

A CHECK LIST OF OPISTHOBRANCH SNAILS OF THE KARACHI COAST

Quddusi B.Kazmi, Nasima M.Tirmizi and Itrat Zehra

Marine Reference Collection and Resource Centre(QBK; NMT); Centre of Excellence in
Marine Biology (IZ), University of Karachi, Karachi-75270, Pakistan

ABSTRACT: The check list deals with 44 species of opisthobranchs belonging to Cephalaspidea (12 species), Anaspidea (4 species), Sacoglossa (4 species), Notaspidea, (2 species) and Nudibranchia (21 species), collected from Pakistan coast of northern Arabian Sea.

KEY WORDS: Sea slugs, Karachi, Sindh coast, check list.

INTRODUCTION

Earlier studies on the opisthobranch molluscan fauna of Karachi - Sindh coast were made by Eliot (1905) and Khan *et al.* (1971, 1973) reporting only a few species. Since reports by Woodward (1856), Murray (1887) and Sowerby (1895) and not available nothing can be said relevant to opisthobranchs in these works. One order Thocosomata of this subclass was treated by Frontier (1963), Fatima (1988) and Zehra & Nayeem (1995); this order is not incorporated here due to its planktonic existence. Tirmizi (1977, restricted) dealt with only few species of opisthobranchs and other molluscs. Tirmizi & Zehra (1982) gave in their generic key some opisthobranchs, later however only two species were reported in a monographic work on gastropods (Tirmizi & Zehra, 1984). Some work has been done on the reproductive biology (Zehra *et al.*, 1988, 1995); from the HEJ Research Institute of Chemistry, University of Karachi biochemical substances from an anaspid *Aplysia juliana* are reported (Rahman, *et al.*, 1991), the specimens are not seen by us. Dance (1992) has given several species distributed in the Indo-Pacific region, four of these species are not encountered by the Pakistani workers, since they are likely to occur on the Pakistan coast they are mentioned here: *Bullina lineata* Gray, *Acteon eloiseae* Abbott, *Atys naucum* Linnaeus, and *Hydatina amplustre* Linnaeus. Some of the colourful species have been communicated occasionally by MRC Newsletters (Kazmi, 1992, 1994). While looking for the biodiversity of the Karachi - Sindh coast, the opisthobranchs were selected for a one year report (Kazmi, 1992, restricted). The present check-list is prepared from the specimens deposited in the Marine Reference Collection & Resource Centre (MRC), University of Karachi, most of them may be new records, and those listed earlier from Karachi by the authors above mentioned, in the latter case the specimens are not seen by us. In all 44 species are reported comprising the following orders : Cephalaspidea, Notaspidea, Anaspidea, Nudibranchia and Sacoglossa obtained from Karachi-Sindh (Bulleji, Cape Monze, Pacha, Banglo, Clifton, Korangi, Sandspit, Manora, Baba Bhit Islands, Ibrahim Hydery, Port Qasim, Wazeer Mansion and Misri Shah), and few samples from Makran (Jiwani and Pasni) (Map).

The opisthobranchs caught alive were brought to the laboratory and maintained in aquaria most are difficult to maintain in aquaria because they are food specialists also some are endangered species! and they are expected to be of particular interest to the

aquarists and pet shops. We have been able to capture the grace and beauty through photographs; the colour is an important criterion for classification which disappears after preservation. For classification mostly Gosliner (1987) and for authors name Franc (1968) are followed. A generic diagnosis is given with a brief description of the species, accompanied either by a coloured photograph, black and white or coloured illustration, with the exception of those compiled from earlier literature. Most of the species have been identified, a few only up to generic level. Their inclusion in this report is to provide a relatively more comprehensive record of the fauna present on the Karachi coast. In addition to a brief description, remarks on the natural history and previous distribution are also included. Distribution of species is omitted when information is not available to the authors. The literature cited do not include the citation of original authority.

Some species spawned in the laboratory. The spawns are either photographed or illustrated. The colour, shape and size of the spawns can also be utilized to some extent in the identification of species otherwise based on morphological and anatomical aspects.

SPECIES ACCOUNT

Order: Cephalaspidea Fischer, 1883
(= Bullomorpha)

Family: Haminoeidae Pilsbry, 1893 (= Atyidae Thiele, 1926)
Genus: *Haminoea* Turton & Kingston, 1830

Apex of shell invisible, being deeply sunken in lateral whorls. No open pit.

Haminoea tenera (Adams, 1858)

Parapodia extend only to middle of shell. Shell visible, thin, fragile, uniformly pale greenish-white in colour.

Muddy-cum-sandy areas of Dhongi Island and Korangi (Khan *et al.*, 1973).

Distribution - Indian Ocean.

Haminoea ? natalensis (Krauss, 1848) (Fig. 1, A, B, Pl. 1)

Shell with narrow aperture, differs from *H. alfredensis* given by Gosliner, 1987, fig. 4C. Shell and body green, irregular patches and spots of darker shades of green. Median radular tooth with three cusps. Hind end of head shield deeply bilobed.

Found crawling in shallow pools in the winter near rocky area of Bulleji, with weeds.

Distribution - Indian Ocean.

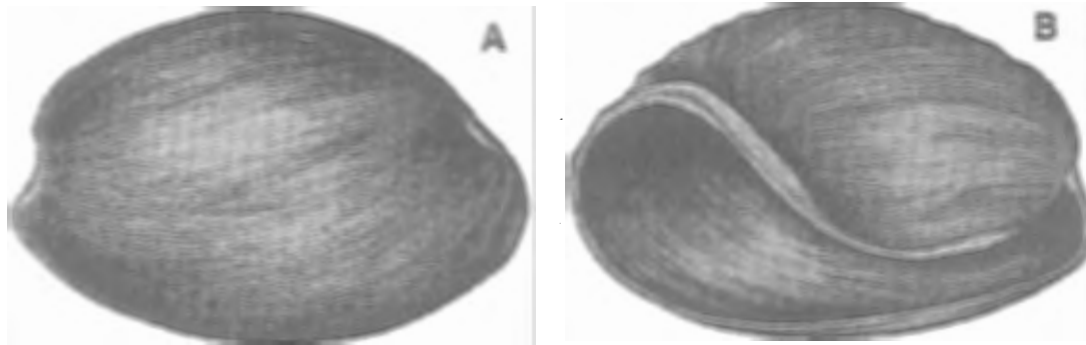


Fig.1. *Haminoea ? natalensis* (Krause, 1848), shell. A, outer view; B. inner view.

Family: Philinidae Gray, 1850

Genus: *Philine* Ascanius, 1772

Large head shield, flattened body, small internal shell, only slightly coiled, extremely thin platelike, chalky and fragile. Masticatory plates 3, calcareous, similar.

Philine kurodai Habe, 1952

(Fig. 2)

Body fully specialized for burrowing. Shell entirely embedded in the fleshy lobes without projections 4 in number. Shell extremely thin and fragile, only slightly coiled.

Frequently found in shallow waters where they gather in large number, sometimes only internal shells from dead specimens found on sandy beaches of Sindh.

Distribution - Indo-Pacific.

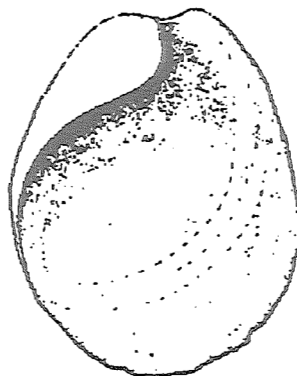


Fig.2. *Philine kurodai* Habe, 1952, shell (after Tirmizi & Zehra, 1982).

Philine sp.
(Fig. 3A,B)

A nondescript broad, flat body, white in colour with a conical tail, very close to *Philine* sp. given by Wells & Bryce (1993:38).

Boat collection near Ibrahim Hydri collected on 24 January 1994.

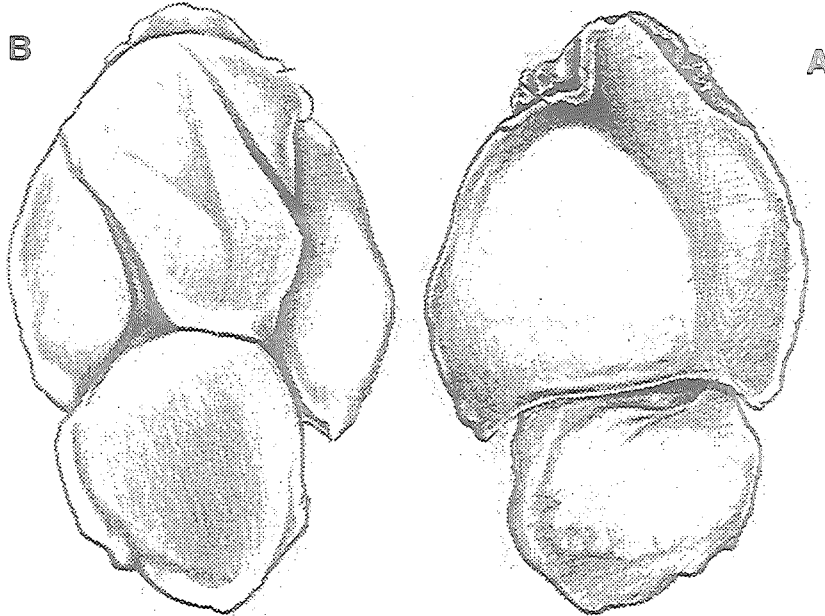


Fig.3. *Philine* sp., A. dorsal view; B. ventral view.

Family : Acteonidae Orbigny, 1835

Genus: *Pupa* Roding, 1798

Shell hard in texture with conical spire. Shell into which the animal can withdraw. Operculum present. Open sperm groove wanting.

Pupa sp.
(Fig. 4A,B)

Normally does not form aggregations. However, one sample (April 1985) from Sandspit had 320 specimens. Occurs high in the intertidal area near the base of the mangrove plant at Wazeer Mansion and Sandspit, the size of shell decreases in July. Spawned in the laboratory in October. Egg mass broad crescent-shaped ribbon. (Fig. 4B).

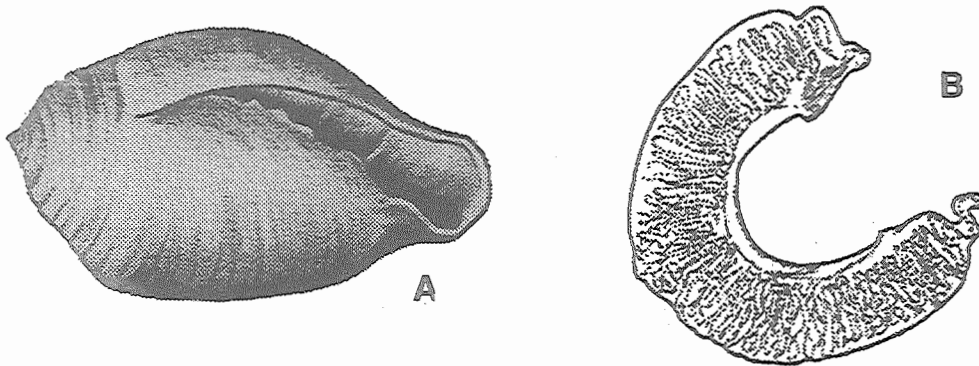


Fig.4. *Pupa* sp., A. shell; B. egg ribbon.

Pupa sulcata (Gmelin,1791)
 (= *Acteon sulcata*)
 (= *Pupa roseomaculata* Iredale,1936)

Shell thick, short spired, suture well-marked, body whorl gently rounded. Broad flat-topped ribs encircle the body whorl. Shell white in colour, with smudged blackish-brown spots on the ribs.

Not very common. Found in shallow water on sand.

Distribution - Indo-Pacific : Mauritius, Red Sea, Singapore, Philippines, Torres Sea, Australia, Tahiti, New Caledonia, Japan and China.

Pupa solidula (Linnaeus, 1767) (= *Solidula solidula*)

Shell solid. Ribs rounded, encircling the shell. Colour of the shell white, with black, red or fawn spots on the ribs, aperture and columella both white.

Fairly common at Manora Island in winter, in shallow water on sand.

Distribution - Tropical and Indo-Pacific : Mauritius, Natal, Torres Sea, New Caledonia, Philippines, Indonesia, Japan and China.

Genus : *Acteon* Montfort, 1810

Shell slender, aperture long and narrow, one or two folds on columella. Shell with operculum.

Acteon sp.
 (Fig. 5)

Lives just beneath the surface of sand. Dull in colour.

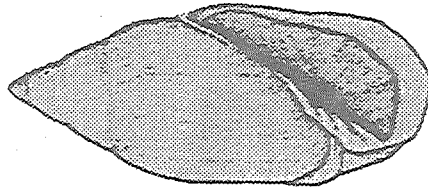


Fig.5. *Aceon* sp. shell (after Tirmizi & Zehra, 1982).

Family Bullidae Lamarck, 1801

Genus *Bulla* Linnaeus, 1758 (= *Bullaria* Rafinesque, 1815)

Shell thick and heavy, comes in many sizes, with swollen body whorl and a sunken spire into top of the shell.

Bulla ampulla Linnaeus, 1758

(Fig.6)

Shell heavy, calcified into which animal can withdraw completely sealing the entrance with operculum. Aperture as long as the shell, spire deeply sunken. Shell fairly thin and papery; polished and mottled brown. Fleshy lobes of foot reflected over the shell both sides and behind.

Winter breeder, deposits eggs in the form of tubular or droplike gelatinous egg mass, usually found in the upper tidal zone intermingled with the green weed, attached on a string. Egg and larvae arranged in coiled form, light yellow in colour. Size of egg mass 15-18mm/5-8mm. Number of larvae per egg mass 500-700. Size of larvae 0.25-0.35mm, survived for 21 days. (Tirmizi, 1977, restricted).

Markedly seasonal, very common in autumn or postmonsoon period although available all the year round at Sandspit, Manora Island, Port Qasim, Clifton mangroves, and Korangi Creek burried in soft silt or mud or shells commonly found in rock and tidal pools, and also from Jiwani. Normally encountered in the marginal region of mangroves where it lives in association with seaweed.

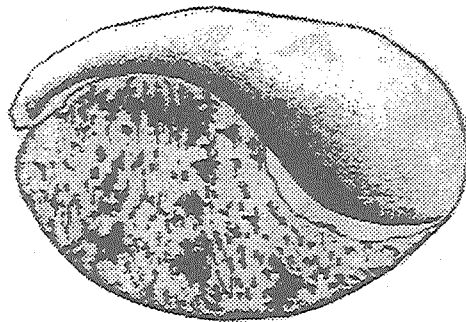


Fig.6. *Bulla ampulla* Linnaeus, 1758, shell (after Tirmizi & Zehra, 1984).

Distribution - Indo West Pacific : Red Sea, Mauritius, Natal, India, Seychelles, Japan, Philippines and China.

Family: Hydatinidae Pilsbry, 1893 (= Aplustridae)

Genus: *Hydatina* Schumacher, 1817

Shell slender and fragile. Exposed spiral shell into which the animal can withdraw. Head shield bears one pair of large earlike appendages and two pairs of smaller ones.

Hydatina physis (Linnaeus, 1758)

(Fig.7A, B)

Extremely beautiful shell with numerous spiral brown or black densely spaced line. Soft part dark pink with blue marginal line around the broad frilly foot. Tentacles wide, of enormous size and ear-shaped.

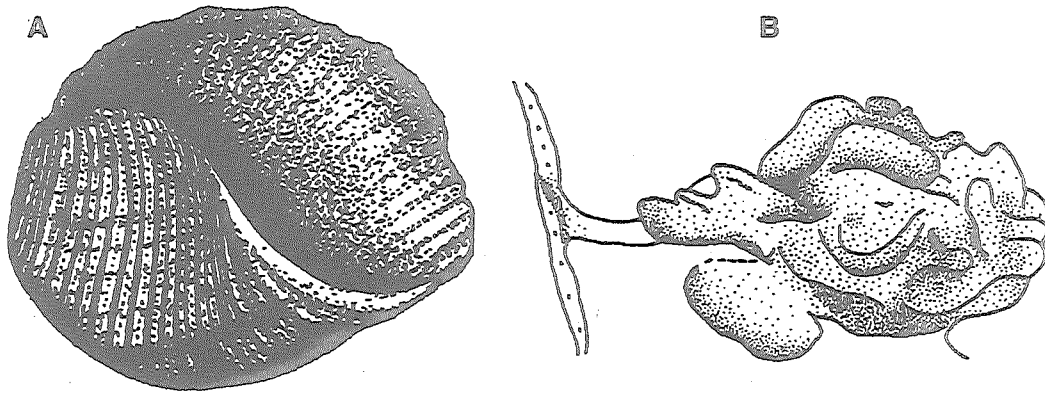


Fig.7. *Hydatina physis* (Linnaeus, 1758), A. shell (after Tirmizi & Zehra, 1984); B. spawn mass (after Zehra & Perveen, 1992).

Egg mass white convoluted structure (Fig.7B). Breeds from November to February.

Fairly common on Karachi coast from October to March, mainly found on rocky shores in small pools on silty sand from Bulleji at tidal height of 0.8m near low water mark, may be associated with cirratulid polychaetes upon which it feeds also from Pasni and Jiwani. Highly specialized predator, feeding exclusively on cirratulid polychaetes (Gosliner, 1987).

Distribution - Circumtropical and known from all warm oceans of the world.

Hydatina zonata (Lightfoot, 1786)

(= *Hydatina velum* (Gmelin, 1791))

(Pl.1B, B')

Ivory coloured fragile shell encircled by one white band bordered with black; aperture wide, soft part very pretty, large, pink and frilly, edged with electric blue.

Majina Island near Karachi. Occasionally found among stones in sand at low water spring tide (Khan *et al*, 1973); also Ibrahim Hyderi Fish Harbour in summer.

Distribution - Indo-pacific : South Africa, Arabian Gulf, northern Arabian Sea and Pacific Ocean.

Hydatina albocincta (van der Hoeven,1811)
(Pl.1C)

Shell very slender and fragile, encircled by 5 or more dark bands, each brown band variegated, pale streak. Spiral sunken. Aperture white. Apex slightly sunken. Shoulder near suture line rounded.

Among fish landings at Ibrahim Hydari Harbour in December.

Distribution - Indo-Pacific.

Order : Anaspidea Fischer, 1883 (=Aplysiomorpha)
Family: Aplysiidae (Laplysiens Lamarck, 1809)
Genus: *Aplysia* Linnaeus, 1767

Skin smooth, devoid of projections. Parapodia mainly free. Cephalic tentacles broadened basally to form an oral veil. A pair of rhinophores and a pair of eyes followed by a neck region merging into a plump trunk. Shell weakly calcified, almost as large as mantle whose lobes leave a hole over it. Several species are likely to occur.

Aplysia oculifera Adams & Reeve, 1850
(Pl.1D)

With small black rings on the body.

Population number fluctuates sporadically. Rock pools at Bulleji (20 January, 1992 at -2m tide) and Makran coast, herbivore. Spawns on the second day of capture from Bulleji. Numerous egg masses of green colour as entangled strings. Veligers emerged. It is reported to be a nocturnal species (Gosliner, 1987).

Distribution - Widely distributed throughout the Indo-West Pacific as far the Hawaii Islands.

Aplysia benedicti Eliot, 1899

Observed egg mass yellowish brown, translucent, long, thick filaments. Spawns from November to March. Abundantly found during winter on the rocky shores.

Distribution - Indo-Pacific : Gulf of Mannar, Pakistan and Samoa Island.

Aplysia sp.
(Pl.1E)

Collected from Somar Goth on 20 March, 1995. Large species, apparently resembling *Aplysia* cf. *extraordinaria* Allan, 1932 given by Wells & Bryce, 1993.

Family: Notarchidae Eales & Engel, 1935

Genus: *Bursatella* Blainville, 1817

Skin shaggy with loose contractile tags and tassels, the larger dendritic. Parapodia separate over mid body and fused posteriorly.

Bursatella leachii (Blainville, 1817)
(= *Notarchus (Bursatella) leachii*)
(Fig. 8)

Large eyelike spots scattered over body, each spot peacock green in centre. Foot narrow, adapted for climbing seaweeds. Tags and tassels pinkish. Shell usually greatly reduced or absent. Penis armed with spines.

Quite abundant on the shores of Karachi, mainly in the cooler months, inhabiting mid-tidal zone on brown weeds associated with *Aplysia* collected from Clifton, feeds on weeds while *Bursatella* ingests large amount of sand. Light brownish yellow egg mass in the month of March consisting of many irregular looplike gelatinous filaments filled with reddish brown eggs.

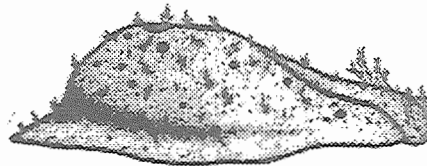


Fig.8. *Bursatella leachii* (Blainville, 1817), lateral view (after Tirmizi & Zehra, 1982).

Distribution - Circumtropical species, including the Mediterranean Tyrrhenian and Adriatic Seas, although its sub-species are geographically isolated. (Gosliner, 1987)

Order: Sacoglossa Ihering, 1876 (=Ascoglossa)

Superfamily: Elysiacea Odhner, 1939

Family: Elysiidae Forbes & Hanley, 1851

Genus: *Elysia* Risso, 1818

With parapodia lacking cerata and shell. Rhinophores rolled. Herbivorous having suctorial buccal complex piercing algal cells and sucking their liquid contents; supplementary food through chloroplasts in the transparent skin of the digestive tract to produce sugars. Reproductive system highly variable. Need of division of genus felt (Jensen, 1993).

Elysia marginata (Pease, 1871) (= *Elysia ornata* (Swainson, 1840))
(Fig. 9 & Pl. 2A)

Body green with opaque white and black spots, parapodial margins orange and black.

Found on green algae in tidal pools at a Banglo on 21 December, 1991.

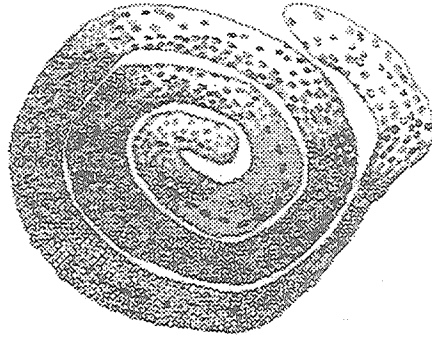


Fig.9. *Elysia marginata* (Pease, 1871), egg ribbon.

Survived in laboratory for two months. Laid three egg masses with interval of one day. Average size of egg mass 7.5mm. Of the three egg masses one found on the seaweed frond in the aquarium, other two on wall of the aquarium. Each egg mass a flat greenish coil of three whorls. Eggs within the coil positively geotactic, released veligers positively phototactic.

Distribution - Widespread in the Indo-West Pacific, also Atlantic.

Elysia near *maoria* Powell, 1937
(Pl.2B)

Body delicate somewhat lance-shaped and flattened, edges raised to form parapodial folds which may be stretched out or fold over the rest of the body. Main head tentacles rolled and tubelike.

The material of this species was initially identified as *E.virdis* (Montaga, 1804), according to Jensen (personal communication Q.B.K) " that green *Elysias* are not all *E.virdis* ", may be it is *E. maoria*.

Found creeping among weeds on lower shore. Colour green or can vary. Seldom visible on the green algae background. Individuals fairly common on the rocky shores from early December to mid March. Sometimes so common that a single branch of green seaweeds accommodates several specimens. Most of the adults die in the aquarium when their reproductive capacities are exhausted. Colour of egg ribbon lemon yellow. Spawning season from December to February.

Distribution - Indo-Pacific: New South Wales, Rottnest Island and Western Australia.

Family: Caliphyllidae Thiele, 1931
 (= Phyllobranchidae = Polybranchiidae)

Genus: *Polybranchia* Pease, 1860 (= *Phyllobranchus* Alder & Hancock, 1864)

Anus lateral. Penis armed. Digestive glands in leaflike cerata. Rhinophores rolled, bifid; short rolled oral tentacles. Radular teeth with denticulate cusps.

Polybranchia viridis (Deshayes, 1857) ?
 (Fig. 10)

The specimen does not allow much handling due to its poor condition. Cerata large, flattened and foliaceous.

Green brown with white specks collected from *Caulerpa* spp., cerata may have a black spot towards margin. (Thompson, 1977 *vide* Jensen, 1993).

Collected from Banglo.

Distribution - Indo-Pacific and Atlantic: Jamaica.

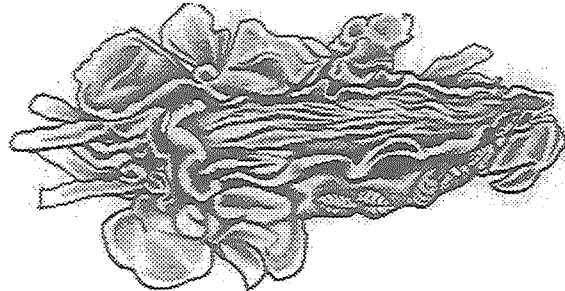


Fig.10. *Polybranchia viridis* (Deshayes, 1857), ventral view.

Polybranchia sp.
 (Fig. 11A,B, Pl.2C)

Only two specimens from Pacha, collected on 19 August 1993, among the siphonaceous green alga *Caulerpa faridii*. Each ceras like a narrow rolled leaf.

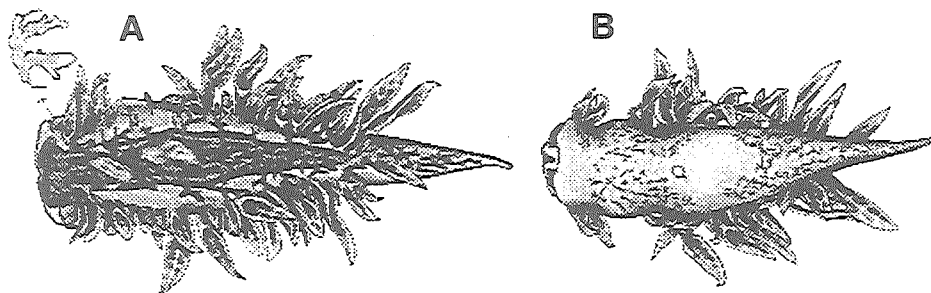


Fig.11. *Polybranchia* sp. A. dorsal view, B. ventral view.

Polybranchia orientalis (Kelaart, 1858) (= *Phyllobranchillus orientalis*)
(Fig. 12, Pl.2D,D')

Bifid rhinophores, hidden in the cerata. About 150 club-shaped deciduous cerata. Margins of cerata thin, finely denticulate, denticles brownish. The cast off cerata displayed worm-like curling and stretching movements for a while before their death. The specimen survived in the laboratory for several days.

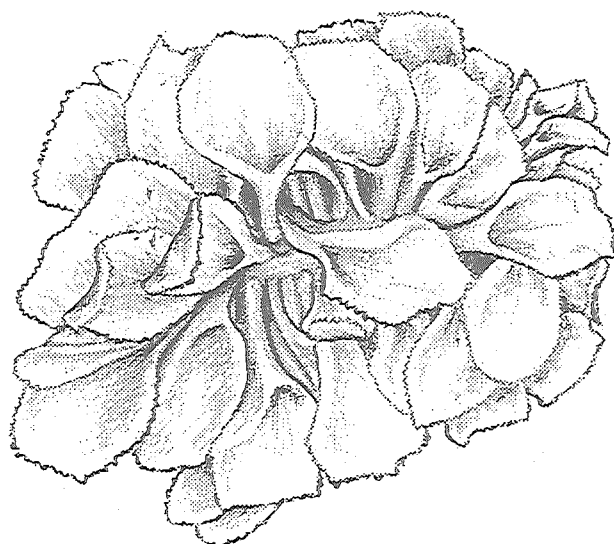


Fig.12. *Polybranchia orientalis* (Kelaart, 1858), dorsal view.

Greyish yellow with chocolate brown mottlings. Digestive gland in cerata yellowish green, a deep brown or black spot centrally on each ceras; found on *Caulerpa brachypus* (Baba & Hamatani, 1971 *vide* Jensen, 1993).

The species appears to be nocturnal (Gosliner, 1987). Collected twice (December 1993, 17 January 1994) from Bulleji.

Distribution - Widely distributed throughout the Indo-Pacific: South Africa, Sri Lanka, India, Japan, New Caledonia, Western Australia and Hawaii.

Order Notaspidea Fisher, 1883
(=Pleurobranchomorpha or Pleurobranchacea)
Family: Pleurobranchidae Duthér, 1859
Subfamily: Pleurobranchinae
Genus: *Berthellina* Gardiner, 1936
(=*Berthella* Vassiere 1925, non Blainville)

Shell covered entirely or absent. Mantle smooth, granular or tuberculate, edge overhanging the foot and the frontal veil. Branchial rachis smooth. Anus in the posterior extremity.

Berthellina citrina (Rüppell & Leuckart, 1828)
(Pl.3A,A')

Rhinophors enrolled. Easily recognized by its smooth shield-like dorsum and yellow to orange colour, with opaque white spots. Delicate and translucent shell hidden by mantle, aperture wide, small in proportion to animal. A long gill lies under the right of mantle.

Exclusively carnivorous utilizing strong jaws to scrape tissues of their prey, a dissected specimen had sponge spicules in the buccal cavity, may be scavenger also, may secrete sulphuric acid from acid gland as defense mechanism. Egg mass an orange collar of about one whorl which stands on its edge. Collected on 20 January, 1996 from Pacha, one specimen spawned on 29 January, veliger released on 15 February, survived for 7 days.

Occurs in rock pools attached to under surface of stones.

Distribution - Atlantic Coast of Cape Peninsula to Mozambique, Suez, Red Sea, Gulf of Kutch and Karachi, throughout the Indo-Pacific to Hawaii.

Genus: *Berthella* de Blainville 1825 (= *Bouvieria* Vayssiere, 1896).

Shell auriculate. Smooth branchial rachis. Branchiae bipinnate. Rhinophores contiguous inserted above veil.

Berthella tupala Marcus, 1957
(Pl.3B)

Translucent white notum with opaque white markings. Rhinophores rolled, simple. Radular teeth sickle shape.

B. tupala occurs in mid-intertidal zone under rocks, breeds in winter, collected on 20 January 1996 from Pacha, spawned on the next day, the spawn a white translucent spire.

Distribution - Known from the Western Atlantic, South Africa to Hawaii.

Order: Nudibranchia (=Acoela Cuvier, 1817)
Suborder: Arminacea (= Arminoidea)
Genus: *Armina* Rafinesque, 1814
Family: Arminidae A. Pruvot - Fol, 1927

Large oral veil in front. Cerata absent, rhinophores not retractable. Usually length-wise ridges along upper body surface. A row of gill leaflets present in a groove between foot and body.

Armina babai (Tchang, 1934)
(Fig. 13)

Body without ridges, covered with papillae of varying sizes. Rhinophores with 8

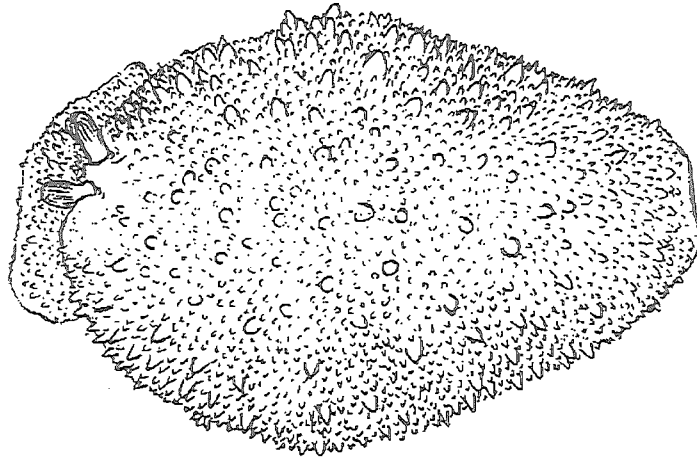


Fig.13. *Armina babai* (Tchang, 1934).

10 folds. Median tooth of radula with blunt median cusp flanked by 5-6 denticles. Mantle light brown, papillae white, Anterior gills white, posterior gills reddish brown. Egg ribbons coiled with a hold fast on first whorl (Kazmi & Tirmizi, in press).

Common on Damb Bunder (Baluchistan) and Ibrahim Hyderi.

Distribution - China, Japan and Pakistan.

Armina punctilopsis Lin, 1992
(Pl.3C,C')

Body without ridges, covered with fine papillae. Rhinophores with 10 folds. Median tooth of radula with prominent median cusp and 5-7 lateral denticles. Colour ashy with two large purplish spots on the notum. Gills dark purple, foot yellow. Collected from Sindh coast in winter (Kazmi & Tirmizi, in press).

Distribution - Hong Kong and Pakistan.

Suborder: Doridacea Odhner, 1939 (=Holohepatica)
Family: Asteronitidae Thiele, 1931
Genus: *Artachaea* Bergh, 1881

Notum tuberculate. Eight gills. Shifted from Dorididae to Asteronitidae by Gosliner (1987). According to him the genus was first time then reported from the Indian Ocean. but Eales and Eliot (1907) report of *A. intermedia* and *A. clavata* from Aden and Zanzibar respectively needs to be discussed.

Artachaea sp.
(Fig. 14)

Colour of body brownish mottled. It can be doubtfully referred to *A.intermedia*

Eales, 1938 described from Aden.

One specimen collected at Sonari on 8 October, 1991.

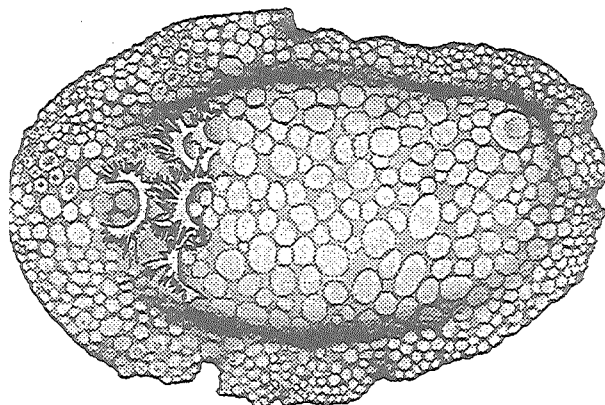


Fig.14. *Artachaea* sp., dorsal view.

Family: Kentrodorididae Bergh, 1892 (= Centrodoritidae)

Genus: *Jorunna* Bergh, 1876

Back granular. Gills tripinnate. Male atrium bears a stylet.

Jorunna funebris (Kelaart, 1859)

(= *Jorunna zania* Marcus, 1976)

(Pl.3 D)

Distinguishable from other dorids by its white ground colour with black spots on the dorsum.

Spawned several times in the laboratory. Egg mass an undulating collar of four to five whorls. Newly laid egg collar off white, changed to purple with time. Veligers maintained. Feeds on brown sponges.

Collected continuously from the rock pools of Bulleji in summer attached to the under side of stones from the lower intertidal to shallow subtidal zones. It seems to be most common opisthobranch of Karachi coast.

Distribution - Indo-west Pacific.

Family: Polyceridae Alder & Hancock, 1845 (= Euphauridae)

Genus: *Thecacera* Fleming, 1828

Without any papillae or tubercles, mantle border with club-shaped appendages. Large rhinophore sheaths. Branchiae formed of 3 lobes directed forward.

Thecacera pennigera (Montagu, 1804)

(= *T. maculata* Eliot, 1905)

(= *T. lamellata* Barnard, 1933)

Body light flesh colour with black spots and a few orange red spots. Rhinophores and gills splashed with orange red. Behind the gills two stout, simple appendages present (Eliot, 1905).

Feeds on aborescent bryozoans, occurs from intertidal boundary to 15m.

Distribution - Widespread, with a seemingly cosmopolitan distribution, known from Europe, Brazil, South Africa, Pakistan, Japan, Australia and New Zealand.

Family: Rostangidae A. Pruvot - Fol, 1951

Genus *Rostanga* Bergh, 1881

Gills generally unipinnate. Dorsal surface covered with papillae of various sizes.

Rostanga muscula (Abraham, 1877)

(Pl. 4A,A')

Red orange colour with dark mottled markings of the same colour on centre of notum.

Feeds on red or orange sponges. Collected from Sonari on 8 October, 1991 under rocks in midintertidal zone and on 18 January 1996, from Manora and spawned on the fifth day (dt: 22 Jan.), as orange whorl, changed to grey after 3 days, veligers emerged on 28 January, photographed on next day and then on 10th day. Veligers survived till 11 February.

Distribution - Indo-Pacific, tropics - Reported from South Africa, Australia, New Zealand and Japan.

Family: Goniodorididae H. & Adams, 1854

(= Okeniidae Iredale & O'Donoghue, 1923)

Genus: *Goniodoris* Forbes & Goodsir, 1839

Mantle soft with a oral veil on the head with long tentacles flattened side lobes.

Goniodoris modesta (?) Alder & Hancock, 1864

Colour dark brown, mottled. Gills large light brown. Rhinophores large perfoliate. Foot narrow and grooved in front. Radular formula 1+1.0.1+1 (Eliot, 1905).

Genus: *Okenia* Menke, 1830

Small soft body, oral veil on head with flattened side lobes or tentacles.

Okenia sp. 1
(Fig.15, Pl.4B)

Collected from Somar Goth (Bulleji) on 28 December, 1994 and again on 20 September, 1995 from Ibrahim Hydery detected under small stone brought in to the laboratory not observed by unaided eye. White body with brown lines between notal appendages and edge. Notum bears a series of 12 short cylindrical processes.

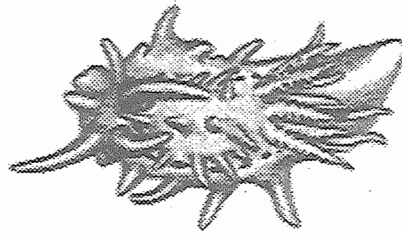


Fig.15. *Okenia* sp., dorsal view.

Okenia sp.2
(Pl.4C)

Collected from Koranig Creek on 20 September, 1995. Similar to *Okenia* sp.1 except that the brown lines on notum are missing.

Family: Chromodorididae (= Glossodorididae)
Genus: *Chromodoris* Alder & Hancock 1855

Body long and narrow, foot longer than the mantle. Vas deferens without armature. Smooth brightly coloured back narrow projecting notal edge. Unipinnate gills retractile into pockets (Cryptobranch). Feeds on sponges, toxic chemicals of sponge absorbed by chromodorids into mantle glands used to repel potential predators (Wells & Bryce, 1993).

Chromodoris semperi Bergh, 1900

Semitransparent, slate-greyish flesh colour body with bright orange spots and deep purple streaks. Foot narrow grooved. Tail projecting. Oral tentacles long and digitate. Six pinnate gills (Eliot, 1905).

Distribution.- Gulf of Kutch and Karachi (Hornell, 1951).