Remarks: A very beautiful sea urchin in living condition with symmetrical spines with annulated primary spines. This species was found to live in the midst of dead coral branches. When the coral branches are broken the sea urchin is exposed.

Genus *Eucidaris* Pomet, 1883

Only one species is known under this genus from the Lakshadweep.

Eucidaris metularis (Lamarck, 1816)

Cidarites metularia Lamarck, 1816, p. 56: East Indies.

Cidaris metularia Bell, 1902, x2p. 230: Maldives

Eucidaris metularia A. M. Clark & Davies, 1966, p. 603: Maldives; A. M. Clark & Rowe, 1971, pp. 140, 150: Islands of the Western Indian Ocean, Mascarene Islands East Africa & Madagascar, Red Sea, Maldiva area, Sri Lanka and Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands, Hawaiian Islands (Distribution Table); Nagabhushanam &

Red, 1972, p. 11 Minicoy Atoll; James, 1986, p. 582: Lakshadweep & Maldiva Area; Sri Lanka, Andaman & Nicobar Islands (Distribution Table).

Material: Androth, one specimen, collected under coralstones.

ORDER AULODONTA

Under this Order species belonging to one family have been collected.

Family DIADEMATIDAE

Two genera are known from the Lakshadweep.

Key to the genera of the Family

Primary ambulacral tubercles large in two regular series; ambulacral spines not peculiar; no spines on buccal plates..... *Diadema* Gray

Primary ambulacral tubercles very small; aboral ambulacral spines very slender, retrorsely barbed distally..... *Echinothrix* Peres, 1953

Genus *Diadema* Gray

Two species are collected under this genus. Both of them are new records to the Lakshadweep.

Key to the species of the genus

Large tridentate pedicellariae, mostly with narrow blades meeting at the tip; a red ring around the anus..... *D. setosum* (Leske, 1778)

Tridentate pedicellariae leaf or spoon-shaped tapering slightly to a rounded distal end..... *D. savignyi* Michelin, 1845

Diadema setosum (Leske, 1778)

Echinometra setosa Leske, 1778, p. 36: East Indies

Diadema setosum A. M. Clark & Rowe, 1971, pp. 140, 153: Mascarene Islands, East Africa & Madagascar, Red Sea, S. E. Arabia, Sri Lanka area, Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands (Distribution Table); James, 1986, p. 583: Sri Lanka, Andaman and Nicobar Islands (Distribution Table)

Material: Kiltan, four specimens, collected under coral stones.

Remarks: It is dangerous to handle this sea urchin in live condition since the sharp spines enter into the hand. It is recorded for the first time from the Lakshadweep.

Diadema savignyi Michelin, 1845

Diadema savignyi Michelin, 1845, p. 15: Mauritius; A. M. Clark & Rowe, 1971, pp. 140, 153: Islands of Western Indian Ocean, Mascarene Islands, East Africa & Madagascar, S.E. Arabia, Sri Lanka, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands (Distribution Table); James, 1986, p. 583: Sri Lanka, Andaman & Nicobar Area (Distribution Table).

Material: Chetlat, two specimens, collected under coral stones.

Remarks: This species is so far not recorded from the Maldives though the British Museum has specimens from Maldives. It is recorded here for the first time from the Lakshadweep.

Genus *Echinothrix* Peters, 1853

Two species are from the Lakshadweep.

Key to the species of genus

Primary interambulacral spines distinctly verticillated, whorls close together; spines relatively brittle, inner cavity more than half diameter of spine; larger spines commonly banded

E. calamaris (Pallas, 1774)

Primary interambulacral spines distinctly striated, without whorls; relatively stout, inner cavity less than half diameter; unicolour

E. diadema (Linnaeus, 1758)

Echinothrix calamaris (Pallas, 1774)

Echinus calamaris Pallas, 1774, p. 31; East Indies

Echinothrix calamaris A. M. Clark & Rowe, 1971 pp. 140, 153: Islands of the Western Indian Ocean, Mascarene Islands, East Africa & East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands, Hawaiian Islands (Distribution Table); Nagabhushanam & Rao, 1972, p. 290: Minicoy Atoll.

Material: Chetlat, three specimens; Androth, one specimen, collected under coral stones on the reef.

Echinothrix diadema (Linnaeus, 1758)

Echinus diadema Linnaeus, 1758, p. 664: Locality not known

Echinothrix diadema Bell, 1902, p. 260: Maldives; James, 1969, p. 58: Lakshadweep; A. M. Clark & Rowe, 1971, pp. 140, 153: Islands of the Western Indian Ocean, Mascarene Islands, East Africa & Madagascar, Red Sea, S.E. Arabia, Maldiva area, Sri Lanka area, Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands, Hawaiian Islands, Hawaiian Islands (Distribution Table); Nagabhushanam & Rao, 1972, p. 290: Minicoy Atoll.

Material: Chetlat, two specimens; Kadmat, one specimen; Amini, two specimens; Kavaratti, two specimens; Minicoy, one specimen.

Remarks: This species is recorded from the Lakshadweep for the first time.

ORDER STROMBOURIDAE

Only specimens belonging to one family are known from the Lakshadweep.

FAMILY STOMOPNEUSTIDAE

This family has only one genus. This has been collected from the Lakshadweep.

Genus *Stomopneustes* L. Agassiz, 1841

Only one species is known under this genus:

Stomopneustes variolaris (Lamarck, 1806)

Echinus variolaris Lamarck, 1806, p. 47: Locality not known.

Stomopneustes variolaris Koehler, 1927, p. 103: Mascarene Islands, Sri Lanka & Madagascar, S.E. Arabia, West India & Pakistan, Maldiva area; China & Southern Japan, South Pacific Islands (Distribution Table); Nagabhushanam & Rao, 1972, p. 290: Minicoy Atoll; James, 1986, p. 583: Lakshadweep & Maldiva Area, Gulf of Mannar, Palk Bay on the

Indian side; Sri Lanka, Andaman & Nicobar Islands (Distribution Table),

Material: Chetlat, two specimens; Kiltan, two specimens collected under coral stones.

Remarks: Since these were collected in the lagoon where the water is always calm, they were not found to bore into rock. In places like Visakhapatnam where there is heavy wave action this species burrows into rock for protection.

ORDER CAMRODONTA

Species belonging to three Families have been collected.

Key to the families of the order

1. Test sculptured by pits and depressions.....
TEMNOLEURIDAE
- 1'. Test not sculptured by pits and depressions..2
2. Gill cuts sharp and deep.....
TOXOPNEUSTIDAE
- 2'. Gill cuts not sharp and deep.....
ECHINOMETRIDAE

Family TOXOPNEUSTIDAE

Under this family two genera are collected from the Lakshadweep.

Key to the genera of the family

Globiferous pedicellariae very large and conspicuous.....*Toxopneustes* L. Agassiz, 1841

Globiferous pedicellariae small and inconspicuous.....*Tripneustes* L. Agassiz, 1841

Genus *Toxopneustes* L. Agassiz, 1841

Only one species is collected under this species.

Toxopneustes pileolus (Lamarck)
(Fig. 19)

Echinus pileolus Lamarck, 1816, p. 45: Mascarene Islands.

Toxopneustes pileolus A. M. Clark & Rowe, 1971, pp. 142, 156: Islands of Western Indian Ocean, Mascarene Islands, East Africa & Madagascar, S. E. Arabia, Sri Lanka area, Bay of Bengal, East Indies,

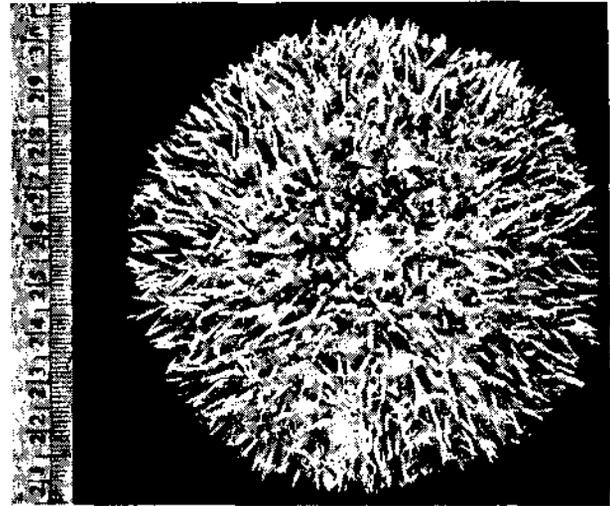


Fig. 19 *Toxopneustes pileolus*

Philippines, China & Southern Japan, South Pacific Islands (Distribution Table); James, 1986, p. 583: Gulf of Mannar & Palk Bay along the South East coast of India, Sri Lanka, Andaman & Nicobar Islands (Distribution Table).

Material: Kadamat, two specimens, on both occasions collected among live corals.

Remarks: In the living condition it has the habit of covering itself with bits of corals and pieces of algae. It is recorded here for the first time from the Lakshadweep.

Genus *Tripneustes* L. Agassiz, 1841

Only one species is collected under this genus.

Tripneustes gratilla (Linnaeus, 1758)
(Fig. 20)

Echinus gratilla Linnaeus, 1758, p. 664: Locality not known.

Tripneustes gratilla A. M. Clark & Davies, 1966, p. 399: Maldives; James, 1969, p. 67: Gulf of Mannar, Nicobar, Mauritius, Red Sea; A. M. Clark & Rowe, 1971, pp. 142, 156: Islands of Western Indian Ocean, Mascarene Islands, East Africa & Madagascar, Red Sea, S. E. Arabia, Maldivian area, Sri Lanka area, Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands, (Distribution Table); Nagabhusahnam & Rao, 1972,



Fig. 20 *Tripneustes gratilla*

p. 290: Minicoy Atoll; James 1986, p. 583. Lakshadweep & Maldives, Gulf of Mannar & Palk Bay along S. E. Coast of India, Sri Lanka, Andaman & Nicobar Islands (Distribution Table).

Material: Chetlat, several specimens; Kiltan, several specimens; Kadamat, three specimens; Amini, several specimens; Kalpeni, two specimens, all specimens collected in the lagoons on algal beds.

Remarks: This species is common in the lagoon at Amini. The ripe gonads of this species are of export value and are considered as a delicacy in Japan.

Family TEMNOPLEURIDAE

Only two genera are collected under this Family from the Lakshadweep.

Key to the Genera of the Family

Primary tubercles distinctly crenulated; coronal plates with small sutural pits or none.....
Salmacis L. Agassiz, 1841

Primary tubercles not crenulated; interambulacral plates low and numerous; pore pairs distinctly biserial.....*Mespila* Agassiz & Desor, 1846

Genus *Salmacis* L. Agassiz, 1841

Two species are known from the Lakshadweep. Only one species is collected during the survey.

Key to the Species of the Genus

Primary spines violet in colour; in the living condition covers itself with bits of shells, coral pieces etc*S. virgulata* L. Agassiz 1846

Primary spines banded with red and yellow colours; in the living condition does not cover with bits of shells and coral pieces
S. bicolor L. Agassiz, 1846

Salmacis virgulata L. Agassiz & Desor 1846

Salmacis virgulata L. Agassiz & Desor, 1846, p. 359: Sri Lanka; A. M. Clark & Rowe, 1971, pp. 140, 156: Sri Lanka, Bay of Bengal, East Indies, Philippines (Distribution Table); James, 1986, p. 583: Gulf of Mannar & Palk Bay on the Indian side; Sri Lanka.

Material: Androth, one specimen, collected on the reef flat.

Remarks: This species appears to be very rare. This is also not recorded from the Maldives. It is reported here for the first time from the Lakshadweep.

Genus *Mespila* Agassiz & Desor, 1846

Only one species is collected under this genus,

Mespila globulus (Linnaeus, 1758)

Echinus globulus Linnaeus, 1778, p. 664: Locality not known.

Mespila globulus A. M. Clark & Rowe, 1971, pp. 140, 155: Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands (Distribution Table).

Material: Kavaratti, two specimens, collected under coral stones.

Remarks: This species is also not known from the Maldives. It is recorded here for the first time from the Lakshadweep.

Family ECHINOMETRIDAE

Under this Family three genera are collected from the Lakshadweep.

Key to the Genera of the Family

1. Only three pore-pairs to the arcs.....
Echinostrephus A. Agassiz, 1863

- 1'. Four to many pore-pairs to the arcs.....2
2. Primary spines very strongly developed, long, thick and heavy.....
Heterocentrotus Brandt, 1835

- 2' Primary spines not very strongly developed, not long, thick and heavy
Echinometra Gray, 1825

Genus *Echinostrephus* A. Agassiz, 1863

This little genus of curious rock-boring sea urchin is characteristic of the coral rock areas. Only one species is known.

Echinostrephus molaris (Blainville)
(Fig. 21)

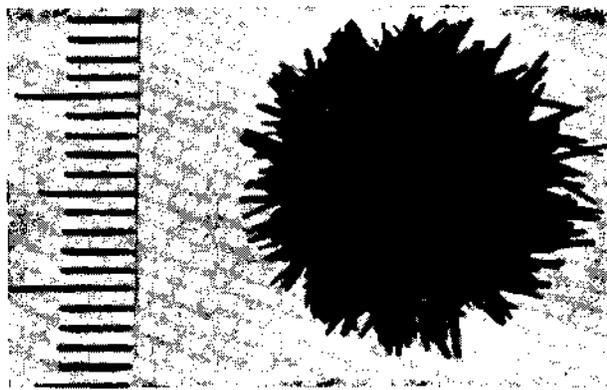


Fig. 21 *Echinostrephus molaris*

Echinus molaris Blainville, 1825, p. 88: Locality not known.

Echinostrephus molaris A. M. Clark, & Davies, 1966: Maldives; A. M. Clark & Rowe, 1971, pp. 142, 157: Mascarene Islands, East Africa & Madagascar, Red Sea, S. E. Arabia, Western India & Pakistan, Maldiva area; Sri Lanka area, Bay of Bengal, East Indies, North Australia, China & Southern Japan, South Pacific Islands; (Distribution Table); James' 1986, 1986, 583: Lakshadweep & Maldives Area, Sri Lanka, Andaman & Nicobar Islands (Distribution Table).

Material : Agatti, one specimen, collected from a coral stone.

Remarks : This is a rock borer and is recorded here for the first time from the Lakshadweep.

Genus *Heterocentrotus* Brandt, 1835

This extraordinary genus comprises the so called 'slate pencil' urchins. One species is known from the Lakshadweep.

Heterocentrotus mammillatus (Linnaeus, 1758)

Echinus mammillatus Linnaeus, 1758, p. 667: Locality not known.

Heterocentrotus mammillatus H. L. Clark, 1921, p. 151: Torres Strait; A. M. Clark & Davies, 1966, p. 603: Maldives; James, 1969, p. 58: Lakshadweep, Red Sea, Mascarene Islands, A. M. Clark & Rowe, 1971, pp. 142, 158: Mauritius, East Africa & Madagascar, Red Sea, S. E. Arabia, Maldiva area, Sri Lanka Area, East Indies, North Australia, Philippines China & Southern Japan, South Pacific Islands, Hawaiian Islands (Distribution Table .

Material : Agatti, one specimen; Kavaratti, two specimens, collected from coral reef flat.

Remarks : It is one of the beautiful sea urchins in the living condition. The spines are used to write on slates.

SUBCLASS IRREGULARIA

Species belonging to this Subclass have the anal opening outside the apical system in posterior interambulacrum. Species belonging to all the four orders have been collected.

Key to the Orders of the Subclass

1. Ambulacra simple not forming petals aborally, test usually high.....
HOLECTYPOIDA
- 1'. Ambulacra petaloid; test often flattened and broad 2
2. Dental apparatus strongly developed and present in adults; phyllodes absent.....
CLYPEASTROIDA
- 2'. Dental apparatus present in young stages; phyllodes more or less developed.....3
3. Phyllodes and bourrelets well developed forming a floscelle.....CASSIDULOIDA
- 3'. Phyllodes usually little developed; bourrelets absent.....SPATANGOIDA

ORDER HOLECTYPOIDA

Forms regular with high test. Ambulacra simple. Apical system and peristome central. Periproct in close contact with the apical system. Spines simple and small. Pedicellariae of the usual four types.

There are two Suborders under this order of which members belonging to one Suborder have been recorded from the Indian Seas.

SUBORDER ECHINONEINA

Test often elongate. Peristome oblique. Gill slits and buccal plates absent. Primary tubercles do not form distinct verticle series except in young forms. Masticatory apparatus present in young stages only.

This Suborder has only one Family viz., Echinoneidae.

Family ECHINONEIDAE

Two genera are known under this Family of which one is known from the Indian Seas.

Genus *Echinoneus* Leske, 1778

Only one species is known from the Indian Seas.

Echinoneus cyclostomus Leske, 1778 (Fig. 22)

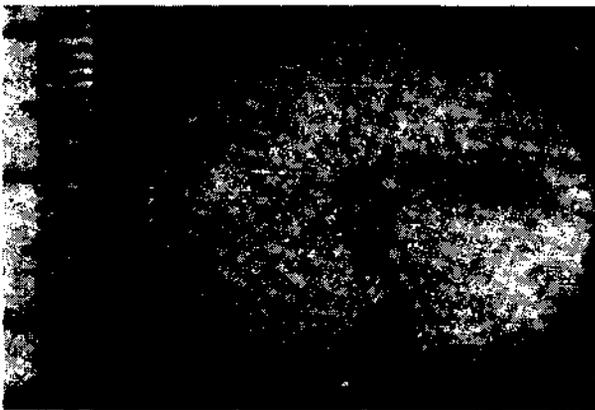


Fig. 22 *Echinoneus cyclostomus*

Echinoneus cyclostomus; Leske, 1778, p. 173: Locality not known; Bell, 1902, p. 232: Lakshadweep; A. M. Clark & Davies, p. 599: Maldives; A. M. Clark & Rowe, 1971, pp. 144, 158: Islands of Western Indian Ocean, Mascarene Islands East Africa & Madagascar, S. E. Arabia

Maldive area, Sri Lanka Area, Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands, Hawaiian Islands (Distribution Table); Nagahushanam & Rao, 1972, p. 290: Minicoy Atoll; James, 1986, p. 584: Lakshadweep & Maldives, Sri Lanka, Andaman & Nicobar Islands (Distribution Table).

Material: Chetlat, two tests; Kiltan, two tests.

Remarks: Only tests were collected. Live specimens were not seen on the reefs.

ORDER CLYPEASTROIDA

Species belonging to one Family is known from the Lakshadweep.

Family CLYPEASTERIDAE

Only one genus is collected from the Lakshadweep.

Genus *Clypeaster* Lamarck, 1801

Under this genus two species are recorded. The record of *Clypeaster humilis* by Nagabhushanam & Rao (1972) from Minicoy Atoll needs confirmation.

Key to the species of the Genus

Edge of the test markedly thickened; petaloid area somewhat thickened.....

C. reticulatus (Linnaeus, 1758)

Central part of the test raised and margin flat; petals more or less distinctly closed ...

C. humilis (Leske, 1778)

Clypeaster reticulatus (Linnaeus, 1758)

Echinus reticulatus Linnaeus 1758, p. 663: Locality not known.

Rhaphidoclypus reticulatus Koehler, 1922, p. 68: Maldives.

Clypeaster reticulatus A. M. Clark, & Rowe, 1971, pp. 144, 160: Islands of Western Indian Ocean, Mascarene Islands, East Africa and Madagascar, Red Sea S. E. Arabia, Persian Gulf, Maldive area, Sri Lanka area, Bay of Bengal, East Indies, North Australia, Philippines, China and Southern Japan, South Pacific Islands, Hawaiian Islands (Distribution Table); James, 1986, p. 584: Lakshadweep &

Maldive area, Sri Lanka (Distribution Table).

Material: Chetlat, two tests; Kadamat, one test.

Remarks: No live specimens could be collected during the survey. In the Maldives it is recorded from more than 20 metres depth.

ORDER CASSIDULOIDA

In this Order species belonging to one Family are recorded.

Family ECHINOLAPADIDAE

Species belonging to one genus only are collected from the Lakshadweep.

Genus *Echinolampas* Gray, 1825

Two species are collected under this genus from the Lakshadweep.

Key to the species of the Genus

Peristome pentagonal; interproiferous zone of petals with crowded tubercles, often about eight in a single transverse series.....

E. ovata (Leske, 1778)

Peristome oval; few tubercles between the pores.....

E. alexandri de Loriol, 1876

Echinolampas ovata (Leske, 1778)
(Fig. 23)

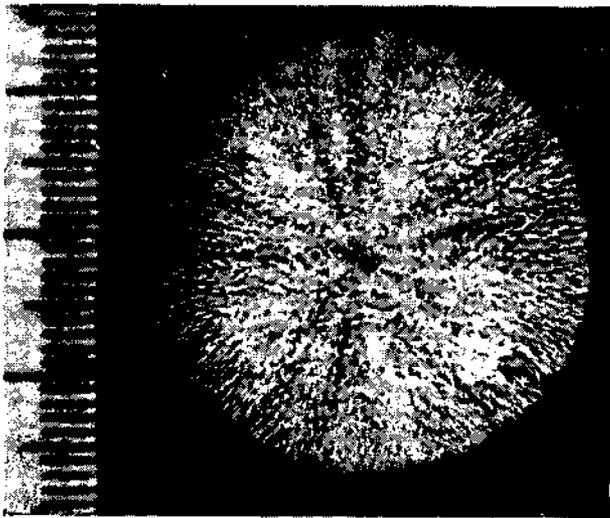


Fig. 23 *Echinolampas ovata*

Echinanthus ovatus Leske, 1778, [p. 1] 1919:
Locality not known.

Echinolampas ovata A. M. Clark and Rowe,
1971, pp. 143, 163: Mascarene Islands,

Red Sea, Sri Lanka area, Bay of Bengal, East Iddies, North Australia (Distribution Table); James, 1986, p. 584: Gulf of Mannar and Palk Bay on Indian side Sri Lanka.

Material: Chetlat, one specimen; Kiltan, one specimen; Amini, two specimens (one test); Androth, one test, all live specimens collected under corals stones.

Remarks: This species is collected for the first time from Lakshadweep.

Echinolampas alexandri de Loriol, 1876

Echinolampas alexandri de Loriol, 1876, p. 4: Mauritius; A. M. Clark and Rowe, 1971, pp 144, 163: Islands of the Western Indian Ocean, Mascarene Islands, S. E. Arabia; Sri Lanka area, Bay of Bengal, East Indies, South Pacific Islands (Distribution Table); James, 1986, p. 584: Gulf of Mannar and Palk Bay on the Indian side; Sri Lanka (Distribution Table).

Material: Kiltan, two specimens, Collected under coral stones.

Remarks: This species is recorded here for the first time from the Lakshadweep.

ORDER SPANTANGOIDA

Only one species belonging to the family Brissidae is collected during the survey. Nagabhushanam and Rao (1972) listed species belonging to two other families under this order from Minicoy Atoll.

Key to Families of the Order

1. Peristome crescentic or D-shaped; labrum well developed no subanal fasciole.....
LOVENIIDAE
- 1'. Subanal fasciole present; no inner fasciole2
2. Peripetalous fasciole absent.....
SPATANGIDAE
- 2'. Peripetalous fasciole present. . .BRISSIDAE

Family LOVENIIDAE

Under this Family two Genera are present. One species belonging to the Genus *Lovenia*

has been reported by Nagabhushanam & Rao (1972) from Minicoy Atoll.

Key to the Genera of the Family

No Peripetalous fasciole; sternum almost naked
..... *Lovenia* Agassiz & Desor, 1847

Peripetalous fasciole present and also inner and
subanal ones; sternum well tuberculated.....
Breynia Agassiz & Desor, 1847

Genus *Lovenia* Agassiz & Desor 1847

Under this genus only one species viz.,
L. elongata (Gray, 1845) has been listed from
Minicoy.

Family SPATANGIDAE

Under this Family genus *Maretia* has been
recorded from Minicoy.

Genus *Maretia* Gray, 1855

Under this genus one species viz., *M.*
planulata (Lamarck) has been listed from Mini-
coy Atoll by Nagabhushanam & Rao (1972).

Family BRISSIDAE

Under this Family two genera are collected from
the Lakshadweep.

Key to the Genera of the Family

Distinct anal fasciole on each side of periproct;
subanal plastron not projecting like snout
beyond periproctal area.....*Metalia* Gray, 1855

No anal fasciole; subanal plastron not projecting
like a snout.....*Brissus* Leske; 1778

Genus *Metalia* Gray 1855

Under this Genus only one species viz. *M.*
spatangus (Linnaeus, 1758) has been listed from
Minicoy Atoll by Nagabhushanam & Rao (1972).

Genus *Brissus* Leske, 1778

Under this Genus only test of one species
has been collected during the survey

Brissus latecarinatus (Leske, 1778)
(Fig. 24)

Spatangus latecarinatus Leske, 1778, p. 185:
Locality not known.

Brissus latecarinatus A. M. Clark & Rowe,
1971, pp. 146, 165; Islands of the
Western Indian Ocean, Mascarene
Islands, East Africa & Madagascar;



Fig. 24 *Brissus latecarinatus*

Maldive area, Sri Lanka area, East
Indies, North Australia, Philippines,
China & Southern Japan, South Pacific
Islands, Hawaiian Islands (Distribution
Table); James, 1986. p. 585; Laksha-
dweep & Maldive area, Sri Lanka
(Distribution Table).

Material : Agatti, one specimen (test only).

Remarks : This species is recorded for the first
time from Lakshadweep.

CLASS HOLOTHURIOIDEA

The holothurians are the least known group
of the echinoderms because of the difficulties in
preserving them and also due to the notable
unattractiveness of the preserved specimens.
In their habits they show less diversity than the
more active brittle stars and the sea urchins.
The majority of them are sluggish. The longest
holothurian belonging to the order Apoda live
more or less exposed on the sea bottom,
particularly in the open areas near the coral
reefs. Small forms live under rock fragments or
among the dead corals often burying themselves
deep in the sand and withdrawing out of sight
when disturbed. The colours are mostly brown
or grey of some shade. Some species are
handsomely coloured with shades of red, yellow
and violet colours. The tentacles are frequently
in contact with the body colour. Some of them
harbour commensals like crabs and Carapid fish.

The holothurians are the only group which have some economic value. An edible product known as *beche-de-mer* or *Trepang* is prepared out of the body wall of certain holothurians.

In this work 26 species are reported of which four species are new records to the Lakshadweep.

Species belonging to three Order have been collected.

Key to the Orders of the Class

1. Tentacles tree-shaped, much branched; anterior end with introvert DENDROCHIROTIDA
- 1'. Tentacles peltata or digitate; no true introvert..... 2
2. Tentacles peltate; body cylindrical with podia ASPIDOCHIROTIDA
- 2'. Body vermiform with rough or warty surface; tentacles pinnate; podia and respiratory trees absent APODA

ORDER: ASPIDOCHIROTIDA

Species belonging to three Families have been collected from the Lakshadweep.

Key to the Families of the Order

1. Body cylindrical or vermiform; pedicels and papillae long (95-10 mm.) confined more or less to five ambulacral bands; calcareous ring ribbon-like with radials and interradials markedly dissimilar in size; body translucent LABIDODEMATIDAE
- 1'. Body cylindrical or rectangular; pedicels and papillae short not confined to ambulacral areas; calcareous ring not ribbon-like with radials and interradials of similar size; body not translucent 2
2. Gonads in single tuft to the left side of the mesentery; spicules in various forms; S-shaped and C-shaped rods absent. HOLOTHURIIDAE
- 2'. Gonads in two tufts, one on each side of the dorsal mesentery; S and C-shaped rods present..... STICHOPODIDAE

Family LABIDODEMATIDAE

This Family is described by James (1981) to accomodate the genus *Labidodemas* Seleka, 1867. So Far only one genus is known under this Family

Genus *Labidodemas* Selenka, 1867

One species is known from the Lakshadweep.

Lobidodemas rugosum (Ludwig, 1875)

Holothuria rugosa Ludwig, 1875, p. 110: South Pacific Islands; Pearson, 1913, p. p. 82: Maldives.

Labidodemas rugosum Rowe, 1969. p. 133; A.M. Clark & Rowe, 1971, pp. 176, 197: Maldiva area, Bay of Bengal, East Indies, North Australia, Philippines, South Pacific Islands (Distribution Table) Mukhopadhyay & Samanta, 1983, pp. 308, 312: Kavaratti (Lakshadweep); James, 1986, p. 685: Lakshadweep & Maldives area, Andaman and Nicobar area (Distribution Table).

Material: Chetlat, two specimens; Kadamat, two specimens, collected under coral stones.

Remarks: At Andaman this species is found completely buried inside sand under big stones. It is a rare species in Lakshadweep.

Family HOLOTHURIIDAE

Under this Family three Genera are collected during the survey.

Key to the Genera of the Family

1. Spicules: tables, buttons, rod resetts, perforated plates; if branched rods present only in combination with others and never on their own *Holothuria* Linnaeus, 1764
- 1'. Spicules: very numerous branched rods usually dichotomously lobed 2
2. Anus guarded by five enlarged calcified papillae or anal teeth ... *Actinopyga* Bronn, 1860
- 2'. Arms not guarded by five enlarged calcified papillae though five groups of similar papillae may be present *Bohadschia* Jaeger, 1833

Genus *Holothuria* Linnaeus, 1764

Over one hundred species are known under this genus. Several attempts were made to reduce the unwieldy mass of species included under the genus into more manageable groups by earlier workers like Pearson (1914), Panning (1929-35) and Deichmann (1958). For one reason or other the earlier studies remained inconclusive. Rowe (1969) revised the Family Holothuriidae and proposed a new classification which is followed in this paper.

Under this genus 17 subgenera have been recognised by Rowe (1969). Of these species belonging to eight subgenera have been collected. The subgenus *Cystipus* is recorded for the first time from the Lakshadweep. The following key is adopted from Rowe (1969).

Key to the subgenera the Genus

1. Spicules: tables always present in combination with rods or rosettes, never with buttons 2
- 1'. Spicules: tables always present in combination with buttons, no rosettes or rods. . 3
2. Spicules: tables usually with reduced disc and moderately high or high spire ending in a few spines forming maltase cross when viewed from above *H. (Holodemia)* Pearson, 1914
- 2'. Spicules: tables in combination with rods in the body wall, tables with reduced disc and spire, either rounded at the tip or terminate in a few spines which form a single or double maltase cross when viewed from above, no rosettes. *H. (Semperothuria)* Deichmann, 1958
3. Spicules : table variously developed never modified into hollow fenestrated spheres; buttons smooth, regularly or irregularly developed, often twisted. 4
- 3'. Spicules: tables always strongly developed sometimes modified into hollow fenestrated spheres; buttons always knobbed or rugose or modified to form hollow fenestrated ellipsoids 7
4. Spicules: tables usually well developed the rim of the disc not spinose; buttons not twisted, sometimes flat and thin with or without an apparent median longitudinal ridge, outlines regular or irregular...5
- 4'. Spicules: tables more or less well developed disc usually spinose; buttons irregular or twisted, never flattened, lacking any appearance of a median longitudinal ridge.6
5. Spicules: tables well developed, disc smooth and round usually with ten or more peripheral holes, spines of moderate height ending in a several small spines; buttons oval thin, flat, very rarely with a few knobs an apparent median longitudinal ridge present, three to six pairs of relatively small holes, buttons regular or irregular in outline*H. (Platyperona)* Rowe, 1969
- 5'. Spicules: tables fairly stout, disc smooth squarish in outline, usually with eight regular peripheral holes spire of moderate height ending in a cluster of small spines; buttons not thin or flat and lacking any appearance of longitudinal ridge usually with three pairs of comparatively large holes and regular in outline *H. (Thymioscycia)* Pearson, 1914
6. Spicules: tables not strongly developed, rim of disc usually spinose, spire low, ending usually in a ring of spines or cluster of spines, tables occasionally degenerate or incomplete; buttons irregular though not twisted, usually with three pairs of holes or else incomplete forming small lobed rosette-like bars *H. (Mertensiothuria)* Deichmann, 1958
- 6'. Spicules; tables always well developed rim of disc spinose and turned up to give a 'cup and saucer' aspect to the table in lateral view, spire low to moderate in height, usually terminating in a ring or cluster of small spines; pseudobuttons abundant, smooth, usually irregular and often reduced to a single row of three or four holes, occasionally buttons quite regular with three pairs of holes *H. (Lessonothuria)* Deichmann, 1958
7. Spicules: tables with disc usually knobbed spire low, bearing many short spines which are sometimes so numerous and closely crowded that they may almost either obscure the disc or become connected to the knobs

of the margin of the disc thus forming a fenestrated sphere; buttons usually simple with large regularly or irregularly arranged knobs, generally three to four or more pairs of relatively small holes which may become somewhat obscured by the size of the large knobs *H. (Cystipus)* Haacke, 1880

- 7'. Spicules: tables stout, well developed spire moderate or high, never modified into hollow fenestrated ellipsoids; tables well developed with smooth disc, spire of moderate height or high terminating in several small spines; buttons hollow fenestrated ellipsoids though a few simple knobbed buttons may be present
H. (Microthela) Brandt, 1835

Subgenus *Halodeima* Pearson, 1914

One species is known from the Lakshadweep.

Holothuria (Halodeima) atra Jaeger, 1833

Holothuria atra Jaeger, 1833, p. 22: East Indies.

Holothuria (Halodeima) atra Rowe, 1969, p. 137: Amboina; A. M. Clark & Rowe, 1971, pp. 176; Islands of Western Indian Ocean, Mascarene Islands, East Africa & Madagascar, Red Sea S. E. Arabia, Persian Gulf, Maldiva area, Sri Lanka area, Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan South Pacific Islands Hawaiian Islands (Distribution Table); Mukhopadhyay & Samanta, 1983, pp. 302, 311: Lakshadweep & Maldiva area, Gulf of Mannar & Palk Bay on the Indian side, Sri Lanka, Andaman & Nicobar Islands (Distribution Table),

Material: Chetlat, several specimens, Kiltan, several specimens; Kadamat, five specimens; Amini, three specimens; Agatti, several specimens, Kavaratti, two specimens, all specimens collected from the lagoon.

Remarks: This is the most common holothurian in Lakshadweep. This species is always fully exposed on sandy bottoms and is never encountered under stones.

Subgenus *Semperothuria* Deichmann, 1958

Only one species is collected under this subgenus.

Holothuria (Semperothuria) cinerascens
 (Brandt, 1835)

(Fig. 25)

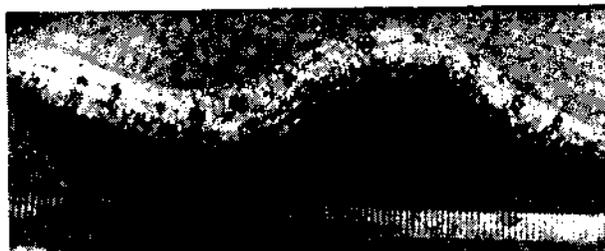


Fig. 25 *Holothuria (Semperothuria) cinerascens*

Stichopus (Gymnochirota) cinerascens Brandt, 1835, p. 51: China & Southern Japan.

Holothuria cinerascens Pearson, 1913, p. 64: Maldives, Seychelles, Sri Lanka; James, 1969, p. 61: Gulf of Mannar, Arabian Sea, Lakshadweep.

Holothuria (Semperothuria) cinerascens Rowe, 1969, p. 135: A. M. Clark & Rowe, 1971, p. 178: Islands of Western Indian Ocean Mascarene Islands, East Africa & Madagascar, Red Sea, S. E. Arabia, Maldives, Sri Lanka area, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands, Hawaiian Islands (Distribution Table); Mukhopadhyay & Samanta, 1983, pp. 302, 311: Lakshadweep; James, 1986, p. 583: Lakshadweep & Maldiva area, Sri Lanka (Distribution Table).

Material: Chetlat, two specimens; Bitra, two specimens; Kiltan, Several specimens; Kadamat, three specimens; Amini, several specimens Androth, one specimen; Kavaratti, three specimens; Minicoy, several specimens, all specimens collected under coral stones.

Remarks: This is a common holothurian in Lakshadweep. They were found to attach to the rock firmly. It is provided with profuse cuvierian tubes which are discharged on disturbance to the animal.

Subgenus *Platyperona* Rowe, 1969

Only one species is known from the Lakshadweep. This was reported for the first time from the Lakshadweep by the author in 1969.

Holothuria (Platyperona) difficilis (Semper)

Holothuria difficilis Semper, 1868, p. 92: Samoa.

Microthele difficilis A. M. Clark and Davies, 1966, p. 600: Maldives. James, 1969, p. 61: Lakshadweep, Red Sea.

Holothuria (Platyperona) difficilis Rowe, 1969, p. 145.; A. M. Clark & Rowe, 1971, p. Islands of Western Indian Ocean, Mascarene Islands, Red Sea, Maldivian area, Sri Lanka area, Bay of Bengal, East Indies, North Australia; Philippines, China & Southern Japan, South Pacific Islands Hawaiian Islands (Distribution Table); Mukhopadhyay & Samanta, 1983, pp. 302, 311: Lakshadweep; James, 1986, p. 585: Lakshadweep & Maldivian area, Sri Lanka, Andaman & Nicobar Islands, (Distribution Table).

Material: Chetlat, several specimens; Kiltan, several specimens; Amini, several specimens; all collected under coral stones.

Remarks: The colour in the living condition is light brown with dark brown blotches. The posterior end is tapering. The ventral side is thickly distributed by pedicels which are yellowish-brown in colour.

Subgenus *Thymioscyia* Pearson, 1914

Three species are collected from the Lakshadweep during the survey.

Key to the species of the subgenus

1. Spicules: buttons with small holes burrowing form with often red spots
..... *H. (Thymioscyia) arenicola* Semper, 1868
- 1'. Spicules: buttons with large holes 2
2. Spicules: tables stout with a cluster of short spines at the top fugitive form skin Sanday to touch
..... *H. (Thymioscyia) impatiens*
(Forsk., 1775)

- 2'. Spicules: tables not stout and with a few spines at the top skin smooth and soft; fugitive form.....*H. (Thymioscyia) hilla*
Lesson, 1830

Holothuria arenicola Semper, 1868, p. 81: Philippines.

Holothuria (Thymioscyia) arenicola Rowe, 1969, p. 147; A. M. Clark & Rowe, 1971, p. 178: Islands of Western Indian Ocean, Mascarene Islands, East Africa & Madagascar, Red Sea, Maldives, Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands, Hawaiian Islands (Distribution Table); James, 1986, p. 585: Lakshadweep & Maldivian area, Andaman and Nicobar area (Distribution Table).

Material: Chetlat, four specimens; Kadamat, two specimens; Amini, one specimen; Androth, one specimen, all found buried in sand.

Remarks: At Chetlat when the tide precedes small holes were seen through which water was gushing out. These are caused by this species. It is almost impossible to take out the species. The moment we dig they will go deeper into sand and below there are big stones which make digging difficult. It is recorded here for the first time from Lakshadweep.

Holothuria (Thymioscyia) impatiens (Forsk.)

Fistularia impatiens Forskal, 1775, p. 121: Red Sea.

Holothuria impatiens Selenka, 1867, p. 340: Suez; A. M. Clark & Davies, p. 599: Maldives; James, 1969, p. 61: Andamans, Lakshadweep, Red Sea. Nagabhushanam & Rao, 1972, p. 290: Minicoy Atoll;

Holothuria (Thymioscyia) impatiens Rowe, 1969, p. 146; A. M. Clark & Rowe, 1971, p. 178: Islands of Western Indian Ocean, Mascarene Islands, East Africa & Madagascar, Red Sea, S. E. Arabia Persian Gulf, Maldives, Sri Lanka area, Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands, Hawaiian Islands

(Distribution Table) Mukhopadhyay & Samanta, 1983, pp. 307, 311: Lakshadweep & Maldivian area, Sri Lanka, Andaman and Nicobar area;

Material: Chetlat, two specimens; Kiltan, two; Kadamat, one specimen; Amini, two specimens; Agatti, one specimen; Kalpeni, two specimens; Kalpeni, two specimens; Minicoy, three specimens, all collected under coral stones.

Remarks: It is very common holothurian in Lakshadweep. It is a fugitive form found under stones. Two or three specimens are found under the same rock. On disturbing thick Cuvierian tubes are released. It was reported for the first time from the Lakshadweep by the author in 1969. It is distributed in the Atlantic also

Holothuria (Thymioscisia) hilla Lesson

Holothuria hilla Lesson, 1830, p. 266: South Pacific Islands; A. M. Clark & Rowe, 1967, pp. 126-128.

Holothuria monocaria Koehler & Vaney, 1908, p. 11: Lakshadweep; Mergui Archipelago, Andamans, Persian Gulf; A. M. Clark & Davies, 1966, p. 603: Maldives; Nagabhusahnam

Holothuria (Thymiosycia) hilla Rowe, 1947; A. M. Clark & Rowe, 1971, p. 178: Islands of Western Indian Ocean, Mascarene Islands, East Africa & Madagascas, Red Sea, S.E. Arabia, Persian Gulf; Maldives, Sri Lanka, Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan, & Rao, 1972, p. 290: Minicoy Atoll: (Distribution Table) Mukhopadhyay & Samanta, 1983, pp. 307, 311: Lakshadweep; James, 1986, p. 585: Lakshadweep & Maldivian area, Sri Lanka, Andaman and Nicobar Islands, (Distribution Table).

Material: Chetlat, several specimens; Bitra, two specimens; Kiltan, several specimens; Kadamat, three specimens; Amini, two specimens; Minicoy, two specimens, all collected under coral stones.

Remarks: It is one of the most common holothurians in Lakshadweep. It is a fugitive species found under coral stones.

Subgenus *Mertensiothuria* Deichmann, 1958

Three species are known from the Indian Seas of which two have been collected from the Lakshadweep.

Key to the species of the subgenus

1. Spicules in the inner layer resembling narrow rosettes *H. (Mertensiothuria) pervicax* Selenka, 1867
- 1'. Buttons delicate, mostly with large holes, often narrow *H. (Mertensiothuria) leucospilota* (Brandt, 1835)

Holothuria (Mertensiothuria) pervicax (Selenka, 1867)

Holothuria pervicax Selenka, 1867, p. 327: Zanzibar; A. M. Clark & Davies, 1966, p. 600: Maldives; James, 1969, p. 61: Lakshadweep.

Holothuria (Mertensiothuria) pervicax Rowe, 1969, p. 149; A. M. Clark & Rowe, 1971, p. 176: Islands of Western Indian Ocean, Mascarene Islands, East Africa & Madagascar, Red Sea, S. E. Arabia, Maldives, Sri Lanka area, East Indies, North Australia, Philippines, South Pacific Islands Hawaiian Islands (Distribution Table); Mukhopadhyay & Samanta, 1983, p. 311: Lakshadweep; James, 1986, p. 585: Lakshadweep & Maldivian area, Sri Lanka, Andaman & Nicobar Islands (Distribution Table).

Material: Chetlat, one specimen; Minicoy, two specimens; all collected under coral stones.

Remarks: This is a rare species in Lakshadweep. It is reported for the first time from Lakshadweep by James (1969) James (1986) also reported for the first time from Andaman and Nicobar area. In fact this is the first record to the whole of Bay of Bengal.

Holothuria (Mertensiothuria) leucospilota (Brandt, 1851)

Stichopus (Gymnochirota) leucospilota Brandt, 1835, p. 51: South Pacific Islands.

Holothuria vagubunda Koehler & Faney, 1908, p. 17: Andaman Islands, Gulf of Persia, Great Cocos Island, Lakshadweep.

Holothuria leucospilota A. M. Clark & Davies, 1966, p. 603: Maldives; James, 1969, p. 62; Gulf of Mannar, Arabian Sea, Andamans, Lakshadweep, Red Sea.

Holothuria (Mertensiothuria) leucospilota Rowe, 1969, p. 148; A. M. Clark & Rowe, 1971, pp. 176: Islands of Western Indian Ocean, Mascarene Islands, East Africa, & Madagascar, Red Sea, S. E. Arabia, Persian Gulf, Western India & Pakistan, Maldivian area, Sri Lanka area, Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands, Hawaiian Islands (Distribution Table); James, 1986, p. 585: Lakshadweep & Maldives, Gulf of Mannar & Palk Bay along S. E. coast of India, Sri Lanka, Andaman & Nicobar Islands (Distribution Table).

Material: Chetlat, several specimens; Kiltan, several specimens; Kadamat, four specimens; Amini, several specimens; Androth, two specimens; Kavaratti, three specimens; Minicoy, five specimens, all collected in the lagoon.

Remarks: This species has a peculiar habit of tucking its posterior end under a big rock. The anterior end keeps on moving with ventrally directed tentacles. In some places as many as 5 or 6 were found to be distributed per square metre.

Subgenus *Lessonothuria* Deichmann, 1958

Only one species is known under this subgenus from the Lakshadweep.

Holothuria (Lessonothuria) pardalis Selenka, 1867

Holothuria pardalis Selenka, 1867, p. 336: Sandwich Islands, Zanzibar. A. M. Clark, Davies, 1966, p. 600: Maldives; James, 1969, p. Gulf of Mannar, Andamans, Lakshadweep, Gulf of Kutch; Nagabhushanam & Rao 1972, p. 291: Minicoy Atoll.

Holothuria (Lessonothuria) pardalis Rowe, 1969, p. 150; A. M. Clark & Rowe, 1971, p. 176: Islands of Western Indian Ocean, Mascarene Islands, East Africa & Madagascar, Red Sea, S. E. Arabia; Western India & Pakistan, Maldivian area, Sri

Lanka area, Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands, Hawaiian Islands; Mukhopadhyay & Samanta, 1983, p. 311: Lakshadweep

Material: Chetlat, three specimens; Bitra, two specimens; Kiltan, four specimens; Minicoy, two specimens, all collected under coral stones.

Remarks: It is one of the most common holothurians of the Lakshadweep. It is not an active holothurian but the tentacles are well extended during movements. It is a burrowing form.

Subgenus *Cystipus* Haacke, 1880

Only one species is collected under this genus from the Lakshadweep.

Holothuria (Cystipus) rigida (Selenka)

Stichopus rigidus Selenka (Partime) 1867, p. 317: Zanzibar, Hawaii.

Holothuria rigida Semper, 1868, p. 79: Philippines.

Holothuria (Cystipus) rigida Rowe, 1969, p. 155; A. M. Clark & Rowe, 1971, p. 176: Mascarene Islands, East Africa and Madagascar, Red Sea, Maldivian area, East Indies, North Australia, Philippines, South Pacific Islands (Distribution Table); James, 1986, p. 585: Lakshadweep & Maldivian area, Andaman and Nicobar area.

Material: Kiltan, two specimens, found buried under sand.

Remarks: This is a rare species in Lakshadweep. It is a fussorial form. In small specimens sand sticks to the body as a coating. It is an inactive holothurian showing very little movement. It is recorded here for the first time from the Lakshadweep.

Subgenus *Microthela* Brandt, 1835

Only one species is collected under this subgenus from the Lakshadweep.

Holothuria (Microthela) nobilis (Selenka) (Fig. 26)

Mulleria nobilis Selenka, 1867, p. 313: Zanzibar, Sandwich Islands.

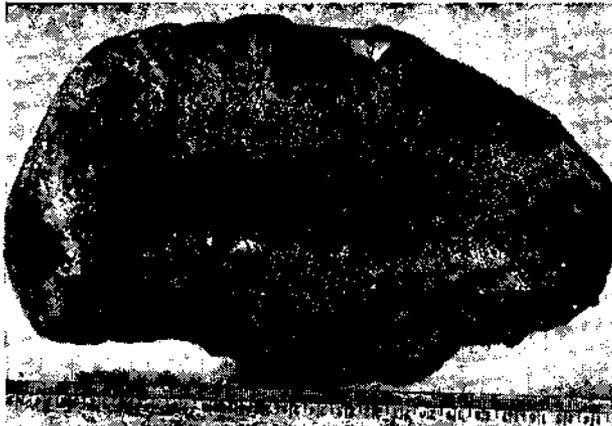


Fig. 26 *Holothuria (Microthela) nobilis*

Microthela nobilis A. M. Clark & Davies, 1966, p. 600: Maldives; James, 1969, p. 61: Lakshadweep, Red Sea; Nagabhusanam & Rao, 1972, p. 291: Minicoy Atoll.

Holothuria (Microthela) nobilis Rowe, 1969, p. 162; A. M. Clark & Rowe, 1971, p. 178: Islands of Western Indian Ocean, Mascarene Islands, East Africa & Madagascar, Red Sea, Maldivian area, Sri Lanka area, East Indies, North Australia, Philippines China & Southern Japan, South Pacific Islands, Hawaiian Islands (Distribution Table) Mukhopadhyay & Samanta, 1983, p. 311: Lakshadweep; James, 1986, p. 585: Lakshadweep & Maldivian area, Sri Lanka, Andaman and Nicobar Islands (Distribution Table)

Material: Chetlat, several specimens; Kiltan, several specimens; Kadamat, three specimens; Amini, several specimens; Kavaratti, two specimens, all specimens collected from the lagoon, depth less than a metre.

Remarks: This is the most valuable holothurian for *beche-de-mer*. It was found common at Amini and Chetlat. There is very good scope to exploit this species in Lakshadweep.

Genus *Actinopyga* Bronn, 1861

Three species are collected from the Lakshadweep.

Key to the species of the Genus

1. Tentacles 25 or more; colour chocolate brown above and lighter below.....
A. mauritiana (Quoy & Gaimard, 1833)

- 1'. Tentacles 20 or fewer; colour either brown or black..... 2
2. Large rods, often branched at the ends, sometimes with lateral branches; colour uniformly brown throughout.....
A. echinites (Jaeger, 1833)
- 2'. Large rods absent; rosettes small often incomplete; black or dark brown.....
A. miliaris (Quoy & Gaimard, 1833)

Actinopyga mauritiana (Quoy & Gaimard, 1833)

Holothuria mauritiana Quoy & Gaimard, 1833, p. 138: Mauritius.

Actinopyga mauritiana Koehler & Vaney, 1908, p. 22: Galle, Lakshadweep, Coco Island, Andaman Island; A. M. Clark & Davies, 1966, p. 603: Maldives; James, 1969, 61: Andamans, Nicobar, Lakshadweep, Red Sea; A. M. Clark & Rowe, 1971, p. 176: Islands of Western Indian Ocean, Mascarene Islands, East Africa and Madagascar, Red Sea, Western India and Pakistan, Maldivian area, Sri Lanka area, Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands, (Distribution Table); Nagabhusanam & Rao, 1972, p. 290: Minicoy Atoll; Mukhopadhyay & Samanta, 1983, pp. 300, 311: Lakshadweep; James, p. 585: Lakshadweep & Maldivian area, Sri Lanka, Andaman Nicobar Islands (Distribution Table).

Material: Chetlat, several specimens; Kiltan, several specimens; Kadamat, four specimens; Amini, several specimens; Agatti, two specimens; Androth, two specimens; Kavaratti, three specimens; Kalpeni, one specimen; Minicoy three specimens, all specimens collected on the reef flat near the low water mark.

Remarks: This is one of the most common holothurians in the Lakshadweep. This species can be used for *beche-de-mer* preparation. Often on lifting the specimen small pieces of corals, and such other objects are found attached to the ventral side.

Actinopyga echinites (Jaeger, 1833)

Mulleria echinites Jaeger, 1833, p. 17: East Indies.

Actinopyga echinites Pearson, 1914, p. 183: Indian Ocean; Rowe, 1969, p. 131; A. M. Clark & Rowe, 1971, p. 176: Islands of Western Indian Ocean, Mascarene Islands, East Africa & Madagascar, S. E. Arabia, Sri Lanka area, Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan; South Pacific Islands (Distribution Table); James, 1986, p. 585: Sri Lanka, Andaman & Nicobar Islands (Distribution Table).

Material: Amini, two specimens, under coral stones.

Remarks: This species grows to a large size and is used in the preparation of *beche-de-mer*. It is very rare and is recorded for the first time from the Lakshadweep. It is also not known from the Maldives.

Actinopyga miliaris (Quoy & Gaimard, 1833)

Holothuria miliaris Quoy and Gaimard, 1833, p. 137: East Indies.

Actinopyga miliaris James, 1969, p. 61: Lakshadweep; Rowe, 1969, p. 131; A. M. Clark & Rowe, 1971, p. 176: Islands of Western Indian Ocean, Mascarene Islands, East Africa & Madagascar, Red Sea, Sri Lanka area, Bay of Bengal, East Indies, North Australia, Philippines, China and Southern Japan, South Pacific Islands (Distribution Table); Nagabhusanam & Rao, 1972, p. 290: Minicoy Atoll; Mukhopadhyay and Samanta, 1983, p. 311: Lakshadweep.

Material: Minicoy, two specimens, collected under coral stones.

Remarks: This a rare holothurian in Lakshadweep. Good quality *beche-de-mer* can be prepared from this species. It was recorded for the first time from Lakshadweep by James (1969).

Genus *Bohadschia* Jaeger, 1833

Two species are collected under this genus from the Lakshadweep during the survey. One of them is recorded here for the first time.

Key to the species of the genus

Colour in life pale or yellow brown above and

white below.....*Bohadschia marmorata*
(Jaeger, 1833)

Colour brown or purplish brown with eye-like spots all over the body.....*Bohadschia argus*
Jaeger, 1833

Bohadschia marmorata Jaeger, 1833
(Fig. 27)

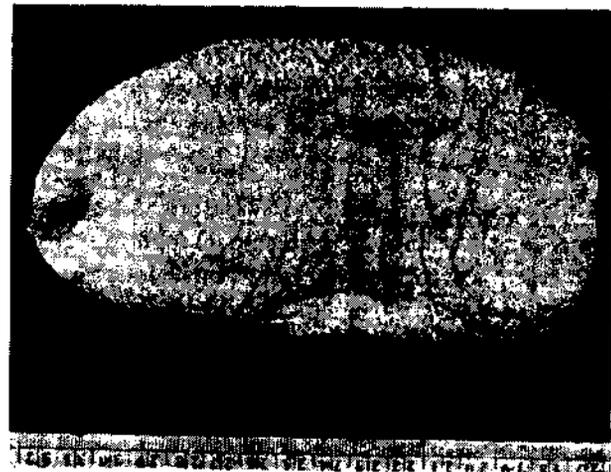


Fig. 27 *Bohadschia marmorata*

Bohadschia marmorata Jaeger, 1833, p. 18: East Indies; A. M. Clark & Rowe, 1971, p. 176: Mascarene Islands, East Africa & Madagascar; Red Sea, Sri Lanka area, Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands (Distribution Table); Nagabhusanam and Rao, 1983, p. 301: Lakshadweep. James; 1986 p. 585: Lakshadweep and Maldivian area, Gulf of Mannar and Palk Bay on the Indian side, Sri Lanka, Andaman and Nicobar Islands (Distribution Table).

Holothuria marmorata James, 1969, p. 62: Andamans, Lakshadweep; Nagabhusanam & Rao, 1972, p. 290: Minicoy Atoll.

Material: Chetlat, several specimens; Bitra, two specimens; Kiltan, several specimens; Kalpeni, two specimens, all specimens collected from lagoon, depth less than a metre.

Remarks: This species recorded for the first time from the Lakshadweep by James (1969).

Bohadschia argus Jaeger, 1833

Bohadschia argus Jaeger, 1833, p. 19: East Indies; Rowe, 1969, p. 130; A. M. Clark

and Rowe, 1971, p. 176: Islands of Western Indian Ocean, Sri Lanka area, Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Islands (Distribution Table); James, 1986, p. 58: Sri Lanka, Andaman and Nicobar Islands (Distribution Table).

Material: Chetlat, several specimens; Kiltan, several specimens; Kadamat, two specimens; Amini, several specimens; Agatti, two specimens; Kavaratti, three specimens; all specimens collected from the lagoon, depth less than one metre.

Remarks: Though this is a very common species surprisingly it has not so far been reported from the Lakshadweep. It is reported here for the first time from the Lakshadweep. It is also not reported from the Maldives so far.

Family STICHOPODIDAE

Under this Family two genera are collected from the Lakshadweep.

Key to the genera of the Family

Spicules in the form of tables, branched rods, S or C-shaped rods.....*Stichopus* Brandt, 1835

Spicules reduced, grains or dichotomously branched rods.....*Thelenota* Brandt, 1835

Genus *Stichopus* Brandt, 1835

Two species are collected from the Lakshadweep.

Key to the species of the genus

Colour dark green; C-shaped spicules not large
..... *S. chloronotus* Brandt, 1835

Colour yellowish-brown with small brown dots
..... *S. variegatus* Semper, 1868

Stichopus chloronotus Brandt, 1835

Stichopus chloronotus Brandt, 1835, p. 50: Japan; A. M. Clark & Davies 1966, p. 600: Maldives; James, 1969, p. 61: Lakshadweep, Nicobar; A. M. Clark & Rowe 1971, p. 178: Islands of the Western Indian Ocean, Mascarene Islands, East Africa and Madagascar, Maldivian area, Sri Lanka area, Bay of Bengal, East Indies, North Australia,

Philippines, China & Southern Japan, South Pacific Islands, Hawaiian Islands (Distribution Table); Nagabhushanam & Rao, 1983, p. 312: Lakshadweep. James, 1986, p. 586: Lakshadweep & Maldivian area, Sri Lanka, Andaman and Nicobar Islands (Distribution Table).

Material: Chetlat, two specimens, Kiltan, several specimens; Kadamat, one specimen; Amini, two specimens; Agatti, one specimen; Kavaratti, two specimens; Kalpeni two specimens, all specimens collected from lagoon, depth less than a metre.

Remarks: It is extremely abundant in the lagoon of Kiltan Island during January, 1987. It lies out in the open without making any attempt to conceal its body under corals.

Stichopus variegatus Semper, 1868

Stichopus variegatus Semper, 1868, p. 73: Philippines; A. M. Clark & Rowe, 1971, p. 178: Mascarene Islands, East Africa and Madagascar, Red Sea, S. E. Arabia, Persian Gulf, Maldivian area Sri Lanka area, Bay of Bengal, East Indies, North Australia, Philippines; China & Southern Japan, South Pacific Islands (Distribution Table); Nagabhushanam & Rao, 1983, p. 312: Lakshadweep; James, 1986, p. 586: Lakshadweep & Maldivian area, Gulf of Mannar and Palk Bay on the Indian side, Sri Lanka, Andaman & Nicobar Islands (Distribution Table)

Material: Chetlat, two specimens; Kiltan, two specimens; Kadamat, one specimen collected under coral stones.

Genus *Thelenota* Brandt, 1835

This genus grows to a massive size of 600 mm. in length. One species is collected during the survey.

Thelenota ananas (Jaeger, 1833) (Fig. 28)

Trepang ananas 1833, p. 24: East Indies

Thelenota ananas A. M. Clark and Davies, 1966, p. 603: Maldives; James, 1969, p. 60: Lakshadweep; A. M. Clark and Rowe, 1971, p. 178: Maldives, East Indies, North Australia, China & Southern Japan, South Pacific Islands (Distribut-

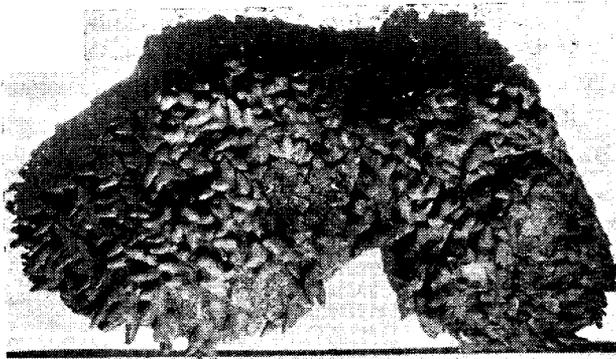


Fig. 28 *Thelenota ananas*

ion Table); Nagabhushanam & Rao, 1972, p. 291: Lakshadweep; Mukhopadyay & Samanta, 1983, pp. 309, 311: Lakshadweep; James, 1986, p. 586: Lakshadweep & Maldiv Islands (Distribution Table).

Material: Chetlat, three specimens; Kavaratti, one specimen; Minicoy, three specimens, all specimens collected from the lagoons, depth less than a metre.

Remarks: This is one of the quality holothurians for the preparation of *beche-de-mer*. It was recorded for the first time from the Lakshadweep by James (1969).

ORDER DENDROCHIROTIDA

Species belonging to one Family have been collected during the survey.

Family PHYLLOPHORIDAE

Two genera are collected under this Family from the Lakshadweep. One of them is a new record to the Lakshadweep.

Key to the genera of the Family

Radials with shorter posterior prolongations, interradial single piece Spicules: large perforated plates, perforations almost of completely obliterated; calcareous ring with rather short posterior bifurcate prolongations on the radial plates which are formed of several small pieces.....

Afrocucumis Deichmann, 1944

Radials with longer posterior prolongations, interradials with eight pieces; Spicules; tables

with four pillared spire, which is low, usually terminating in a ring of short spines, perforated plates also present *Phyrella* Hedding & Panning, 1954.

Genus *Afrocucumis* Deichmann, 1944

Only one species is collected under this genus.

Afrocucumis africana (Semper, 1868)

Cucumaria africana Semper, 1863, p. 58: Philippines.

Afrocucumis africana James, 1969, p. 60 Andamans, Lakshadweep; A. M. Clark, 1971, p. 182: Islands of Western Indian Ocean, Mascarene Islands, East Africa & Madagascar, Maldiv area, Bay of Bengal, East Indies, North Australia, China & Southern Japan, South Pacific Islands (Distribution Table); Mukhopadyay & Samanta, 1983, p. 312: Lakshadweep; James, 1986, p. 586: Lakshadweep and Maldiv area, Andaman and Nicobar Islands (Distribution Table).

Material: Chetlat, five specimens; Minicoy, six specimens, collected from the crevices of coral stones.

Genus *Phyrella* Hedding & Panning, 1954

This genus is reported for the first time from the Lakshadweep. Only one species is collected from the Lakshadweep.

Phyrella fragilis (Oshima, 1912)

Phyllophorus fragilis Oshima, 1912, p. 81: Japan.

Phyrella fragilis A. M. Clark & Rowe, 1971, p. 184: East Indies, China & Southern Japan; James, 1983, pp. 37,38: Port Blair (Andamans); James, 1986, p. 585: Andaman & Nicobar Islands (Distribution Table)

Material: Chetlat, two specimens; Amini, one specimen; Agatti, one specimen; Androth, two specimens, all specimens buried in sand under coral stones.

Remarks: It is recorded here for the first time from the Lakshadweep. James (1983) listed it for the first time from Andamans. Due to its burrowing habits it is not reported from many places in the Indo-Pacific region.

ORDER : APODA

Three species belonging to one Family under this Order have been collected during the survey.

Family SYNAPTIDAE

Three genera are collected during the survey. One of them is a new record to the Lakshadweep.

Key to the Genera of the Family

1. Size very large, anchor plates subrectangular with numerous holes..... *Synapta*
Eschscholtz, 1827
- 1'. Size not very large, anchor plates oval with seven large holes.....2
2. Calcareous ring with conspicuous anterior projections; anchor plates abruptly contracted posteriorly..... *Ophiodesma*
Fisher, 1907
- 2'. Calcareous ring without noticeable anterior projections; anchor plates not abruptly contracted at posterior end, but with large smooth hole on either side
Eupta Ostergren, 1898

Genus *Synapta* Eschscholtz, 1829

Only one species is known under this genus from the Indian Seas. This has been collected from the Lakshadweep.

Synapta maculata (Chamisso & Eysenhardt, 1821)
Holothuria maculata Chamisso & Eysenhardt,
1821, p. 352 : South Pacific Islands.

Synapta maculata James, 1969, p. 62: Andamans, Lakshadweep; A.M. Clark & Davies 1966, p. 603: Maldives; A.M. Clark & Rowe, 1971, p. 186 : Islands of Western Indian Ocean, Mascarene Island, East Africa & Madagascar, Red Sea, S. E. Arabia, Maldives area, Sri Lanka area, Bay of Bengal, East Indies, North Australia, Philippines, China & Southern Japan, South Pacific Island (Distribution Table); Nagabhushanam & Rao, 1972, p. 291 : Minicoy Atoll; Mukhopadhyay & Samanta, 1983, pp. 310, 312: Lakshadweep; James, 1986, p. 587: Lakshadweep & Maldives area, Sri Lanka, Andaman & Nicobar Island (Distribution Table).

Material: Chetlat, several specimens; Kiltan, two specimens; Kadamat, two specimens; Amini, one specimen; Agatti, one specimen; Kalpeni, two specimens; Minicoy, several specimens.; all collected from the reef flat.

Remarks: This species is common in Lakshadweep. It shovels sand into the mouth with its relatively large pinnate tentacles. The tentacles are seen to be in active moment during feeding. It crawls along by holding on to solid objects by its anchors.

Genus *Ophiodesma* Fisher, 1907

Under this genus one species is recorded for the first time from the Lakshadweep.

Ophiodesma grisea (Semper, 1868)

Synapta grisea Semper, 1868, p. 11: Philippines.

Ophiodesma grisea A.M. Clark & Rowe, 1971, p. 186 : East Africa, & Madagascar, Red Sea, S.E. Arabia, Sri Lanka area, Bay of Bengal, East Indies, North Australia, Philippines, Hawaiian Islands (Distribution Table); James, 1985, p. 586; Sri Lanka, Andaman & Nicobar Island (Distribution Table).

Material: Kavaratti, one specimen, collected on the reef flat.

Remarks: It is recorded here for the first time from the Lakshadweep.

Genus *Eupta* Ostergren, 1898

Under this genus only one species is known from the Indian Seas. It was recorded for the first time from Lakshadweep by James (1969).

Eupta godeffroyi (Semper, 1868)

Synapta godeffroyi Semper, 1868, p. 231 : Navigator Island.

Eupta godeffroyi A.M. Clark & Davies, 1966, p. 600 : Maldives; James, 1969, p. 62 : Lakshadweep; A.M. Clark & Rowe, 1971, p. 184 : Mascarene Island, East Africa & Madagascar, Red Sea, Maldives area, East Indies, North Australia, Philippines, South Pacific Islands, Hawaiian Islands (Distribution Table); Mukhopadhyay & Samanta, 1983, p. 312 : Lakshadweep; James, 1986, p. 587 : Lakshadweep & Maldives area (Distribution Table).

Material: Amini, one specimen; Kalpani, one specimen; Minicoy, one specimen.

Remarks: This is a rare species in the Lakshadweep. It was recorded for the first time from the Lakshadweep by James (1969).

All the echinoderms collected during the survey from the various Islands are listed in Table I.

ZOOGEOGRAPHY

A study of the zoogeography of echinoderms is interesting for the reasons that their movements are limited, their bathymetrical range is narrow, their larval life is brief and that they are entirely marine in habit. The composition and origin of the Australian echinoderms has been dealt with at length by H.L. Clark (1921, 1946). A.M. Clark (1976, 1980, 1984) wrote on the zoogeography of echinoderms of the coral reefs and echinoderms from Hong Kong and the Seychelles respectively. Although echinoderms are known to have a wide range of distribution out of a total of 1029 shallow-water echinoderms considered by A.M. Clark and Rowe (1971) from the Indo-West Pacific region only 57 (5.5%) extend their range of distribution from the Islands of the Western Indian Ocean to the Hawaiian Islands. Only eight species are known throughout the tropic in Atlantic and Pacific Oceans. Recently James (1986) wrote a paper on the zoogeography of shallow-water echinoderms of the Indian Seas. He has clearly shown that the faunal composition of echinoderms of Sri Lanka and India along the Gulf of Mannar and Palk Bay are somewhat different and he has given reasons for this difference in distribution. He has also recorded fifty species for the first time from the South East Coast of India, Lakshadweep and the Andaman and Nicobar Islands.

In this paper a total of 255 species of echinoderms known from the shallow-waters upto a depth of 20 metres from the Lakshadweep-Maldives area (129 species), Sri Lanka (178 species) and the Andaman and Nicobar Islands (111 species) are considered for discussion here. Seventy eight species are collected from the various Islands of the Lakshadweep (Table 1.) Of these 30 species are recorded for the first time from the Lakshadweep. Of the 78 species

collected from the Lakshadweep 38 species are collected only from the Lakshadweep. Some species like *Mithrodia clavigera*, *Cistina columbica* and *Ophiocoma anaglyptica* are cavernicolous and are likely to be taken at other places in the Indian region when intensive collections are made. *Linckia multifora*, *Dactylosaster cylindricus*, *Ophiocoma dentata*, *Bohadschia argus*, *Holothuria Mertensiothuria leucospilota* and *Stichopus chloronotus* are very common in the Lakshadweep. It is surprising that the large starfish *Asteropsis carinifera* which was common at Kiltan and Chetlat is so far not recorded from the Lakshadweep and even from the Maldives. *Linckia multifora* and *D. cylindricus* which are common at Lakshadweep are not distributed in the Andaman and Nicobar Islands. Of the 255 species only 49 species are common to the three regions showing that only 19.2% of the species are distributed in the three widely separated regions of Lakshadweep-Maldives area, Sri Lanka and Andaman and Nicobar Islands. Sixty seven species are collected from Sri Lanka alone. This maximum number partly reflects due to the intensive collections made at Sri Lanka since 1882, and also due to the 'area effect' referred by Price (1982). Sri Lankan coast is far more extensive than the coast line of small Islands in the Lakshadweep and the Andaman and Nicobar Islands. Therefore a corresponding increase in species diversity is apparent. As many as 15 publications are available on the echinoderms of Sri Lanka. Twenty five species are reported only from the Andaman and Nicobar Islands. James (1986) listed 111 species of which 27 species are new records to the Andaman and Nicobar Islands. Comparison of the species distributed in different regions show interesting relationships. There seem to be greater affinity between the echinoderms of Sri Lanka and Lakshadweep since 39 (15.2%) species are common to both the regions whereas only 21 (8.2%) species are common between Sri Lanka and Andaman and Nicobar Islands and only 16 (6.2%) species are common to the Lakshadweep to the Andaman and Nicobar Islands. James (1986) has stated that the echinoderms of Lakshadweep are oceanic and those of Andaman and Nicobar Islands are continental. Since both the Lakshadweep and Sri Lanka are Oceanic Islands there is greater similarity of fauna between them.

Echinoderms common to the Lakshadweep and Sri Lanka, Sri Lanka and Andaman and Nicobar Islands and Lakshadweep and Andaman and Nicobar Islands are listed in Table 2. Echinoderms reported from Sri Lanka alone and echinoderms common to Lakshadweep, Sri Lanka and Nicobar Islands are given in Table 3. Echinoderms reported from the Lakshadweep and Andaman and Nicobar Islands alone are presented in Table 4. Finally the number of echinoderms with their percentage from various regions and

their combinations are given in Table 5.

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TABLE 1. *List of Echinoderms Collected from the Lakshadweep*
(NR: New Record; C; Common; R: Rare; New genus & species T: test only)

	Chetlat	Bitra	Kiltan	Kadmat	Anini	Agatti	Androth	Kavaratti	Kalpeni	Minicoy	Remarks
ASTEROIDAE											
OREASTERIDEA											
<i>Culcita novaeguineae</i>	+	-	+	+	-	+	-	+	-	+	NR
<i>C. schmideliana</i>	-	-	-	+	+	-	-	+	-	-	NR
<i>Halityle regularis</i>	-	-	+	-	-	-	-	-	-	-	NR
<i>Pentaceraster regulus</i>	-	+	-	-	-	-	-	-	-	-	NR
OPHIDIASTERIDAE											
<i>Linckia laevigata</i>	-	+	-	-	+	+	-	+	-	+	C
<i>L. guldingi</i>	+	-	-	-	+	+	-	-	-	-	R
<i>L. multiflora</i>	+	+	+	+	+	+	-	+	+	+	C
<i>Dactylosaster cylindricus</i>	+	-	+	+	+	-	-	+	-	+	C
<i>Leiaster leachi</i>	-	+	-	-	-	-	-	-	-	+	NR
<i>Paraferdina laccadivensis</i>	-	-	-	-	-	-	-	-	-	+	N. gen. et. sp.
<i>Fromia indica</i>	-	-	-	-	-	-	-	+	-	-	R
<i>F. milleporella</i>	-	+	-	-	-	-	-	-	-	-	R
ASTEROPIDAE											
<i>Asteropsis carinifera</i>	+	-	+	-	-	-	-	-	-	-	NR
ASTERINIDAE											
<i>Asterina burtoni</i>	-	-	-	-	+	-	-	-	-	-	R
<i>Patirella exigua</i>	-	-	-	-	-	+	-	-	-	-	NR
<i>Tegulaster ceylanica</i>	-	-	-	-	-	+	-	+	-	-	NR
ACANTHASTERIDAE											
<i>Acanthaster planci</i>	-	-	-	+	-	+	-	+	+	+	R

Table 1 contd.

ECHINASTERIDAE

Cistina columbiae + - - - - - - - - - NR

OPHIUROIDEA

OPHIOMYXIDAE

Ophiomyxa australis - - - - - - - - - + NR

AMPHIURIDAE

Amphipholis squamata + - - - - - - - - - NR

OPHIACTIDAE

Ophiactis savignyi - - - - - - - - - +

OPHIOTRICHIDAE

Macrophiothrix longipeda + - + + - - + - - -
Ophiotrix (Keystonea) nereidina - + - - - - - - - - NR

OPHIOCOMIDAE

Ophiocomella sexradia + + + - - - - - - - NR
Ophiocoma scolopendrina - - + + + - - - + +
O. dentata + - + + + - - - - + C
O. brevipes + - - + - - - - - + R
O. anaglyptica + - - - - - - - - - NR
Ophiomastix annulosa - - - - - - - - - +
Ophiocoma erinaceus + - + + + - + + + -
O. pica + - - + - - - + - -

OPHIURIDAE

Ophioclegans cincta - - - - - - + - - - NR
Ophiolepis superba - - - - - - - + - - NR

ECHINOIDEA

CIDARIDAE

Eucidaris metularia - - - - - - + - - -
Prionocidaris verticellata + - + - - - - - - -

DIADEMATIDAE

Diadema setosum - - + - - - - - - - NR
D. savignyi + - - - - - - - - - NR
Echinothrix calamaris + - - - - - + - - -
E. diadema + - - + + - - + + +

STOMOPNEUSTIDAE

Stomopneustes variolaris + - + - - - - - - +

Table 1 contd.

TEMNOPLEURIDAE

<i>Mespila globulus</i>	-	-	-	-	-	-	-	+	-	-	NR
<i>Salmacis virgulata</i>	-	-	-	-	-	-	+	-	-	-	NR

TOXOPNEUSTIDAE

<i>Toxopneustes pileolus</i>	-	-	-	+	-	-	+	-	-	-	NR
<i>Tripneustes gratilla</i>	+	-	+	+	+	-	-	-	+	-	

ECHINOMETRIDAE

<i>Echinometra mathaei</i>	+	-	+	+	+	-	+	+	-	+	NR
<i>Echinostrephus molaëti</i>	-	-	-	-	-	+	-	-	-	-	
<i>Heterocentrotus mammillatus</i>	-	-	-	-	-	+	-	+	-	-	

ECHINONEIDAE

<i>Echinoneus cyclostomus</i>	+	-	-	-	-	-	-	-	-	-	T
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CLYPEASTERIDAE

<i>Clypeaster reticulatus</i>	+	-	-	+	-	-	-	-	-	-	T
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ECHINOLAMPADIDAE

<i>Echinolampas alexandri</i>	-	-	+	-	-	-	-	-	-	-	NR
<i>E. ovata</i>	+	-	-	+	+	-	+	-	-	-	NR

BRISSIDAE

<i>Brissus latecarinatus</i>	-	-	-	-	-	+	-	-	-	-	T
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HOLOTHURIOIDEA

HOLOTHURIIDAE

<i>Acinopyga mauritiana</i>	+	-	+	+	+	+	+	+	+	+	C
<i>A. echinites</i>	-	-	-	-	+	-	-	-	-	-	R
<i>A. miliaris</i>	-	-	-	-	-	-	-	-	-	+	R
<i>Bohadschia argus</i>	+	-	+	+	+	+	-	+	-	-	C
<i>B. marmorata</i>	+	+	+	-	-	-	-	-	+	-	
<i>Labidodemas rugosum</i>	+	-	-	+	-	-	-	-	-	-	R
<i>Holothuria (Cysuipus) rigida</i>	-	-	+	-	-	-	-	-	-	-	NR
<i>H. (Halodeima) atra</i>	+	-	+	+	+	+	-	+	-	-	C
<i>H. (Lessonothuria) pardalis</i>	+	+	+	+	-	+	-	-	-	+	C
<i>H. (Merteniothuria) leuscospilota</i>	+	-	+	+	+	-	+	-	-	+	C
<i>H. (M.) pervicax</i>	+	-	-	-	-	-	-	-	-	+	R
<i>H. (Microthele) nobilis</i>	+	-	+	+	+	+	-	+	-	-	C
<i>H. (Playperona) difficilis</i>	+	-	+	-	+	-	-	-	-	+	C
<i>H. (Semperothuria) cinerascens</i>	+	+	+	+	+	-	-	+	-	+	

Table 1 contd.

<i>H. (Thymiosycia) arenicola</i>	+	-	-	+	+	-	-	-	-	-	C
<i>H. (T.) hilla</i>	+	+	+	+	+	-	-	-	-	+	C
<i>H. (T.) impatiens</i>	+	-	+	+	+	+	-	-	-	+	C
STICHOPODIDAE											
<i>Stichopus chloronhtus</i>	+	-	+	+	+	+	-	+	+	-	C
<i>S. variegatus</i>	+	-	+	+	+	-	-	-	-	-	
<i>Thelenotia ananas</i>	+	-	-	-	-	-	-	-	-	+	R
PHYLLOPHORIDAE											
<i>Afrocucumis africana</i>	+	-	-	-	-	-	-	-	-	+	R
<i>phyrella fragilii</i>	+	-	-	-	+	+	+	-	-	-	NR
SYNAPTIDAE											
<i>Euapta godeffroyi</i>	-	-	-	-	+	-	-	-	+	+	R
<i>Ophioesma grisea</i>	-	-	-	-	-	-	-	+	-	-	NR
<i>Synapta maculata</i>	+	-	+	+	+	+	-	-	+	+	C
Total number of species	44	12	30	31	30	25	5	20	7	29	

TABLE 2 Distribution of Echinoderms in Lakhsadweep, Sri Lanka and Andaman and Nicobar Islands

Echinoderms common to Lakshadweep & Sri Lanka	Echinoderms common to Sri Lanka and Andaman and Nicobar Islands	Echinoderms common to Lakshadweep and Andaman and Nicobar Islands
<i>Capillaster multiradiatus</i>	<i>Luidia suvignyi</i>	<i>Comoster gracilis</i>
<i>Comanthina schlegell</i>	<i>Astropecten zebra</i>	<i>Astropecten monaeanthus</i>
<i>Heterometra reynaudi</i>	<i>Protoreaster nodosus</i>	<i>Culcita novaeguineae</i>
<i>Comatella maculta</i>	<i>Protoreaster lincki</i>	<i>Archaster typicus</i>
<i>Lamprometra palmata</i>	<i>Nardoa lemonnieri</i>	<i>Ophiocoma brevipes</i>
<i>Stephanometra indica</i>	<i>Metrodira subulata</i>	<i>Ophiocoma dentata</i>
<i>Decametra taprobanes</i>	<i>Asterina sarasini</i>	<i>Ophioneis porrecta</i>
<i>Oligometra serripinna</i>	<i>Euretaster bribrosus</i>	<i>Prionocidaris verticellatus</i>
<i>Astropecten indicus</i>	<i>Echinaster purpureus</i>	<i>Echinothrix calamaris</i>
<i>Siraster tuberculatus</i>	<i>Ophiomaza cacaotica</i>	<i>Afrocucumis africana</i>
<i>Dactylosaster cylindricus</i>	<i>Ophioptheon elegans</i>	<i>Labidodemas rugosum</i>
<i>Fromia milleporella</i>	<i>Ophiaracnella gorgonia</i>	<i>Patinapta oopeax</i>
<i>Leiaster leachi</i>	<i>Ophioplocus imbricatus</i>	<i>Holothuria (Cystipus) rigida</i>
<i>Linckia multifora</i>	<i>Colobocentrus atratus</i>	<i>Holothuria (Metriatyla) albiventer</i>
<i>Asteropsis carinifera</i>	<i>Actinopyga lacanora</i>	<i>Phyrella fragilis</i>
<i>Astroboa clavata</i>	<i>Polyscheira rufescens</i>	<i>Holothuria (Thymiosycia) arenicola</i>
<i>Gymnolophus obscura</i>	<i>Bohadschia argus</i>	

Table 2 contd.

<i>Macrophiothrix langipeda</i>	<i>Bohadschia vitiensis</i>
<i>Ophiothrix purpurea</i>	<i>Holothuria (Selenkothuria)</i> <i>erinaceus</i>
<i>Ophiocoma pica</i>	<i>Holothuria (Metriatyla) scabra</i>
<i>Ophionereis dubia</i>	<i>Acaudina molpadioides</i>
<i>Ophiaracnella septemspinosa</i>	
<i>Asthenosoma varium</i>	
<i>Salmacis bicolor</i>	
<i>Salmacis virgulata</i>	
<i>Temnopleurus toreumaticus</i>	
<i>Temnotrema siamense</i>	
<i>Clypeaster rarispinus</i>	
<i>Clypeaster reticulatus</i>	
<i>Echinolampas alexandri</i>	
<i>Echinolampas ovata</i>	
<i>Martie planulata</i>	
<i>Pseudomaretia alta</i>	
<i>Lovenia elongata</i>	
<i>Actinopyga serratidens</i>	
<i>Bahadschia tenuissima</i>	
<i>Holothuria (Platyperona)</i> <i>difficilis</i>	
<i>Holothuria (Semperothuria)</i> <i>cinerascens</i>	
<i>Leptopentacta javanica</i>	

TABLE 3

Distribution of echinoderms in Lakshadweep, Sri Lanka and Andaman and Nicobar Islands

Echinoderms reported from Sri Lanka alone	Echinoderms reported from Lakshadweep, Sri Lanka and Andaman and Nicobar Islands
<i>Comaster parvicirrus</i>	<i>Luidia maculata</i>
<i>Comanthus samoanus</i>	<i>Astropecten polyacanthus</i>
<i>Comatella stilligera</i>	<i>Culcita schmideliana</i>
<i>Amphimetra molleri</i>	<i>Fromia indica</i>
<i>Heterometra amboinae</i>	<i>Linckia guildingi</i>
<i>Himerometra robustipinna</i>	<i>Linckia laevigata</i>
<i>Stemphanometra spicata</i>	<i>Asterina burtoni</i>
<i>Cenometra herdmani</i>	<i>Patriella pseudoexigua</i>
<i>Troptometra carinata</i>	<i>Tegulaster ceylanica</i>
<i>Luidia hardwicki</i>	<i>Acanthaster planci</i>
<i>Luidia hardmani</i>	<i>Ophiomyxa australis</i>
<i>Astropecten andersoni</i>	<i>Amphipholis squamata</i>
<i>Astropecten bengalensis</i>	<i>Ophiactis savignyi</i>
<i>Astropecten euryacanthus</i>	<i>Ophiocoma erinaceus</i>

Table 3 contd.

Astropecten hemprichi
Astropecten sarasini
Anthenea pentagonula
Goniodiscaster scaber
Goniodiscaster vallet
Stellaster equestris
Pentaceraster affinis
Poraster superbus
Gomophia aegyptica
Disasterina spinosa
Amphiura (Fellaria) octacantha
Amphiura (Amphiura) lutkeni
Amphiodia microplax
Macrophiothrix variabilis
Ophiocnemis marmorata
Ophiolithrix exigua
Ophiolithrix (Keystonea) nereidina
Ophiaracna incrassata
Phyllacanthus imperialis
Prionocidarais baculosa
Microcyphus ceylanicus
Salmaciella dussumieri
Clypeaster fervens
Pseudoboletia maculata
Gymnechinus robillardi
Clypeaster humilis
Fibularia volva
Peronella oblonga
Echinodiscus auritus
Echinodiscus bisperforatus
Metalia latissima
Rhynobrissus pyramidalis
Holothuria (Selenkothuria) moebi
Holothuria (Semperothuria) imitans
Holothuria (Theelothuria) kurti
Holothuria (Theelothuria) spinifera
Stichopus naso
Havelockia versicolor
Polycheira stuhlmanni
Pentacta armatus
Pentacta quadrangularis
Pseudocolochirus violaceus
Labidoplax dubia
Staurothyone rosacea
Synaptula striata
Stolus buccalis
Stolus conjugens

Ophiocoma soolopendrina
Ophiocomella sexradia
Ophiomastix annulosa
Ophioelegans cincta
Ophiolepis superba
Ophiura kinbergi
Eucidaris metularia
Prionocidarais baculosa
Astropyga radiata
Diadema savignyi
Diadema setosum
Echinothrix diadema
Stomopneustes variolaris
Toxopneustes pileolus
Tripneustes gratilla
Echinometra mathaei
Echinostrephus molaris
Echinoneus cyclostomus
Laganum depressum
Actinopyga echinites
Actidopyga mauritiana
Actinopyga miliaris
Bohadschia marmorata
Holothuria (Lessonothuria) pardalis
Holothuria (Halodeima) edulis
Holothuria (Holodeima) atra
Holothuria (Mertensthuria) leucospila
Holothuria (Microteele) nobilis
Holothuria (Thymiosycia) hilla
Holothuria (Thymiosycia) impatiens
Stichopus chloronotus
Stichopus variegatus
Ophiodesma grisea
Synapta maculata

Table 3 contd.

Thyone papuensis
Trachythyone imbricata
Trachythyone typica
Ohshimella ehrenbergi
Phyllophorus (Phyllothurta) cbuenis
Phylloporus (Urodemella) brocki

Table 4 Distribution of Echinoderms in Lakshadweep, Sri Lanka and Andaman and Nicobar Islands

Echinoderms reported from Lakshadweep alone	Echinoderms reported from Andaman and Nicobar Islands alone
<i>Heterometra flora</i>	<i>Ceratonardoa carinata</i>
<i>Heterometra sol</i>	<i>Fromia armata</i>
<i>Decametra mollis</i>	<i>Nareoa frianti</i>
<i>Dorometra mauritiana</i>	<i>Neoferdina offertii</i>
<i>Archaster loriolis</i>	<i>Tamaria dubiosa</i>
<i>Haliptyle regularis</i>	<i>Chaetaster vestitus</i>
<i>Formia nodosa</i>	<i>Ophiocentrus verticillatus</i>
<i>Paraferdina laccadivensis</i>	<i>Amphioplus (Amphioplus) intermedius</i>
<i>Mithrodia clavigera</i>	<i>Amphioplus (Lymanella) andrae</i>
<i>Cistina columbiae</i>	<i>Ophiactis modesta</i>
<i>Ophiocentrus dilatatus</i>	<i>Macrophiothrix speciosa</i>
<i>Ophiopteron elegans</i>	<i>Ophiarthrum pictum</i>
<i>Ophiothela danae</i>	<i>Ophiaranella infernalis</i>
<i>Ophiolithix foveolata</i>	<i>Ophiolepis nodosa</i>
<i>Ophiolithrix trilineata</i>	<i>Archnoides placenta</i>
<i>Ophiolithrix (Keystocea) propinqua</i>	<i>Breynia vredenburgi</i>
<i>Ophiocoma anaglyptica</i>	<i>Moira stygia</i>
<i>Ophiomastix variabilis</i>	<i>Metalia sternajis</i>
<i>Ophiopeza spinosa</i>	<i>Holothuri (Acanthotrapeza) pyxis</i>
<i>Chaetodiadema granulatum</i>	<i>Holotnuria (Mertensiothuria) fuscocinerea</i>
<i>Parasalenia gratiosa</i>	<i>Trachytnyone alcocki</i>
<i>Mespila globulus</i>	<i>Protankyra pseudodigitata</i>
<i>Parasalenia poehli</i>	
<i>Heterocentrotus mammillatus</i>	
<i>Echinocsamus crispus</i>	
<i>Fibularia ovulum</i>	
<i>Peronella lesueuri</i>	
<i>Echinolampas alexandri</i>	
<i>Brissus latecarinatus</i>	
<i>Bohadschia graeffei</i>	
<i>Labridodemas semperianum</i>	
<i>Holothuria (Metriatyla) martensi</i>	
<i>Holothuria (Stauropora) discrepans</i>	
<i>Holothuria (Thymiosycia) aphanes</i>	
<i>Thelenota ananas</i>	
<i>Euapta godeffroyi</i>	
<i>Syanptula recta</i>	

TABLE 5. *Number of echinoderms known from various regions of India*

	Lakshadweep, Sri Lanka Andaman & Nicobar	Lakshadweep only	Sri Lanka only	Andaman & Nicobar only	Lakshadweep & Sri Lanka	Sri Lanka & Andaman & Nicobar	Laksha- dweep & Andaman & Nicobar
Crinodis	—	4	9	—	8	—	1
Asteroids	10	6	15	6	7	9	3
Ophiuroids	10	10	8	9	7	4	3
Echinoids	13	10	14	4	12	1	2
Holothuroids	11	8	21	6	5	7	7
Total	49 (19.5%)	38 (14.9%)	67 (26.2%)	25 (9.8%)	39 (15.2%)	21 (8.2%)	16 (6.2%)

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