

Echinodermata of Lakshadweep, Arabian Sea with the description of a new genus and a species

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Abstract

During the recent dives around reef slopes of some islands in the Lakshadweep, a total of 52 species of echinoderms, including four unidentified holothurians, were encountered. These included 12 species each of Crinoidea, Asteroidea, Ophiuroidea and eight species each of Echinoidea and Holothuroidea. Of these 11 species of Crinoidea [*Capillaster multiradiatus* (Linnaeus), *Comaster multifidus* (Müller), *Phanogenia distincta* (Carpenter), *Phanogenia gracilis* (Hartlaub), *Phanogenia multibrachiata* (Carpenter), *Himerometra robustipinna* (Carpenter), *Lamprometra palmata* (Müller), *Stephanometra indica* (Smith), *Stephanometra tenuipinna* (Hartlaub), *Cenometra bella* (Hartlaub) and *Tropiometra carinata* (Lamarck)], four species of Asteroidea [*Fromia pacifica* H.L. Clark, *F. nodosa* A.M. Clark, *Choriaster granulatus* Lütken and *Echinaster luzonicus* (Gray)] and four species of Ophiuroidea [*Gymnolophus obscura* (Ljungman), *Ophiothrix* (*Ophiothrix*) *marginata* Koehler, *Ophiomastix elegans* Peters and *Indophioderma ganapatii* gen. et. sp. nov. and one species of Holothuroidea [*Stichopus herrmanni* Semper] are newly recorded from Lakshadweep. The goniasterid asteroids *Fromia pacifica* H.L. Clark and *F. nodosa* A.M. Clark and the ophiotrichid ophiuroid *Ophiothrix* (*Ophiothrix*) *marginata* Koehler are additions to the Indian echinoderm fauna while the ophiodermatid ophiuroid genus *Indophioderma* gen. nov. with the new species *Indophioderma ganapatii* sp. nov. as type species described here is new to science. An updated list of 161 species of echinoderms consisting of 18 species of Crinoidea, 41 species of Asteroidea, 38 species of Ophiuroidea, 29 species of Echinoidea and 35 species of Holothuroidea, is provided.

Keywords: Arabian Sea, Echinodermata, India, Lakshadweep, New genus, New species

Introduction

The Echinodermata, other than Crinoidea, of Lakshadweep, off the west coast of India in the Arabian Sea, were documented by James (1989), Sastry (1991) and Mukhopadhyay (1991) and consolidated by Sastry (2007). Later, Sastry and Satyanarayana (2009) added two crinoids

namely, *Comatella nigra* Carpenter and *Comatella stelligera* Carpenter, for the first time to the fauna of these islands. Subsequently, Nowshad *et al.* (2019) newly reported the asteroid *Nardoa frianti* Koehler from Kavaratti Island of Lakshadweep. Recently one of us (NM) has surveyed the Lakshadweep using SCUBA equipment and collected several echinoderms. Since the whole Holothuroidea are

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under Schedule-I of the Indian Wild life (Protection) Act, only photographs have been taken of holothurians. These are being reported hereunder. Some specimens collected by Ch. Satyanarayana from his earlier surveys were also included and mentioned as such under the material of respective species. Many are new records from these Islands. Interestingly, all the crinoids in the collection, excepting *Comatella stelligera* Carpenter, are new to these islands. Under each species the original reference and only references wherein complete synonymy and/or distribution can be found are cited for the sake of brevity. Classification and current status is from World Register of Marine Species (WoRMS) when no other source is available to the authors. Distribution in India is mainly from Sastry (2007) and general distribution Elsewhere is chiefly from Clark and Rowe (1971).

Material and Methods

Surveys of Lakshadweep were made during two seasons, February 01 to 25, 2018 and November 15 to December 10, 2018 periods respectively. SCUBA diving and collections were made around the reef slopes of Agatti, Bangaram, Tinnakara, Kalpeni, Kavaratti, Minicoy, Kadamat, Amini and Piramul (Perumal) Par (a submerged reef North of Agatti Island) (Plate I). About 50 dives were made during the survey up to 40m, including six night dives at a depth up to 22m at Minicoy and Kavaratti Islands. The specimens were preserved in formalin and 70% alcohol in the field laboratory. They were later dried and deposited in the National Zoological Collections of Zoological Survey of India (N.Z.C.), Kolkata.

Abbreviations of Islands

AG- Agatti; AGE-Agatti East; AGN - Agatti North; AGS - Agatti South; B- Bangaram; BW - Bangaram West; KA - Kadamat; KA / KP - Kadamat? or Kalpeni?; KP- Kalpeni; KV - Kavaratti; KVW- Kavaratti West; MCY- Minicoy; MCYN - Minicoy North; PMP- Perumal Par, PMPN - Perumal par North.

Classified List of Species under Report

(# New to science, ** New to India, * New to Lakshadweep, @ New to National Zoological Collections of Zoological Survey of India)

Class CRINOIDEA

Order COMATULIDA

Family COMATULIDAE

1. *Capillaster multiradiatus* (Linnaeus)*
2. *Comaster multifidus* (Müller)*
3. *Comatella stelligera* (Carpenter)
4. *Phanogenia distincta* (Carpenter)*
5. *Phanogenia gracilis* (Hartlaub)*
6. *Phanogenia multibrachiata* (Carpenter)*

Family HIMEROMETRIDAE

7. *Himerometra robustipinna* (Carpenter)*

Family MARIAMETRIDAE

8. *Lamprometra palmata* (Müller)*
9. *Stephanometra indica* (Smith)*
10. *Stephanometra tenuipinna* (Hartlaub)*

Family COLOBOMETRIDAE

11. *Cenometra bella* (Hartlaub)**

Family TROPIOMETRIDAE

12. *Tropiometra carinata* (Lamarck)*

Class ASTEROIDEA

Order VALVATIDA

Family ACANTHASTERIDAE

13. *Acanthaster planci* (Linnaeus)

Family ASTERINIDAE

14. *Aquilonastra burtoni* (Gray)

Family GONIASTERIDAE

15. *Fromia milleporella* (Lamarck)
16. *Fromia nodosa* A.M. Clark**
17. *Fromia pacifica* H.L. Clark**

Family OPHIDIASTERIDAE

18. *Dactylosaster cylindricus* (Lamarck)
19. *Linckia laevigata* (Linnaeus)
20. *Linckia multifora* (Lamarck)

Family OREASTERIDAE

21. *Choriaster granulatus* Lütken*
22. *Culcita novaeguineae* Müller & Troschel
23. *Culcita schmideliana* (Bruzelius)
- Order SPINULOSIDA
- Family ECHINASTERIDAE
24. *Echinaster luzonicus* (Gray)*
- Class OPHIUROIDEA
- Order AMPHILEPIDIDA
- Family OPHIOTRICHIDAE
25. *Gymnolophus obscura* (Ljungman)*@
26. *Macrophiothrix longipeda* (Lamarck)
27. *Ophiothrix (Ophiothrix) marginata* Koehler**
28. *Ophiothrix (Acanthophiothrix) purpurea* von Martens
29. *Ophiothrix (Acanthophiothrix) vigelandi* A.M. Clark
- Order OPHIACANTHIDA
- Family OPHIOCOMIDAE
30. *Breviturma dentata* (Müller & Troschel)
31. *Breviturma pica* (Müller & Troschel)
32. *Ophiocoma erinaceus* Müller and Troschel
33. *Ophiocoma scolopendrina* (Lamarck)
34. *Ophiomastix annulosa* (Lamarck)
35. *Ophiomastix elegans* Peters*
- Family OPHIODERMATIDAE
36. *Indophioderma ganapatii* new genus, new species#
- Class ECHINOIDEA
- Order DIADEMATOIDA
- Family DIADEMATIDAE
37. *Diadema savignyi* (Audouin)
38. *Diadema setosum* (Leske)
39. *Echinothrix calamaris* (Pallas)
- Order STOMOPNEUSTOIDA
- Family STOMOPNEUSTIDAE

40. *Stomopneustes variolaris* (Lamarck)
- Order CAMARODONTA
- Family TOXOPNEUSTIDAE
41. *Tripneustes gratilla* (Linnaeus)
- Family ECHINOMETRIDAE
42. *Echinometra mathaei* (Blainville)
43. *Echinostrephus molaris* (Blainville)
44. *Heterocentrotus mammillatus* (Linnaeus)
- Class HOLOTHUROIDEA
- Order ASPIDOCHIROTIDA
- Family HOLOTHURIIDAE
45. *Holothuria (Halodeima) atra* Jäger
- Order SYNALLACTIDAE
- Family STICHOPODIDAE
46. *Stichopus chloronotus* Brandt
47. *Stichopus herrmanni* Semper
48. *Thelenota ananas* (Jäger)
- Unidentified Holothurians:
49. Holothurian sp. 1
50. Holothurian sp. 2
51. Holothurian sp. 3
52. Holothurian sp. 4

Systematic Account

- Class CRINOIDEA
- Order COMATULIDA
- Family COMATULIDAE
- Capillaster multiradiatus*** (Linnaeus)

1758. *Asturias multiradiata*: Linnaeus. *Systema Naturae*, **10**: 663.

1971. *Capillaster multiradiatus*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-West Pacific echinoderms*, p. 15 (key) and p. 6-7 (distribution).

2007. *Capillaster multiradiatus*: Sastry, D.R.K. *Rec. zool. Surv. India, Occ. Paper, No .271*: 4.

Material: KA - 13. Dt. 13.02.2018. One spec. KA - 59: Dt. 17.02.2018. One spec. PMP. Dt. 22.11.2018. One spec.

Description: Arms 13-31, 110-120 mm long. P₁ on first brachial segment. IBr with 2 segments, IIBr with 4 segments. First brachial syzygyat 2+3 Cirri up to 21, cirrus segments up to 21, dorsal side of distal segments margin of distal segments with a slight thickening in the centre or the distal margin.

Distribution: Lakshadweep, Tamil Nadu, Andaman and Nicobars. **Elsewhere:** Widely distributed Indo-west Pacific species from Easy coast of Africa to South Pacific Is. The species is newly recorded from Lakshadweep.

Comaster multifidus (Müller)

(Pl. II. Fig. a)

1841. *Alecto multifida* Müller, J. *Über die Gattungen und Arten der Comatulen. Monatsberichte Königlich Preussische Akademie der Wissenschaften zu Berlin.* 1841:179-189 (also *Archiv für Naturgeschichte, Jahrg. 7, v. 1, Berlin, 1841, p. 139-148.*

1971. *Comaster multifidus*: Clark, A.M. and Rowe, F.W.E. *Monograph of Shallow-water Indo-west Pacific echinoderms*, p. 16 (key), p. 6-7 (Distribution).

2007. *Comaster multifidus*: Sastry, D.R.K. *Rec. zool. Surv. India.* Occ. Paper No. 271: 7

Material: KA-54. Dt. 15.02.2018. One spec. KP-20. Dt. 20.02.2018. One spec.

Description: Arms 53 and more than 92, 120 and 150mm long respectively. Proximal pinnules form flexible combs. II Br with 2 or 4 ossicles, up to VBr series, of 4 ossicles. Pinnules on division series longest. P₁ on II Br segment, P₂ and subsequent pinnules much shorter than P₁ and flexible, I Br syzygy at 3+4 centrodorsal with subradial clefts. Cirri absent. Centrodorsal star shaped with no subradial cleft. Cirri rudimentary with 1 or 2 segments.

Distribution: Lakshadweep and Andamans. Elsewhere: East Indies, North Australia, Philippine Islands and South Pacific Islands. The species is newly recorded from Lakshadweep.

Comaster sp.

Material: PMPN18-71, 72. Dt. 22.11.2018. Two specs.

Description: Comb pinnules present. First brachial pinnule on second segment. Auxillaries of division series with a syzygy. Arms at least 11 and 12, 50mm long with only II Br with 4 ossicles. First Br syzygy at 3+4 Cirri about 20, distal segments with median thickening.

Remark: The division series are not complete and could not be identified beyond genus.

Comatella stelligera (Carpenter)

1880. *Actinometra stelligera* Carpenter, P. H. *J. Linn. Soc.(Zool.)*,15: 198.

1888. *Actinometra maculata* Carpenter, P. H. *Reports of the Scientific Results of the voyage of H.M.S. Challenger (Zool.)*, 26: 307. WoRMS

1971. *Comatella stelligera*: Clark, A.M. and Rowe, F.W.E. *Monograph of Shallow-water Indo-west Pacific echinoderms*, p. 15 (key), p. 6-7 (Distribution).

1971. *Comatella maculata*: Clark, A.M. and Rowe, F.W.E. *Monograph of Shallow-water echinoderms of Indo-west Pacific echinoderms*, p. 15 (key), p. 6-7 (Distribution).

2005. *Comatella maculata*: Sastry, D.R.K. *Rec. zool. Surv. India.* Occ. Paper No. 271: 8

2005. *Comatella stelligera*: Sastry, D.R.K. *Rec. zool. Surv. India.* Occ. Paper No. 271: 9

Material: AGNN18-41. Dt. 20.11.2018. One spec. KV-29. Dt.09.02.2018. One spec. KV-17. Dt.09.02.2018. One spec.

Description: Arms 20-45, 50-120 mm long. Distal segments of proximal pinnules flexible and form into a comb. IIBr and IVBr only on outer side. All division series of 2 ossicles. First brachial syzygy at 3+4 P₁ on second segment. P₁, P₂ and P₃, subequal or P₂ stout and largest. Cirri more than 35 with up to 20 segments, dorsal side of cirrus segments convex or with a slight carination.

Distribution: Lakshadweep, Tamil Nadu and Andamans and Nicobars. **Elsewhere:** Maldives to South Pacific Islands.

Phanogenia distincta (Carpenter)

1888. *Actinometra distincta*: Carpenter, P.H. *Reports of the Scientific Results of the Voyage of H.M.S. Challenger, Zoology.* 26 (part 60): i-x, 295, pl. lv. Fig. 1.

1894. *Antedon brevicirra* Bell, E.J. *Proc. zool. Soc. Lond.* 1894: 400. WoRMS

1971. *Comaster brevicirra*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-west Pacific echinoderms*, p. 6-7 (Distribution), p. 16 (Key). WoRMS

1971. *Comaster distinctus*: Clark, A.M. and Rowe, F.W.E.

Monograph of shallow-water Indo-West Pacific echinoderms, p. 16 (key) and p. 6-7 (distribution).

2007. *Comatula brevicirra*: Sastry, D.R.K. *Rec. zool. Surv. India. Occ. Paper No. 271*: 9

2019. *Phanogenia distincta*: Messing, C. WoRMS

Material: AGE-39. Dt. 06.02.2018. One spec. AGNN18-42. Dt. 20.11.2018. One spec.

Description: Arms only 30 intact in specimen from AG, arms 39 in the other from AGE First brachial syzygy at 1+2 Several Br series broken, first brachial pinnule on second segment, some division series also with pinnules. Division series up to IVBr, IIBr with 4 ossicles, others with 2 or 4 ossicles, all auxiliaries with a syzygy. Division series alternating with arms. Cirri many in one specimen inferred from fresh several scars of cirri and only 2 are intact with 14 segments, cirri 14 arranged around the centrodorsal in the other, dorsal side of segments convex, distal segments with a slight transverse thickening.

Distribution: Lakshadweep, Andamans and Nicobars. **Elsewhere:** Bay of Bengal, East Indies and South China Sea. The species is newly recorded from Lakshadweep.

Phanogenia gracilis (Hartlaub)

(Pl. II. Fig. b)

1890. *Actinometra gracilis* Hartlaub. *Nachr. Ges. Gottingen Mai. 1890*: 187

1971. *Comaster gracilis*: Clark, A.M. and Rowe, F.W.E. *Monograph of Shallow-water Indo-west Pacific echinoderms*, p. 16 (key), p. 6-7 (Distribution).

2007. *Comaster gracilis*: Sastry, D.R.K. *Rec. zool. Surv. India. Occ. Paper No.271*: 7

2019. *Phanogenia gracilis*: Messing, C. WoRMS

Material: AG-1&1A. Dt. 03.02.2018. One spec. AGNN18-47. Dt.20.11.2018. One spec. AGSN18-38. Dt. 19.11.2018. One spec. BWN18-51, 52. Dt. 20.11.2018. Two specs. B-34. Dt. 04.02.2018. One spec. BW-21. Dt.05.02.2018. One spec. KA-58. Dt. 17.02.2018. One spec. KA-59. Dt.17.02.2018. One spec. KA-8. Dt. 13.02.2018. One spec. KA/KP? Two specs. KV-12. Dt. 10.02.2018. One spec. KV. Dt. 10.02.2018. One spec. KV. Dt. 08.02.2018. One spec.

Description: Arms very crowded numbering up to 90, up to 150 mm long. Distal portion of proximal pinnules comb like. Division series up to VI Br, IIBr with 4 ossicles,

others with 2 or 4. Some division series alternating with arms on inner or external side. Centrodorsal pentagonal or star-shaped without radial clefts. First brachial syzygy at 1+2. First brachial pinnule on 2nd arm segment, long and slender. Pinnules of division series very long and slender. Cirri absent or up to 10 very short, rudimentary and slender with up to 4 segments. P₁ on second brachial segment.

Distribution: Lakshadweep and Andaman Islands. **Elsewhere:** Maldives, Bay of Bengal, East Indies, South China Sea and South Pacific Islands. The species is recorded here for the first time from Lakshadweep.

Phanogenia multibrachiata (Carpenter)

1888. *Actinometra multibrachiata* Carpenter, P.H. *Reports of the Scientific Results of the Voyage of H.M.S. Challenger, Zoology. 26* (part 60): 299

1971. *Comaster multibrachiatus*: Clark, A.M. and Rowe, F.W.E. *Monograph of Shallow-water Indo-west Pacific echinoderms*, p. 16 (key), p. 6-7 (Distribution).

2007. *Comaster multibrachiatus*: Sastry, D.R.K. *Rec. zool. Surv. India, Occ. Paper No.271*: 7

2019. *Phanogenia multibrachiata*: Messing, C. WoRMS.

Material: KV-42 Dt. 10.02.2018. One spec.

Description: Arms 28 intact, 70 mm long. First brachial pinnule on first segment. First brachial syzygy at 2+3. Division series up to VBr, IIBr with 4 ossicles, others with 2 or 4 ossicles. Some division series broken beyond IIBr or IIIBr, division series alternating with arms internal or external. Cirri 14, some slender, arranged around the centrodorsal, cirrus segments 14.

Distribution: Lakshadweep and Andamans. **Elsewhere:** Bay of Bengal, East Indies, Philippine Islands and South China Sea. The species is new to Lakshadweep.

Family HIMEROMETRIDAE

Himerometra robustipinna (Carpenter)

1881. *Actinometra robustipinna* Carpenter, P.H. *Notes Leyden Mus.3*: 201

1908. *Himerometra magnipinna* A.H. Clarck, *Smithsonian Misc. Colln. 52*(2): 214. WoRMS

1908. *Himerometra robustipinna* A.H. Clarck, *Smithsonian Misc. Colln. 52*: 213 [Homonym of *Himerometra robustipinna* (Carpenter), renamed *H. pulcher* vide infra]

1912. *Himerometra pulcher* Clark, A.H. *Echinoderma of the Indian Museum, Part VII*: 114. World List of Crinoidea. WoRMS

1971. *Himerometra magnipinna*: Clark, A.M. and Rowe, F.W.E. *Monograph of Shallow-water Indo-west Pacific echinoderms*, p. 21 (key), p. 8-9 (Distribution).

1971. *Himerometra robustipinna*: Clark, A.M. and Rowe, F.W.E. *Monograph of Shallow-water Indo-west Pacific echinoderms*, p.21 (key), p. 8-9 (Distribution).

2007. *Himerometra magnipinna*: Sastry, D.R.K. *Rec. zool. Surv. India. Occ. Paper No.271*: 12

2007. *Himerometra robustipinna*: Sastry, D.R.K. *Rec. zool. Surv. India. Occ. Paper No.271*: 13

Material: AG-1&1A. Dt. 03.02.2018. One spec. AG-2. Dt. 03.02.2018. Three specs. AG. Dt. 06.02.2018. Three specs. AGNN18. Dt. 20.11.2018. Five specs. AGE-9, 28. Dt. 04.02.2018. Two specs. KA-39. Dt. 15.02.2018. One spec. KV? One spec.

Description: Upto 60 arms, 120 mm long. Division series beyond I Br with 2 or 4 ossicles, Pinnules on the division series longest, segments not longer than broad, tapering to a flagellate end, with more than 35 segments. Cirri up to 40, cirrus segments up to 30, distal segments with dorsal spine or thickening. Pinnules on division series largest, Br pinnules subequal or gradually diminishing in size from P₁ onwards; largest pinnules with more than 30 wider than long segments, smooth tapering gradually towards a flagellate tip.

Distribution: Lakshadweep and Andamans. *Elsewhere:* Bay of Bengal to South Pacific Islands. The species is newly recorded here for the first time from Lakshadweep.

Family MARIAMETRIDAE

***Lamprometra palmata* (Müller)**

1841. *Alecto palmata*: Müller, J. J. *Archiv fur Naturgesch.* i. p. 144.

1932. *Lamprometra palmata*: A. H. Clark, *Rec. Indian Mus.* 34(4): 557.

1962. *Lamprometra palmata*: Sane, S.R. and Chhapgar, B.F. *J. Bomb. Nat. Hist. Soc.*, 59(2): 673.

1971. *Lamprometra palmata*: Clark. A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-West Pacific echinoderms*, p. 24 (key), p. 8-9 (distribution).

1972. *Lamprometra palmata*: Rao. K.H. and Sowbhagyavathi. R. *Proc. Indian Natn. Sci. Acad*, 38 (5&6): 360-366.

2007. *Lamprometra palmata*: Sastry. D.R.K. *Rec. zool. Surv. India. Occ. Paper. No. 271*: 13

Material: MCYN18-131. Dt. 30.11.2018. One spec.

Description: Arms 21, 65mm long, cirri 23+20, dorsal side rounded. P₂ longer, stouter at the base, not keeled, flexible distally. Division series with 2 ossicles.

Distribution: Gujarat, Daman, Maharashtra, Karnataka, Kerala, Lakshadweep, Tamil Nadu, Andhra Pradesh and Andamans. *Elsewhere:* West coast of India to Australia and Hawaiian Islands. The species is new to Lakshadweep.

***Stephanometra indica* (Smith)**

(Pl. II. Fig. c)

1876. *Comatula indica*: Smith, E.A. *Ann. Mag. Nat. Hist.*, 17(4): 406.

1890. *Antedon spinipinna* Hartlaub, C. *Nachr. Ges. Gottingen*, 5: 179. WoRMS

1971. *Stephanometra indica*: Clark. A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-West Pacific echinoderms*, p. 24 (key), p. 8-9 (distribution).

1971. *Stephanometra spinipinna*: Clark. A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-West Pacific echinoderms*, p. 24 (key), p. 8-9 (distribution).

2007. *Stephanometra indica*: Sastry, D.R.K. *Rec. zool. Surv. India, Occ. Paper No. 271*: 14

Materials: KA-13. Dt. 13.02.2018. One spec. KA-31. Dt. 15.02.2018. One spec. KA-33. Dt.15.02.2018. One spec. KP-16. Dt. 20.02.2018. One spec. KP-40. Dt. 21.02.2018. One spec. KV-N18, 150 Dt. 03.12.2018. 4 specs. KV-N18. Dt. 03.12.2018. 1 spec. KV. Dt. 04.12.2018. Three specs. KV-16. Dt. 08.02.2018. One spec. MCY. Dt. 28.11.2018. One spec. MCY-N18, Dt. 30.11.2018. One spec. MCY-N18, Dt. 30.11.2018. One spec. MCY-N18 Dt. 30.11.2018 One spec. KV-27 Dt. 05.12.2018. One spec.

Description: Arms 27-41, 130 mm long, first brachial syzygy at 3+4 and second well beyond 10. P₁ on 2nd segment, P₂ longest and spike-like. Pinnules on division series stout and longest. P₁, P₃ and the following pinnules smaller and flexible. P₁ slender more than 10 small segments and a little flexible. P₂ stout with about 10 large segments. P₃ onwards small, slender and flexible. Division series up to III Br. IIBr with 4 ossicles, others with 2 or 4 ossicles, alternating with arms or on both sides, III Br on outer side. Cirri 24-37, cirrus segments 18-21, distal

segments with dorsal thickening in the middle. In some specimens some division series broken.

Distribution: Gujarat, Lakshadweep, Tamil Nadu and Andamans. *Elsewhere:* East Indies, Philippine Islands and South Pacific Islands. The species is newly recorded from Lakshadweep.

Stephanometra tenuipinna (Hartlaub)

(Pl. II. Fig. d)

1890. *Antedon tenuipinna* Hartlaub. C. (1890) *Nachrichten von der Königlichen Gesellschaft der Wissenschaften und der Georg-August-Universität zu Göttingen* no. 5:178

1908. *Himerometra echinus* Clark, A.H. *Smithsonian Misc. Colln.* 52: 218. WoRMS

1971. *Stephanometra echinus*: Clark, A.M. and Rowe, F.W.E. *Monograph of Shallow-water Indo-west Pacific echinoderms*, p. 24 (key), p. 8-9 (Distribution).

2019. *Stephanometra tenuipinna*: Messing, C. WoRMS

Material: KV-N18. Dt. 03.12.2018. One spec. KVV-8. Dt. 04.12.2018. One spec. MCY-N18-137. Dt. 28.11.2018. 23 specs.

Description: Arms 37, 125 mm long. First brachial syzygy at 3+4, Second brachial syzygy beyond 10 segments at 15+16 or 16+17. P₁ on second segment. P₂ stout and largest. Proximal pinnules long stiff and erect, P₃ onwards somewhat soft, flexible and curved. Division series up to IVBr, well separated, of 2 segments, IIIBr and IVBr when present on outer side only. Cirri 35, cirrus segments 28, longest cirrus 31 mm long distal segments from about 8-10 or distal half with median thickening or spine like. Cirri 35+127 distal segments with a median dorsal thickening.

Remarks: Based on the key of Clark and Rowe (1971, p. 24, note 26- *tenuipinna* with only 24 arms, 70 mm long and *echinus* with 28-40 arms, 85mm long) some specimens were initially identified with *S. echinus*. It was considered that the species was probably based on a larger specimen of *S. tenuipinna* (Hartlaub) and both the species appear to be sympatric at Sri Lanka area (? Gulf of Mannar), East Indies and The Philippines (*tenuipinna* also from South Pacific Is). The length of arms maximum 70 mm in *tenuipinna* and minimum 85 mm in *echinus* suggest the differences are small and IBr is rarely developed, while arm length 85 mm onwards IBr and sometimes IVBr are developed. Based on WoRMS

both are here treated as *S. tenuipinna*.

Distribution: Lakshadweep. *Elsewhere:* Sri Lanka area (Gulf of Mannar?), East Indies, The Philippines and South Pacific Islands. This is the first report of the species from Lakshadweep and new to Indian fauna.

Family COLOBOMETRIDAE

Cenometra bella (Hartlaub)

1890. *Antedon bella* Hartlaub, C. *Nach. Ges. Göttingen*, (1890)5:174

1947. *Cenometra bella*: Clark, A.H. *U.S. nat. Mus. Bull.* 82: 27

1971. *Cenometra bella*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-West Pacific echinoderms*, p. 19 (key), p. 10-11 (distribution).

2019. *Cenometra bella*: Messing, C. WoRMS.

Materials: KA - 55. Dt. 17.02.2018. One spec. KA - 44 Dt. 15.02.2018. One spec. KV Dt. 05.12.2018. One spec. KP1. Dt. 20.02.2018. One spec. KP-10. Dt. 20.02.2018. Fourspecs. KP - 38: Dt. 21.02.2018. One spec. KP - 4. Dt. 20.02.2018. Two specs. KP - 42. Dt. 21.02.2018. One spec. KP - 18. Dt. 20.02.2018. One spec; KP - 30 Dt. 21.02.2018. One spec; KP-29. Dt. 21.02.2018. Three specs. KP - 8. Dt. 20.02.2018. One spec. KP - 6. Dt. 20.02.2018. Three specs. KV - N18. Dt. 03.12.2018. One spec; KV. Dt. 09.02.2018. One spec. KV - 12. 10.02.2018. One spec.

Description: Arms up to 35, 135mm long. No tubercles on basal segments of proximal pinnules, no carination on pinnule segments. All division series of 2 ossicles, rarely a IBr with 4 ossicles. III Br either on both sides or alternating with arms on inner or outer side. P₂ stout and largest, distal margin spinose, not carinate. P₁ similar to P₂ but less stout and a little shorter. P₃ much smaller than P₂. Cirri up to 40, with up to 40 segments, distal segments with a pair of tubercles on dorsal side.

Distribution: Lakshadweep. *Elsewhere:* Bay of Bengal to South Pacific Islands. The species newly recorded from Lakshadweep is also new to Indian Fauna.

Family TROPIOMETRIDAE

Tropiometra carinata (Lamarck)

1816. *Comatula carinata* Lamarck, J.B.P.A. de. *Hist. nat. anim. s. vert.* 2: 534.

1971. *Tropiometra carinata*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-West Pacific echinoderms*. 10-11 (distribution) and 25 (key).

2007. *Tropiometra carinata*: Sastry, D.R.K. *Rec. Zool. Surv. India, Occ. Paper No. 271*: 19

Material: AGN. DT. 20.11.2018. One spec. AG-26A. Dt. 03.02.2018. One spec. KA-40. Dt. 15.02.2018. One spec. KA-48. Dt. 15.02.2018. One spec. KA-50. Dt. 15.02.2018. Two specs. KP-14. Dt. 20.02.2018. One spec. KP-12. Dt. 20.02.2018. Three spec. KP-25. Dt. 21.02.2018. Two specs. KP-36. Dt. 21.02.2018. Three specs. KP-2. Dt. 20.02.2018. One spec. KP-5. Dt. 20.02.2018. Four specs. KP-7. Dt. 20.02.2018. Two specs. KP-26. Dt. 21.02.2018. One spec. KP-27. Dt. 21.02.2018. Two specs. KV-26. Dt. 03.12.2018. One spec. PMPN18. Dt. 22.11.2018. Two specs. KP28. Dt. 21.02.2018. Four specs.

Description: Arms 10, 35-80 mm long. Pinnules stiff and prismatic, gradually become shorter and slender. Cirri 10-15, sometimes robust and short, with 11 to 16 segments, distal segments transversely thickened dorsally mostly at the distal margin. Cirri and distal segments with transverse dorsal thickening.

Remarks: One spec from B-35. Dt. 4.2.2018 has 10 arms of 40 mm length and very slender and long cirri with up to 20 segments. Distal cirrus segments have the dorsal thickening like a projection towards distal sometimes appearing almost like a spine.

Distribution: Lakshadweep, Kerala, Tamil Nadu and Andhra Pradesh. *Elsewhere:* Red Sea and East coast of Africa to East Indies. The species is newly recorded from Lakshadweep.

Class ASTEROIDEA

Order VALVATIDA

Family ACANTHASTERIDAE

Acanthaster planci (Linnaeus)

(Pl. III. Fig. a,b)

1758. *Asterias planci*: Linnaeus, C. *Systema Naturae*. Ed. **10**: 823.

1840. *Echinaster ellisi* Gray, J.E. *Ann. Mag. nat. Hist.* **6**(1): 281. WoRMS

1971. *Acanthaster planci*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-West Pacific echinoderms*, p. 71 (key), p. 38-39 (distribution).

1991. *Acanthaster planci*: Sastry, D.R.K. *State Fauna Series 2: Fauna of Lakshadweep*, p. 372.

1993. *Acanthaster planci*: Clark, A.M. *Echinoderm studies*. **4**: 323.

2007. *Acanthaster planci*: Sastry, D.R.K. *Rec. zool. Surv. India Occ. Paper No. 271*: 67

Material: AG-4. Dt. 03.02.2018 One spec. MCYN18-127. Dt. 28.11.2018. One spec. Arms 15, R/r = 40/15 mm, spines long.

Distribution: Goa, Lakshadweep, Andamans and Nicobars. *Elsewhere:* Tropicopolitan, Red Sea and East Africa to Hawaiian Island, in the Indo-west Pacific, Galapagos Islands to Gulf of California in the East Pacific with *Echinaster ellisi* (Gray) as a synonym as per WoRMS.

Family ASTERINIDAE

Aquilonastra burtoni (Gray)

(Pl. III. Fig. c)

1840. *Asterina burtoni*: Gray, J.E. *Annals of the Magazine of Natural History*. **6**: 289.

2007. *Asterina burtoni*: Sastry, D.R.K. *Rec. zool. Surv. India Occ. Paper No. 271*: 42

2019. *Aquilonastra burtoni* (Gray, 1840): Mah, C.L. WoRMS

Material: KA-9. DT. 13.02.2018. One spec.

Distribution: Gujarat, Lakshadweep, Tamil Nadu, West Bengal, Andamans and Nicobars, *Elsewhere:* Red Sea, Persian Gulf and East coast of Africa to South Pacific Islands.

Family GONIASTERIDAE

Fromia milleporella (Lamarck)

(Pl. III. Fig. d)

1816. *Asterias milleporella*: Lamarck, J.B.P.A. de. *Hist. nat. anim. s. vert.* **2**: 564.

1971. *Fromia milleporella*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-west Pacific echinoderms*, p. 63 (key), p. 34-35 (distribution).

1991. *Fromia milleporella*: Sastry, D.R.K. *State Fauna Series 2: Fauna of Lakshadweep*. p. 394.

1993. *Fromia milleporella*: Clark, A.M. *Echinoderm Studies*. **4**: 332.

2007. *Fromia milleporella*: Sastry, D.R.K. *Rec. zool. Surv. India Occ. Paper No. 271*: 70.

Material: AGSN18-34. Dt. 19.11.2018. Two specs. B-36. Dt. 04.02.2018. One specs. KA - 35. Dt. 15.02.2018. One specs.

Remarks: The specimens measure 23-40mm in R. Abactinal plates not in regular series, no distinct carinal series. Actinal plates in three series at the arm base.

Distribution: Lakshadweep and Andamans. *Elsewhere:* widely distributed from East coast of Africa to South

Pacific Islands.

Fromia nodosa A.M. Clark

(Pl. III. Fig. e,f; Pl. IV. Fig. a,b)

1967. *Fromia nodosa* Clark, A.M. *Bull. Br. Mus. nat. Hist. (Zool.)*, 15(4): 189

1991. *Fromia nodosa*: Marsh, L.M. and Price, A.R.G. *Bull. Br. Mus. nat. Hist. (Zool.)*, 57(1): 63 (Sumatra)

Material: AGSN18-33. Dt. 19.11.2018. One spec. KV-4. Dt. 09.02.2018. Three specs. MCYN18-86,87,126&128. Dt. 28.11.2018 Four specs.

Remarks: The specimens measure 35-45mm in R. Marginal plates large and convex sometimes separated by small flat plates. Carinal series of larger plates distinct in many arms. Actinal plates in two series at the base of the arm. Papular pores present on the disc and also between the marginal.

Distribution: Lakshadweep. Elsewhere: Islands of Western Indian Ocean, Maldives, Sri Lanka and Sumatra. The species is newly recorded from Lakshadweep and is also new to India.

Fromia pacifica H.L. Clark

(Pl. XII. Fig. a.)

1921. *Fromia pacifica* Clark, H. L. The echinoderm fauna of Torres Strait: its composition and its origin. *Department of Marine Biology of the Carnegie Institute*. 10: 42.

1971. *Fromiapacifica*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-West Pacific echinoderms*, p. 63 (key), p. 36-37 (distribution).

2019. *Fromia pacifica*: Mah, C.L. WoRMS.

Material: KA-7. Dt. 13.02.2018. Two specs. AM-2. Dt. 17.02.2018. Two specs. B-19. Dt. 04.02.2018. One spec. AGE-101. Dt. 06.02.2018. One spec. KA-35. Dt. 15.02.2018. Two specs. B-36. Dt. 04.02.2018. Two specs. BW-8. Dt. 05.02.2018. Four specs. PMPN18-69. Dt. 22.11.2018. One spec. AG-4&5. Dt. 03.02.2018. Two specs.

Description: The specimens measure 25-40mm in R. Marginal plates flat, granule covered, becoming smaller distally. Furrow spines 3, rarely 2, subequal, distal one somewhat larger. Papillar pores single, Madreporite single. The specimen from AGE-101 is 25mm in R and 6 armed.

Distribution: Lakshadweep. **Elsewhere:** Philippine Islands and South Pacific Islands. The species newly recorded from Lakshadweep is also new to India.

Family OPHIDIASTERIDAE

Dactylosaster cylindricus (Lamarck)

(Pl. IV. Fig. c)

1816. *Asterias cylindrica* Lamarck, J.B.P.A. de. *Hist. nat. anim. s. vert. 2*: 567.

1971. *Dactylosaster cylindricus*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-West Pacific echinoderms*, p. 59 (key), p. 34-35 (distribution).

1991. *Dactylosaster cylindricus*: Sastry, D.R.K. *State Fauna Series 2: Fauna of Lakshadweep*. p. 367.

2007. *Dactylosaster cylindricus*: Sastry, D.R.K. *Rec. zool. Surv. India*. 271: 69.

Material: KA. Dt. 20.01.2008. Coll. Ch. Satyanarayana. One spec. with four full arms, the fifth short with regenerating tip.

Distribution: Lakshadweep, Andamans and Nicobars. **Elsewhere:** SE Arabia and East coast of Africa to South Pacific Islands.

Linckia laevigata (Linnaeus)

(Pl. IV. Fig. d)

1758. *Asterias laevigata* Linnaeus, C. *Systema Naturae*, 10: 662.

1971. *Linckia laevigata*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-West Pacific echinoderms*, p. 62 (key), p. 36-37 (distribution).

1991. *Linckia laevigata*: Sastry, D.R.K. *State Fauna Series 2: Fauna of Lakshadweep*. p. 368.

2007. *Linckia laevigata*: Sastry, D.R.K. *Rec. zool. Surv. India Occ. Paper No.* 271: 73.

Material: AM-8. 17.02.2018. One spec. B-30. 04.02.2018. One spec. BW-17. Dt. 05.02.2018. One spec. KA-6. Dt. 13.02.2018. One spec. Lakshadweep, three specs.

Distribution: Lakshadweep, Tamil Nadu, Andamans and Nicobars. **Elsewhere:** East coast of Africa to South Pacific Islands.

Linckia multifora (Lamarck)

(Pl. IV. Fig. e)

1816. *Asterias multifora* Lamarck, J.B.P.A. de. *Hist. nat. anim. s. vert. 2*: 565.

1971. *Linckia multifora*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow water Indo-west pacific echinoderms*, p. 62 (key), p. 36-37 (distribution).

1991. *Linckia multifora*: Sastry, D.R.K. *State Fauna Series 2: Fauna of Lakshadweep*. p. 369.

2007. *Linckia multifora*: Sastry, D.R.K. *Rec. zool. Surv. India Occ. Paper No. 271*: 75.

Material: B-26. Dt. 04.02.2018. One spec. KA-21. Dt. 14.02.2018. 12 specs. PMPN18-68, 69. Dt. 22.11.2018. 34 specs. MCY. Dt. 20.01.2018. 4 spec. KV-9. Dt. 08.02.2018. 7 specs. AM-2A. Dt. 17.02.2018. 6 specs. KP-17. Dt. 20.02.2018. One spec. KP-43. Dt. 21.02.2018. 6 specs. Lakshadweep, two specs.

Remarks: The specimens generally have 5 or 6 arms tapering towards tip with one or two madreporites. There are some specimens with one or two long arms and remaining regenerating arms. There are also two comet forms. The R ranged between 50 and 90 mm.

Distribution: Lakshadweep, Tamil Nadu, Andamans and Nicobars. *Elsewhere:* Tropical Indo-west Pacific.

Family OREASTERIDAE

Choriaster granulatus Lütken

(Pl. IV. Fig. f)

1869. *Choriaster granulatus*: Lütken, C. *Catalog Godeffroy Museum*. 4: 35.

1971. *Choriaster granulatus*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-West Pacific Echinoderms*, p. 53 (key), p. 34-35 (distribution).

1993. *Choriaster granulatus*: Clark, A.M. *Echinoderm studies*. 4: 298.

2007. *Choriaster granulatus*: Sastry, D.R.K. *Rec. zool. Surv. India Occ. Paper No. 271*: 59.

Material: AG. Dt. 03.02.2018. One spec.

Description: R/r = 90/50mm. Oral and aboral surfaces covered with smooth skin, abactinal plates and marginal plates not distinguishable; arms blunt, form almost stellate, broadly rounded at tips. Interradial areas extensive. Abactinal as well as actinal sides flat in preserved specimen, abactinal side convex in live condition. Granule covering fine, tightly packed, appearing as smooth thick skin to the naked eye in the preserved specimen, distinguishable only under high magnification. Madreporite single. Furrow

spines 7, middle longest gradually becoming shorter on either side.

Remark: In addition, another specimen was noticed at Kavaratti on Dec 5, 2018 and photographed. The abactinal side appears as though covered by thick skin in live condition and under low magnification in the preserved condition. But when the dried specimen is observed under high magnification very fine granulation could be seen.

Distribution: Lakshadweep and Andamans. *Elsewhere:* Red sea, East Indies, The Philippines, South China sea, South Pacific Islands (Clarck and Rowe, 1971), Red Sea and East Africa, South China Sea, N. Australia, New Caledonia, Fiji, (Clarck, 1993). The species is newly recorded from Lakshadweep.

Culcita novaeguineae Müller & Troschel

(Pl. V. Fig. a)

1842. *Culcita novaeguineae* Müller, J. and Troschel, F.H. *System der Asteriden*. p. 38.

1971. *Culcita novaeguineae*: Clark, A.M. and Rowe, F.W.E. *Monograph of Shallow-water Indo-West Pacific echinoderms*, p. 54 (key), p. 34-35 (distribution).

1991. *Culcita novaeguineae*: Sastry, D.R.K. *State Fauna Series 2: Fauna of Lakshadweep*, p. 366.

2007. *Culcita novaeguineae*: Sastry, D.R.K. *Rec. zool. Surv. India Occ. Paper No. 271*: 59.

Material: B. Dt. 20.11.2018, photograph only.

Distribution: Lakshadweep, Andamans and Nicobars. *Elsewhere:* Lakshadweep and Bay of Bengal to Hawaiian Islands.

Culcita schmideliana (Bruzelius)

(Pl. V. Fig. b)

1805. *Asterias schmideliana* Bruzelius, A.J. *Dissertatio sistens speices cognitae Asteriarum. Lundae. (Naturforscher, xvi. t. 1)* p. 11.

1971. *Culcitaschmideliana*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-West Pacific echinoderms*, p. 53 (key), 34-35 (distribution).

200. *Culcitaschmideliana*: Sastry, D.R.K. *Rec. zool. Surv. India Occ. Paper No. 271*: 60.

Material: KA. Dt. 20.01.2008. Coll. Ch. Satyanarayana.

One young spec. KA. Dt. 13.02.2018. Photograph. KV. 08.02.2018. Photograph.

Distribution: Lakshadweep and Andamans. *Elsewhere:* East coast of Africa to Maldives and Sri Lanka area.

Order SPINULOSIDA

Family ECHINASTERIDAE

Echinaster luzonicus (Gray)

(Pl. V. Fig. c,d)

1840. *Othilia luzonica*: Gray, J.E. *Ann. Mag. Nat. Hist.* 6 (37): 282.

1971. *Echinaster luzonicus*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-west pacific echinoderms*, p. 72 (key), p. 40-41 (distribution).

1996. *Echinaster (Echinaster) luzonicus*: Clark, A.M. *Echinoderm Studies*. 5: 224.

2007. *Echinaster (Echinaster) luzonicus*: Sastry, D.R.K. *Rec. zool. Surv. India Occ. Paper No.271*: 82.

2019. *Echinaster luzonicus*: Mah, C.L. WoRMS

Material: B-37. Dt. 04.02.2018. One spec.

Description: Arms five, tapering towards the tip; single madreporite; subambulacral spine series conspicuous, continuous and close to the furrow spines.

Distribution: Gujarat, Lakshadweep, Tamil Nadu, Andamans and Nicobars. *Elsewhere:* Maldives, East Indies, The Philippines, South China Sea, North Australia and South Pacific Islands. The species is newly recorded here from Lakshadweep.

Class OPHIUROIDEA

Order AMPHILEPIDIDA

Family OPHIOTRICHIDAE

Gymnolophus obscura (Ljungman)

(Pl. VI. Fig. a,b)

1867. *Ophiocnemis obscura*: Ljungman, A. *Öfversigt af Kgl. Vetenskaps-Akademiens Förhandlingar* 1866. 23(9): 333.

1969. *Gymnolophus obscura*: James, D.B. *Bull. Cent. Mar. Fish. Res. Inst. No. 7*: 55.

1971. *Gymnolophus obscura*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow water Indo-west pacific echinoderms*, p. 117 (key), p. 82-83 (distribution).

1988. *Gymnolophus obscura*: James, D.B. *Proc.Symp. Endangered*

Marine Animals and Marine Parks, 1985. 1: 404.

Material: AG-5. Dt. 03.02.2018. One spec.

Description: The specimen measures 9mm in disc diameter, disc scales naked. Radial shields 4 mm long, high crest in the middle, highest at the distal end, gradually sloping towards centre of the disc. Arms 30 mm long, upper arm plates as long as broad proximally, a little wider further. Lower arm plates octagonal, longer than broad. Arm spines up to 5 proximally, appearing smooth with incipient triangular spikes, lowest arm spine very small with proximally curved and pointed spines at the tip. Only tooth papillae present, no lateral papillae. General colouration black with a longitudinal speckled marking on the arms prominent proximally.

Distribution: Lakshadweep and Tamil Nadu. *Elsewhere:* Maldives, Bay of Bengal, East Indies, Philippine Islands and North Australia. The species is newly recorded from Lakshadweep and it is an addition to N.Z.C.

Macrophiothrix longipeda (Lamarck)

(Pl. VI. Fig. c)

1816. *Ophiura longipeda*: Lamarck, J.B.P.A. de. *Histoire naturelle des animaux sans vertèbres*. 2: 544.

1971. *Macrophiothrix longipeda*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow water Indo-west pacific echinoderms*, p. 114 (key), p.82-83 (distribution).

1991. *Macrophiothrix longipeda*: Sastry, D.R.K. *State Fauna Series 2: Fauna of Lakshadweep*. p. 377.

2007. *Macrophiothrix longipeda*: Sastry, D.R.K. *Rec. zool. Surv. India Occ. Paper No.271*: 142.

Material: KA-23. Dt. 14.02.2018. One spec. Disc covered by spinose stumps. Disc and arms blue with dark spots on both sides.

Distribution: Lakshadweep, Tamil Nadu, West Bengal, Andamans and Nicobars. *Elsewhere:* Indo-West Pacific from East coast of Africa to South Pacific Islands excluding Red Sea and Persian Gulf.

Ophiothrix (Ophiothrix) marginata Koehler

(Pl. VIII. Fig. a, b, c)

1905. *Ophiothrix marginata*: Koehler, R. *Siboga Expeditie*. 45b:79. Pl VIII, figs 7-9.

1966. *Ophiothrix (Ophiothrix) marginata*: Clark, A. M. *Ann. Mag.*

nat. Hist. (13) 9: 647.

2019. *Ophiothrix marginata*: Stöhr, S.; O'Hara, T. & Thuy, B. (Eds.). WoRMS

Material: AM-1. Dt. 17.02.2018. One spec. KV-19. Dt. 10.02.2018. One spec.

Description: Disc measures 5 and 6 mm in diameter. Radial shields 2 mm long, separated by a single series of elongate disc scales. Disc plates circular at the center and elongate radially and interradially. Disc scales with long spines; radial shields bare, outer margin straight and wide. Arms 30 and 35 mm long. Upper arm plates wider than long, distal margin arched, a pale longitudinal line bordered on either side by dark lines. Arm spines thrice as long as the arm plate, middle arm spines clavate at the tip, lateral arm plates of segments from some distance from the disc with the lowest arm spines comb-like with teeth pointing towards the disc. Lower arm plates with a concave distal margin. In the specimen from AM-1 the dark longitudinal lines of upper arm plates continuing on the disc between radial shields and interrupted on disc.

Distribution: Lakshadweep. *Elsewhere*: Off Aru Islands. This is the first report of the species after its description by Koehler (1905) from Siboga Stn. 273, East of Aru Islands in the East Indies. The species is newly recorded from Lakshadweep and is an addition to Indian Fauna.

Ophiothrix (Acanthophiothrix) purpurea von Martens (Pl. VI. Fig. d)

1867. *Ophiothrix purpurea* von Martens. *Amber. db. Akad. Wiss. Berl.* 1867: 346.

1971. *Ophiothrix (Acanthophiothrix) purpurea*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-West Pacific echinoderms*, p. 112 (key), p. 86-87 (distribution).

1991. *Ophiothrix (Acanthophiothrix) purpurea*: Sastry, D.R. *State Fauna Series 2: Fauna of Lakshadweep*. p. 378.

2007. *Ophiothrix (Acanthophiothrix) purpurea*: Sastry, D.R.K. *Rec. zool. Surv. India Occ. Paper No. 271*: 149.

Material: AGS3-2. Dt. 19.11.2018. One spec. B-40. Dt. 04.02.2018. One spec. KA-46. Dt. 15.02.2018. One spec. KP-3. Dt. 20.02.2018. Two specs. KV-44. Dt. 10.02.2018. One spec. PMPN18-57. Dt. 22.11.2018. Two specs. MCYN18_82, 83. Dt. 28.11.2018. Two specs. KA-38. Dt. 15.02.2018. Three specs.

Distribution: Lakshadweep and Andamans. *Elsewhere*: Indo-west Pacific from SE Arabia and East coast of Africa to South Pacific Islands.

Ophiothrix (Acanthophiothrix) vigelandi A.M. Clark

1968. *Ophiothrix (Acanthophiothrix) vigelandi* Clark, A.M. *Bull. Br. Mus. Natn. Hist. (Zool.)*. 16(7): 277.

1971. *Ophiothrix (Acanthophiothrix) vigelandi*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-West Pacific echinoderms*, p. 111 (key), p. 86-87 (distribution).

1991. *Ophiothrix (Acanthophiothrix) vigelandi*: Sastry, D.R.K. *State Fauna Series 2: Fauna of Lakshadweep*. p. 379.

2007. *Ophiothrix (Acanthophiothrix) vigelandi*: Sastry, D.R.K. *Rec. zool. Surv. India Occ. Paper No. 271*: 149.

Materials: AGNN18-46. Dt. 19.11.2018. One spec. KV-6. Dt. 09.02.2018. One spec. PMPN18-66. Dt. 22.11.2018. One spec. PMPN-66. Dt. 22.11.2018. One spec.

Distribution: Lakshadweep and Andamans. *Elsewhere*: Philippine Is., New Caledonia, New South Wales, Amboina and Kei Is.

Order OPHIACANTHIDA

Family OPHIOCOMIDAE

Breviturma dentata (Müller & Troschel)

(Pl. VII. Fig a)

1842. *Ophiocoma dentata* Müller, J. and Troschel, F.H. *System der Asteriden*. p. 99.

1971. *Ophiocoma dentata*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow water Indo-west pacific echinoderms*, p. 119 (key), p.86-87 (distribution).

2007. *Ophiocoma dentata*: Sastry, D.R.K. *Rec. zool. Surv. India, Occ. Paper No. 271*: 114.

2013. *Ophiocoma (Breviturma) dentata*: Stöhr, S., Boissin, E. and Hoareau, T.B. *Eur. J. Taxon.* 68: 13.

2019. *Breviturma dentata*: Stöhr, S., O'Hara, T., and Thuy, B. WoRMS.

Material: AGE-102. Dt. 06.02.2018. One spec. KA-3. Dt. 12.02.2018. One spec. KV-2. Dt. 08.02.2018. One spec.

Remarks: Upper and lower arm plates with white patches bordered by black. In some specimens the disc and upper arm plates have white patches, sometimes on alternating plates.

Distribution: Lakshadweep, Tamil Nadu, Andamans and Nicobars. *Elsewhere:* East coast of Africa, Islands of western Indian Ocean, Maldives to Hawaiian Islands.

Breviturma pica (Müller & Troschel)

(Pl. VII. Fig. b)

1842. *Ophiocoma pica* Müller, J. and Troschel, F.H. *System der Asteriden*. p. 101.

1971. *Ophiocoma pica*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow water Indo-west pacific echinoderms*, p. 118 (key), p. 86-87 (distribution).

2019. *Breviturma pica*: Stohr, S., O'Hara, T., and Thuy, B. WoRMS.

Material: AGNN18-45. Dt. 19.11.2018. Four specs. AM-5. Dt. 17.02.2018. One spec. KA-2. Dt. 12.02.2018. One spec. KV-5. Dt. 10.02.2018. One spec. PMPN18-67. Dt. 22.11.2018. One spec. KVTWN18-167. Dt. 05.12.2018. 8 specs.

Distribution: Lakshadweep and Nicobars. *Elsewhere:* Indo-west Pacific, Red Sea and East coast of Africa to South Pacific Islands.

Ophiocoma erinaceus Müller and Troschel

(Pl. VII. Fig. c)

1842. *Ophiocoma erinaceus*: Müller, J. and Troschel, E.H. *System der Asteriden*. p. 98.

1971. *Ophiocoma erinaceus*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow water Indo-west pacific echinoderms*, p. 119 (key), p. 86-87 (distribution).

1991. *Ophiocoma erinaceus*: Sastry, D.R.K. *State Fauna Series 2: Fauna of Lakshadweep*. p. 380.

2007. *Ophiocoma erinaceus*: Sastry, D.R.K. *Rec. zool. Surv. India Occ. Paper No. 271*: 115.

Material: AGSN18-31. Dt. 19.11.2018. One spec. AGNN18-45. Dt. 20.11.2018. 1 spec. AM-4. Dt. 17.02.2018. One spec. KV-30. Dt. 09.02.2018. Three specs. KVN-28. Dt. 05.12.2018. 10 specs. KV-22. Dt. 10.02.2018. Five specs.

Distribution: Lakshadweep, Tamil Nadu, Andamans and Nicobars. *Elsewhere:* Red Sea and East coast of Africa to Hawaiian Islands.

Ophiocoma scolopendrina (Lamarck)

(Pl. VI. Fig. e)

1816. *Ophiura scolopendrina* Lamarck, J.B.P.A. de. *Histoire*

Naturelle des animaux sans vertebres. 2: 544.

1971. *Ophiocoma scolopendrina*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-West Pacific echinoderms*, p. 119 (key), p. 86-87 (distribution).

1991. *Ophiocoma scolopendrina*: Sastry, D.R.K. *State Fauna Series 2: Fauna of Lakshadweep*. p. 381.

2007. *Ophiocoma scolopendrina*: Sastry, D.R.K. *Rec. zool. Surv. India Occ. Paper No. 271*: 117.

Material: KA-22. Dt. 14.02.2018. One spec. KVN-28. Dt. 05.12.2018. One juvenile spec. Arm spines 4 and 3, oral side white.

Distribution: Lakshadweep, Tamil Nadu, Andamans and Nicobars. *Elsewhere:* Indo-west Pacific from Red Sea, Persian Gulf and East Coast of Africa to Hawaiian Islands.

Ophiomastix annulosa (Lamarck)

(Pl. VII. Fig. d)

1816. *Ophiura annulosa* Lamarck, J.B.P.A. de. *Hist. nat. anim. s. vert. 2*: 543.

1971. *Ophiomastix annulosa*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-West Pacific echinoderms*, p. 120 (key), p. 86-87 (distribution).

1991. *Ophiomastix annulosa*: Sastry, D.R.K. *State Fauna Series 2: Fauna of Lakshadweep*. p. 382.

2007. *Ophiomastix annulosa*: Sastry, D.R.K. *Rec. zool. Surv. India Occ. Paper No. 271*: 119.

Material: AG-5. Dt. 03.02.2018. One spec.

Distribution: Lakshadweep and Andamans. *Elsewhere:* Maldives to South Pacific Islands.

Ophiomastix elegans Peters

(Pl. VI. Fig. f)

1851. *Ophiarthrum elegans* Peters, W. *Ber. K. Press. Akad. Wiss.* 1851 : 463

1971. *Ophiarthrum elegans*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-West Pacific echinoderms*, p. 120 (key), p. 86-87 (distribution).

2007. *Ophiarthrum elegans*: Sastry, D.R.K. *Rec. zool. Surv. India Occ. Paper No. 271*: 112.

2019. *Ophiomastix elegans*: O'Hara, T. D.; Hugall, A. F.; Cisternas, P. A.; Boissin, E.; Bribiesca-Contreras, G.; Sellanes, J.; Paulay,

G.; Byrne, M. *Molecular Phylogenetic and Evolution* (2019). **130**: 72 (also WoRMS)

Material: AGE-12. Dt.06.02.2018. One spec. BWN18-53. Dt. 20.11.2018. One spec.

Remark: Disc scales naked. Black on upper and lower sides. Arms banded white and black on upper side, or with dark brown spots, lower side white.

Distribution: Lakshadweep, Andamans and Nicobars. *Elsewhere*: Lakshadweep to South Pacific Islands. The species is newly recorded from Lakshadweep.

Order OPHIACANTHIDA

Family OPHIODERMATIDAE

Indophioderma gen. nov.

urn:lsid:zoobank.org:act:85CF1D23-335E-4B3F-B27B-2911BCEBE07E

Etymology of the generic nomen: The generic name is formed by the combination of the locality (India) and the type genus of the family Ophiidermatidae.

Type species: *Indophioderma ganapatii* sp. nov. urn:lsid:zoobank.org:act:B87403E6-D6B8-4ED7-B90A-164911587AB7 by present designation

Generic Diagnosis: This diagnosis applies to the monotypic genus and the species. Radial shields and disc plates entirely covered with granules. Oral plates, oral shields and supplementary oral shields naked. Single tentacle scale. Single undivided genital slit on each side of the arm.

Indophioderma ganapatii sp. nov.

(Pl. IX. Fig. a, b; Pl. X. Fig. a, b)

Holotype: ZSI/GNC/E2160/2, by present designation collected by N. Marimuthu on 06.02.2018 from Agatti Is.

Description of the Holotype (ZSI/GNC/E2160/2): The specimen measures 7mm in disc diameter; arm length 25mm; disk plates, radial shields, ventral inter-radial disk granule covered; radial shields not discernible. Dorsal arm plates longer than broad, with a broad distal border and a narrow proximal border (no granulation on arms). Lateral arm plates with 8 to 10 short adressed spines shorter than the length of the arm plate. Arms on dorsal side appear to be brown, every third to six dorsal arm plate and lateral arm plates with darker proximal border

giving a banded appearance. Oral plates, oral shields and supplementary oral shields completely naked. No dental papillae. Oral papillae about 10 on each side, the distal 2 to 3 extending on the lateral oral plates are broader while the rest are tapering or spine like. Oral shields somewhat triangular with curved distal edge, supplementary oral shields are round with the straight proximal border adjoining the oral shield. Ventral arm plates as long as broad with a rounded distal border; uniformly pale in the preserved specimen without banded appearance. Tentacle scale single. Genital opening single, one on each side of the arm (Genital Opening not subdivided).

Differentiation: This specimen does not fit into the key given by Clark and Rowe (1971) or the Synoptic Key for Ophiidermatidae of Fell (1961). The present specimen differs from *Ophiurodon*, *Ophiuroconis*, *Toporkovia*, *Ophiochaeta* and *Ophiarachna* by having adressed arm spines. In the genera with adressed arm spines and single tentacle scale, *Ophioconis*, *Cryptopelta*, *Bathypectinura*, *Ophiopaepale* and *Schizoderma* oral shields are covered by granules. In the genera, *Diopoderma*, *Ophiocryptus*, *Ophioncus* and *Ophioderma* there are two tentacle scales and the genital clefts are subdivided with 4 apertures in each inter radius. *Ophiochaeta* has spines on disc scales. Among the genera with only granule covered disc scales, the radial shields are naked in *Ophiarachnella* and *Ophiochasma*. *Ophiopezella* has some enlarged plates on the disc and margin. In *Ophiocormus* arm plates are concealed by granulation and *Ophioclastus* has supplementary arm plates. Supplementary oral shields are present in *Distichopus* and *Pectinura*. *Ophiopeza* has enlarged disc scales with enlarged granulation and supplementary oral shields. *Ophiopsammus* (synonym of *Ophiopeza* as per Fell, 1961 but valid as per Clark and Rowe, 1971 and WoRMS) has carinated dorsal arm plates (Clark and Rowe, 1971: 127, key). Thus the new genus is very close to *Bathypectinura*, *Ophiopaepale* and *Schizoderma*. However the arm spines are only 3-4 in all the three genera. Further the radial shields are partly exposed and granulation is comparatively very fine in *Bathypectinura*, and the ventral arm plates are subdivided in the other two genera. We therefore propose to describe a new genus and species with the following diagnosis to accommodate the present specimen.

Etymology of the specific nomen: The species is

named after late Prof. P. N. Ganapati who initiated the first author into study of echinoderms.

Class ECHINOIDEA

Order DIADEMATOIDA

Family DIADEMATIDAE

Diadema savignyi (Audouin)

(Pl. XI. Fig. a)

1809. *Cidarites savignyi*: Audouin, V. *Explication sommaire des planches d'Echinoderms de l'Égypte et de la Syrie, publiées par J. C. Savigny, membre de l'Institut; offrant un exposé des caractères naturels des genres avec la distinction des espèces, par Victor Audouin.* pp. 203-212.

2007. *Diadema savignyi*: Sastry, D.R.K. *Rec. zool. Surv. India Occ. Paper No. 271*: 164.

Material: KA. Dt. 22.01.2008. Coll. Ch. Satyanarayana. One spec.

Distribution: Lakshadweep, Andamans and Nicobars. **Elsewhere**: Widely distributed in Indo-west Pacific shallow - waters.

Diadema setosum(Leske)

(Pl. XII. Fig. b)

1758. *Echinus saxatile*: Linnaeus, C. *Systema Naturae*. Ed., **10**: 664.

1971. *Diadema savignyi*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-West Pacific echinoderms*, p. 153 (key), p.140-141 (distribution).

2007. *Diadema savignyi*: Sastry, D.R.K. *Rec. zool. Surv. India, Occ. Paper No. 271*: 114.

Material: AGE. Dt. 17.11.2018. One spec. AM-6. Dt. 17.2.2018. One spec. KA-25. Dt. 14.02.2018. One spec.

Distribution: Lakshadweep, Andamans and Nicobars. **Elsewhere**: Widely distributed in Indo-west Pacific shallow-waters.

Echinothrix calamaris (Pallas)

(Pl. XI. Fig. b)

1774. *Echinus calamaris* Pallas. *Spicilegia zoologica, quibus novae imprimis et obscurae animalium species iconibus, descriptionibus atque commentariis illustrantur cura P.S. Pallas.* Berolini. *Fasciculus 10*: 31.

2007. *Echinothrix calamaris*: Sastry, D.R.K. *Rec. zool. Surv. India. Occ. Paper No. 271*: 166.

Materials: AGE. Dt. 06.02.2018. One spec. BWN18-48 & 49. Dt. 20.11.2018. Seven specs. KVN18-81. Dt. 24.11.2018. One spec.

Remarks: Ambulacra bulged near the apical system. Ambulacral spines green, needle-like with backwardly pointed spikes, interambulacral spines black or black with white bands.

Distribution: Lakshadweep and Andamans. **Elsewhere**: Persian Gulf, Red Sea and East coast of India to Hawaiian Islands.

Order STOMOPNEUSTOIDA

Family STOMOPNEUSTIDAE

Stomopneustes variolaris (Lamarck)

(Pl. XI. Fig. f)

1816. *Echinus variolaris* Lamarck. J.B.M. de. *Histoire naturelle des animaux sans vertèbres*. Tome troisième. Paris: Deterville/Verdière. 3: 47.

1971. *Stomopneustes variolaris*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-West Pacific echinoderms*, p. 153 (key), p. 140-141 (distribution).

2007. *Stomopneustes variolaris*: Sastry, D.R.K. *Rec. zool. Surv. India. Occ. Paper No. 271*: 168.

Material: KV-81. 24.11.2018. One spec.

Distribution: Lakshadweep, Tamil Nadu, Andhra Pradesh, Andamans and Nicobars. **Elsewhere**: East coast of Africa tp South Pacific Islands.

Order CAMARODONTA

Family TOXOPNEUSTIDAE

Tripneustes gratilla (Linnaeus)

(Pl. XI. Fig. c)

1758. *Echinus gratilla* Linnaeus, C. *Systema naturae*, 10: 664

1971. *Tripneustes gratilla*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-west Pacific echinoderms*, p. 156 (Key), p. 142-143 (Distribution).

2007. *Tripneustes gratilla*: Sastry, D.R.K. *Rec. zool. Surv. India Occ. Paper No. 271*: 180

Material: AGNN18-1, 2, Dt. 17.11.2018. Seven specs.

Distribution: Lakshadweep, Tamil Nadu, Andhra Pradesh, Andamans and Nicobars. **Elsewhere**: East coast of Africa to Hawaiian Islands.

Family ECHINOMETRIDAE

Echinometra mathaei (Blainville)

(Pl. XI. Fig. d, e)

1825. *Echinus mathaei* de Blainville, H.M. *Dictionaire des Sciences Naturelles*. **37**: 94.

1971. *Echinometra mathaei*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-West Pacific echinoderms*, p. 157 (key), p. 142-143 (distribution).

2007. *Echinometra mathaei*: Sastry, D.R.K. *Rec. zool. Surv. India Occ. Paper No. 271*: 181.

Material: KA - 26. Dt. 14.02.2018. One spec. Black spines. PMPN18 - 70. Dt. 22.11.2018. One spec. Spines olive green.

Distribution: Lakshadweep. *Elsewhere*: Indo-west Pacific from Red Sea, Persian Gulf, East coast of Africa to Hawaiian Island.

Echinostrephus molaris (Blainville)

(Pl. XIII. Fig. e)

1825. *Echinus molare* de Blainville, H.M. *Dictionaire des Sciences Naturelles*. **37**: 88.

1925. *Echinostrephus molare*: Clark, H.L. *A catalogue of recent sea-urchins (Echinoidea) in the collection of the British Museum (Natural History)*. p. 130.

1971. *Echinostrephus molaris*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-West Pacific echinoderms*, p. 157 (key), p.142-143 (distribution).

1991. *Echinostrephus molaris*: Sastry, D.R.K. *State Fauna Series 2. Fauna of Lakshadweep*, p. 388.

2007. *Echinostrephus molaris*: Sastry, D.R.K. *Rec. zool. Surv. India Occ. Paper No. 271*: 183.

Material: BW-6. Dt. 05.02.2018. One spec. AGE-14 Dt. 06.02.2018. Two specs.

Distribution: Lakshadweep and Nicobars. *Elsewhere*: Indo-west Pacific from East coast of Africa to Hawaiian Islands.

Heterocentrotus mammillatus (Linnaeus)

1758. *Echinus mammillatus* Linnaeus, C. *Systema Naturae*, **10**: 667.

1971. *Heterocentrotus mammillatus*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-West Pacific echinoderms*,

p. 158 (key), p. 142-143 (distribution).

1991. *Heterocentrotus mammillatus*: Sastry, D.R.K. *State Fauna Series 2: Fauna of Lakshadweep*. p. 389.

2007. *Heterocentrotus mammillatus*: Sastry, D.R.K. *Rec. zool. Surv. India Occ. Paper No. 271*: 184.

Material: KV-81. 24.11.2018. One massive primary spine only.

Distribution: Lakshadweep. *Elsewhere*: Red Sea and East Coast of Africa to Hawaiian Islands.

Class HOLOTHUROIDEA

Order ASPIDOCHIROTIDA

Family HOLOTHURIIDAE

Holothuria (Halodeima) atra Jäger

(Pl. XII. Fig. c)

1833. *Holothuria atra* Jäger, G.F. *De Holothuris*, p. 22

1971. *Holothuria (Halodeima) atra*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-West Pacific echinoderms*, p. 176-177 (Distribution)

1991. *Holothuria (Halodeima) atra*: Mukhopadhyay, S.K. *State Fauna Series 2: Fauna of Lakshadweep*. p. 408.

2007. *Holothuria (Halodeima) atra*: Sastry, D.R.K. *Rec. zool. Surv. India. Occ. Paper No. 271*: 220.

Material: Photographs taken at Agatti, Amini, Bangaram, Kadamat, Kavaratti

Distribution: Karnataka, Kerala, Lakshadweep, Tamil Nadu, Andamans and Nicobars. *Elsewhere*: Red Sea, Persian Gulf and East coast of Africa to Hawaiian Islands.

Order SYNALLACTIDA

Family STICHOPODIDAE

Stichopus chloronotus Brandt

(Pl. XII. Fig. d)

1835. *Stichopus (Perideris) chloronotus* Brandt, J.F. *Prodromus descriptions animalium*, **1**: 50.

1971. *Stichopus chloronotus*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-West Pacific echinoderms*, p. 178-179 (Distribution).

1991. *Stichopus chloronotus*: Mukhopadhyay, S.K. *State Fauna Series 2: Fauna of Lakshadweep*. p. 408.

2007. *Stichopus chloronotus*: Sastry, D.R.K. *Rec. zool. Surv. India. Occ. Paper No. 271*: 235.

Material: Photographs from Agatti, Bangaram, Kadamat, Perumal Par

Distribution: Lakshadweep, Tamil Nadu, Andamans and Nicobars. *Elsewhere*: East coast coast of Africa to Hawaiian Islands.

***Stichopus herrmanni* Semper**

(Pl. XII. Fig. e)

1868. *Stichopus variegatus herrmanni* Selenka, E. *Z. wiss. Zool.*, **17**: 316.

1908. *Stichopus variegatus*: Koehler, R. and Vaney, C. *Echinoderma of the Indian Museum, Part IV*: 23 [non: *Stichopus variegatus* Semper, 1868].

1971. *Stichopus herrmanni*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-West Pacific echinoderms*, p. 178-179 (Distribution).

1991. *Stichopus variegatus*: Mukhopadhyay, S.K. *State Fauna Series 2: Fauna of Lakshadweep*. p. 409

2007. *Stichopus horrens*: Sastry, D.R.K. *Rec. zool. Surv. India. Occ. Paper No. 271*: 236

Material: Photographs from Amini, Agatti, Bangaram, Kadamat and Kavaratti.

Distribution: Lakshadweep, Tamil Nadu, Andamans and Nicobars. *Elsewhere*: East coast of Africa to South Pacific Islands. The Lakshadweep record mentioned by Sastry (2007) Mokhopadhyaya (1991) and was based on the report of Nagabhushanam and Rao (1972) which require confirmation. Thus this is the first record of the species from Lakashadweep.

***Thelenota ananas* (Jäger)**

(Pl. XII. Fig. f)

1833. *Thelenota ananas* Jäger, G.F. *De Holothuriis*, p. 24.

1971. *Thelenota ananas*: Clark, A.M. and Rowe, F.W.E. *Monograph of shallow-water Indo-West Pacific echinoderms*, p. 178-179 (Distribution).

1991. *Thelenota ananas*: Mukhopadhyay, S.K. *State Fauna Series 2: Fauna of Lakshadweep*. p. 409.

2007. *Thelenota ananas*: Sastry, D.R.K. *Rec. zool. Surv. India. Occ. Paper No. 271*: 237.

Material: Photographs from Agatti, Bangaram and Kavaratti.

Distribution: Lakshadweep, Andamans and Nicobars. *Elsewhere*: Mascarene Islands, Maldives, East Indies, North Australia, South China Sea and South Pacific Islands.

Unidentified Holothurians

Holothuriansp. 1 Agatti, Pl XIII. Fig. a

Holothurian sp. 2 Agatti. Pl. XIII. Fig. b

Holothurian sp. 3 Perumal Par Pl XIII. Fig. c

Holothurian sp. 4. Kavaratti. Pl. XIII. Fig. d

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Author Contributions

The survey was designed by NM and RR. NM surveyed and made collections. Identification and Notes were by DRKS. The manuscript was prepared by DRKS, NM and RR.

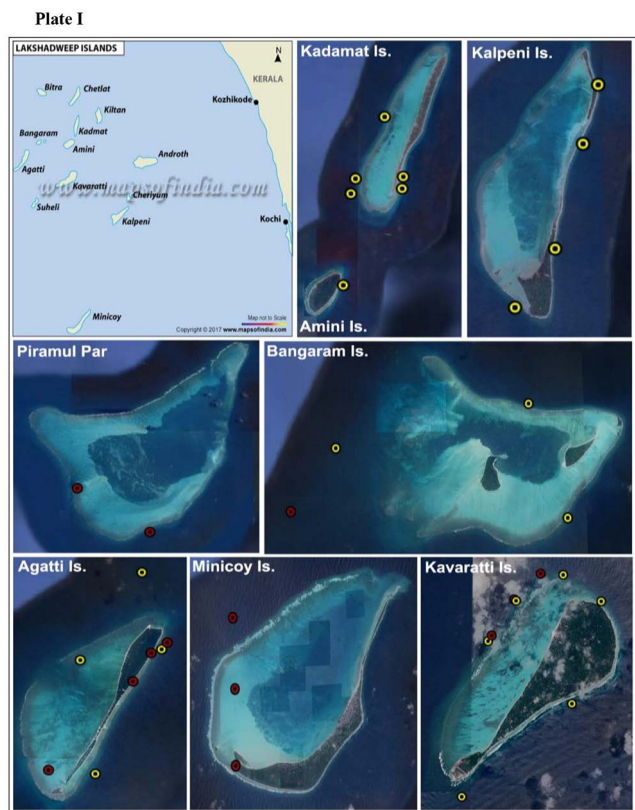


Figure 1. Map showing the study sites.

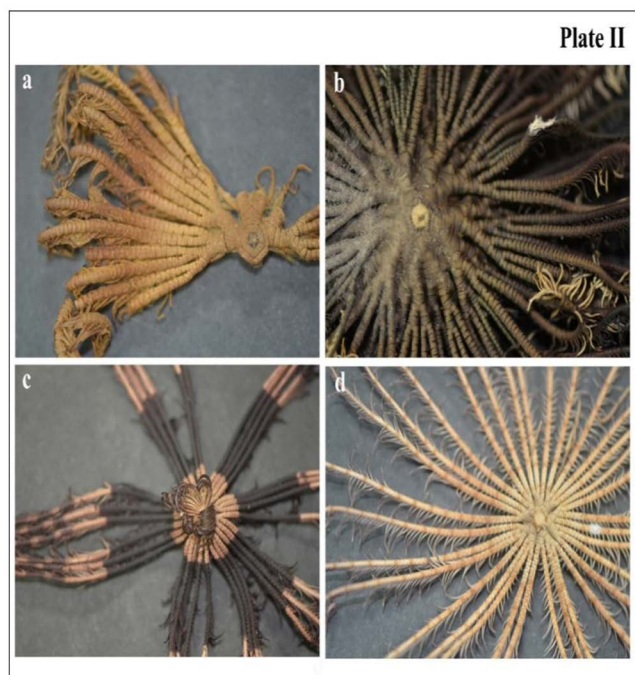


Figure 2. a. *Comaster multifidus*, b. *Phanogenia gracilis*, c. *Stephanometra indica*, d. *Stephanometra tenuipinna*.



Figure 3. a. *Acanthaster planci*, b. *Acanthaster planci*, c. *Aquilonastra burtoni*, d. *Fromia milleporella*, 5-armed specimen, e. *Fromia nodosa*, abactinal view, f. *Fromia nodosa*, actinal view



Figure 4. a. *Fromia nodosa*, abactinal view, b. *Fromia nodosa*, actinal view, c. *Dactylosaster cylindricus*, d. *Linckia laevigata*, e. *Linckia multifora*, f. *Choriaster granulatus*.

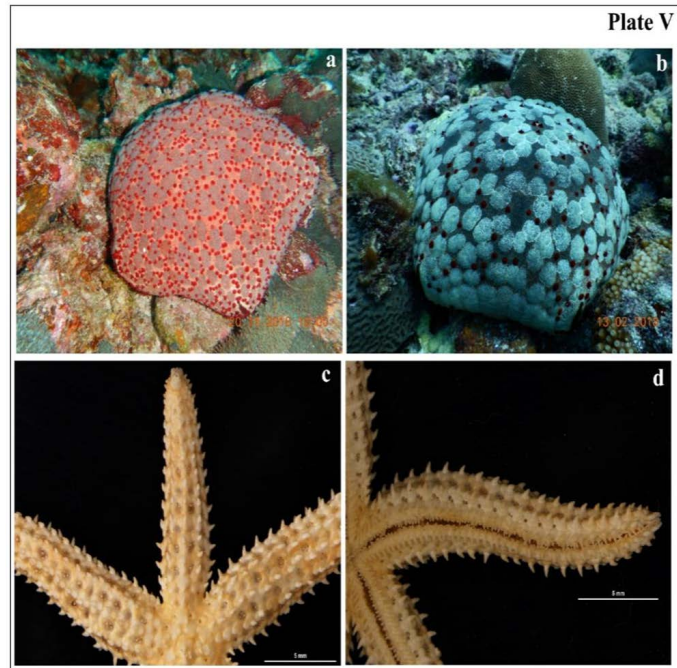


Figure 5. a. *Culcita novaeguineae*, b. *Culcita schmideliana*, c. *Echinaster luzonicus*, abactinal view, d. *Echinaster luzonicus*, actinal view of an arm.

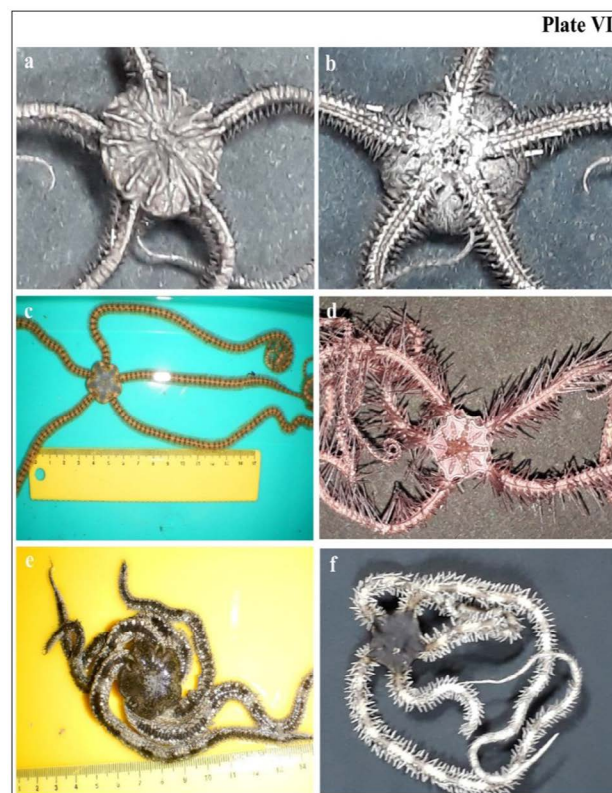


Figure 6. a. *Gymnolophus obscura*, dorsal view, b. *Gymnolophus obscura*, ventral view, c. *Macrophiothrix longipeda*, d. *Ophiothrix (Acanthophiothrix) purpurea*, e. *Ophiocoma scolopendrina*, f. *Ophiomastix elegans*.

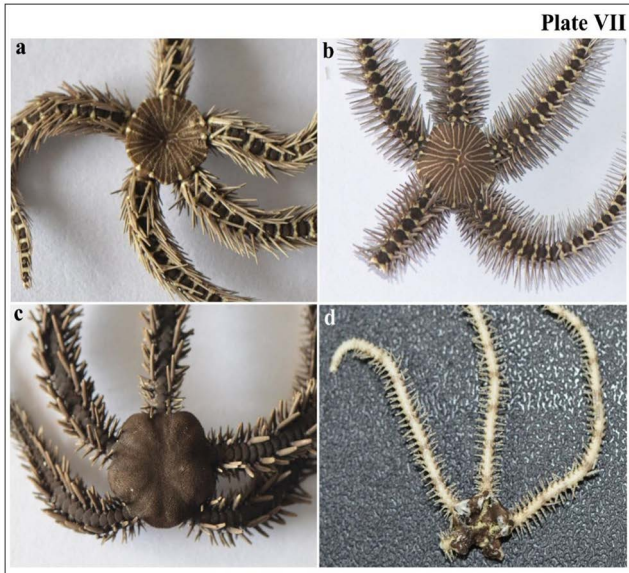


Figure 7. a. *Breviturma dentata*, b. *Breviturma pica*, c. *Ophiocoma erinaceus*, d. *Ophiomastix annulosa*.

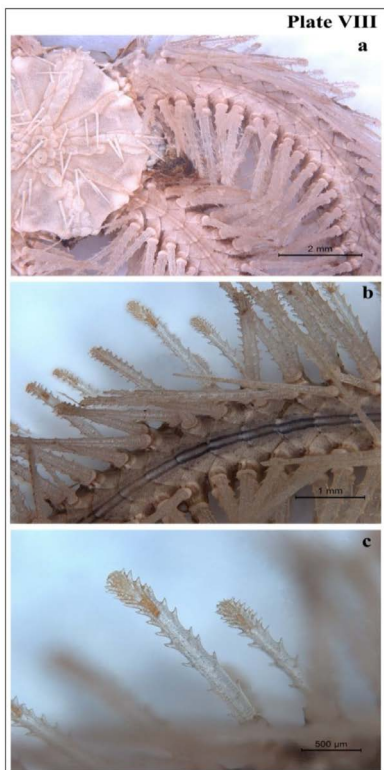


Figure 8. a. *Ophiothrix (Ophiothrix) marginata*, disc and arms, dorsal view, b. *Ophiothrix (Ophiothrix) marginata*, ventral view of part of an arm, c. *Ophiothrix (Ophiothrix) marginata*, enlarged view of clavate arm spines.

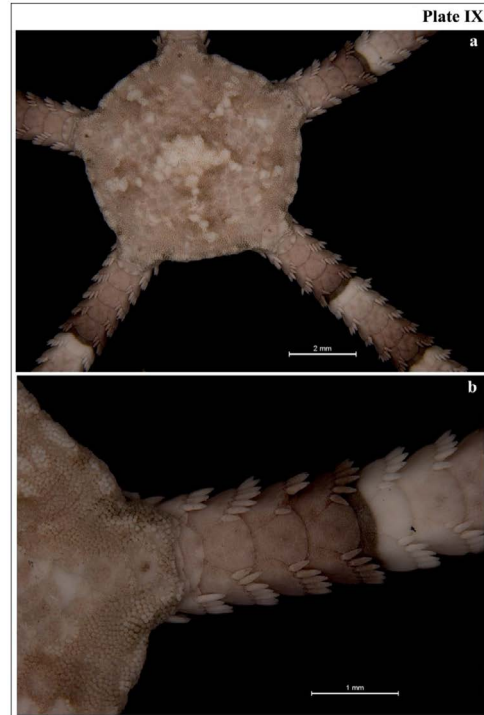


Figure 9. a. *Indophioderma ganapatii* sp. nov., dorsal view of disc and part of arms, b. *Indophioderma ganapatii* sp. nov., dorsal view of part of disc and part of an arm enlarged.

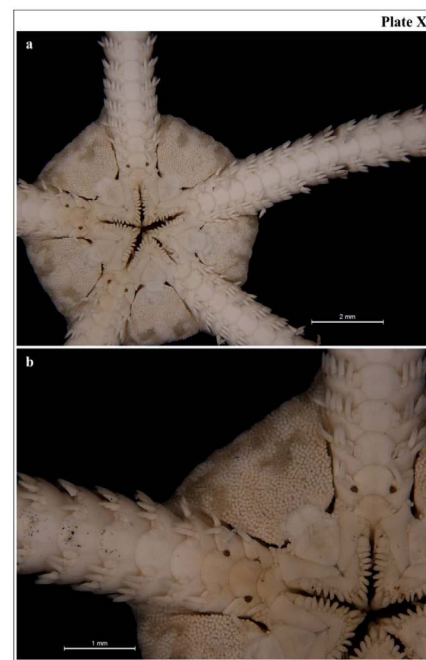


Figure 10. a. *Indophioderma ganapatii* sp. nov., ventral view of disc and part of arms, b. *Indophioderma ganapatii* sp. nov., ventral view of part of disc and part of an arm enlarged.

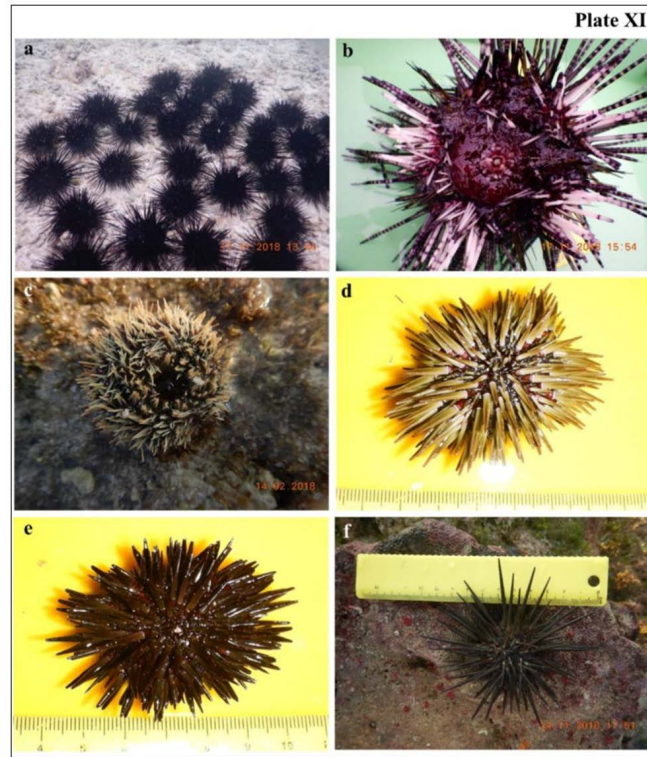


Figure 11. a. *Diadema savignyi*, b. *Echinothrix calamaris*, c. *Tripneustes gratilla*, d. *Echinometra mathaei*, with olive-green spines, e. *Echinometra mathaei*, with black spines, f. *Stomopneustes variolaris*.

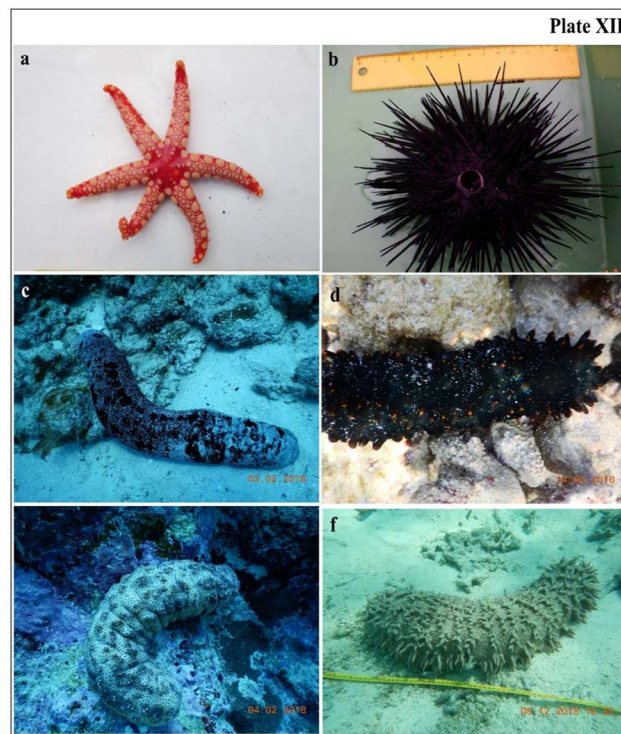


Figure 12. a. *Fromia pacifica*, 6-armed specimen, b. *Diadema setosum*, c. *Holothuria (Halodeima) atra*, d. *Stichopus chloronotus*, e. *Stichopus herrmanni*, f. *Thelenota ananas*.

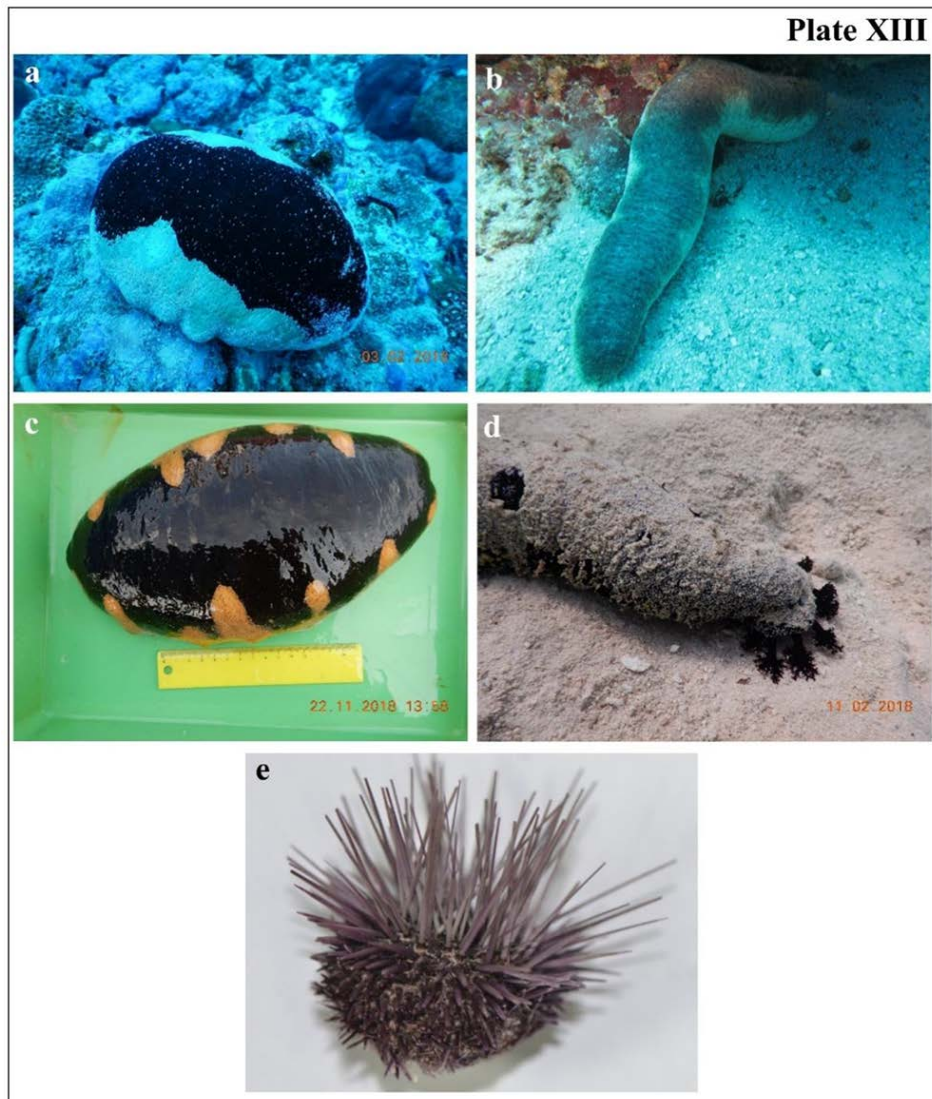


Figure 13. a. Holothurian sp. 1, b. Holothurian sp. 2, c. Holothurian sp. 3, d. Holothurian sp. 4, e. *Echinostrephus molaris*.

References

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Appendix	
Updated list of Echinodermata of Lakshadweep including Laccadive sea.	
Class CRINOIDEA	
Order COMATULIDA	
Family THALASSOMETRIDAE	
1	<i>Crotalometra sentifera</i>
Family CHARITOMETRIDAE	
2	<i>Glyptometra macilenta</i>
3	<i>Perissometra occidentalis</i>
Family COLOBOMETRIDAE	
4	<i>Cenometra bella</i>
Family COMATULIDAE	
5	<i>Capillaster multiradiatus</i>
6	<i>Comaster multifidus</i>
7	<i>Comatella nigra</i> Carpenter
8	<i>Comatella stelligera</i>
9	<i>Phanogenia distincta</i>
10	<i>Phanogenia gracilis</i>
11	<i>Phanogenia multibrachiata</i>
Family HIMEROMETRIDAE	
12	<i>Himerometra robustipinna</i>
Family MARIAMETRIDAE	
13	<i>Lamprometra palmata</i>
14	<i>Stephanometra indica</i>
15	<i>Stephanometra tenuipinna</i>
Family PENTAMETROCRINIDAE	
16	<i>Decametrocrinus</i> sp.
17	<i>Thaumatocrinus investigatoris</i>
Family Tropiometridae	
18	<i>Tropiometra carinata</i>
Class ASTEROIDEA	
Order PAXILLOSIDA	
Family ASTROPECTINIDAE	
1	<i>Astropecten greigi</i>
2	<i>Persephonaster rhodopeplus</i>
Family PORCELLANASTERIDAE	
3	<i>Porcellanaster ceruleus</i>
Order NOTOMYOTIDA	
Family BENTHOPECTINIDAE	
4	<i>Benthopecten violaceus</i>
5	<i>Cheiraster (Cheiraster) pilosus</i>

6	<i>Cheiraster cribellum</i>
Order VALVATIDA	
Family ASTERINIDAE	
7	<i>Aquilonastra burtoni</i>
8	<i>Aquilonastra cepheus</i>
9	<i>Disasterina leptalacantha</i>
10	<i>Patiriella pseudoexigua</i>
11	<i>Tegulaster ceylanica</i>
Family GONIASTERIDAE	
12	<i>Fromia indica</i>
13	<i>Fromia milleporella</i>
14	<i>Fromia monilis</i>
15	<i>Fromia pacifica</i>
16	<i>Fromia nodosa</i>
17	<i>Nymphaster moebii</i>
18	<i>Pentagonaster intermedius</i>
19	<i>Pentagonaster pulvinus</i>
20	<i>Plinthaster doederleini</i>
21	<i>Pseudarchaster roseus</i>
22	<i>Siraster tuberculatus</i>
Family OREASTERIDAE	
23	<i>Choriaster granulatus</i>
24	<i>Culcita novaeguineae</i>
25	<i>Culcita schmideliana</i>
26	<i>Halityle regularis</i>
27	<i>Pentacaster regulus</i>
Family ASTEROPSEIDAE	
28	<i>Asteropsis carinifera</i>
Family ACANTHASTERIDAE	
29	<i>Acanthaster planci</i>
Family OPHIDIASTERIDAE	
30	<i>Cistina columbiae</i>
31	<i>Dactylosaster cylindricus</i>
32	<i>Leiaster leachi</i>
33	<i>Linckia guildingi</i>
34	<i>Linckia laevigata</i>
35	<i>Linckia multifora</i>
36	<i>Nardoa novaecaledoniae</i>
37	<i>Paraferdina laccadivensis</i>
Order FORCIPULATIDA	
Family ZOROASTERIDAE	

38	<i>Cnemidaster squameus</i>
39	<i>Zoroaster angulatus</i>
40	<i>Zoroaster planus</i>
41	<i>Zoroaster zea</i>
Order SPINULOSIDA	
Family ECHINASTERIDAE	
42	<i>Echinaster luzonicus</i>
Class OPHIUROIDEA	
Order PHRYNOPHIURIDA	
Family OPHIOMYXIDAE	
1	<i>Ophiomyxa australis</i>
Family ASTERONYCHIDAE	
2	<i>Astronyx loveni</i>
Order OPHIURIDA	
Family OPHIURIDAE	
3	<i>Amphiophiura paupera</i>
4	<i>Amphiophiura radiata</i>
5	<i>Ophiura aequalis</i>
6	<i>Ophiura irrorata</i>
Family OPHIOLEPIDIDAE	
7	<i>Ophioelegans cincta</i>
8	<i>Ophiolepis superba</i>
9	<i>Ophiotrochus panniculus</i>
Order AMPHILEPIDIDA	
Family OPHIOTHRICIDAE	
10	<i>Gymnolophus obscura</i>
11	<i>Macrophiothrix demessa</i>
12	<i>Macrophiothrix longipeda</i>
13	<i>Macrophiothrix propinqua</i>
14	<i>Ophiothrix (Ophiothrix) marginata</i>
15	<i>Ophiothrix (Ophiothrix) trilineata</i>
16	<i>Ophiothrix (Acanthophiothrix) purpurea</i>
17	<i>Ophiothrix (Acanthophiothrix) vigelandi</i>
18	<i>Ophiothrix (Keystonea) nereidina</i>
Family OPHIOCOMIDAE	
19	<i>Breviturma dentata</i>
20	<i>Breviturma pica</i>
21	<i>Ophiocoma anaglyptica</i>
22	<i>Ophiocoma brevipes</i>
23	<i>Ophiocoma erinaceus</i>
24	<i>Ophiocoma lubrica</i>

25	<i>Ophiocoma scolopendrina</i>
26	<i>Ophiocomella sexradia</i>
27	<i>Ophiomastix annulosa</i>
28	<i>Ophiomastix elegans</i>
Family OPHIONEREIDAE	
29	<i>Ophionereis porrecta</i>
Family OPHIODERMATIDAE	
30	<i>Bathypsectinura heros</i>
31	<i>Indophioderma ganapatii</i> sp. nov.
Family OPHIACANTHIDAE	
32	<i>Ophiomitra rudis</i>
33	<i>Ophiotreta matura</i>
Family OPHIACTIDAE	
34	<i>Ophiactis savignyi</i>
Family AMPHIURIDAE	
35	<i>Amphipholis squamata</i>
36	<i>Amphiura dispar</i>
37	<i>Amphiura lorioli</i>
38	<i>Histampica duplicata</i>
Class ECHINOIDEA	
Order CIDAROIDA	
Family CIDARIIDAE	
1	<i>Eucidaris metularia</i>
2	<i>Prionocidaris baculosa</i>
3	<i>Prionocidaris verticillata</i>
4	<i>Stylocidaris lorioli</i>
5	<i>Stylocidaris tiara</i>
Order ECHINOTHURIOIDA	
Family ECHINOTHURIIDAE	
6	<i>Phormosoma bursarium</i>
7	<i>Phormosoma verticillatum</i>
Order DIADEMATOIDA	
Family DIADEMATIDAE	
8	<i>Astropyga radiata</i>
9	<i>Diadema savignyi</i>
10	<i>Diadema setosum</i>
11	<i>Echinothrix calamaris</i>
12	<i>Echinothrix diadema</i>
Order SELENIOIDA	
Family SALENIIDAE	
13	<i>Salenocidaris miliaris</i> var. <i>indica</i>

Order STOMOPNEUSTOIDA	
Family STOMOPNEUSTIDAE	
14	<i>Stomopneustes variolaris</i>
Order CAMARODONTA	
Family TEMNOPLEURIDAE	
15	<i>Mespilia globulus</i>
16	<i>Salmacis virgulata</i>
Family TOXOPNEUSTIDAE	
17	<i>Pseudoboletia maculata</i>
18	<i>Toxopneustes pileolus</i>
19	<i>Tripneustes gratilla</i>
Family ECHINOMETRIDAE	
20	<i>Echinometra mathaei</i>
21	<i>Echinostrephus molaris</i>
22	<i>Heterocentrotus mammillatus</i>
Order HOLECTYPOIDA	
Family ECHINONEIDAE	
23	<i>Echinoneus cyclostomus</i>
Order CLYPESTEROIDA	
Family CLYPEASTERIDAE	
24	<i>Clypeaster reticulatus</i>
Family LAGANIDAE	
25	<i>Laganum depressum</i>
Order CASSIDULOIDA	
Family ECHINOLAMPADIDAE	
26	<i>Echinolampas alexandri</i>
27	<i>Echinolampas ovata</i>
Order SPATANGOIDA	
Family BRISSIDAE	
28	<i>Brissus latecarinatus</i>
29	<i>Metalia spatagus</i>
Class HOLOTHUROIDEA	
Order HOLOTHURIIDA	
Family HOLOTHURIIDAE	
1	<i>Actinopyga echinites</i>
2	<i>Actinopygamauritaniana</i>
3	<i>Actinopyga miliaris</i>
4	<i>Bohadschiaargus</i>
5	<i>Bohadschia graeffei</i>
6	<i>Bohadschiamarmorata</i>
7	<i>Holothuria (Cystipus) rigida</i>

8	<i>Holothuria (Halodeima) atra</i>
9	<i>Holothuria (Lessonothuria) pardalis</i>
10	<i>Holothuria (Mertensiothuria) fuscocinerea</i>
11	<i>Holothuria (Mertensiothuria) leucospilota</i>
12	<i>Holothuria (Mertensiothuria) pervicax</i>
13	<i>Holothuria (Metriatyla) ocellata</i>
14	<i>Holothuria (Microthele) nobilis</i>
15	<i>Holothuria (Platyperona) difficilis</i>
16	<i>Holothuria (Semperothuria) cinerascens</i>
17	<i>Holothuria (Thymiosycia) arenicola</i>
18	<i>Holothuria (Thymiosycia) hilla</i>
19	<i>Holothuria (Thymiosycia) impatiens</i>
20	<i>Labiododemas rugosum</i>
Order SYNALLACTIDA	
Family STICHOPODIDAE	
21	<i>Stichopus chloronotus</i>
22	<i>Stichopus herrmanni</i>
23	<i>Thelenota ananas</i>
Family SYNALLACTIDAE	
24	<i>Dendrothuria similis</i>
Order DENDROCHIROTIDA	
Family PHYLLOPHORIDAE	
25	<i>Afrocucumis africana</i>
26	<i>Phyrella fragilis</i>
Order DACTYLOCHIROTIDA	
Family YPSILOTHURIIDAE	
27	<i>Ypsilothuria bitentaculata</i>
Order ELASIPODIDA	
Family DEIMATIDAE	
28	<i>Deima blakei</i>
Family PSYCHROPOTIDAE	
29	<i>Psychropotes minutus</i>
Order APODIDA	
Family SYNAPTIDAE	
30	<i>Chondroclaea baselli</i>
31	<i>Euapta godeffroyi</i>
32	<i>Opheodesoma grisea</i>
33	<i>Synapta maculata</i>
34	<i>Synaptula recta</i>
Family CHIRIDOTIDAE	
35	<i>Polycheira rufescens</i>