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ON THE SCYPHOZOA FROM EAST COAST OF INDIA, INCLUDING ANDAMAN & NICOBAR ISLANDS

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INTRODUCTION

The class scyphozoa includes the larger medusae (Jelly fish), an exclusively marine planktonic group inhabiting estuarine as well as oceanic waters. Because of their relatively weak swimming ability; currents, tides and wind greatly influence their movements and they maintain themselves in water column by the rhythmic pulsation of their bell. Some of them demonstrate sensitivity to light intensity by surfacing during the morning and late afternoons and discending during midday and in darkness, where as the others react just in opposite manner. They also display a remarkable ability to withstand considerable temperature and salinity changes. Their migration (from open sea to estuary) depends upon their physiological needs, mainly for foraging and spawning.

Medusa (juvenile or mid developmental stages of cnidarians) of 125 species and 82 genera under different classes, orders and families have been recorded so far from Indian coast (Haldar and Choudhury, 1995). But uptil recently, there was no complete and detailed information of the scyphozoan medusae from the east coast of India.

The present study and information is based on the survey work (1996–2000) throughout the east coast of India, including Andaman and Nicobar islands and also from the previous works of Sarkar *et. al.* (1999 and 2002), Haldar & Choudhury (1995); Goswami (1992); Kramp (1961); Menon (1930 & 1936); Rao (1931); and Mayer (1910).

STUDY AREA

STUDY AREA	STATE	STUDY AREA	STATE
Kanyakumari	Tamilnadu	Dolphin's nose beach	Andhra Pradesh
Tuticorin	Tamilnadu	Chilka	Orissa
Mandapam	Tamilnadu	Puri	Orissa
Pamban	Tamilnadu	Gahirmatha (Ekakula)	Orissa
Krusadai Island	Tamilnadu	Chandipur	Orissa
Rameswaram	Tamilnadu	Talsari	Orissa
Dhanuskodi	Tamilnadu	Digha	West Bengal
Madras(Chennai)	Tamilnadu	Shankarpur	West Bengal
Vishakpatnam	Andhra Pradesh	Jalda Khoti	West Bengal
Rishikonda & Lawsons Bay	Andhra Pradesh	Rasulpur	West Bengal
Bheemunipatnam	Andhra Pradesh	Andaman Islands	

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MATERIALS & METHODS

Adult and juvenile scyphozoans are mainly obtained from drag nets and shore siene, operated by local fishermen. Medusae are obtained from estuarine waters, from drag nets and also from 'Bagda' nets (a triangular net operated by a single person to collect post larva of tiger prawn at West Bengal and Orissa coast). Majority of the scyphozoans are examined on beach in more or less fresh condition and parts are collected (for examination under zoom binocular microscope). Few of the specimens finally preserved in 5 % formalin solution.

PRESENT STATUS OF SCYPHOZOA

The number of scyphozoa species estimated world over is around 220 under 75 genera and 23 families, of which 35 species under 24 genera and 18 families are estimated after recent survey from the east coast of India and Andaman group of Islands.

CHECKLIST OF SCYPHOZOA

Phylum CNIDARIA

Class SCYPHOZOA

Order A STAUROMEDUSAE

Family I ELEUTHEROCARPIDAE

1. *Lucernariopsis* sp Panikkar.

Order B CUBOMEDUSAE

Family II CARYBDEIDAE

2. *Carybdea alata* Reynaud.
3. *Tamoya gargantua* Haeckel.

Family III CHIRODROPIDAE

4. *Chiropsalmus buitendijki* Horst.
5. *Chiropsalmus quadrigatus* Haeckel.
6. *Chiropsalmus quadrumanus* (Muller).

Order C CORONATAE

Family IV ATOLLIDAE

7. *Atolla wyvillei* Haeckel.

Family V NAUSITHOIDAE

8. *Nausithoe punctata* Kolliker.

Family VI PERIPHYLLIDAE

9. *Periphylla periphylla* (Peron & Lesueur)

Order D SEMAEOSTOMAE

Family VII PELAGIIDAE

10. *Chrysaora helvola* Brandt.
11. *Chrysaora melanaster* Brandt.
12. *Chrysaora quinquecirrha* (Desor).
13. *Pelagia noctiluca* (Forskal).

Family VIII CYANEIDAE

14. *Cyanea purpurea* Kishinouye.

Family IX ULMARIDAE

Subfamily AURELIINAE

15. *Aurelia aurita* (Linne).
16. *Aurelia solida* Browne.

Order E RHIZOSTOMEAE

Suborder KOLPOPHORAE

Family X CASSIOPEIDAE

17. *Cassiopea andromeda* (Forskal).

Family XI CEPHEIDAE

18. *Cephea* sp. Kramp.
19. *Netrostoma coerulescens* Maas.
20. *Netrostoma setouchianum* (Kishinouye).
21. *Netrostoma typhlodendrium* Schultz.

Family XII MASTIGIIDAE

22. *Mastigias albipunctatus* Stiasny
23. *Mastigias papua* (Lesson)
24. *Mastigietta palmipes* (Haeckel)

Family XIII VERSURIGIDAE

25. *Versuriga anadyomene* (Maas)

Family XIV THYSANOSTOMATIDAE

26. *Thysanostoma thysanura* Haeckel.
27. *Thysanostoma loriferum* (Ehrenberg).

Suborder DAKTYLIOPHORAE

Family XV LYCHNORHIZIDAE

28. *Lychnorhiza malayensis* Stiansy.

Family XVI CATOSTYLIDAE

29. *Acromitus flagellatus* (Maas).
30. *Acromitus rabanchatu* Annandale.
31. *Crambionella annandalei* Rao.
32. *Crambionella orsini* (Vanhoffen).

Family XVII LOBONEMATIDAE

33. *Lobonema mayeri* Light.
34. *Lobonemoides robustus* Stiansy.

Family XVIII RHIZOSTOMATIDAE

35. *Rhopilema hispidium* (Vanhoffen)

Order A STAUROMEDUSAE

A group of polyp-like jelly fishes (medusa) developing directly from scyphistoma, consisting of a calyx and a distinct aboral peduncle with an adhessive disc; typically with adradial marginal lobes carrying hollow and terminally knobbed tentalcles. Body shape more or less conical (Scyphistomid).

Remarks : These are chiefly found in the colder waters and remain attached with sea weeds, rocks etc. by adhessive disc. No alternation of generation found in their life cycle.

No poisonous effect reported from representatives under this order.

Family I ELEUTHEROCARPIDAE

Stauromedusae with four simple, perradial stomach pouches.

Genus ***Lucernariopsis*** Uchida, 1929

1815. *Leucernaria* Lamouroux, *Histoire des Polypiers corralligenes flexibles vulgairement nommes zoophytes* : 472.

1910. *Lucernaria* Mayer, *Medusae of the world : Scyphomedusae,* III : 510.

1929. *Lucernariopsis* Uchida, *Jap. J. Zool.,* II : 154.

Diagnosis : Well developed margial lobes, with eight adradial clusters of hollow, terminally knobbed tentacles; peduncle single chambered, or four chambered in lower portion, without muscles; coronal ring muscle discontinuous in each adradius; no perradial and interradial marginal anchors of papillae.

Distribution : Indian Ocean, Antarctic Sea, Black Sea, North Sea, English Channel, Plymouth, Adriatic Sea.

1. ***Lucernariopsis*** sp. Panikkar 1944

Remarks Panikkar recorded this species from Krusadai Island (Gulf of Mannar) in 1944 and after that there is no report of this species from Indian coast.

Order B CUBOMEDUSAE

Free swimming medusae; umbrella margin not cleft into lappets, with four interradial tentacles or bunch of tentacles situated on gelatinous wing shaped structures, called pedalia; four perradial sense organs situated on the sides of the bell; four wide perradial sacs extending outwards from the central stomach into the subumbrellar cavity, incompletely seperated by interradial septa; four pairs of leaf shaped gonads attached along the inter radial septa and extending into the gastrovascular cavity; opening of the bell cavity partially closed by an annular diaphragm called velarium.

Remarks Scyphozoa under this order are commonly known as 'Box–Jellyfish' due to their cuboidal shape of the bell with four flattened sides. They are strong swimmers and active predators, feeding mainly on small fish. Some of the members have powerful stings which causes weals on the skin and sometimes excruciatting pain of the bathers, which may last for 10–12 hours.

These are generally found in open waters of warm seas and migrate in shallow water for spawning. There is no alternation of generation in their life cycle.

Family II CARYBDEIDAE

Cubomedusae with four simple or tripartite interradial tentacles; four stomach pouches without diverticula.

Genus ***Carybdea*** Peron & Lesueur 1809

1809. *Carybdea* Peron & Lesueur. *Ann. Mus, Hist. nat.*, XIV : 332

1880. *Charybdea* Haeckel, *Sysem der Acraspeden* : 439

1910. *Carybdea* Mayer, *Medusae of the World : Scyphomedusae,* III : 506.

Diagnosis Four simple pedalia; stomach flat; without mesenteries; gastric cirri forming brush-like bundles at the interradial corners of the stomach.

2. ***Carybdea alata*** Reynaud 1830

1830. *Carybdea alata* Reynaud, *Lessons Centurie Zoologique* : 95, p.33, fig. 1.

1961. *Carybdea alata* : Kramp, *J. mar. biol. Ass. U.K.*, **40** : 304.

Diagnosis : 60–80 mm in height, 50 mm or more wide; ex-umbrella without warts; sensory niches enclosed by a pair of covering scales below and by one above; gastric filaments in crescentic areas extending horizontally at the corner of the stomach; tentacles simple in structure.

Distribution : East coast of India : Madras, Tamilnadu (Menon, 1930).

Elsewhere : Southern Atlantic, West Indies, South Africa, West Africa, South & Tropical Pacific, Hawaiian Islands, Philippines, Sumatra, Florida, Japan, Ceylon, Bermudas, Red sea, Indo–China, Carribean sea.

Poisonous effect : Commonly known as "Sea–wasp" and have powerful stings, which inflict their strong injurious effects upon bathers by nematocysts (Halstead, 1971).

Remarks The present description is based on Kramp (1961). Menon 1930, recorded this species from Madras as *Charybdea madraspatana* n. sp.

Genus ***Tamoya*** Muller, 1859

1859. *Tamoya* Muller, *Abh. Naturf. Ges. Halle.*, V (I) : 1-12, 3 pls.

1880. *Tamoya* Haeckel, *System der. Acraspeden* : 442.

1910. *Tamoya* Mayer. *Medusae of the world : Scyphomedusae,* III : 512.

Diagnosis : Four simple pedalia; stomach deep, connected with the sub-umbrella by well developed perradial mesenteries; gastric cirrri in bands extending vertically along the walls of the stomach, in the interradii.

Remarks The genus is closely related to *Carybdea,* being distinguished only by its large stomach with its perradial mesenteries and its vertical clusters of gastric cirri.

No poisonous effects reported from the representatives under this genus.

3. ***Tamoya gargantua*** Haeckel, 1880

1880. *Tamoya gargantua* Haeckel, *System der Acraspeden* : 444.

1931. T*amoya alata* : Rao, *Rec. Indian Mus.*, **33** : 27.

1961. *Tamoya gargantua* : Kramp., *J. mar. biol. Assn. U.K.*, **40** : 306-307.

Material examined : 1 ex. Rishikonda beach, 24.xii.1998.

Diagnosis : Bell 65 mm in height, 45 mm in diameter; length of tentacle 185–198 mm. Pedalia with a sharp outer and inner edge; pyramidal at the base and flattened near apex. 6–9 much branched canal in the velarium of each quadrant. The sense club have large median eyes with conspicuous lens; no lateral eyes. Velarial canals end in trident like distal branches.

Distribution : East coast of India : Vishakpatnam coast, Andhra Pradesh, (present record); Sand head, West Bengal (Haldar & Choudhury, 1995; Rao, 1931); Puri coast, Orissa (Rao, 1931); Ennur, Tamilnadu (Rao, 1931).

Elsewhere : Mergui Archipelago, Arabian sea, North America; Malay Archipelago; New Southwales, Australia; Iranian Gulf; Japan; Samoa Islands; New Guinea.

Remarks : This is a neretic species. According to Mayer (1910), this is an imperfectly known species. Menon (1930) recorded from Madras coast as *Tamoya* sp.

Family III CHIRODROPIDAE

Cubomedusae with four interradial clusters of tentacles; four stomach pouches with eight diverticula.

Remarks : *Chironex fleckeri* Southcott is the most venomous (may produce death within 3–8 minutes in human) species among marine invertebrates belongs to this family, distribution of which is reported from North Queensland and Australia (Halstead, 1971).

Genus ***Chiropsalmus*** L. Aagassiz, 1862

1862. *Chiropsalmus* L. Agassiz, *Contr. nat. Hist. U.S.*, IV : 174.

1910. *Chiropsalmus* Mayer, *Medusae of the world : Scyphomedusae,* III : 515.

Diagnosis : Finger shaped unbranched; hernia-like pouches which project from the four perradial stomach pouches into the bell cavity; the free margins of the eight leaf-shaped gonads entire and simple.

4. ***Chiropsalmus buitendijki*** Horst, 1907

1907. *Chiropsalmus buitendijki* Horst, *Notes Leyden Mus.*, **29**(2) : 101, p.2, fig. 1-6.

1910. *Chiropsalmus buitendijki* Mayer, *Medusae of the World : Scyphomedusae,* III : 515.

Material examined : 1 ex., Marina beach, Chennai, 26.I.2000.

Diagnosis : Bell 62 mm in height and wide; each pedalium with six fingers and tentacles in a leniar series on the outer side of the main shaft : eight long, simple, finger shaped subumbrellar gastric saccules, nearly at the depth of the bell cavity.

Distribution : East Coast of India : Marina Beach, Chennai, Tamilnadu (Present record; Menon, 1930); Krusadai Island (Menon, 1936).

Elsewhere : Java, Malay Archipelago; Australia.

Remarks : Poisonous effect not known.

5. ***Chiropsalmus quadrigatus*** Haeckel, 1880

1880. *Chiropsalmus quadrigatus* Haeckel, *Sys. der. Acraspeden* : 447.

1910. *Chiropsalmus quadrigatus* Mayer, *Medusae of the world* : Scyphomedusae III : 516.

Diagnosis : 70–100 mm high, 80–100 mm wide or more; bell dome shaped. Pedalium with 5–9 fingers and tentacles, irregularly placed; eight gastric saccules laterally flattened and cock's comb-shaped.

Distribution : East coast of India : Krusadai Island, Tamilnadu (Menon, 1936).

Elsewhere : Rangoon; Philippines, Northern Australia.

Poisonous effect : Commonly known as 'Sea wasp' and inflict their painful injurious effects upon bathers by their nematocysts (Halstead, 1971).

Remarks : Present description is based on Kramp (1961).

6. ***Chiropsalmus quadrumanus*** (Muller 1859)

1859. *Tamoya quadrumanus* Muller, *Abh. Naturf. Ges. Halle.*, **5**(1) : 1-11, Pls. 2,3, figs. 28–32.

1862. *Chiropsalmus quadrumanus* L. Agassiz. *Cont. Nat. Hist. U S.*, **4** : 174.

Material examined : 1 ex. Marina beach., Chennai, Tamilnadu., 26.i.2000.

Diagnosis : Bell 69 mm in height, 77 mm wide. Bell more or less dome shaped; each pedalium with six finger like branches and hand shaped. Each of four gastric saccules gives rise to finger shaped, hernia-like sacs.

Distribution : East coast of India : Marina Beach, Chennai, Tamilnadu (Present record); Ennur, Tamilnadu (Rao, 1931); Puri coast, Orissa (Rao, 1931).

Elsewhere : Elphinstone Islands; Mergui Archipelago; Brazil; North Carolina; East coast of US, Sumatra; Australia; S. Amreica; W. Africa.

Remarks : Poisonous effect not known.

Order C CORONATAE

Free swimming scyphomedusae. Umbrella margin cleft into lappets; with a single mouth opening provided with simple lips; with sense organs (rhopalia) and solid marginal tentacles arising from clefts between the lappets; with a circular, coronal furrow in the exumbrella, and peripheral to this a zone of gelatinous thickenings (pedalia) divided by radiating clefts alternating in position with the tentacles and rhopalia.

Remarks : Members of order coronatae generally occur in deeper colder waters of the ocean. Few species found near the surface of warmer waters. No alternation of generation found in their life cycle.

No poisonous effect is reported from the representatives under this order.

Family IV ATOLLIDAE

Rhopalia or marginal sense organs more than eight, alternate with an equal number of tentacles; marginal lappets twice in number of tentacles.

Genus : ***Atolla*** Haeckel, 1880

1880. *Atolla* Haeckel, *System der Acraspeden* : 488.
1961. *Atolla* Kramp, *J. mar. biol. Assn. U.K.*, **40** : 311.

Diagnosis : Eight adradial gonads and four interradial subgenital ostia; disc quite flat, central part lenticular, circular furrow deep. Rhopalia 20–22 alternating with equal number of tentacles.

7. ***Atolla wyvillei*** Haeckel, 1880

1880. *Atolla wyvillei* Haeckel, *System der Acraspeden* : 488.
1973. *Atolla wyvillei* Fagetti, *Revista Bio. mar.*, **15**(1) : 48–49.

Diagnosis : Diameter of bell varies from 25–100 mm, according to age group. Central lens varies from 20–70 mm in diameter. 20–29 tentacles alternate with many minute rhopaliar pedalia.

Distribution : East coast of India : Off Krishna delta, Andhra Pradesh. Off Gangetic delta (Rao, 1931); Andaman sea (Rao, 1931).

Elsewhere : Lakshadweep sea (Rao, 1931).

Remarks : This is a deep-sea luminescent medusa. The present description is based on Kramp (1961) and Haldar & Choudhury (1995).

Family V NAUSITHOIDAE

Eight rhopalia, eight tentacles and sixteen marginal lappets; no sac-like pouches upon the subumbrella; 16 radiating simple stomach pouches.

Genus *Nausithoe* Kolliker 1853

1853. *Nausithoe* Kolliker, *Zeit. fur. wissen. zool.*, **4** : 323.

Diagnosis : Nausithoidae with eight adradial gonads.

8. *Nausithoe punctata* Kolliker, 1853

1853. *Nausithoe punctata* Kolliker, *Zeit. fur. wissen. zool.*, **4** : 323.

1961. *Nausithoe punctata* : Kramp, *J. mar. biol. Assn., U.K.*, **40** : 316.

Diagnosis : 9-15mm wide,discoidal,central disc thick,without radiating furrow finely punctured; gastric filaments not grouped in clusters; large gonads.

Distribution : East Coast of India : Madras, Tamilnadu (Menon, 1930).

Elsewhere : Trivandram (Travancore) Coast and Calicut, Kerala, India; Mediterranean; Japan; Florida; North Australia; East Coast of USA; Malay Archipelago; Galapagos Island; Naples (Cylon); Gulf of Guinea; Maldive Islands; Singapore; West Africa.

Remarks : This is a surface and shallow water species in warm seas. The present description is based on Kramp (1961) and Menon (1930).

Family VI PERIPHYLLIDAE

Four interradial rhopalia and with 4–28 numbers of tentacles.

Genus *Periphylla* Haeckel, 1880

1880. *Periphylla* Haeckel, *Syst der Acraspeden* : 418.

1910. *Periphylla* Mayer, *Medusae of the world* : *Scyphomedusae,* III : 543.

Diagnosis : 12 tentacles (4 perradial and 8 adradial);16 marginal lappets,8 gonads.

9. *Periphylla periphylla* (Peron & Lesueur, 1809)

1809. *Carybdea periphylla* Peron & Lesueur, *Annu. Mus. Hist. nat.*, **14** : 20.

1880. *Periphylla hyacinthina* Haeckel, *Syst der Acraspeden* : 419, Pl. 24, figs. 11-16.

1961. *Periphylla periphylla* : Kramp, *J. mar. biol. Ass. U.K.*, **40** : 320.

Diagnosis : Upto 200 mm in diametre; usually higher than wide,with a pointed or dome shaped apex; gonads U-shaped.

Colour : Stomach and subumbrella purple or violet.

Distribution : East Coast of India : Bay of Bengal (Rao, 1931).

Elsewhere : Laccadive sea and almost all seas.

Remarks : Bathy-pelagic, majority of them are found in cold waters. Present description is based on Kramp (1961) and Rao (1931).

Order D SEMAEOSTOMEAE

Scyphozoan jelly fish with umbrellar margin cleft into lappets; no coronal furrow and pedalia; hollow marginal tentacles may or may not be present, marginal rhopalia present; single central mouth opening, with four large curtain-like or gelatinous lips; gonads situated in sac-like folds of endodermal wall of the subumbrella.

Remarks : They are mainly found in coastal waters, where they may occur in large wind-drifted aggregation. Number of small fishes and other small animals are found to be trapped in tentacles and mucus of bell.

Some of the members have painful stings. The medusa alternates with scyphistoma.

Family VII PELAGIDAE

Central stomach gives rise to completely separated, unbranched radiating pouches; no ring-canal; tentacles arise from umbrellar margin between the clefts of the lappets; oral arms long, pointed and much folded.

Genus ***Chrysaora*** Peron & Lesueur, 1809

1809. *Chrysaora* Peron and Lesueur, *Annu. Mus. Hist. nat.*, **14** : 364.

1862. *Dactylometra* L.Agassiz, *Cont. Nat. Hist. U.S.*, **4** : 166.

1961. *Chrysaora* : Kramp, *J. mar. biol. Ass. U.K.*, **4** : 323.

Diagnosis : 32–48 or more simple marginal lappets; 8 marginal sense organs; 3–9 tentacles between each successive pair of marginal sense organs; 16 radial stomach pouches; in the marginal zone 8 rhopalar stomach pouches are much narrower than the 8 tentacular pouches; exumbrella with numerous minute nematocyst warts.

10. ***Chrysaora helvola*** Brandt, 1838

1838. *Chrysaora (Polybostrycha) helvola* Brandt, *Mem. Acad. Sci. St. Petrb. Sci. Nat.* **6**(2) : 384, Pls 15, figs. 1-4.

1961. *Chrysaora helvola* Kramp : *J. mar. biol. Assn. U.K.*, **40** : 324–325.

Diagnosis : Upto 300 mm wide, hemispherical or flatter; rhopalar stomach pouches oval, in middle portion twice as wide, at the margin half as wide as tentaclular pouches; three tentacles in each octant.

Colour : Umbrella yellowish-brown or reddish-yellow or bright orange with about 32 rayed chestnut brown stars on exumbrella.

Distribution : East coast of India : Puri coast, Orissa (Rao, 1931). Madras, Tamilnadu.

Elsewhere : East Africa; China; Japan; Pacific coast of N. America.

Remarks : *Dactylometra quinquecirrha* (Chrysaora stage) recorded by Light (1914, *Philip. J. Sci.*, IX : 198) from Philippine and also reported by Menon (1930) from Madras coast, probably a form of *Chrysaora helvola*. According to Menon (1930), this is a common jelly fish of Madras coast.

The present description is based on Kramp (1961) and Rao (1931).

11. ***Chrysaora melanaster*** Brandt, 1838

1838. *Chrysaora melanaster* Brandt, *Mem Acad. Scie. St. Peterb. Sci. Nat.*, **6**(2) : 385.

1961. *Chrysaora melanaster* : Kramp, *J. Mar. Biol. Ass. U.K.*, **40** : 326–327.

Material examined : 3 exs. Talsari, Orissa.; 3.iii.1997.

Diagnosis : Diameter of the bell 93–122 mm; length of the mouth arms 130–300 mm; marginal lappets are more or less equal in size and shape; septa between stomach pouches straight; rhopalar pouches in middle portion some what broader; at margin considerably narrower than the tentacular pouches; 3–5 tentacles in each octant; 32 radiating reddish–brown streaks on subumbrella and 16 radiating brownish streak on subumbrellar below the septa between stomach pouches.

Colour : Brownish.

Distribution East Coast of India : Talsari, Orissa (Present record); Madras coast, Tamilnadu (Rao, 1931).

Elsewhere Trivandrum, Kerala, India; Japan, Alaska, Philippines, California.

Remarks : Poisonous effects not known.

12. ***Chrysaora quinquecirrha*** (Desor, 1848)

1848. *Pelagia quinquecirrha* Desor, *Proc. Boston. Soc. Nat. Hist.*, **3** : 76.

1862. *Dactylometra quinquecirrha* L. Agasizz, *Cont. Nat. Hist. U S.*, **4** : 125–166.

1961. *Chrysaora quinquecirrha* : Kramp., *J. Mar. biol. Assn. U.K.*, **40** : 327.

Diagnosis : Upto 250 mm wide; marginal lappets semicircular or tongue-shaped; the lappet–clefts of the primary and secondary tentacles deep, the tertiary mere shallow notches, stomach pouches one of equal in width, septa straight, 2–3 large tentacles in each octant.

Colour : Pale yellowish pink.

Distribution : East Coast of India Puri, Orissa (Kramp, 1958); Madras, Tamilnadu (Gravely, 1941).

Elsewhere : Trivandrum coast, India; Brazil; Florida; Philippines; S. China; Java; Woodshole; Malay Archipelago to Japan; Gulf of Guinea; East coast of U S A; Gulf of Siam; England; West coast of Africa.

Poisonous effects These jelly fishes are commonly known as 'Sea Nettle' and inflict injurious wounds on human by their nematocysts (Halstead, 1971).

Remarks : Present description is based on Kramp (1961).

Genus ***Pelagia*** Peron & Lesueur, 1809

1809. *Pelagia* Peron & Lesueur, *Ann. Mus. Hist. Nat. Paris.*, **14** : 349.

1961. *Pelagia* : Kramp, *J. mar. biol. Assn., U.K.*, **40** : 328.

Diagnosis : 16 marginal lappets; 8 tentacles alternating with 8 marginal sense organs; with 16 radial stomach pouches, all alike, each terminating in a pair of unbranched canals entering the marginal lappets; exumbrella with numerous nematocysts.

13. ***Pelagia noctiluca*** (Forskall, 1775)

1775. *Medusa noctiluca* Forskall, *Descriptiones animalium avium amphibiorum, Piscium, insectorum, vermium* : 107, Pl. 31.

1809. *Pelagia noctiluca* Peron & Lesueur, *Ann. Mus. Hist. Nat.*, **14** : 349.

Diagnosis : Bell diameter 90 mm (Rao, 1931); on their outer surface the marginal lappets have an elongate conical thickening in which a prolongation of the gastric cavity is present. The rhopalium is conical and pear shaped and is lodged in a deep niche roofed over by a membranous flap of the umbrella at the base of the rhopalar lappets. The tentacles are transeversly wrinkled and thus have a segmented appearance. They arise from the membranous part of the umbrella between the velar lappets.

Distribution : East Coast of India : Madras, Tamilnadu (Menon, 1930).

Elsewhere : Calicut coast, Trivandrum coast, Kerala, India; Tropical Atlantic; Western Pacific from Malayan Archipelago to Japan; Mediterranean; East Coast of U S A; North-east Madagascar; Philippines; Adriatic sea; Chagos Archipelago; Australia; E. Africa; Burmudas; Arabian sea; New Foundland; Irish coast, Colombia; Bay of Biscay; Belgium; W. Africa; North Sea; England; California; Brazil.

Poisonous effect This species is well known for bioluminescence. The species is commonly known as "Sea Blubber" and inflict their injurious effects on man by their nematocyst apparatus (Halstead, 1971).

Remarks : The present description is based on Rao (1931).

Family VIII CYANEIDAE

Central stomach gives rise to radiating pouches which again give rise to branches; blind canals in the marginal lappets; no ring canal; complexly folded gonads, inter-radial eversions of the wall of the subumbrella; tentacles arising from the subumbrella at some distance from the margin.

Genus ***Cyanea*** Peron & Lesueur, 1809

1809. *Cyanea* Peron & Lesueur, *Ann. Mus. Hist. Nat. Paris.*, **14** : 363.

1961. *Cyanea* : Kramp, *J mar. biol. Assn. U.K.*, **40** : 331.

Diagnosis : Rhopalia 8 in number; with 8 adradial clusters of tentacles, each of which contains several rows of tentacles; both radial and circular muscles in the subumbrella.

Remarks : Commonly known as "Sea Blubbers" or "Sea Nettle" and only *Cyanea capillata* is known for their poisonous effect (Halstead, 1971).

14. ***Cyanea purpurea*** Kishinouye, 1910

1910. *Cyanea purpurea* Kishinouye, *J. Cell. Sci. Tokyo.*, **27** : 18, Pl. 4, fig. 18,19.

1961. *Cyanea purpurea* : Kramp, *J. mar. biol. Assn. U.K.*, **40** : 335.

Material Examined : 1 ex., Digha Coast., 10. i. 96; 1 ex. Ekakula, 2. i. 2000.

Diagnosis : 230–265 mm wide; rhopalar & tentacular stomach pouches completely seperated; peripheral canals with numerous anastomoses.

Colour : Violet with reddish mouth arm.

Ditribution East Coast of India : Digha coast, West Bengal & Ekakula, Orissa (Present record); Madras, Tamilnadu (Menon, 1930).

Elsewhere : Trivandrum, Kerala, India; Japan.

Remarks : Menon (1930) refers the specimen from the Madras coast doubtfully to the *Cyanea purpurea* Kishinouye.

Family IX ULMARIDAE

Simple or branched radial canals and a ring canal; subgenital pits may or may not be present. No poisonous effect is reported from the members of this family.

Subfamily AURELIINAE

Tentacles and lappets arise from the sides of the exumbrella above the margin, gonads invaginated with subgenital pits.

Genus *Aurelia* Peron & Lesueur, 1809

1809. *Aurelia* Peron & Lesueur, *Ann. Mus. Hist. Nat.*, **19** : 357.

1922. *Aurelia* Stiasny, *Vidensk Medd. Dansk naturf. Foren. Kbh.*, **73** : 522.

Diagnosis : 4 unbranched mouth arms; margin of the bell divided into 8 or 16 broad velar lobes; radial canals gives rise to anastomosing branches.

15. *Aurelia aurita* (Linne, 1758)

1758. *Medusa aurita* Linne, *Systema nature, Ed. 10, reformata*, **2** : 660.

1816. *Aurelia aurita* Lamarck, *Histoire naturelle des animaux sans vertebres* **2** : 573.

1961. *Aurelia aurita* : Kramp, *J. mar. bio. Assn. U.K.*, **40** : 337.

Diagnosis : Bell diameter 75–122 mm, thickness 7–20 mm, length of mouth arm 30–55 mm (Rao, 1931); 8 broad and simple marginal lappets; mouth arm as long as radius of the disc. Bell stiff, with densely crenulated margins and numerous small tentacles; rhopalar and adradial canals unbranched.

Colour : Light reddish purple. According to Mayer (1910) colour variable : almost colourless–violet–rose red.

Distribution : East Coast of India : Andaman Islands, Indian Ocean (Rao, 1931).

Elsewhere : East coast of U S A; N. Atlantic; Gulf of Iran; North-West Pacific; Philippines; Venezuela; Baltic sea; Japan; Norway; British coast; Gulf of Korea; Netherlands; West coast of Sweeden; Denmark; Bermudas; Canada; Scotland; Gulf of Finland; English Channel; W. Africa; Singapore; S. Australia; Red Sea.

Remarks : The present description is based on Kramp (1961).

16. *Aurelia solida* Browne 1905

1905. *Aurelia solida* Browne, *Fauna & Geogr. Maldive & Laccadive Aarchipelago*, **2** : 960–962. Pl. XCIV.

1910. *Aurelia solida* : Mayer, *Medusae of the world : Scyphomedusae*, III : 627–628.

Diagnosis : Diameter of the bell 80–105 mm, thickness 20–25 mm, length of the mouth arm 40–45 mm (Rao, 1931); jelly solid, hemispherical; 8 simple marginal lobes; canals slender and anastomosing; mouth arm thin; ostia large; each marginal sense club arises from the inner end of a very deep grove and points upward towards the exumbrella.

Colour : Transluscent.

Distribution : East Coast of India : Madras, Tamilnadu (Gravely, 1941; Menon, 1930).

Elsewhere : Trivandrum, Kerala, India; Maldive Islands; South of the Azores; West of Africa.

Remarks : The present description is based Kramp (1961).

Order E RHIZOSTOMEAE

Scyphozoan medusae with umbrella margin cleft into lappets; marginal tentacles absent; no central mouth opening, but with numerous mouth openings upon 8 adradial, fleshy, branched appendages arising from the centre of the subumbrella; rhopalia present between marginal clefts.

Remarks : Members under this order commonly found in shallow warmer waters but a few species occur in temperate sea. These are known to alternate with scyphistoma.

Suborder KOLPOPHORAE

Moutharms dichotomous and triangular or three winged. A net work of anastomosing canals communicate with central gastro-vascular cavity in several places between the radial canals. Rhopalar pits smooth, no radial folds. Subgenital ostia without papillae.

Family CASSIOPEIDAE

Subumbrellar muscles in feather-like arcs. Radial canals usually about twice as many as rhopalia. Ring canal may or may not be present. 4 completely seperated sub-genital cavities. Sub genital ostia small and round. Stomach circular. Arm disc octagonal, with four primary canals.

Remarks : No Poisonous effect is reported from the represntatives under this family.

Genus ***Cassiopea*** Peron & Lesueur, 1809

1809. *Cassiopea* Peron & Lesueur, *Ann. Mus. Hist, nat.*, **14** : 356.

1961. *Cassiopea* : Kramp, *J. mar. biol. Assn. U.K.*, **40** : 348.

Diagnosis Mouth arms 8, irregularly branched, with ventral mouth openings. Ring Canal may or may not be present; rhopalar and interrhopalar canals 16 or more.

17. ***Cassiopea andromeda*** (Forskal, 1775)

1775. *Medusa andromeda* Forskal, *Descriptiones animalium, avium, amphibiorum, piscium, insectorum, vermium.*, 107, Pl. 31.

1829. *Cassiopea andromeda* Eschscholtz, *System der Acalephen* : 43.

1977. *Cassipea andromeda* : Neumann, *Wilhelm Roux Arch. dev. Biol.*, **183**(1) : 79-83.

Material examined : 1 ex., Jalda khoti, 3.II.1997.

Diagnosis : Bell diameter 80 mm, flat, shield shaped, length of the mouth arm 28 mm, wide and Flat; tree like branches in each arm. Numerous club shaped small and 6 large vesicles present on each arm between the mouth openings.

Distribution : East Coast of India Jalda khoti, Midnapur district, West Bengal (present record); Sand head, Ganga estuary (Haldar & Choudhury, 1995); Krusadai Island (Menon, 1936); Gulf of Mannar, (Krusadai Island and Rameswaram, Rao 1931); Madras, Tamilnadu (Menon, 1930).

Elsewhere : West coast of India; Maldive Islands; North Australia; Red sea, Malay Archipelago; Suez Canal; E. Africa.

Family XI CEPHEIDAE

Radial subumbrellar muscles present. 8 rhopalar radial canals. Ring canal absent. 4 subgenital cavities, not clearly seperated. Subgenital ostia small and round. Stomach octagonal with 8 primary canals.

Remarks : No poisonous effects reported from the members of this family.

Genus ***Cephea*** Peron & Lesueur, 1809

1809. *Cephea* Peron & Lesueur, *Ann. Mus. Hist. Nat.*, **14** : 360.

1961. *Cephea* : Kramp, *J. mar. biol. Assn., U.K.* **40** : 352.

Diagnosis : Inter-rhopalar radial canals more than three in each octant; warts present on central portion of exumbrella; long, pointed filaments on mouth arms.

Distribution : *East Coast of India* : Nicobars (Kramp, 1961); Madras, Tamilnadu (Menon, 1930).

Elsewhere : Arabian sea; Philippines; Australia; Japan; W. Africa; Red sea.

18. ***Cephea*** sp. Kramp 1958

Remarks : The present description is based on Kramp (1961). Menon reported this species as *Cephea sp.* from Madras Coast in 1930, which was also recorded by Kramp as same in 1958 from Nicobar Islands.

Genus ***Netrostoma*** L. S. Schultze, 1898

1898. *Netrostoma;*Kramp : *J. Mar. biol. Ass.U.K.*, **40** : 355.

1898. *Netrostoma* Schultze, *Denkschr. med. natur. Ges., Jena*, **8** : 457.

Diagnosis : Inter-rhopalar radial canal 3 in each octant; large warts present on central dome of exumbrella; stiff appendages present on mouth-arms and arm-disc.

19. *Netrostoma coerulescens* Maas, 1903

1903. *Netrostoma coerulescens* Maas, *Siboga Exped., Mongr.* II : 35, Pl. 5, fig. 37, 46.

1961. *Netrostoma coerulescens* : Kramp, *J. mar. biol. Ass.U. K.*, **40** : 356.

Diagnosis About 200 mm. wide; central dome with about 10 wart-like projections; 6–8 round edged lappets in each octant; mouth-arm 8, short, massive, laterally compressed, curved outwards, bifurcated at outer ends, with short terminal branches. 2 kinds of appendages between mouth openings—small, thin, tubular and larger, spindle shaped.

Colour : Pale blue or bluish in live. Numerous brown spots are present on its surface.

Distribution : *East coast of India :* Krusadai Island (Menon,1936), Madras coast, Tamilnadu (Menon,1930).

Elsewhere : Trivandrum coast, Calicut (West coast of India); Maldive Islands, Indian ocean; Australia; Malay Archipelago; Philippines; Japan; Arabian Sea.

Remarks : The present description of the species is based on Kramp (1961) and Menon (1930).

20. *Netrostoma setouchianum* (Kishinouye, 1902)

1902. *Microstylus setouchianus* Kishinouye, *J. coll. Sci. Tokyo,* **17** : 11, Pl. 1, 2; Fig. 8-10.

1937. *Netrostoma setouchianum* Stiasny, *Zool. Anz., Bd.* **120** : 110-115, fig. 1, 2.

Diagnosis : Central dome covered completely by more than 50 solid, pointed projections and surrounded by a wide annular furrow; 6–8 flat, rounded velar lappets in each octant; mouth-arms with numerous small, short appendages among the frilled mouths.

Distribution : *East coast of India*; Madras; (Menon, 1930).

Elsewhere : Japan.

Remarks Present description of this species is based on Kramp (1961).

21. *Netrostoma typhlodendrium* Schultze, 1898

1898. *Netrostoma typhlodendrium* Schultze, *Denkschr. med. Natur. Ges. Jena*, **8** : 457.

1961. *Netrostoma typhlodendrium* : Kramp, *J. mar. biol. Ass. U.K.*, **40** : 356-357.

Material examined : 3 exs., Shankarpur, 4.III.97.

Diagnosis : Bell diametre 56–82 mm; length of mouth-arm 28–43mm, central dome more or less flat and covered with number of warts; rhopalar lappets conical, pointed and narrower than velar lappets; velar lapprts 7 and rhopalar lappets 2 in each octant; no ring canal, but rhopalar and inter-rhopalar canals connected centrifugally by the extension of anastomoses.

Distribution : East coast of India : Shankarpur, West Bengal (Present record); Gangetic delta and canning, W. B. (Rao, 1931a); Prentice Island, river Mooriganga, Matla river and river Saptamukhi; W. B. (Haldar and Choudhury, 1995).

Elsewhere : Mergui Archipelago, Malayan Archipelago.

Remarks : Estuarine species; prefers coastal waters (Haldar and Choudhury, 1995); Upto 110 mm wide (Kramp, 1961).

Family XII MASTIGIIDAE

Rhizostomeae, with annular subumbrellar muscles. 8 rhopalar radial canals. Subgenital ostia broad. Arm-disc quadratic, with 4 primary canals. Mouth-arm short, pyramidal, 3-winged, with filaments on arm-disc.

Genus ***Mastigias*** L. Agassiz, 1862

1862. *Mastigias* L. Agassiz, *Contr. Nat. Hist. U.S.A.*, **4** : 152.

1888. *Mastigias* and *Desmostoma* Vanhoffen, *Bibliotheca. zoologica*. I(3) : 33, 35, 44, 45.

Diagnosis : Mouth-arms terminating in a naked, club shaped extremity; Mouth opening not only along the three edges of the mouth arms, but also on their flat, expanded sides; numerous small clubs and filaments between the frilled mouths; intracircular mesh-work of canals with 6–20 canal-roots in each octant, usually communicating with the rhopalar canals.

Remarks : No poisonous effects is reported from the members of this family.

22. ***Mastigias albipunctatus*** Stiasny, 1920

1920. *Mastigias albipunctata* Stiasny., *Zool. Meded.*, **5** : 224.

1961. *Mastigias albipunctatus* : Kramp, *J. Mar. biol. Assn. U.K.*, **40** : 358.

Diagnosis : Upto 145 mm wide, usually faintly vaulted; ex-umbrella, with a network of nematocyst warts with a whitish accumulation of nematocysts at apex; 6–14 velar lappets in each octant; arm-disc with a very long central filament surrounded by several shorter; mouth arms about as long as disk-radius, their terminal appendages variable in length and shape; 12–14 canal roots in each octant; perradial rhopalar canals shorter and broader than the inter-radial, with few or no anastomoses.

Distribution East Coast of India : Madras, Tamilnadu (Menon, 1930).

Elsewhere : Malay archipelago; Mergui Archipelago.

Remarks : The present description of species is based on Kramp (1961).

23. ***Mastigias papua*** (Lesson, 1830)

1830. *Cephea papua* Lesson, *Zoologie.*, **2** : 122, Pl. 11, figs. 2,3.

1961. *Mastigias papua* : Kramp, *J. mar. biol, Assn. U.K.*, **40** : 359–360.

Diagnosis : Upto 80 mm wide, usually hemispherical, exumbrella with very fine granulations, gelatinous substance firm; deep furrows between the velar lappets (in each octant); mouth arms

about half as long as bell diameter, the simple upper portion 1.5 times as long as the three winged lower portion; each arm usually, but not always terminates in a club-shaped filament, triangular in cross section; numerous small, club shaped vesicles between mouth; less than 10 canal-roots in each octant; rhopalar canal slender, usually with anastomoses.

Distribution East Coast of India : Gulf of Mannar, Tamilnadu (Jones, 1960).

Elsewhere : Mergui Archipelago; Japan; Philippines; Pelao & Saipan Island; North Australia; Gulf of Siam; Loochoo Island.

Remarks : The description of the species is based on Kramp (1961). In 1960. S. Jones reported this species from Gulf of Mannar, but Kramp (1961) failed to mention this distribution in his publication.

Genus ***Mastigietta*** Stiansny, 1921

1921. *Mastigietta* Stiasny, *Capita zool.*, I(2) : 100.

Diagnosis : Moutharms without appendages, their upper, undivided portion much reduced, almost rudimentary, and only partly united by 8 membranes.

24. ***Mastigietta palmipes*** (Haeckel, 1880)

1880. *Crambessa palmipes* Haeckel, *System der Acraspeden* : 620.

1910. *Catostylus palmipes* Mayer, *Medusae of the world : Scyphomedusae,* III : 667.

1921. *Mastigietta palmipes* Stiasny, *Capita zool.*, I(2) : 100.

Material examined : 1 ex., Pamban., 23.i.2000 (Material found partially damaged).

Diagnosis : About 69 mm wide; exumbrella with numerous nematocyst warts, lappet region smooth; 6 velar lappets in each octant; moutharms moderately thick, shorter than radius of the disc, no appendages; arm-disc with filaments; 12–14 canal roots in each octant; rhopalar canals with anastomoses throughout their length.

Distribution : East Coast of India : Pamban beach, Tamilnadu (present record); Krusadai Island (Menon, 1936).

Elsewhere : Malay Archipelago; N Australia.

Family XIII VERSURIGIDAE

With annular subumbrellar muscle. 8 rhopalar radial canals, subgenital ostia broad. Arm-disc quadratic, with 4 primary canals. Mouth arm broad and leaf-shaped.

Remarks : No poisonous effect even reported from the representatives under this family.

Genus *Versuriga* Kramp, 1961

1880. *Versura* Haeckel, *System der Acraspeden* : 606.

1961. *Versuriga* Kramp, *J. mar. biol. Assn. U K.*, **40** : 362-363.

Diagnosis : Mouth arms three winged, broad, with secondary lappets and with clubs and filaments; arm–disc with filaments.

25. *Versuriga anadyomene* (Maas, 1903)

1903. *Crossostoma anadyomene* Maas, *Siboga Exped., Mongr.* **11** : 56 Pl. 7, figs. 65-68.

1931. *Versura anadyomene :* Rao, *Rec. Indian Mus.*, **33** : 46–47.

1961. *Versuriga anadyomene* : Kramp, *J. mar.biol. Assn. U K.*, **40** : 363.

Diagnosis : Umbrella more or less flat, diameter being 110 mm, resembling a watch glass; Velar lappets usually 8 between two rhopalia; velar and rhopalar lappets bearing a prolongation of anastomosing network of canals; length of the winged part of the mouth arm 75 mm, extending beyond the margin of the umbrella.

Distribution : East Coast of India : Off Sandheads, Mouth of Ganga; Bay of Bengal, West Bengal (Haldar & Choudhury, 1995).

Elsewhere : Mergui Archipelago, Malayan Archipelago; Gulf of Siam; Philippines; Australia.

Remarks : The present description is based on Rao (1931).

Family XIV THYSANOSTOMATIDAE

Mouth-arm elongate, narrow, lash-like, triangular in cross section; no filaments.

Remarks : No poisonous effect is known from the representatives under this family.

Genus *Thysanostoma* L. Agassiz, 1862

1862. *Thysanostoma* L. Agassiz, *Cont. Nat. Hist. U S.*, **4** : 153.

1910. *Thysanostoma* Mayer, *Medusae of the world : Scyphomedusae,* III : 691.

Diagnosis : Mouth arms may or may not be naked, club-shaped extremities; 8 rhopalar canals all with anastomoses; ring canals distinct.

26. *Thysanostoma thysanura* Haeckel, 1880

1880. *Thysanostoma thysanostoma* Haeckel, *System der Acraspeden :* 625, Pl. 39, figs, 1-9.

1918. *Thysanostoma thysanura* Mayer, *Bull. U S Nat. Mus.*, **I** : 227.

Diagnosis : 100–120 mm wide, exumbrella with polygonal network of nematocysts; velar lappets well separated, without a connecting membrane, shape, size and number variable; arm disc with numerous short, slender filaments; mouth-arms without a naked terminal portion; intracircular canal system with comparatively large, open meshes.

Distribution : East Coast of India : Puri, Orissa (Rao, 1931).

Elsewhere : Malay Archipelago; Australia; Japan; Philippines.

Remarks : The present description is based on Kramp (1961).

27. ***Thysanostoma loriferum*** (Ehrenberg, 1835)

1835. *Rhizostoma lorifera* Ehrenberg, *Abh. Preuss, Acad, Wiss Berlin,* : 260.
1880. *Himantostoma lorifera* Haeckel, *Syst, der. Acraspeden.*, : 628.
1910. *Lorifera lorifera* Mayer, *Medusae of the World : Scyphomedusae*, III : 694.
1940. *Thysanostoma lorifera* Stiansy, *Dana Rep.*, **18** : 24., figs.4,and 5, Pl. 2.
1961. *Thysanostoma loriferum* : Kramp, *J. mar.biol. Assn. UK.*, **40** : 364.

Diagnosis : Upto 200 mm wide, exumbrella smooth or finely granulated; 6–8 velar lappets in each octant, united by a membrane, mouth arm terminate in a short, oval, naked knob, perradial rhopalar canals; intracircular canal system fine meshed,with upto 30 canal-roots in each octant.

Distribution : East Coast of India : Madras coast, Tamilnadu (Menon, 1930) as : *Lorifera lorifera* Haeckel.

Elsewhere Malayan Archipelago; Philippines; Red Sea.

Remarks : The present description is based on Kramp (1961). In 1930, M. G. K. Menon reported this species from Madras coast as *Lorifera lorifera*, but Kramp (1961) was failed to mention this record in his publication.

Suborder DACTYLIOPHORAE

Mouth arms three-winged. A network of anastomosing canals, issuing from the primary ring canal, does not communicate with the gastral cavity except through the radial canals. Subumbrellar muscles annular. Rhopalar pits with radial folds. Sub-genital ostia narrowed by papillae.

Family XV LYCHNORHIZIDAE

Without scapulets; with permanent ring canal; 16 radial canals broad, much folded mouth arms.

Remarks : No poisonous effect is reported from the representatives of the family.

Genus ***Lychnorhiza*** Haeckel, 1880

1880. *Lychnorhiza* Haeckel, *Sys. der. Acraspeden* : 587.
1910. *Lychnorhiza* Mayer, *Medusae of the world : Scyphomedusae*, III : 672.
1961. *Lychnorhiza* : Kramp, *J. mar. biol. Assn. UK.*, **40** : 366.

Diagnosis : Mouth-arms three-winged, without axial terminal clubs with or without filaments; 8 radial canals reaching bell margin, 8 only reaching ring canal, in each of the 16 spaces 2–4 centripetal vessels.

28. *Lychnorhiza malayensis* Stiasny, 1920

1920. *Lychnorhiza malayensis* Stiansy, *Zool. Meded.*, **5** : 226.

1961. *Lychnorhiza malayensis* Kramp, *J. mar. biol. Assn. U K.*, **40** : 367.

Diagnosis : 100 mm wide, exumbrella partly smooth and partly with irregular network of nematocysts; eight (2 X 4) pointed velar lappets in each octant; mouth-arms about as long as diametre of disk, without any appendages; 4 blind centripetal canals between adjacent radial canals.

Distribution : East Coast of India : Madras coast, Tamilnadu (Menon, 1930).

Elsewhere : Trivandrum, West coast of India; Java; Malay Archipelago.

Remarks : The present description is based on Kramp (1961).

Family XVI CATOSTYLIDAE

Intracircular network of anastomosing canals communicating with the ring canal, but not always with the 16 radial canals; 8 rhopalar canals extending to the umbrella margin, the 8 interrhopalar only to the ring canal; mouth-arms pyramidal.

Genus *Acromitus* Light, 1914

1914. *Acromitus* Light, *Philipp. J. Sci.*, **9** : 212.

1961. *Acromitus* : Kramp, *J. mar. biol. Assn. U K.*, **40** : 368.

Diagnosis : Broad intercircular anastomosing network in direct communication with the radial canal and rhopalar canals; mouth arms each with a terminal whip like filament.

29. *Acromitus flagellatus* (Maas, 1903)

1903. *Himantostoma flagellata* Maas, *Siboga Exped., Mongor.*, **11** : 77, Pl. 10. figs. 87-92. Pl. 11, fig. 101.

1920. *Acromitus flagellatus* Stiasny, *Zool. Meded.*, **5** : 226.

1961. *Acromitus flagellatus* : Kramp, *J. mar. biol. Assn. U.K..*, **40** : 368–369.

Material examined : 2 exs., Digha coast; 10.i.1996; 3 exs., Chandipore, Orissa, 23.xii.1997.

Diagnosis : Diametre of the bell 75–124 mm; brown spots on exumbrella, usually more in central part than that of peripheral region; ostia broad and open; mouth arm more or less equal, stout, and as long as or larger than the radius of the bell. Long filaments from terminal mouth arms.

Distribution : East Coast of India : Digha coast, West Bengal (Present record; Sarkar *et. al.*, 1999 and Goswami, 1992); Canning, Sunderban (Haldar and Choudhury, 1995; Rao, 1931); Kakdwip, West Bengal (Haldar and Choudhury, 1995); Chandipore, Orissa (Present record); Puri coast, Orissa (Rao, 1931); Madras, Tamilnadu (Gravely, 1941; Menon, 1930); Krusadai Island (Menon, 1936); Tuticorin, Tamilnadu (Rao, 1931); Gulf of Mannar or Palk Bay (Jones, 1960).

Elsewhere : Cochin backwater, Kerala; Karwar coast, Karnataka; Burma; Malayan Archipelago; Borneo; Java; Gulf of Siam; Japan; China.

Poisonous effect : It is observed that irritation and swelling occur if contact with the hairy surface of the skin, especially on the upper palm (Present Obsevation).

Remarks : A large number of large sized adult of this species observed to congregate for spawning during December to March and in post monsoon months every year and small medusae also found during same period at Digha coast and its adjoining areas (Sarkar *et. al.* 1999).

In 1910 Mayer described this species as *Lorifera flagellata.*

30. ***Acromitus rabanchatu*** Annandale, 1915

1915. *Acromitus rabanchatu,* Annandale, *Mem. Indian Mus.*, **5** : 96., Pl.vi,viii, figs. 4-6.

1961. *Acromitus rabanchatu* : Kramp, *J mar. biol. Assn. U K.*, **40** : 369.

Material examined : 3 exs. Digha coast, 10.i.1996; 2 exs. Puri coast, 18. x. 1998.

Diagnosis : Diameter of the bell 72–130 mm; exumbrella fairly granulated; subgenital papillae broad, triangular cones with blunt tips; mouth-arms up to twice of the length of radius of the bell, with comparatively short whip like filaments and long thread-like endings; 2–3 faintly branched anastomoses inside the ring canal.

Distribution East Coast of India : Digha coast, West Bengal (Present record, Sarkar *et. al.*, 1999 and Goswami, 1992); Puri coast, Orissa (Present record); Chilka lake, Annandale, (1915); Rao (1931).

Elsewhere : No Records.

Poisonous effect : It is observed that redness of skin, irritation and slight swelling occur if contact with the hairy surface of the skin, especially on the upper palm (Present observation).

Remarks : A large number of adult and medusae of this species also noticed to congregate along with *A. flagellatus* at Digha and adjoining areas (Sarkar *et. al.*, 1999).

Genus ***Crambionella*** Stiasny, 1921

1921. *Crambionella* Stiasny, *Capita Zool.*, **1**(2) : 129.

1940. *Crambionella* : Kramp, *J. mar. biol. Assn. U K.*, **40** : 373.

Diagnosis : With a narrow, wide-meshed, intracircular anastomosing network, not stretching far towards the centre, and communicating only with the ring canal; mouth-arms short with terminal clubs, no whip-like filaments.

Remarks : No poisonous effects reported from the members of this family.

31. ***Crambionella annandalei*** Rao, 1931

1931. *Crambionella annandalei* Rao, *Rec. Indian Mus.*, **33** : 50–55, Pl. 3–4, fig. 1, text figs. 4–8.

Material examined : 5 exs. Digha, 26.ii. 1996; 2 exs. Puri, x. 98; 2 exs. Madras coast, Tamilnadu, 27.i.2000; 3 exs. Corbynes cove, 26.i.1999.

Diagnosis : Diameter of the bell 141–268 mm, length of mouth-arm 24–56 mm, Bell more or less dome-shaped; margin more or less incurved, exumbrellar surface finely granulated, minute short furrows and ridge arranged radially, velar lappets 14 in each octant; mouth-arm well developed with stout, long terminal club. Base of the mouth-arm cylindrical, middle part with trifoliate wing. Terminal club about half of entire mouth-arm and devoid of whip-like filaments.

Colour : Light Brownish to redish brownish.

Distribution : East Coast of India : Digha, West Bengal (Sarkar *et. al.*, 2002); Puri, Orissa (Present record and Rao, 1931); Vizag, Andhra Pradesh (Rao, 1931), Madras, Tamilnadu (Present record and Rao, 1931); Corbines cove, South Andaman (Present record), Andaman(Rao, 1931).

Elsewhere : Burma.

32. ***Crambionella orsini*** (Vanhoffen, 1888)

1888. *Mastigias orsini* Vanhoffen, *Bibliotheca zoologica,* **1**(3) : 34,44. Pl. 4, figs.2-4.

1910. *Catostylus orsini* Mayer, *Medusae of the world : Scyphomedusae,* III : 669.

1921. *Crambionella orisini* Stiasny, *Capita zool.,* **1**(2) : 129.

Diagnosis : 100–200 mm wide, plum, massive, hard, and cartilaginous, smooth; 16 small pointed, smooth velar lappets in each octant, seperated by furrows extending upwards on exumbrella, furrows without pigment; mouth-arms about as long as radius of the bell, proximal portion short, one third as long as distal three-winged, large, prismatic portion with a short gelatinous, pyramidal, bluntly pointed, three cornered terminal knob; extra-circular canal system with several radial vessels.

Distribution : East Coast of India : Madras, Tamilnadu (Menon, 1930; Krusadai Island, Tamilnadu (Menon, 1936); Pondichery (Ranson, 1945).

Elsewhere : Trivandrum, Kerala; India; Arabian Sea; Red Sea; Iranian Gulf.

Remarks : The present description is based on Kramp, (1961).

Family XVII. LOBONEMATIDAE

Intracircular network of anastomosing canals communicating with the ring canal and with some or all of the 16–32 radial canals, but not with the stomach; with window-like openings in the membranes of the mouth-arms; marginal lappets elongated, tentacle-like.

Remarks : No poisonus effects recorded from the represnetatives under this family.

Genus ***Labonema*** Mayer, 1910

1910. *Labonema* Mayer, *Medusa of the world : Scyphomedusae,* III : 688.

1961. *Labonema* : Kramp, *J. mar. biol. Assn. U K.,* **40** : 375.

Diagnosis : With a large-meshed intracircular anastomosing network, which communicates with both rhopalar and inter-rhopalar canals and with ring canal.

33. ***Lobonema mayeri*** Light, 1914

1914. *Lobonema mayeri* Light, *Philpip. J. Sci.* **9** : 217, figs. 7-9.

1961. *Lobonema mayeri* : Kramp, *J. mar. biol. Assn. U K.,* **40** : 375–376.

Diagnosis : Bell flatter than hemisphere and about 305 mm in diametre. Gelatinous substance thick, tough and rigid. Exumbrella regularly studded with erect, gelatinous outgrowths. The largest tubercles are about 30–35 mm high and are centrally placed on exumbrella at a distance about 5 mm from one another. 4 Velar lappets large. Numbers of rhopalia varies. Rhopalia have exumbrellar pits with radiating furrows. The arm-disc large, prominent and thick. Mouth-arms are 160 mm long with fusiform terminal appendages tapering to slender filaments.

Distribution : East Coast of India Madras, Tamilnadu (Menon, 1930).

Elsewhere : Indo-China; Philippines.

Remarks The present discription based on Menon (1930).

Genus ***Lobonemoides*** Light, 1914

1914. *Lobonemoides* Light, *Philpip. J. Sci.,* **9** : 222.

1961. *Lobonemoides* : Kramp, *J. mar. biol. Assn. U K.,* **40** : 376.

Diagnosis : Large–meshed, intracircular anastomosing network, which communicates only with the rhopalar canals and the ring canal.

34. ***Lobonemoides robustus*** Stiasny, 1920

1920. *Lobonemoides robustus* Stiasny, *Zool. Meded.,* **5** : 227.

1961. *Lobonemoides robustus* : Kramp, *J. mar. biol. Assn. U K.,* **40** : 376–377.

Diagnosis : Bell 85 mm broad, thick in the centre but very much thinned out towards the margin. Numerous conical outgrowths on the exumbrellar surface. Number of rhopalia is variable. Between each pair of rhopalia, there are 4 velar and 2 ocular lappets. The velar lappets are rather large, bluntly triangular and deeply cleft, while the occular ones are small. Arm-disc is a little less than the radius of the umbrella. Each mouth–arm has at similar appendages are found between the

frilled mouths all along the length of the arm. The terminal filament of each appendage is twice as long as the appendage itself.

Distribution *East coast of India* : Madras,Tamil Nadu (Menon, 1930).

Elsewhere : Malayan archipelago; Java; Manila; Philippines.

Remarks No example of this species noticed during present survey. The description of the species is presented here in accordance to Menon (1930).

Family XVIII RHIZOSTOMATIDAE

8 pairs of scapulets on upper arms, ring canal may or maynot be present,radial canal 16 4 seperated subgenital cavities; distal portion of arms three ringed, usually with a terminal club.

Remarks : No poisonous effect reported from any representative under this family.

Genus ***Rhopilema*** Haeckel, 1880

1880. *Rhopilema* Haeckel, *Syst. der. Acraspeden,* : 596.

1961. *Rhopilema* : Kramp, *J. mar. biol. Ass. U.K.* **40** : 379.

Diagnosis : Large scapulets and long manubrium; mouth-arms with numerous clubs or filaments and usually with a large terminal club; usually without a ring canal; canal net work broad with numerous fine meshes; inter-rhopalar canals wide.

35. ***Rhopilema hispidium*** (Vanhoffen, 1888)

1888. *Rhizostoma hispidium* Vanhoffen, *Bibliotheca Zoologica,* I(3) : 32, 43, Pl. 5, figs.1-2.

1903. *Rhopilema hispidium* Maas, *Siboga Exped., Monogr.,* **11** 73. Pl. 9, figs. 78-81.

Diagnosis Bell higher than a hemisphere, 250–340 mm wide, exumbrella with numerous small, sharp-pointed, conical projections; in each octant about 8 velar lappets, oblong, rounded; mouth arms terminate in a large club-shaped appendage with a faceted, swollen end, other club-shaped appendages between the mouths on the three wings.

Distribution : East Coast of India Puri, Orissa (Rao, 1931); Madras, Tamilnadu (Menon, 1930); Krusadai Island (Menon, 1936); Palk Bay (Panikkar and Prasad, 1951).

Elsewhere : Trivandrum (Travancore) coast, Kerala, India; Japan; Red Sea; Malayan Archipelago; China; Philippines; Swez bay.

Remarks The present description is based on Kramp (1961). The specimen described by Menon (1936) was a juvenile one and a doubtful species.

VALUE OF THE TAXON

The medusae and adult scyphozoa have an important role to maintain the food chain in the marine ecosystem (Fig. 1) and it is proved that they are never considered friend or foe species for fishes (Sarkar *et. al.*, 1999), though medusae of some species are found in the gut of few large fishes.

Prey is usually caught by nematocyst–ladden tentacles and the stings of few species make hazards to bathers. This poison is actually hipnotoxin in nature and also have biomedical value. The medicine from jellyfish toxin is known over decades to cure puffyness and rheumatic pain in human beings.

It is observed during recent investigation that the fishermen and tribal communities of coastal areas of Digha-Shankarpur (District : Midnapur, West Bengal) have a regular practice to use the jelly mass (bell portion) of *Acromitus* species to cure the infection of inner ear as local application, which indicates the ethno-biological value of this group. It is also reported to use jelly fish as food in the west coast of the country and in Japan after proper trimming and curing of the umbrellar portion.

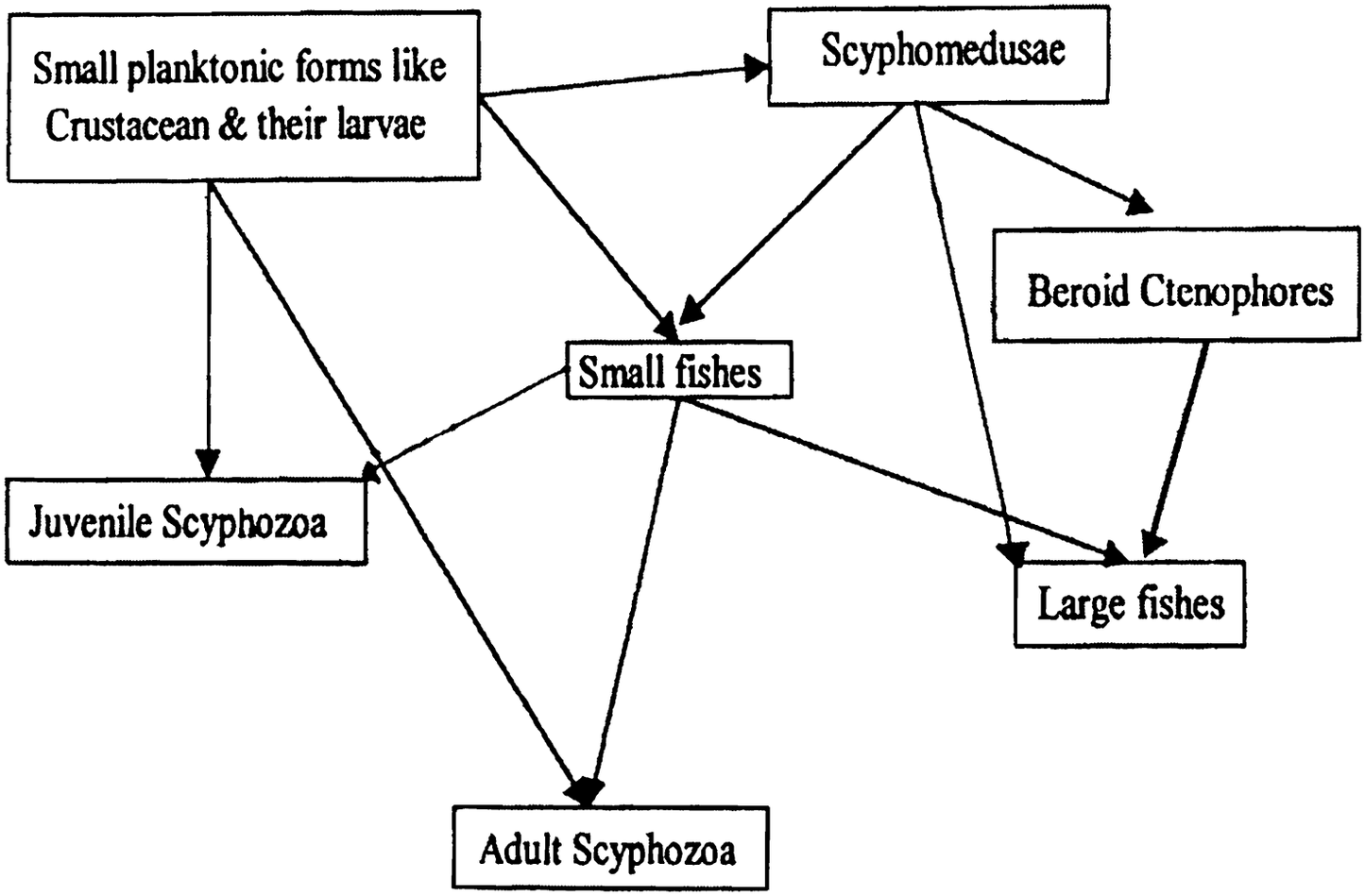

Fig. 1. Prey-predator relationship among scyphozoa with other marine forms.

PRESENT POSITION

Thousands of scyphomedusae, their juveniles and adult forms are destroyed in summer, post monsoon and winter months every year by the local fishermen as cast-off on dry beach from their fishing nets. Death of medusae are also noticed in the brackish water prawn farms by the use of some plant alkaloids to eradicate them.

DISCUSSION

The present findings reveal that uptill recently 35 species of scyphozoan jelly fishes recorded by several workers from eastern coast of India (including Andaman & Nicobar Islands). However, the recent findings indicate a number of species described earlier were absent in the locality of their original description. This negative result of their distribution is probably due to the over exploitation of marine fishery resources, mass mortality in fishing nets and pollution. Besides these, mateorological calamities also affect their migration.

As all scyphozoans species play an essential role in marine ecosystem and some of them have medicinal and edibility value, we must try to conserve them at least by releasing them from fishing nets before landing or by banning the fishing during their mass migration and spawning. Otherwise, in future, some of the species will be threatened or endangered and ultimately will break the ecological balance in marine environment.

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Table 1. : Distribution of Scyphozoa along the East coast, including Krusadai Island and Andaman & Nicobar Islands

No.	Species	West Bengal coast	Orissa coast	Andhra Pradesh coast	Tamilnadu coast	Krusadai Island	Andaman Islands	Nicobar Islands	Remarks
1	*Lucernariopsis* sp.	–	–	–	–	+	–	–	
2	*Charybdea alata* Renaud	–	–	–	+	–	–	–	
3	*Tamoya gargantua* Haeckel	+	+	+	+	–	–	–	
4	*Chiropsalmus buitendijki* Horst	–	–	–	+	+	–	–	
5	*Chiropsalmus quadrigatus* Haeckel	–	–	–	–	+	–	–	
6	*Chiropsalmus quadrumanus* (Muller)	–	+	–	+	–	–	–	
7	*Atolla wyvillei* Haeckel	+	–	+	–	–	+	–	
8	*Nausithoe punctata* Kolliker	–	–	–	+	–	–	–	
9	*Periphylla periphylla* (Peron & Lesueur)	–	–	–	–	–	–	–	Distribution recorded only as : Bay of Bengal.
10	*Chrysaora helvola* Brandt	–	+	–	+	–	–	–	
11	*Chrysaora melanaster* Brandt	–	+	–	+	–	–	–	
12	Chrysaora quinquecirrha (Desor)	–	+	–	+	–	–	–	
13	*Pelagia noctiluca* (Forskal)	–	–	–	+	–	–	–	
14	*Cyanea purpurea* Kishinouye	+	+	–	+	–	–	–	
15	*Aurelia aurita* (Linne)	–	–	–	–	–	+	–	
16	*Aurelia solida* Browne	–	–	–	+	–	–	–	

Table 1. : *Cont'd.*

No.	Species	West Bengal coast	Orissa coast	Andhra Pradesh coast	Tamilnadu coast	Krusadai Island	Andaman Islands	Nicobar Islands	Remarks
17	*Cassiopea andromeda* (Forskal)	+	–	–	+	+	–	–	
18	*Cephea* sp.	–	–	–	+	–	–	–	
19	*Netrostoma coerulescens* Maas	–	–	–	+	+	–	–	
20	*Netrostoma setouchianum* (Kishinouye)	–	–	–	+	–	–	–	
21	*Netrostoma typhlodendrium* Schultze	+	–	–	–	–	–	–	
22	*Mastigias albipunctatus* Stiasny	–	–	–	+	–	–	–	
23	*Mastigias papua* (Lesson)	–	–	–	+	–	–	–	
24	*Mastigietta palmipes* (Haeckel)	–	–	–	+	+	–	–	
25	*Versuriga anadyomene* (Maas)	+	–	–	–	–	–	–	
26	*Thysanostoma thysanura* Haeckel	–	+	–	–	–	–	–	
27	*Thysanostoma loriferum* (Ehrenberg)	–	–	–	+	–	–	–	
28	*Lychnorhiza malayensis* Stiasny	–	–	–	+	–	–	–	
29	*Acromitus flagellatus* (Maas)	+	+	–	+	+	–	–	
30	*Acromitus rabanchatu* Annandale	+	+	–	–	–	–	–	
31	*Crambionella annandalei* Rao	+	+	+	+	–	+	–	
32	*Crambionella orsini* (Vanhoffen)	–	–	–	+	+	–	–	
33	*Lobonema mayeri* Light	–	–	–	+	–	–	–	
34	*Lobonemoides robustus* Stiasny	–	–	–	+	–	–	–	
35	*Rhopilema hispidium* (Vanhoffen)	–	+	–	+	+	–	–	