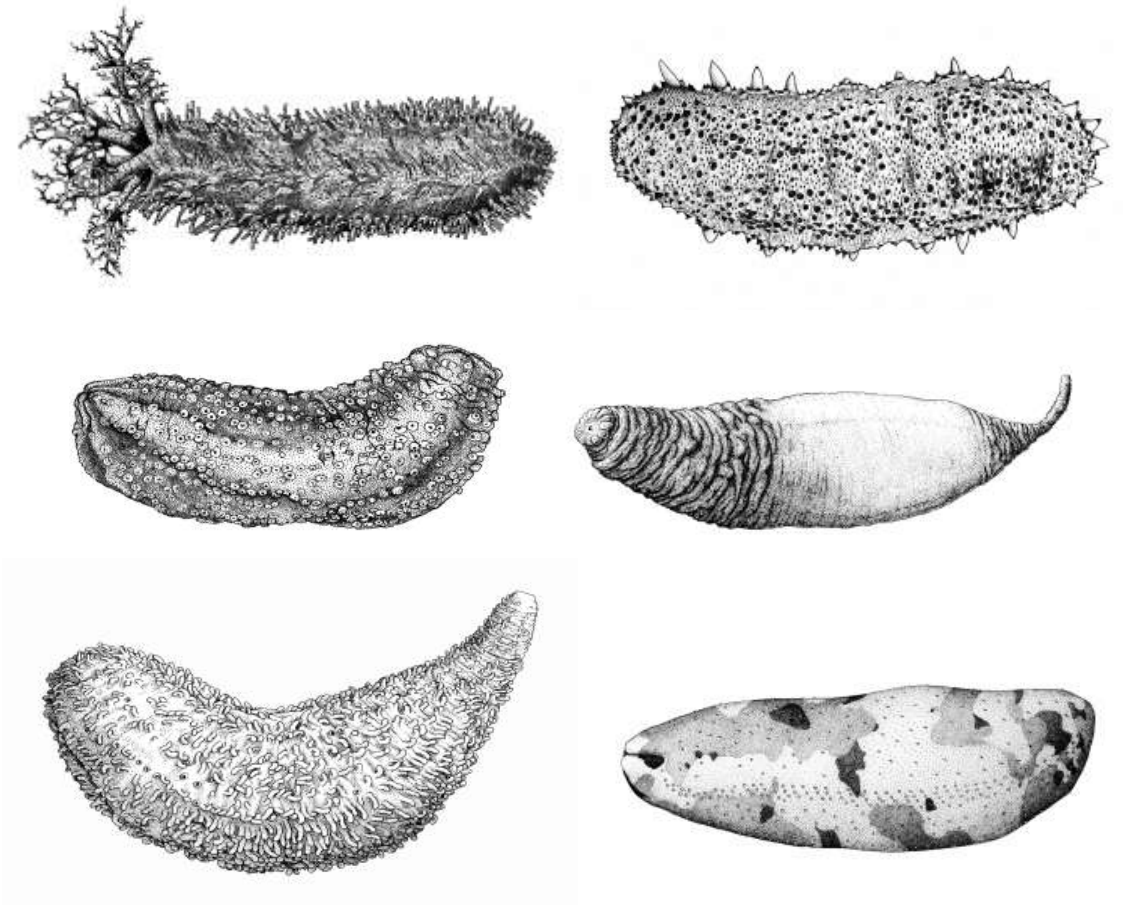
Prepared by the Southeastern Regional Taxonomic Center

An illustrated key to the sea cucumbers of the South Atlantic Bight



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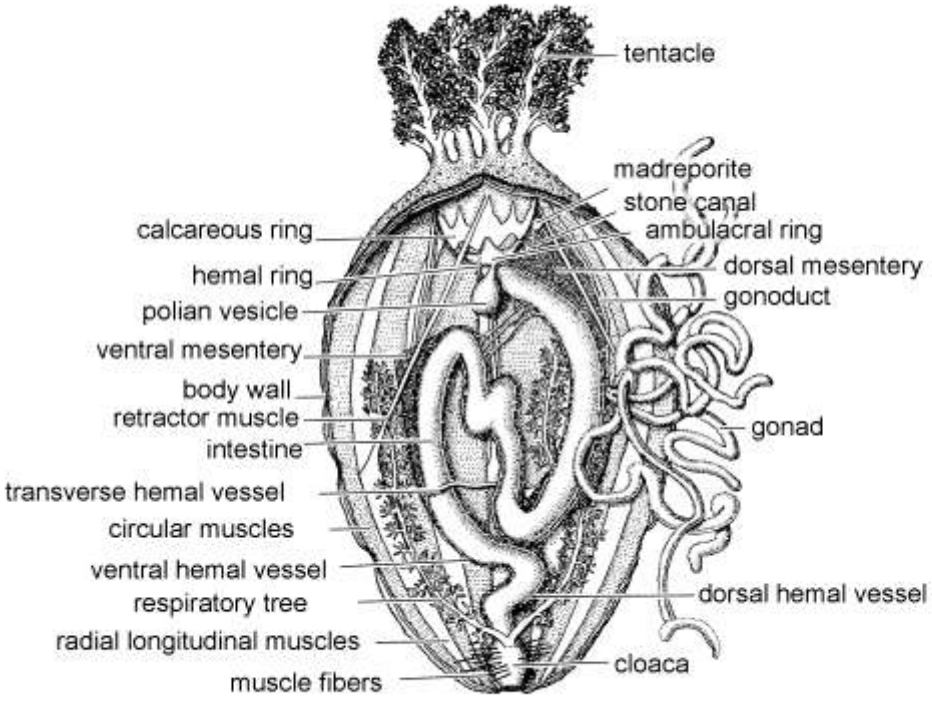
July, 2008

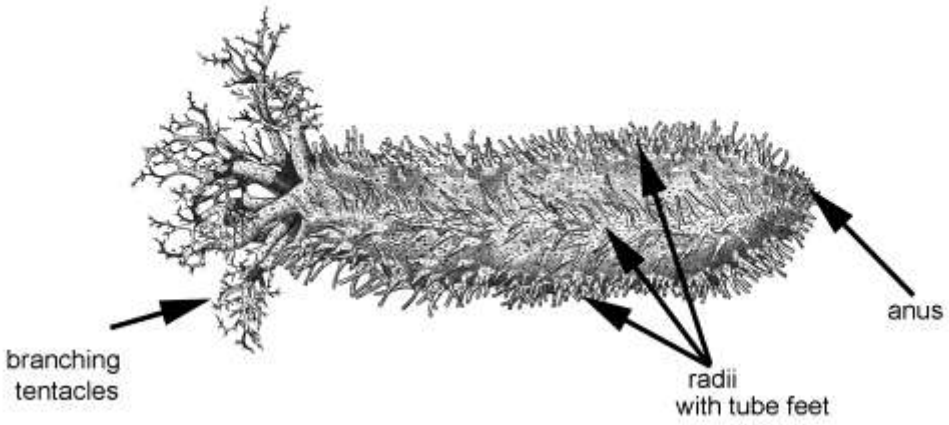
Introduction

The sea cucumbers differ markedly from other echinoderms, for they usually do not possess a conspicuous skeleton, and the body wall is usually leathery or soft. On the deep-sea floor, holothuroids can comprise more than 90% of the ecosystem biomass, and since deep waters cover over 70% of the surface of the earth, holothurians are among the most dominant organisms on our planet. In the tropical Indo-Pacific, large sea cucumbers throng quiet lagoons and back reef areas, but in the Atlantic they are usually less conspicuous and less numerous. In the South Atlantic Bight (SAB), which is defined here as the coastal and oceanic region between Cape Hatteras, North Carolina and Cape Canaveral, Florida, out to a depth of 200 m, four of the six known orders of holothurians are represented by a total of 33 species. An illustrated key is presented here to the SAB species.

General morphology (internal)

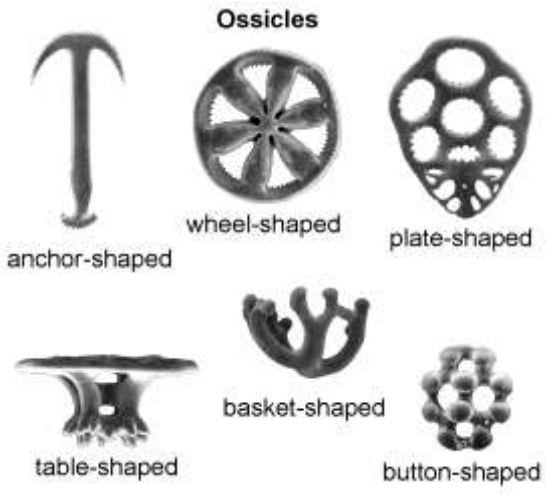


General morphology (external)



Methods of ossicle preparation

The ossicles in the body wall, tube feet and tentacles can be studied only with a high-power ("compound") microscope. If a small piece of tissue, cut from the specimen with fine scissors or a razor blade, is placed on a glass microscope slide and then covered with several drops of liquid household bleach, the bleach dissolves away the soft tissues. The ossicles remain in the liquid, which can then be studied under the microscope. Permanent slide preparations can be made by carefully replacing the bleach with water several times, using an eye dropper, allowing the preparation to dry thoroughly, and adding a commercial mounting medium and cover slip to the slide.



Checklist of South Atlantic Bight holothuroideans

CLASS: HOLOTHUROIDEA

ORDER: DENDROCHIROTIDA
- FAMILY: CUCUMARIIDAE
  - *Duasmodactyla seguroensis* (Deichmann, 1930)
  - *Euthyonacta solida* (Deichmann, 1930)
  - *Ocnus pygmaeus* (Théel, 1886)
  - *Ocnus surinamensis* (Semper, 1868)
  - *Pseudocolochirus mysticus* Deichmann, 1930
  - *Thyonella gemmata* (Pourtalès, 1851)
  - *Thyonella pervicax* (Théel, 1886)
- FAMILY: SCLERODACTYLIDAE
  - *Euthyonidiella trita* (Sluiter, 1910)
  - *Pseudothyone belli* (Ludwig, 1886)
  - *Sclerodactyla briareus* (Lesueur, 1824)
- FAMILY: PHYLLOPHORIDAE
  - *Havelockia scabra* (Verrill, 1873)
  - *Phyllophorus (Urodemella) arenicola* Pawson and Miller, 1992
  - *Pentamera pulcherrima* Ayres, 1854
  - *Thyone crassidisca* Pawson and Miller, 1981
  - *Thyone deichmannae* Madsen, 1941
  - *Thyone pawsoni* Tommasi, 1972
  - *Thyone pseudofusus* Deichmann, 1930
- FAMILY: PSOLIDAE
  - *Psolus fabricii* (Düben and Koren, 1846)
  - *Psolus operculatus* (Pourtalès, 1868)
  - *Psolus tuberculosus tuberculosus* Théel, 1886

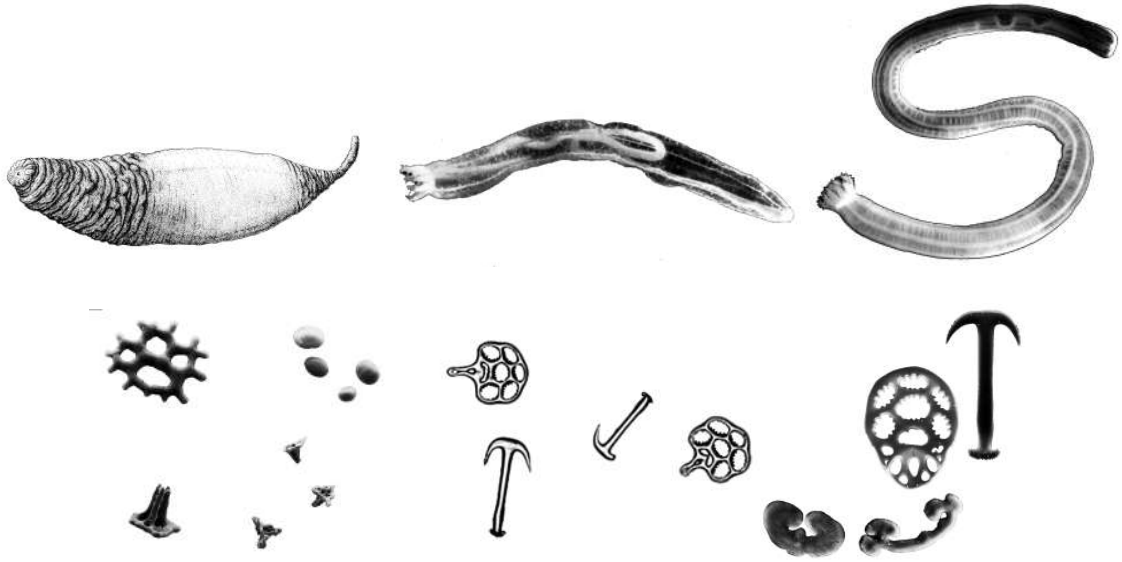
ORDER: ASPIDOCHIROTIDA
- FAMILY: STICHOPODIDAE
  - *Isostichopus badionotus* (Selenka, 1867)
- FAMILY: HOLOTHURIIDAE
  - *Actinopyga agassizii* (Selenka, 1867)
  - *Holothuria (Halodeima) grisea* Selenka, 1867
  - *Holothuria (Halodeima) dakarensis* Panning, 1939
  - *Holothuria (Semperothuria) surinamensis* Ludwig, 1875
  - *Holothuria (Theelothuria) princeps* Selenka, 1867
  - *Holothuria (Vaneyothuria) lentiginosa enodis* Miller and Pawson, 1979

ORDER: MOLPADIIDA
- FAMILY: MOLPADIIDAE
  - *Molpadia oolitica* (Pourtalès, 1851)
- FAMILY: CAUDINIDAE
  - *Paracaudina chilensis obesacauda* (H.L. Clark, 1908)

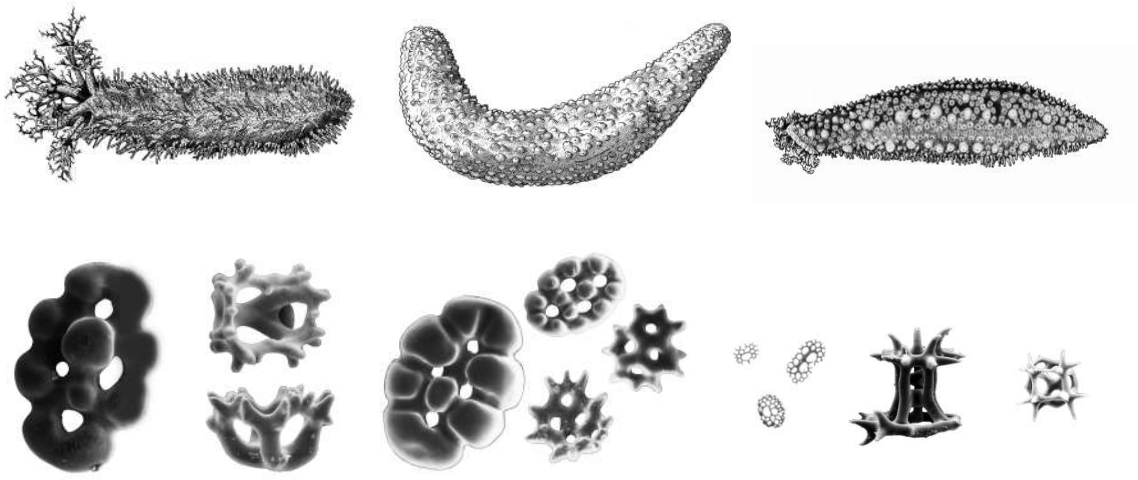
ORDER: APODIDA
- FAMILY: SYNAPTIDAE
  - *Labidoplax buskii* (McIntosh, 1866)
  - *Epitomapta roseola* (Verrill, 1874)
  - *Leptosynapta tenuis* Ayres, 1851
- FAMILY: CHIRIDOTIDAE
  - *Chiridota ferruginea* (Verrill, 1882)

Key to Orders of Holothuroidea of the South Atlantic Bight

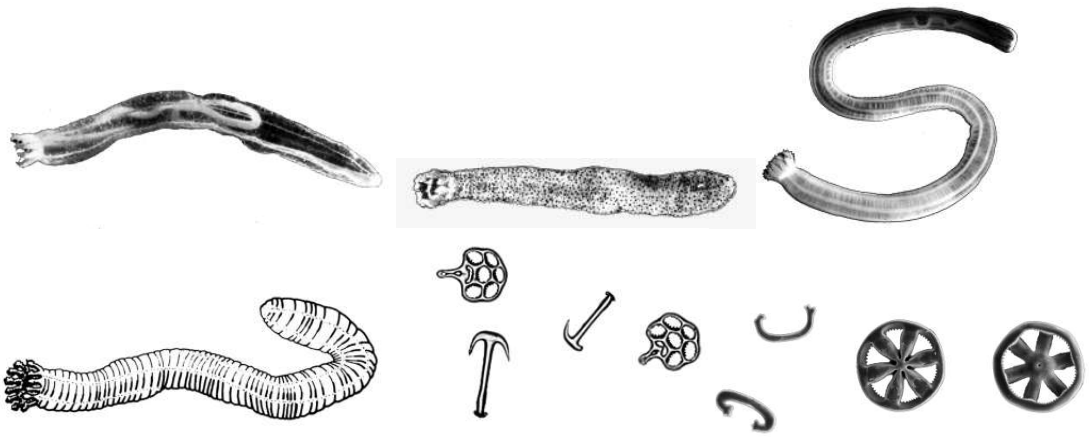
1. Tube feet absent. Body cylindrical and worm-like, or fusiform with a conspicuous tail region. No obvious bilateral symmetry. Tentacles digitate or pinnate. Ossicles may include wheels or anchors.....2



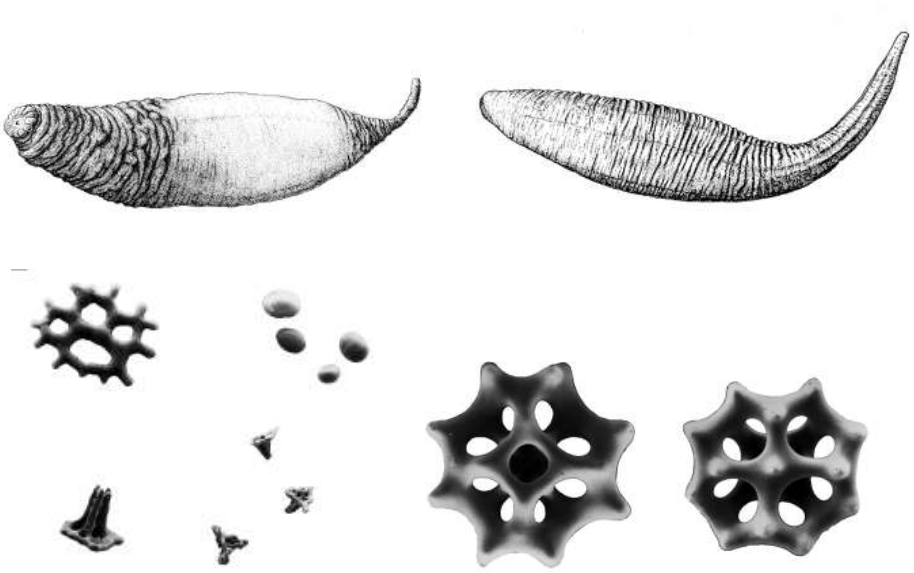
—Tube feet present. Body varies in shape, usually displaying bilateral symmetry. Tentacles digitate in a few taxa, but usually richly branched, or shield-shaped. Ossicles do not include wheels or anchors 3



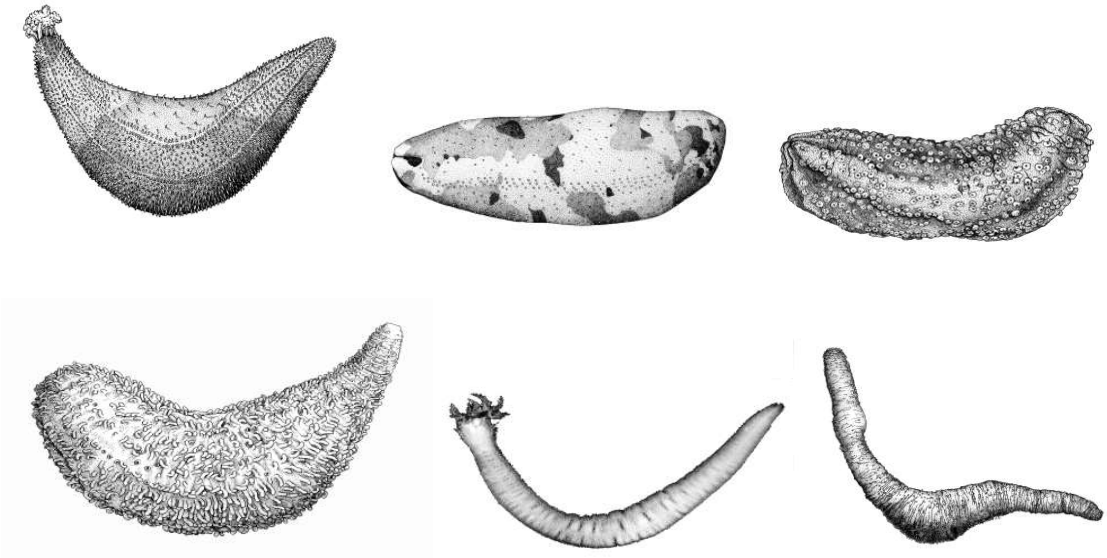
2. Body cylindrical. Respiratory trees and anal papillae absent. Ossicles often include wheels, or anchors.....Order Apodida



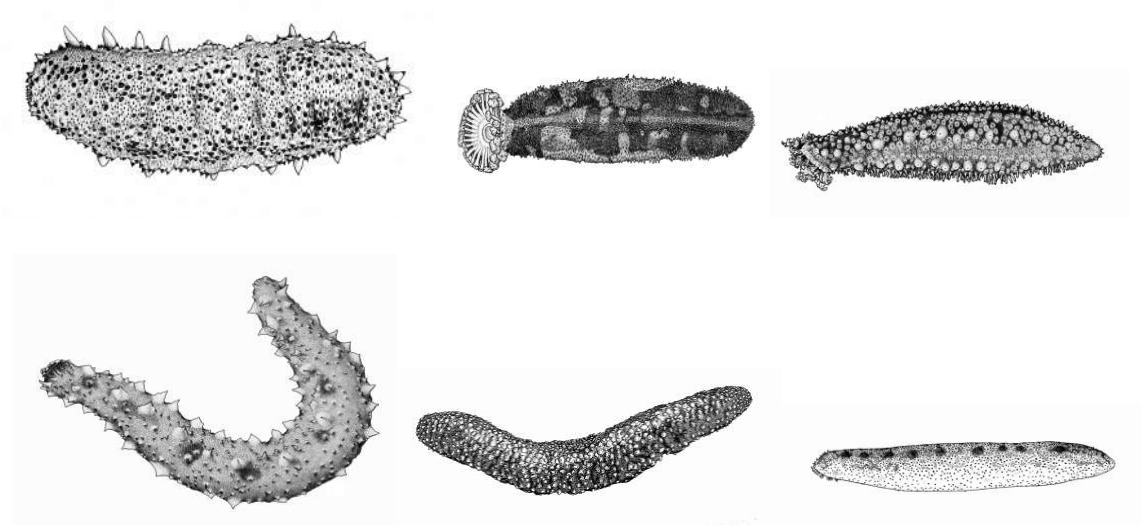
—Body fusiform, narrowing posteriorly to form a conspicuous tail. Respiratory trees present; anal papillae may be present. Ossicles not wheel-shaped .....Order Molpadiida



3. Introvert and retractor muscles present. Tentacles usually richly branching, occasionally digitate ..... Order Dendrochirotida



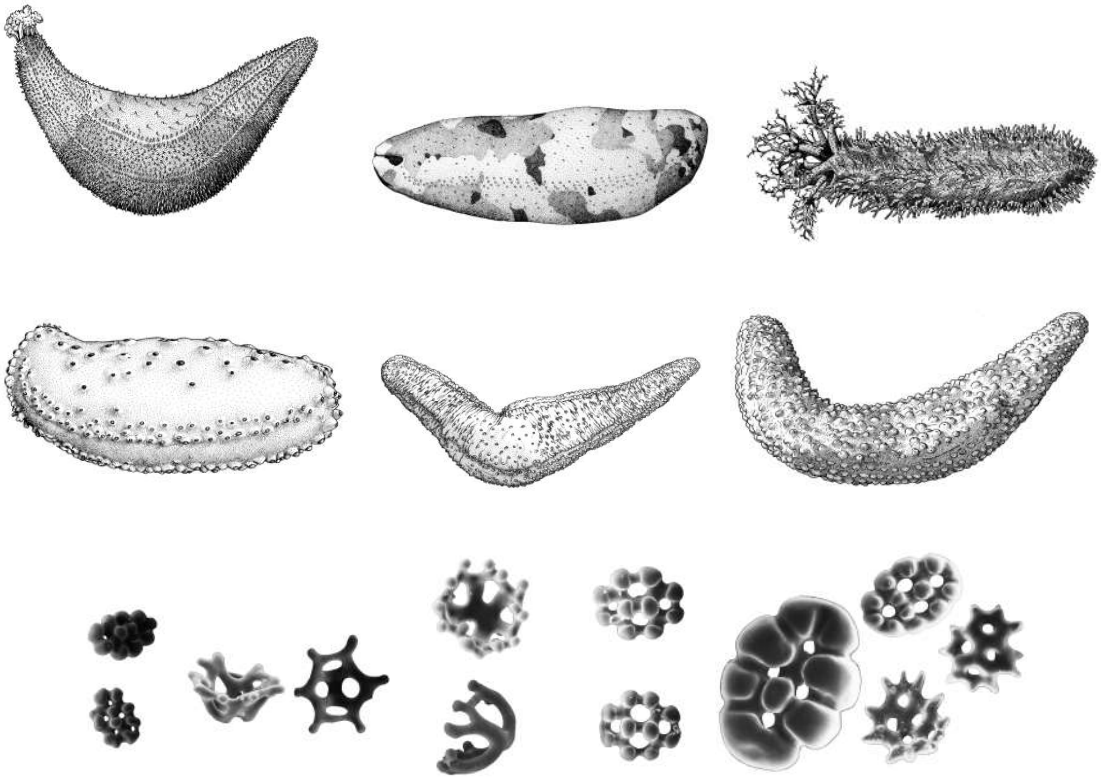
—Introvert and retractor muscles absent. Tentacles shield-shaped..... Order Aspidochirotida



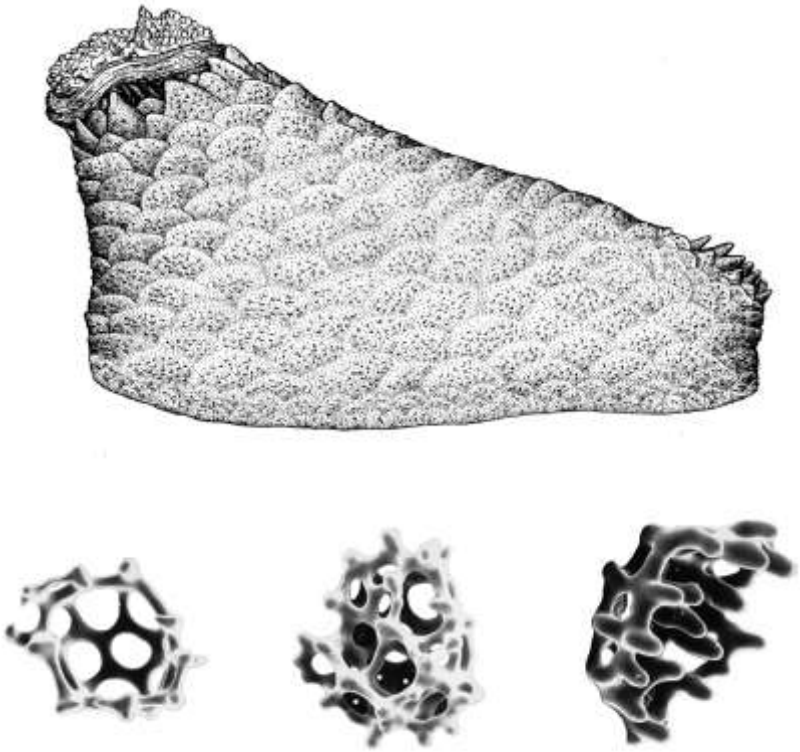
Key to members of the Order Dendrochirotida known from the South Atlantic Bight

1. Body completely or partially enclosed by overlapping conspicuous plates, forming a partial or complete test. (Family Psolidae) 2

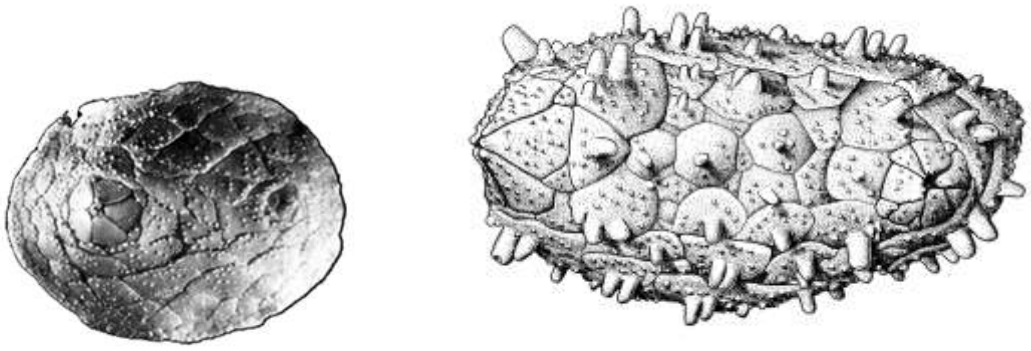
—Body without a test; ossicles usually small, inconspicuous 4



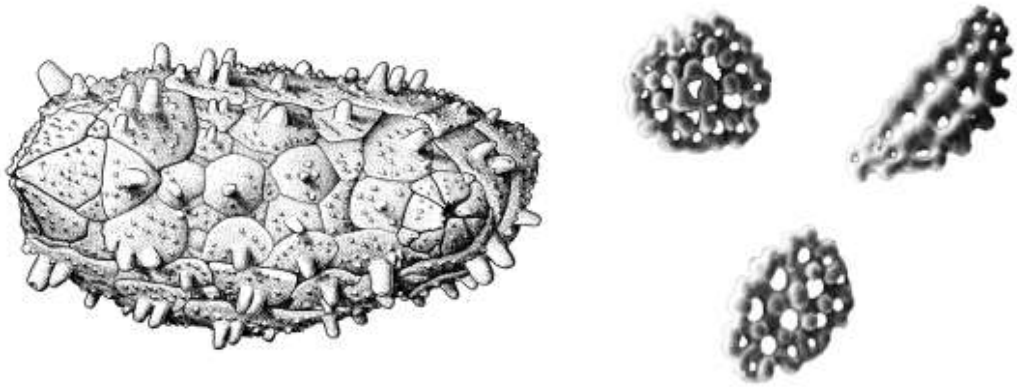
2. Without five distinct oral valves..... *Psolus fabricii*



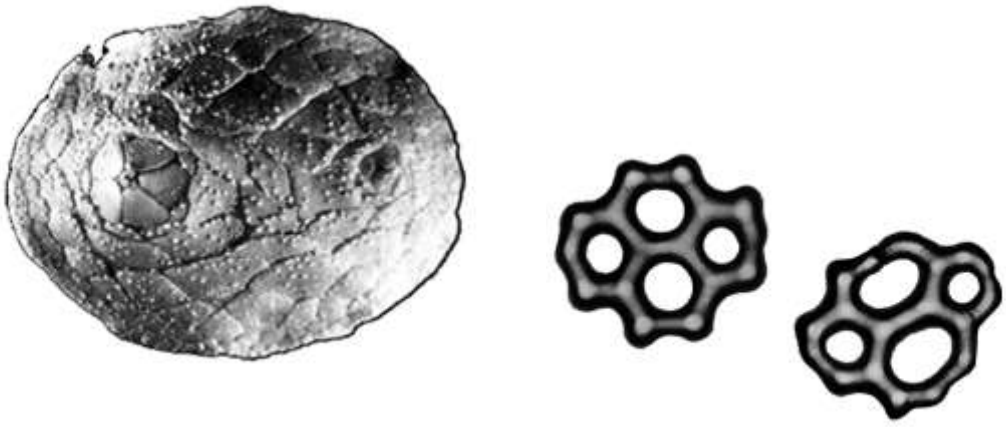
—With five distinct oral valves.....3



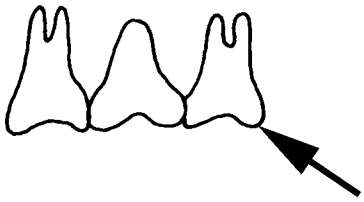
3. Dorsal plates with small knobs (tuberculated). Ossicles in sole (flattened ventral side) plate-shaped with dozens of perforations ..... *Psolus t. tuberculosus*



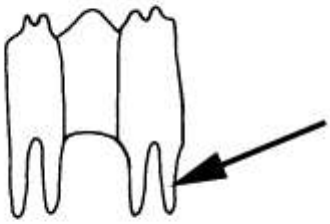
—Dorsal plates not tuberculated. Ossicles in sole (flattened ventral side) plate-shaped with around four perforations ..... *Psolus operculatus*

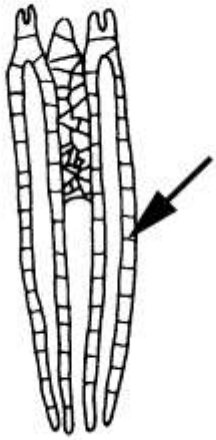


4. Calcareous ring simple, lacking posterior processes. (Family Cucumariidae).....5

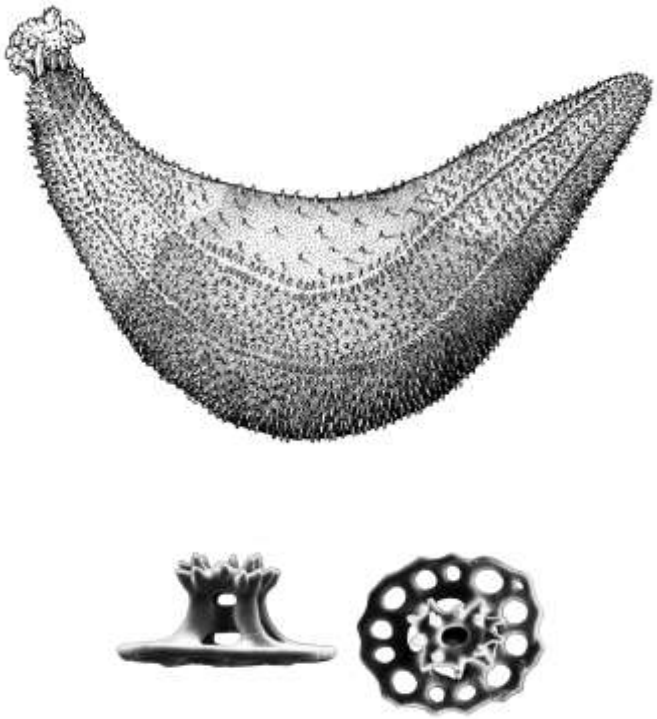


—Calcareous ring with paired or unpaired posterior processes 11



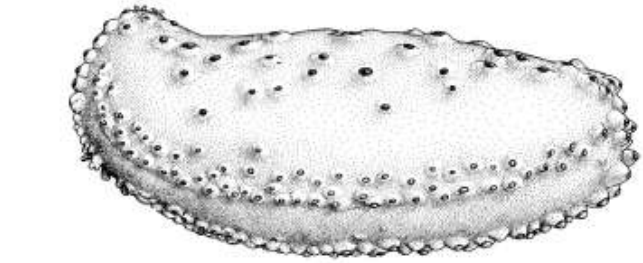


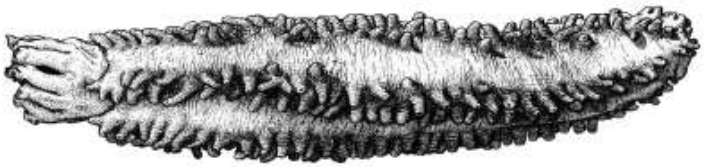
5. Ossicles in body wall include tables.....*Duasmodactyla seguroensis*



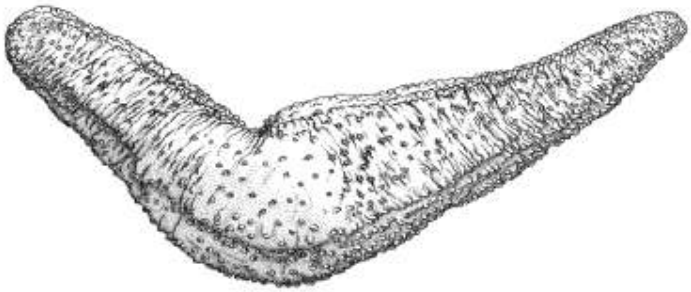
—Ossicles in body wall not including tables. 6

6. Tube feet restricted to radii, mostly absent from interradii 7



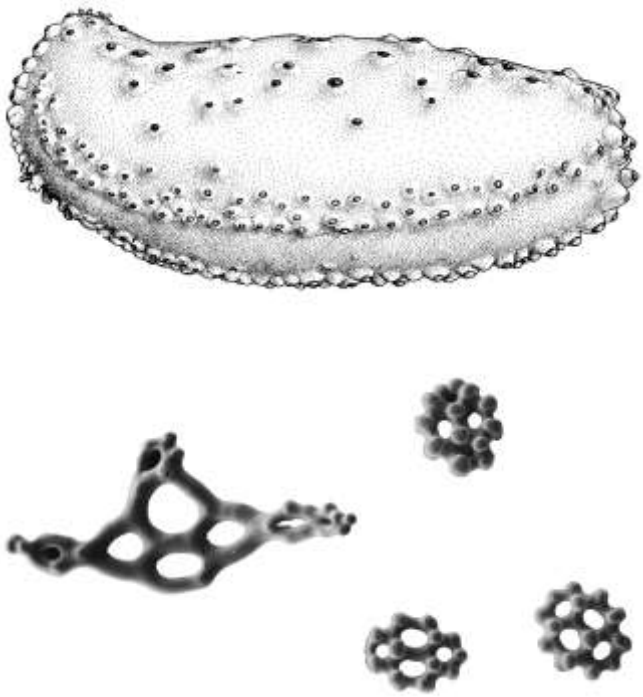


—Tube feet present in radii and interradii.....9

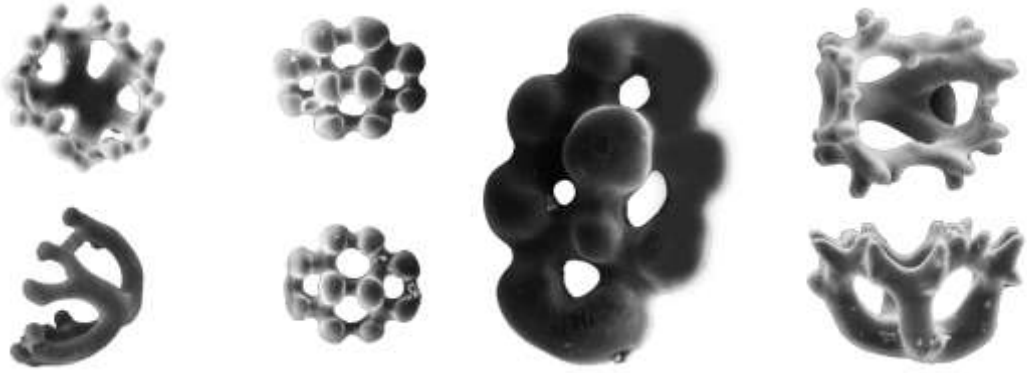


7. Ossicles irregular four-holed plates with low knobs and not including baskets (cups)

..... *Pseudocolochirus mysticus*

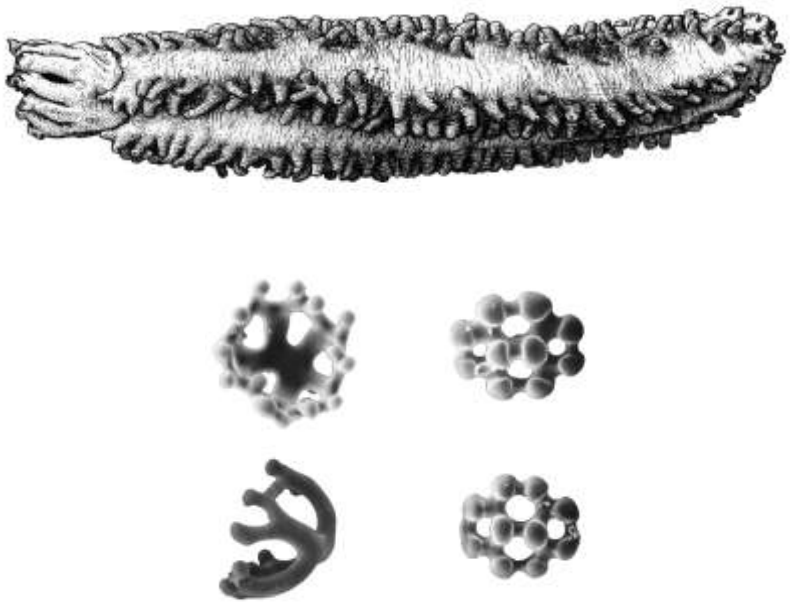


—Ossicles include baskets (cups) and buttons.....8

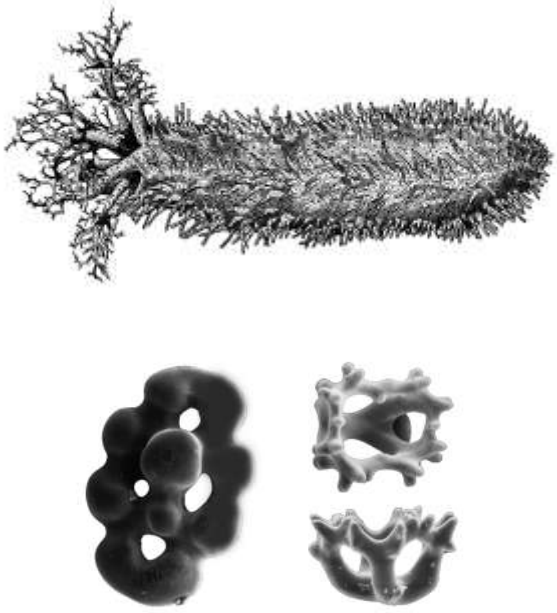


8. Baskets irregular, very deep, like reticulated eggs. Buttons of one type, with ten knobs

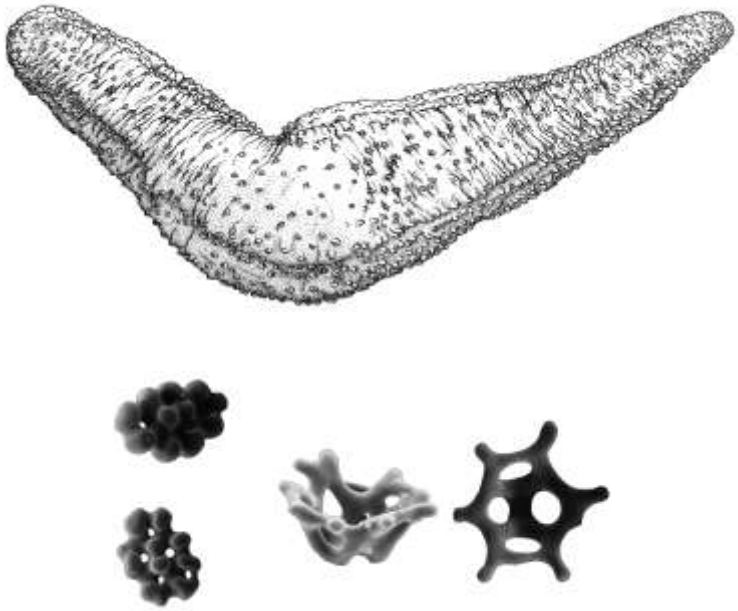
.....*Ocnus pygmaeus*



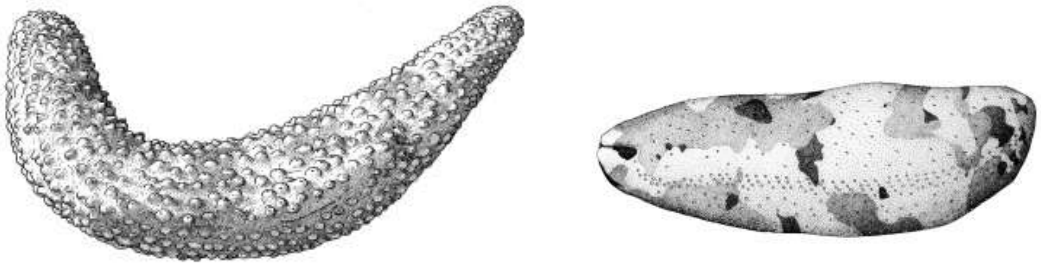
—Baskets deep, concavity defined by four spokes. Buttons of two types: heavier small-holed and delicate large-holed .....*Ocnus surinamensis*



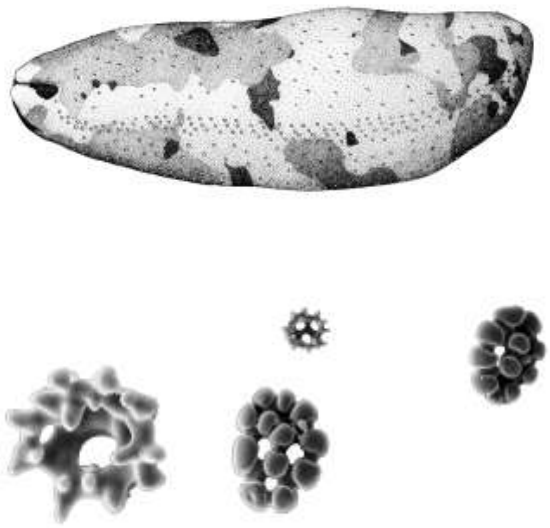
9. Tube feet concentrated along radii. Ossicles in body wall are perforated plates. Baskets flattened, shallow, margin solid, formed by 7-9 teeth. ..... *Thyonella gemmata*



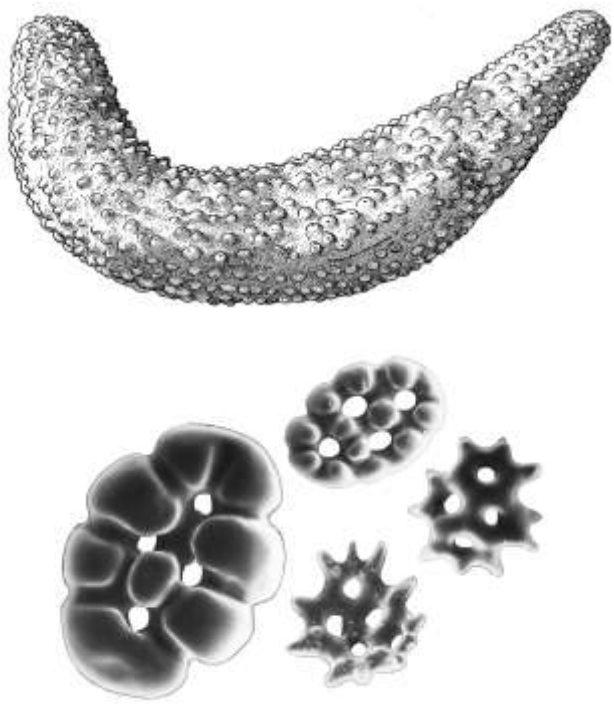
—Tube feet uniformly scattered over body. No perforated plates in body wall. 10



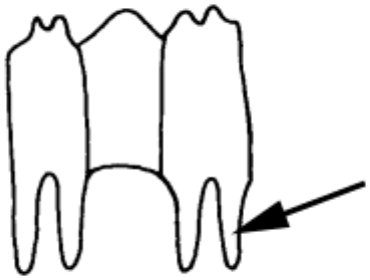
10. Baskets deep with narrow opening; margin fringed with numerous, irregular, small teeth on both inner and outer sides.....*Euthyonacta solida*



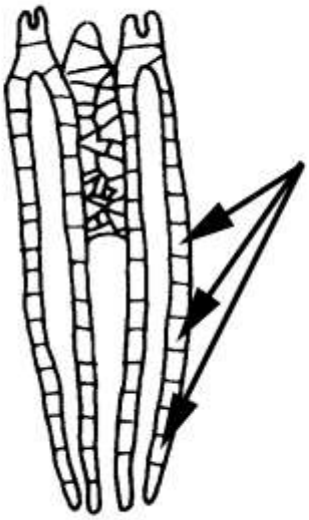
—Baskets shallow with wide opening; with 7-10 blunt teeth forming margin.....*Thyonella pervicax*



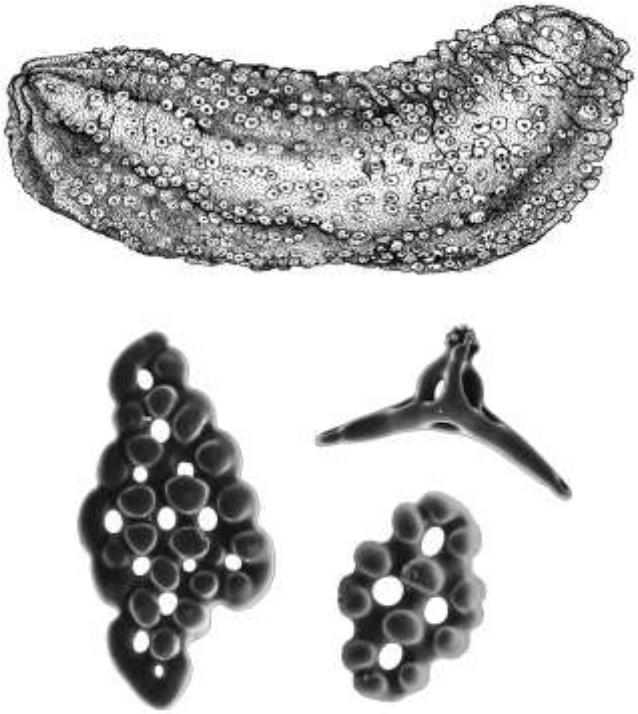
11. Posterior processes of calcareous ring simple, entire (Family Solerodactylidae) 12



—Posterior processes of calcareous ring complex, composed of a mosaic of minute pieces (Family Phyllophoridae).....14

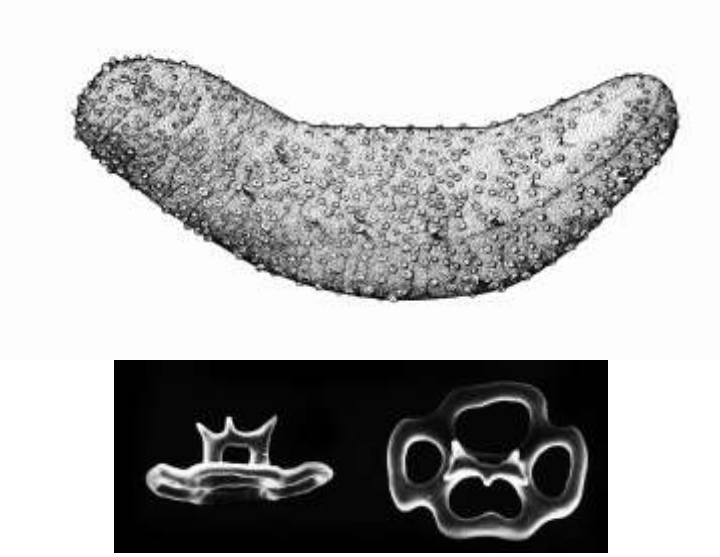


12. Ossicles knobbed buttons. Tube feet contain elongate tables..... *Pseudothyone belli*

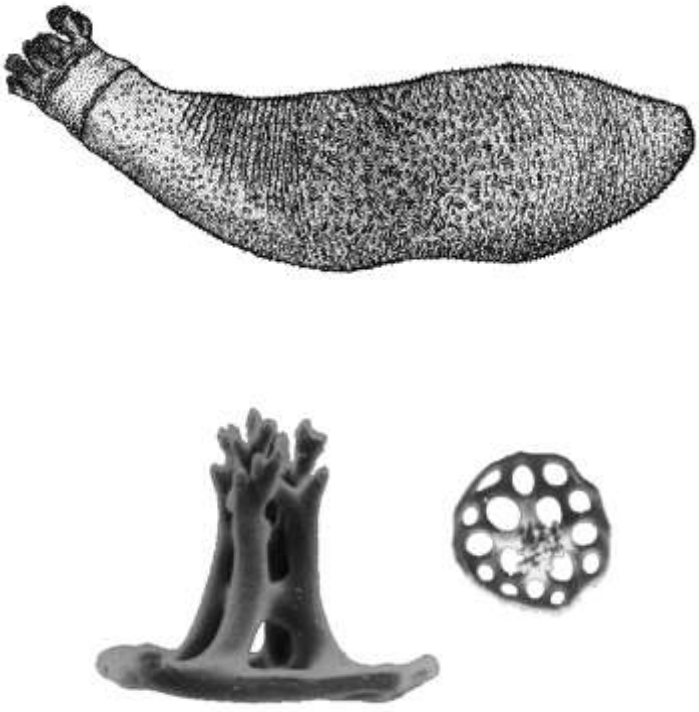


—Ossicles table shaped. Buttons absent. 13

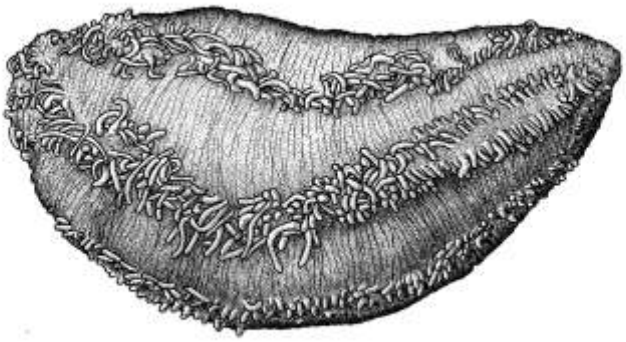
13. Ossicles are oblong to oval tables, with two-pillared spires..... *Euthyonidiella trita*



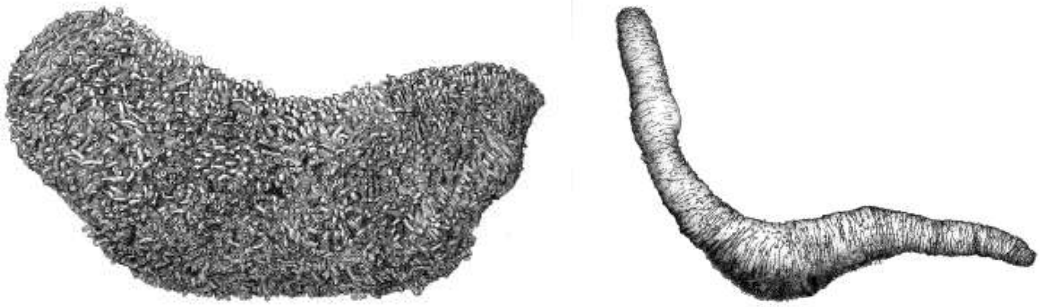
—Ossicles are round to square tables, with four-pillared spires. ..... *Sclerodactyla briareus*



14. Tube feet restricted to the radii.....*Pentamera pulcherrima*

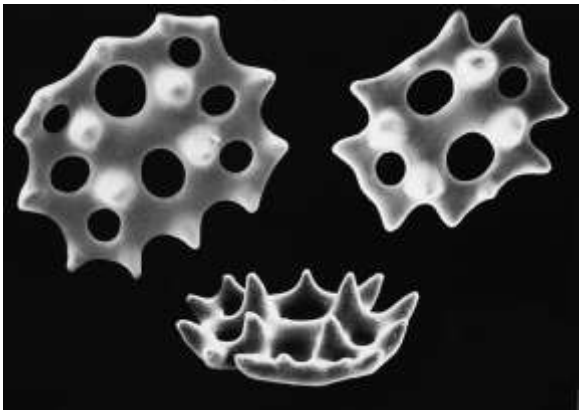


—Tube feet scattered on body wall.....15

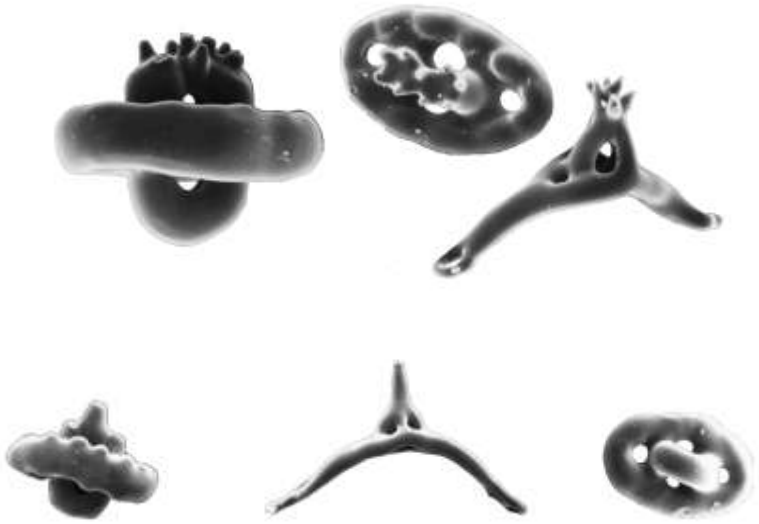


15. With 10 tentacles (no image).....16

—With 20 tentacles. Ossicles tables with scalloped margins and 4-8 perforations. Table spires reduced to form four bluntly pointed projections..... *Phyllophorus (Urodemella) arenicola*

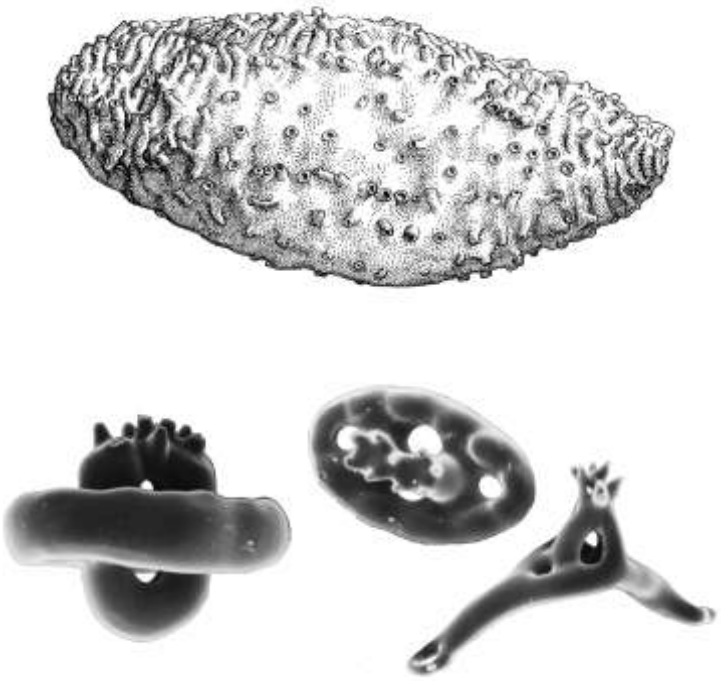


16. Ossicles table shaped with oval disc, four perforations, and thick margins. 17



—Ossicles table shaped with thin margins, irregular disc outlines, and few to numerous perforations.....18

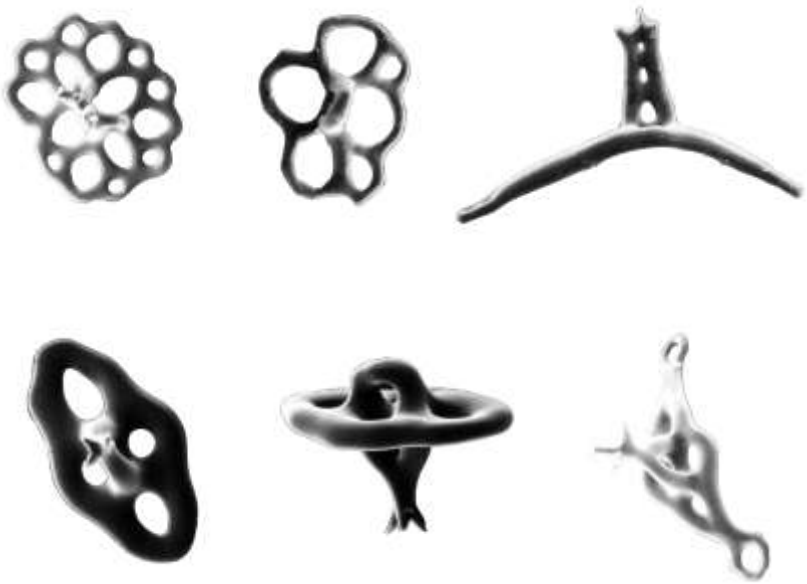
17. Spires of tables terminating in several short teeth ..... *Thyone pseudofusus*



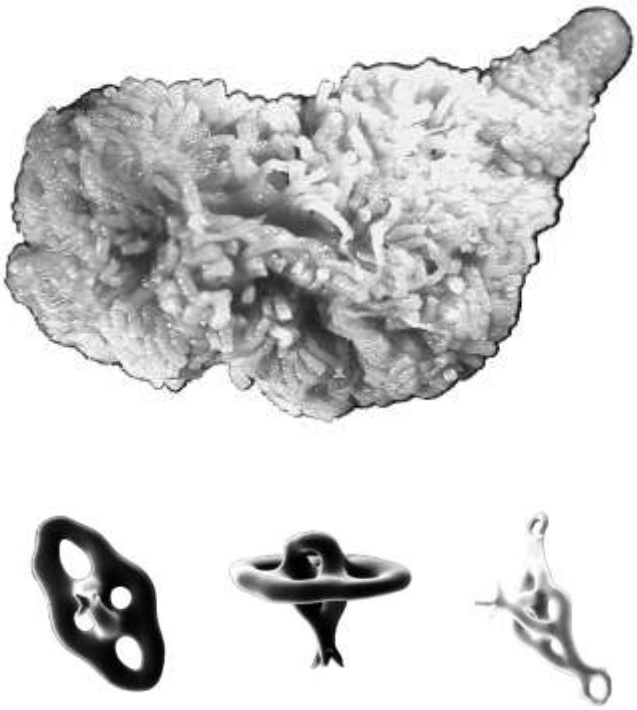
—Spires of tables terminating in a single blunt spine ..... *Thyone crassidisca*

18. Tables with 20-30 holes. Tables in tube feet with short, non-tapering spires .....*Havelockia scabra*

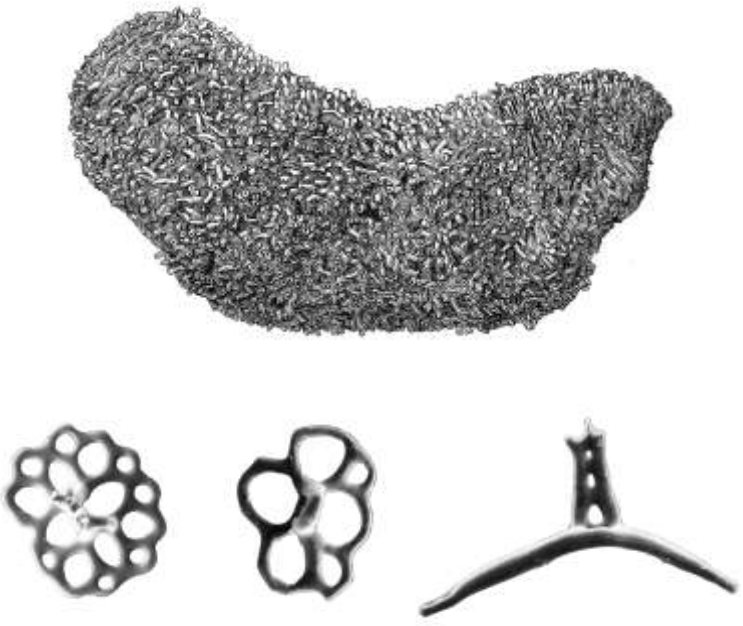
—Tables with 4-8 or 8-18 holes. Tables in tube feet with longer, tapering spires.....19



19. Tables with 4-8 holes. Tables in tube feet with abruptly tapering spires .....*Thyone pawsoni*

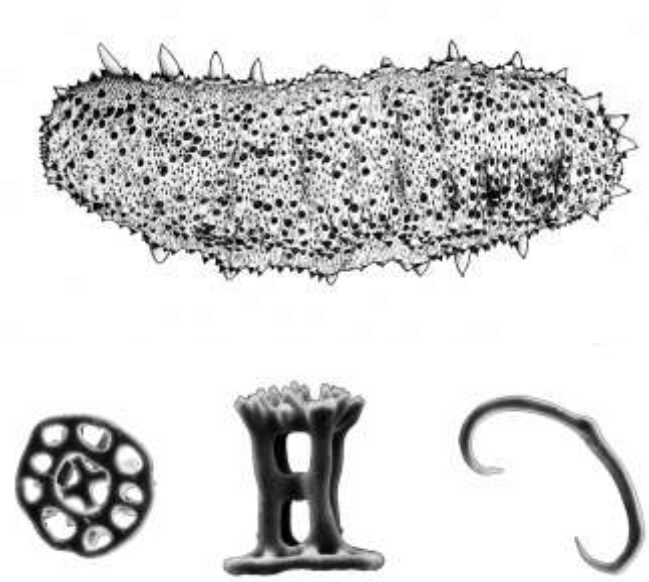


—Tables with 8-18 holes. Tables in tube feet with gently tapering spires.....*Thyone deichmannae*

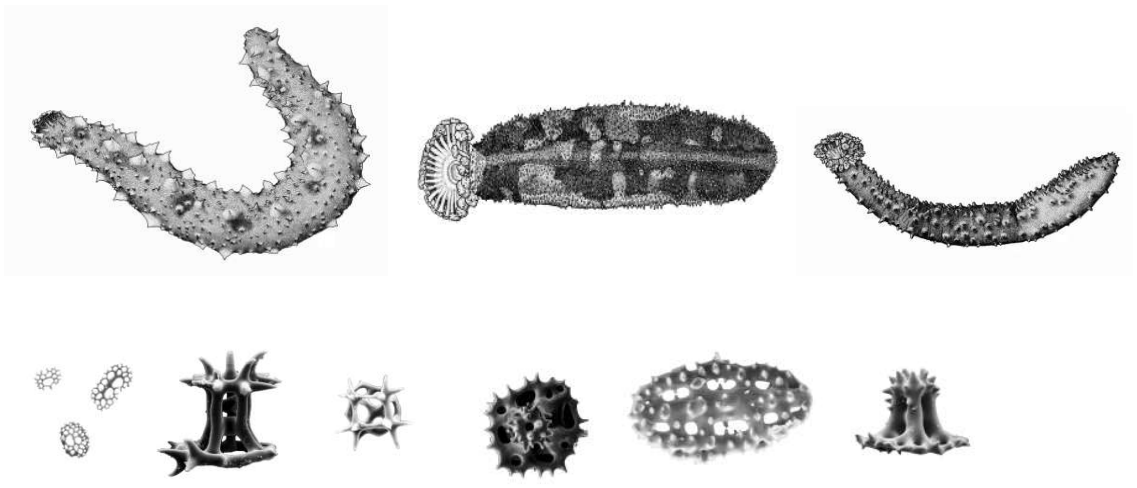


Key to members of the Order Aspidochirotida of the South Atlantic Bight

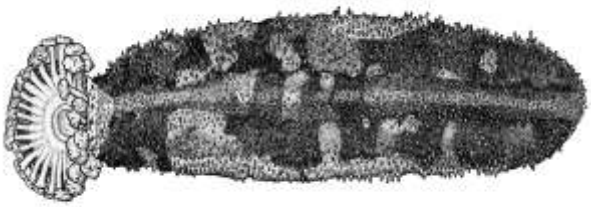
1. Gonad in two tufts, one to each side of the dorsal mesentery. Tables and C-shaped ossicles present. (Family Stichopodidae) ..... *Isostichopus badionotus*



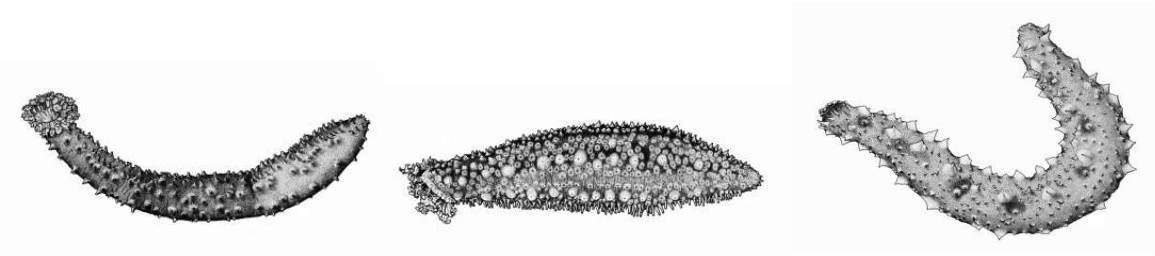
—Gonad in one tuft, lying on one side of the dorsal mesentery. Table shaped ossicles present, usually accompanied by buttons or plates or rods, without C-shaped ossicles (Family Holothuriidae)..... 2

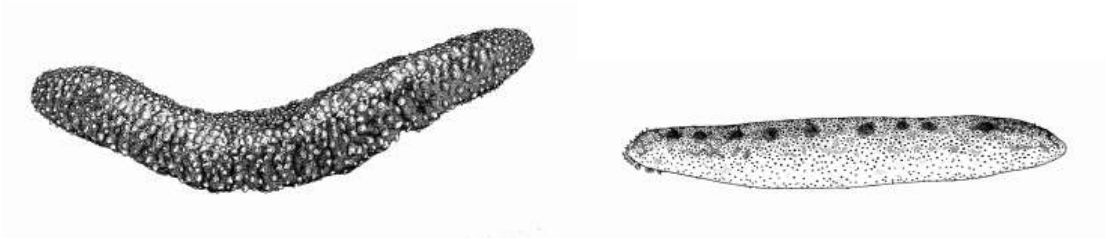


2. Calcified anal teeth present ..... *Actinopyga agassizii*

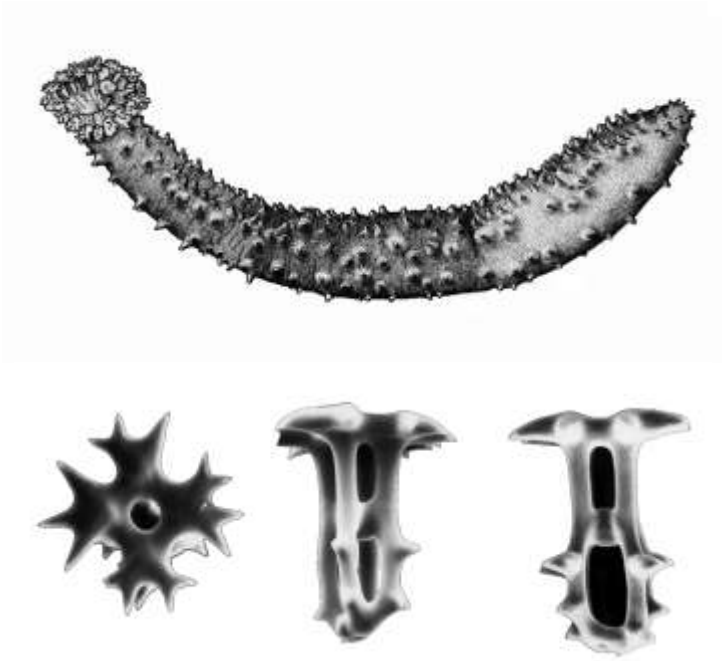


—Calcified anal teeth absent. 3

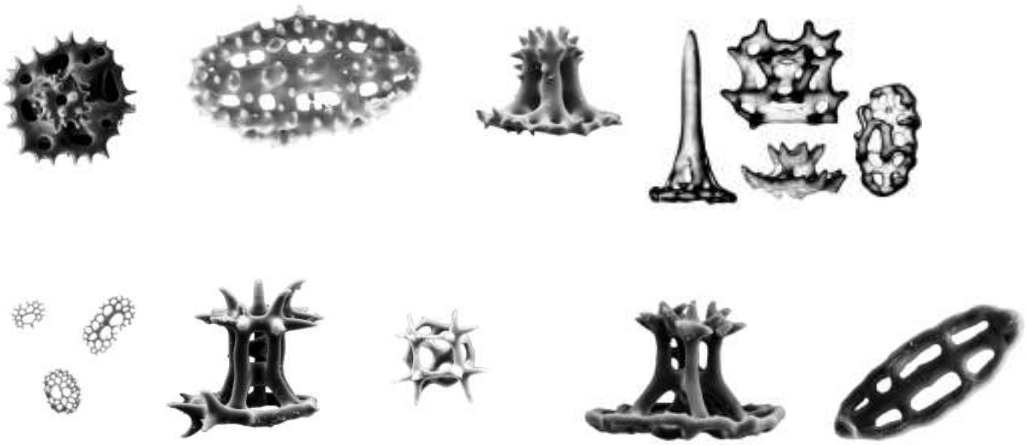




3. Ossicles are tables with disc reduced to an X-shape; no accompanying button, plate or rod shaped ossicles .....*Holothuria (Semperothuria) surinamensis*



—Ossicles are tables with disc; button or plate shaped ossicles also present 4

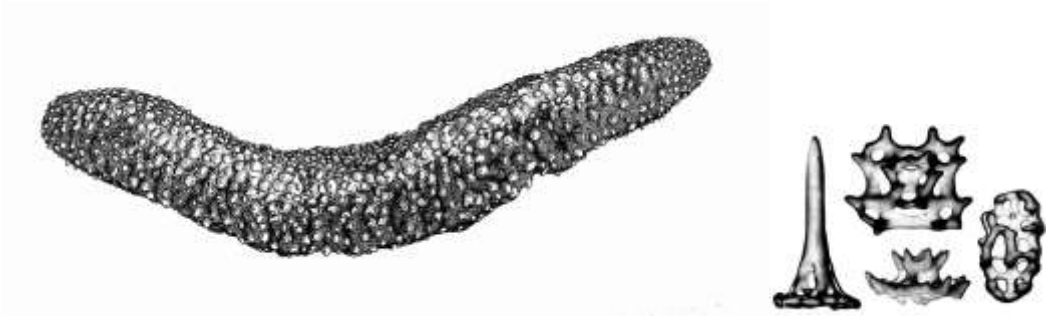


4. Ossicles are tables accompanied by buttons which are irregular, twisted, and knobbed, or regular and knobbed 5

—Ossicles are tables accompanied by smooth buttons or smooth perforated plates 6

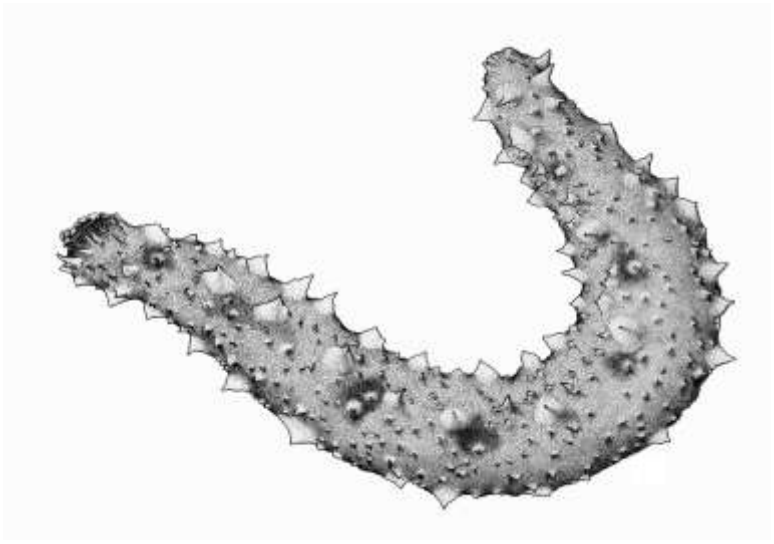
5. Ossicles: buttons irregular and twisted; huge tack-like tables in feet.....

.....*Holothuria (Theelothuria) princeps*



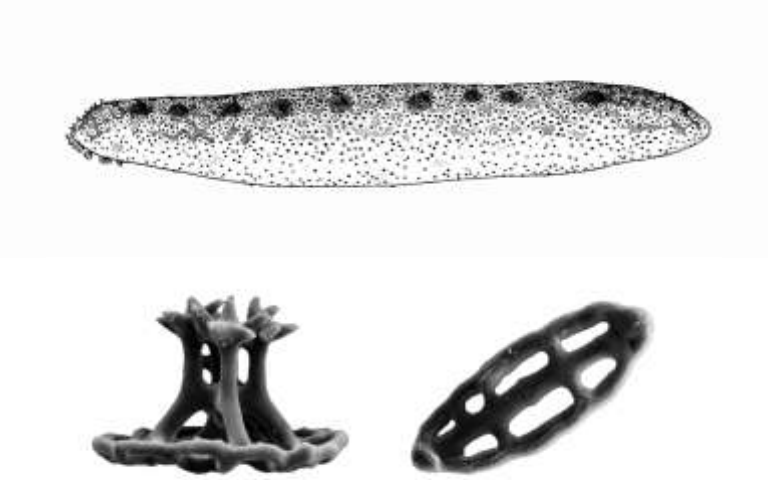
—Ossicles: buttons regular, with numerous knobs. No huge tack-like tables .....

..... *Holothuria (Holothuria) dakarensis*

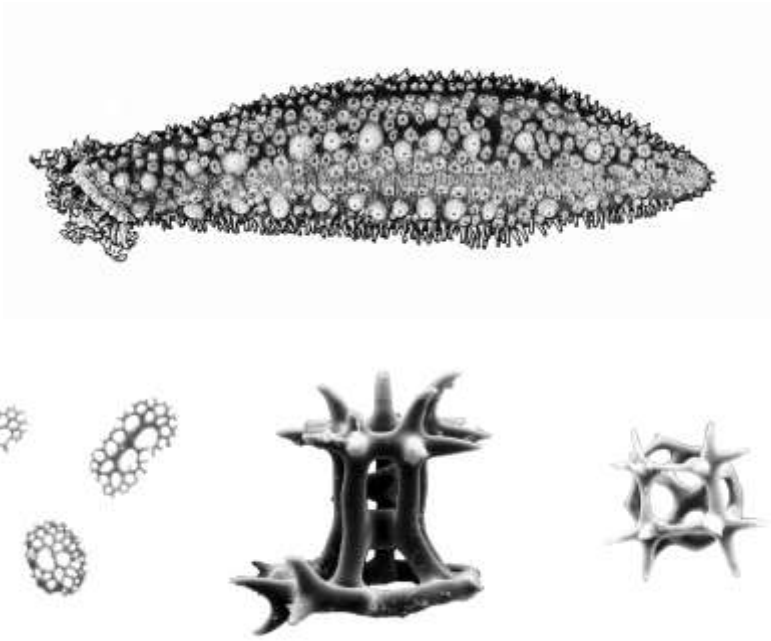


6. Ossicles: tables accompanied by smooth buttons with two rows of holes .....

..... *Holothuria (Vaneyothuria) lentiginosa enodis*

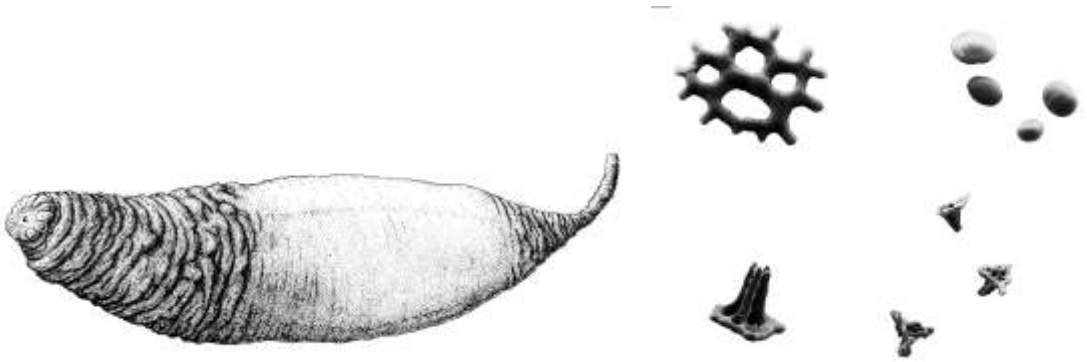


—Ossicles: tables accompanied by small, smooth plates with 2-4 central holes and a few smaller marginal holes .....*Holothuria (Halodeima) grisea*

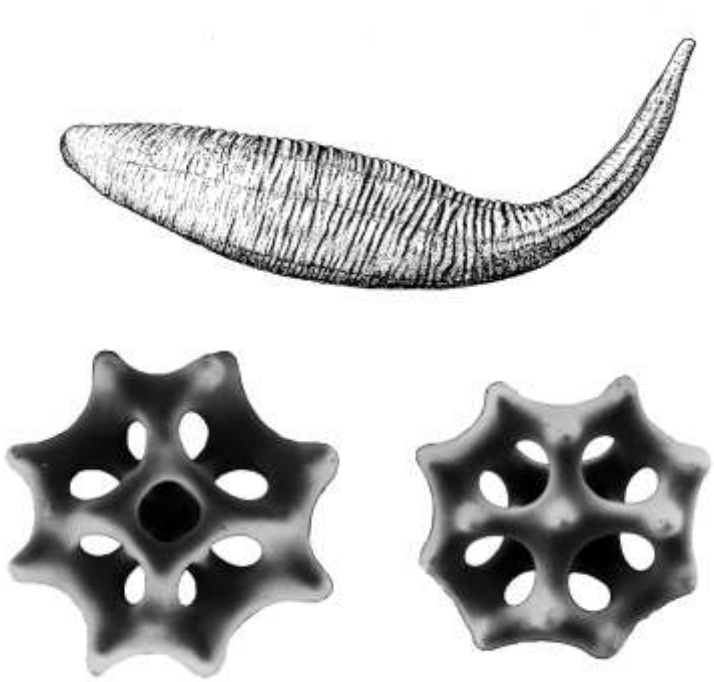


Key to members of the Order Molpadiida of the South Atlantic Bight

1. Ossicles in body wall transformed into dark red phosphatic bodies. Tail ossicles table shaped. (Family Molpadiidae).....*Molpadia oolitica*



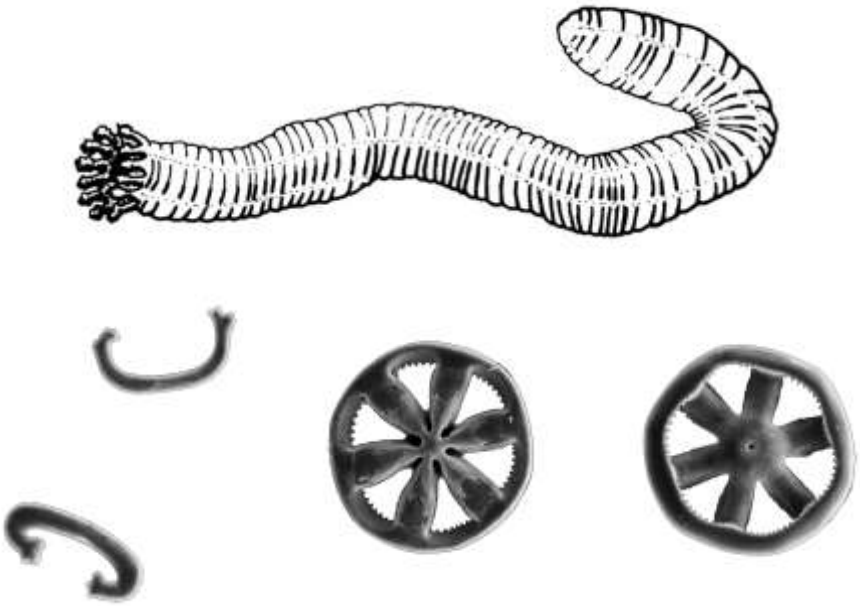
—Ossicles in body wall not transformed into dark red phosphatic bodies. Body wall and tail ossicles in form of distinctive crossed cups.....*Paracaudina chilensis obesacauda*



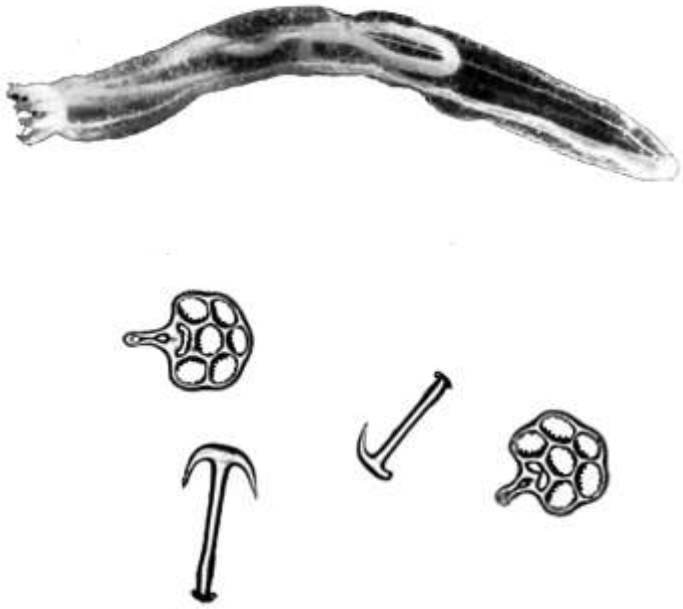
Key to members of the Order Apodida of the South Atlantic Bight

1. Body wall ossicles anchors and anchor plates.....2

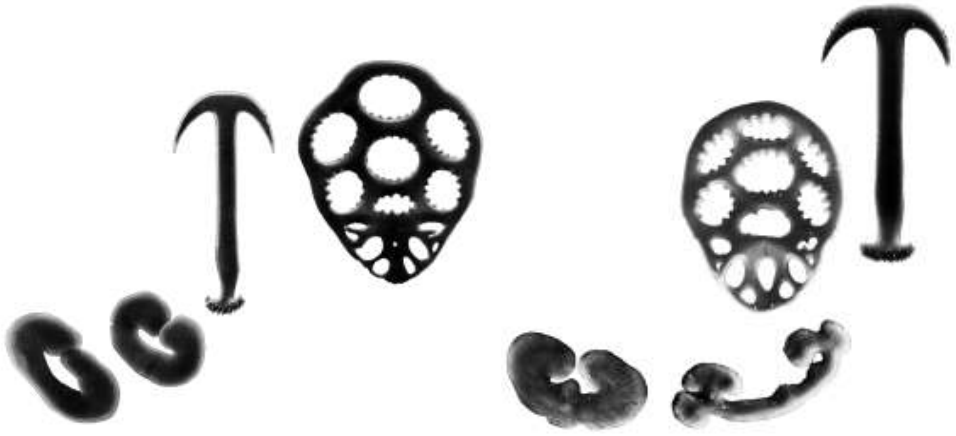
—Body wall ossicles wheels, most common near posterior of body..... *Chiridota ferruginea*



2. Ossicles: anchor plates abruptly narrowed posteriorly to form a handle.....*Labidoplax buskii*



—Ossicles: anchor plates rounded posteriorly; no handle 3



3. Ossicles: anchor plates more than 140 µm long. ..... *Leptosynapta tenuis*

—Ossicles: anchor plates less than 110 µm long. ..... *Epitomapta roseola*