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THE OPISTBRANCH MOLLUSKS (CEPHALASPIDEA, SACCOGLOSSA, NOTASPIDEA, ANASPIDEA AND NUDIBRANCHIA) OF THE ADRIATIC SEA WITH SPECIAL REFERENCE TO THE SLOVENIAN COAST

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ABSTRACT

During the past 20 years, 49 species of Opisthobranch mollusks have been recorded with the aid of SCUBA diving and underwater photography in the Adriatic Sea. We found that certain localities have higher biodiversity than others. Some species are considered rare and only present at certain localities in a limited time of the year, while others can be found through the entire year at different localities and are therefore listed as frequent. Scuba diving and underwater photography are valuable tools in studying biodiversity of opisthobranch mollusks. They provide us not only with records of a certain species but also with some other data, i.e. type of their habitat, food, spawn, etc. In the paper we also report on the highly surprising find of the tropical species Halgerda sp. in the shallow waters of the island of Cres. To our best knowledge this is the only record of any Halgerda species in the Mediterranean Sea.

Key words: Opisthobranchia, Nudibranchia, underwater photography, biodiversity, *Halgerda* sp.

GASTEROPODI OPISTBRANCHI (CEPHALASPIDEA, SACCOGLOSSA, NOTASPIDEA, ANASPIDEA E NUDIBRANCHIA) NEL MARE ADRIATICO, CON PARTICOLARE RILIEVO ALLE ACQUE COSTIERE SLOVENE

SINTESI

Con l'aiuto di equipaggiamento subacqueo autonomo e fotografia subacquea, gli autori sono riusciti a determinare 49 specie di gasteropodi opistobranchi negli ultimi 20 anni. Hanno inoltre constatato che alcune località sono più ricche di altre in fatto di specie, che alcune specie possono dirsi rare in quanto si trovano in poche località e solo in determinati periodi dell'anno, mentre altre possono definirsi comuni poiché sono state trovate in diverse località e durante tutto l'anno. Le immersioni e la fotografia subacquea sono due mezzi preziosi nello studio della biodiversità dei gasteropodi opistobranchi. Con l'aiuto di tali tecniche, gli autori hanno potuto raccogliere anche dati inerenti l'ambiente di vita, il tipo di nutrimento e la forma delle uova che depongono queste specie. Nell'articolo viene segnalato anche il primo ritrovamento della specie tropicale Halgerda sp. nella parte meridionale dell'isola di Cherso. Dalla revisione dei dati disponibili, questa risulta essere la prima segnalazione del genere Halgerda nel mare Mediterraneo.

Parole chiave: Opisthobranchia, Nudibranchia, fotografia subacquea, biodiversità, *Halgerda* sp.

INTRODUCTION

Opisthobranch mollusks are among the most interesting marine organisms. Although they are usually small, their shapes, striking colour patterns and living habits make them difficult to compare with anything else living in the oceans. Therefore, it is no wonder that they became popular subjects of underwater photographers. The underwater pictures made opisthobranch mollusks true stars among marine organisms and raised much interest in their life and habitats where they can be seen. However, despite their popularity, little is known about biology of most of the species. Scuba diving and underwater photography, together with a careful observation of the circumstances in which a particular opisthobranch has been caught on film, can provide us with valuable information about their biology, *i.e.* type of food, mating behaviour, life cycles and above all biodiversity of a particular area.

In this paper, we shall focus mainly on Nudibranchia species that could be more or less frequently encountered in the Adriatic Sea by Scuba divers. There had been 230 species described for the Mediterranean and this number is probably close to the number of species that can also be found in the Adriatic, although far less have been described so far (Cattaneo-Vietti *et al.*, 1990). About 25% of these are endemic Mediterranean species, and about the same number belongs to the Atlantic-Mediterranean and boreal zoogeographical categories. There are only about 5% and 3% of the species that belong to the Tropical-Atlantic and Indo-Pacific zoogeographical regions, respectively. However, these numbers might change in the future due to the warming of the Mediterranean basin and increasing number of lessepsian species entering through the Suez Canal or being introduced by ships ballast waters.

During Scuba diving in the Adriatic in the past 20 years, 35 nudibranch species have been recorded and photographed. In addition, we also report on one species of the ordo Cephalaspidea, four species that are members of the order Saccoglossa, seven species that belong to the order Notaspidea, and two species from the order Anaspidea. Locality, depth and some additional data had been recorded for each photographed specimen.

MATERIAL AND METHODS

Pictures of opisthobranch mollusks were taken by the author using underwater photo equipment during Scuba dives at different localities in the Adriatic Sea (Slovenia and Croatia), unless stated otherwise. Most dives were made in the Bay of Piran (Punta Madona), along the western coast of Istra, in the Cres-Lošinj Archipelago and in the Velebit Channel. Data as to the locality, depth, time of the year, habitat, abundance and size are given for each specimen, unless stated otherwise. In

addition, some other notes have been provided for certain species. Single sightings or rare records that are mentioned for some species are based on personal observations and existing photographic records of several underwater photographers. Systematic nomenclature was adopted according to Sabelli *et al.* (1990) and Le Renard (1997). The latest revision of the checklist was also considered on the CLEMAM web page www.mnhm.fr/base/malaco.html.

RESULTS

List of species with comments

Cephalaspidea Fisher P., 1883

1. *Philinopsis depicta* (Renier, 1804) [*Aglaja*] = *Doridium carnosum* (Cuvier, 1810)

A single record of this probably rare species was made in mid-summer off Strunjan at a depth of 1 meter on the rocky bottom.

Saccoglossa Von Ihering, 1876

2. *Elysia timida* (Risso, 1818)

Several specimens were found feeding on the green alga *Acetabularia acetabularia*. Size about 1.5 cm. Depth 1 m. May 1995. Water temperature 16°C. Another specimen (picture) was photographed in the Bay of Žrnovnica near Sv. Juraj at the beginning of June 1996. Water temperature 17°C, depth 3 m. Not common.

3. *Thuridilla hopei* Bergh, 1872

This is a common species often found on the rocky substrates among bryozoans and cnidarians.

4. *Bosellia mimetica* Trinchese, 1891

The specimen was found in front of the Marine Biological Station in Piran at the depth of 4 m in the month of September. It was taken out of the water and photographed in a petri dish filled with sea water.

5. *Calliopaea bellula* D'Orbigny, 1837

Caught in plankton net close to the surface just off Piran during the month of August. Probably a juvenile, only few mm long.

Notaspidea Fisher P., 1883

6. *Umbraculum umbraculum* (Lightfoot, 1786) = *U. mediterraneum* (Lamarck, 1812)

Photographed several times in the Adriatic. The photo of the specimen was taken at a depth of 36 m by a vertical wall. Location: northeastern coast of the island of Hvar, end of September 2000. The specimen measured about 15 cm in diameter. Considered rare in the northern Adriatic, but rather common in the southern Adriatic.

7. *Tylodina perversa* (Gmelin, 1791)

This species is always associated with the sponge *Verongia aerophoba* on which it feeds. Usually a pair of these animals could be seen on a single sponge. The picture was taken at the island of Cres near Punta Križa at a depth of 8 m in 1999. Several specimens were observed from May to August in the same aquatory. Probably common.

8. *Pleurobranchus testudinarius* Cantraine, 1835

The photo of this specimen was taken in mid-summer in the southern Adriatic on the soft bottom close to the small island of Ogiran near Mljet. Depth about 60 m. Size about 15 cm. Probably rare.

9. *Berthella aurantiaca* (Risso, 1818)

Two specimens found under stone in 1 m deep water. Size 2-3 cm. Punta Križa, Cres Island. July 1994. Not common.

10. *Berthella ocellata* (Delle Chiaje, 1830)

The only record comes from Piran. The specimen was taken out of the water and photographed. It was found under stone, 1 m deep, in the beginning of June 2000.

11. *Berthella stellata* (Risso, 1826)

This only documented record also comes from Piran. The specimen was found under rock. Same as above.

12. *Berthella cf. plumula*

This particular tentatively identified pleurobranchid species was found under stone in a rock pool near Novigrad (Istra). Most probably *Berthella plumula* (Montagu, 1803).

Anaspidea Fisher P., 1883

13. *Aplysia fasciata* Poiret, 1789

Probably a common species in the southern Adriatic. One of the largest opisthobranch mollusks. The specimen on the picture is about 25 cm long and was photographed while swimming at the southern tip of the is-

land of Mljet at a depth of 4 m (southern Adriatic).

14. *Aplysia punctata* (Cuvier, 1803)

One of the most common opisthobranchs. From March to May could be found in large numbers in upper infralittoral zone among green and brown algae on which the species feeds.

Nudibranchia Blainville, 1814

15. *Trapania lineata* Haefelfinger, 1960

Several records of this small species come from various localities in the Adriatic. The particular specimen was found crawling on the surface of the sponge *Haliclona mediterranea* in Žrnovnica (Stari mlin). Size about 1 cm. Endemic Mediterranean species.

16. *Trapania maculata* Haefelfinger, 1960

Found several times. The picture is from Punta Križa, Cres Island. Size about 1 cm. It was taken 4 m deep at the beginning of May. Water temperature was around 15°C. The species is reported to feed on bryozoans, but in this case it was found on a sponge *Ircinia* sp.

17. *Diaphorodoris papillata* Portmann & Sandmeier, 1960

Small species feeding on bryozoans. Specimen depicted here was found in a shady area of larger rocks in Žrnovnica (Stari mlin). It was photographed in the beginning of June at a depth of 7 m, with water temperature of 17°C. Not common.

18. *Crimora papillata* Alder & Hancock, 1862

Same locality and conditions as above. One of several individuals found among brown algae *Dictyota dichotoma* and *Cystoseira* spp. This is a boreal species. In Mediterranean it is reported to feed on a bryozoan *Chartella tenella*. Considered rare.

19. *Doris bertheloti*? (D'Orbigny, 1839)

Fiesa, at a depth of 15 m, detritic bottom in the month of May, water temperature 15°C. The species may be identified by a ridge of prominent tubercles on the top of the notum.

20. *Doris sticta* (Iredale & O'Donoghue, 1923)

The picture of this rare species was taken in mid-summer in the waters of Biševo Island near cape Kobila on a soft bottom at a depth of 65 m. Size of the specimen about 3 cm.

21. *Archidoris pseudoargus* (Rapp, 1827)

Fiesia, at a depth of 15 m, detritic bottom in the month of May, water temperature 15°C. Probably rare species, at least in the northern Adriatic. Large species, the specimen on the picture found on detritic bottom and was about 10 cm long.

22. *Halgerda* sp.

This tropical species was surprisingly found at the southern tip of the island of Cres near the Baldarin Bay at the end of July 1988. The species was found while collecting other mollusks on a fine gravel bottom from which larger stones had been previously removed. Depth 1 m, water temperature 25°C. To our best knowledge, this is the first record of any *Halgerda* species in the Mediterranean. The species was taken out of the water and photographed alive in a petri dish filled with seawater. The specimen was tentatively identified as *Halgerda willeyi* Elliot, 1903.

23. *Chromodoris krohni* (Vérany, 1846)

Typical species of shady habitats and coralligenous biocenosis. Maximum reported length is about 3 cm, on average about 2 cm. The egg laying specimen was taken by surprise on a steep wall on the island of Vis. Not common.

24. *Chromodoris luteorosea* (Rapp, 1827)

Medium sized species of up to 55 mm, but usually considerably smaller. It is a cryptic species found under stones down to 60 m in depths. It feeds on a sponge *Aplysilla rosea*. However, the portrayed specimen was found on a sponge *Hamigera hamigera*, together with several other specimens crawling on hard bottom in the shallow Punta Madona (Piran) waters.

25. *Chromodoris purpurea* (Risso & Guérin, 1831)

Medium sized species of up to 5 cm, allegedly it lives in shady habitats where it feeds on sponges. This single specimen was found, however, in mid-summer almost washed up on the beach of Veli Melj Bay, at the southern tip of Cres Island. The specimen was alive and was subsequently taken to a deeper water (of about 3 m) where it was photographed. Considered rare.

26. *Hypselodoris fontandraui* (Pruvot-Fol, 1951)
= *H. messiniensis* (Von Ihering, 1880)

This is a common Mediterranean species, although less common in the Adriatic. It feeds on different horny sponges. The specimen was photographed at the en-

trance of an underwater cave on *Ircinia* sp. sponge that was shared with another much larger species *Hypselodoris picta*. Mid-August, depth 25 m, 17°C, Duboka Bay, Premuda Island.

27. *Hypselodoris orsinii* (Vérany, 1846)

This is the current valid name for the species. Its previous name, *H. tricolor*, is now listed as a separate species (see below). This small specimen was photographed on *Cacospongia* spp. that is its main food. Common, could be found at various depths.

28. *Hypselodoris picta* (Schultz and Philippi, 1836)
= *Hypselodoris valenciennesi* (Cantraine, 1841)

This recently renamed species is one of the largest dorids. It seems to be frequent at some localities in certain part of the year. The picture was taken at a depth of 25 m in August. During a typical dive (Premuda Island, Duboka Bay) one could find several specimens feeding on *Ircinia* sponges, mating and laying eggs.

29. *Hypselodoris tricolor* (Cantraine, 1835)

This species could be found at various depths and localities, most frequently on different marine sponges. The photograph was made in July at a depth of 17 m (Susak Island).

30. *Hypselodoris villafranca* (Risso, 1818)

Small, probably cryptic species living in shady habitats. Allegedly it feeds on the sponge *Dysidea fragilis*. The picture of the two specimens was taken in shallow water, where they were found under stone (Novigrad, Istra).

31. *Discodoris atromaculata* (Bergh, 1880)
= *Peltdoris atromaculata* (Bergh, 1880)

The most common dorid in the Adriatic. It could be found elsewhere in shady habitats feeding on the sponge *Petrosia ficiformis*. However, it has not been documented in the Gulf of Trieste as yet.

32. *Platydoris argo* (Linne, 1767)

This species lives on rocky bottoms, frequently under stones. The specimen portrayed here was found under a small rock 3 m deep in mid-summer in Baldarin Bay (Punta Križa, Cres). Another specimen was photographed in the shallow waters of Strunjan Bay while crawling among algae. Considered rare.

33. *Dendrodoris grandiflora* (Rapp, 1827)

Common species, seen and photographed a number of times. Frequent species in the Bay of Piran.

34. *Dendrodoris limbata* (Cuvier, 1804)

Another common species that could be found under stones or on soft bottom. Several colour morphs exist, but a common feature is a yellow notum edge. This particular picture comes from the same locality as above.

35. *Phyllidia flava* Aradas, 1847

Characteristic species that can be usually found on sponges such as *Acanthella acuta* or *Axinella* spp. The specimen here is from the island of Hvar and was found in September at a depth of 46 m, temperature 16°C. Locally common.

36. *Tethys fimbria* Linne, 1767

One of the largest opisthobranchs, up to 30 cm long. Sometimes frequent, especially in the early spring. Sporadically occurring in large numbers close to shores. It crawls on the soft bottom, preferably on terrigenous mud. Specimen from Piran, 15 m deep.

37. *Janolus cristatus* (Delle Chiaje, 1841)

Characteristic species, not common. Feeds on a bryozoans, mainly *Bugula* sp. The portrayed species is from Selca. The photo was taken in September at a depth of 12 m, 20°C. Size of the specimen 3 cm.

38. *Aeolidiella alderi* (Cocks, 1852)

Usually found next to the sea anemones on which it feeds. The picture is from Punta Križa (Cres). It was taken at a depth of 3 m in May. Another specimen was detected on the same site while spawning.

39. *Berghia coerulescens* (Deshayes, 1838)

Few confirmed records from the Adriatic. The specimen on the picture was collected in front of the Marine Biological Station in Piran. It was taken out of the water and photographed. Feeds on sea anemones.

40. *Berghia verrucicornis* (Costa A., 1867)

The only record is from Strunjan, where the specimen was found under stone in tidal zone. Mid-winter. Feeds on actinians.

41. *Spurilla neapolitana* (Delle Chiaje, 1841)

Quite common species of shallow waters where it feeds on sea anemones. Several pictures exist from different Adriatic sites.

42. *Eubranchus farrani* (Alder & Hancock, 1844)

Boreal-Mediterranean species, so far photographed at two locations in the Adriatic. First specimen found at Žrnovnica (Stari mlin) near Sv. Juraj. The picture was taken at the beginning of June, 12 m deep at the temperature of about 13°C near the underwater spring of fresh water. Few specimens observed among hydroid colonies. There are two additional pictures on web site www.medslug.de from Medveja.

43. *Eubranchus tricolor* Forbes, 1838

Same location as above. Boreal species with a single record from the described location. Found at a depth of 7 m.

44. *Cratena peregrina* (Gmelin, 1791)

One of the most common nudibranchs. It could be seen frequently among hydrozoan colonies on which it feeds. Prefers *Eudendrium* sp.

45. *Dondice banyulensis* Portmann & Sandmeier, 1960

Photographed at Žrnovnica (Stari mlin) near Sv. Juraj. Probably rare, but in Žrnovnica very frequent or common during certain period of the year (beginning of June). Close to the underwater freshwater springs among hydroid colonies and on *Cystoseira* sp. By the end of June it disappears completely.

46. unidentified species

This unknown small species was found at Žrnovnica in the beginning of June. It was found on a hydroid colony at a depth of 12 m. Most probably a juvenile *Dondice banyulensis*.

47. *Flabellina affinis* (Gmelin, 1791)

Common nudibranch feeding on hydrozoa. Could be found elsewhere in the Adriatic. Very common in certain areas. Picture of this specimen made off Piran at a depth of 10 m.

48. *Flabellina ischitana* Hirano & Thomson, 1990

This recently described species is considered an endemic Mediterranean species and was known only from



Fig. 1: *Philinopsis depicta*



Fig. 2: *Elysia timida*



Fig. 3: *Thuridilla hopei*



Fig. 4: *Bosellia mimetica*



Fig. 5: *Calliopaea bellula*



Fig. 6: *Umbraculum umbraculum*



Fig. 7: *Tyrodina perversa*



Fig. 8: *Pleurobranchus testudinarius*



Fig. 9: *Berthella aurantiaca*



Fig. 10: *Berthella ocellata*



Fig. 11: *Berthella stellata*



Fig. 12: *Berthella* cf. *plumula*



Fig. 13: *Aplysia fasciata*

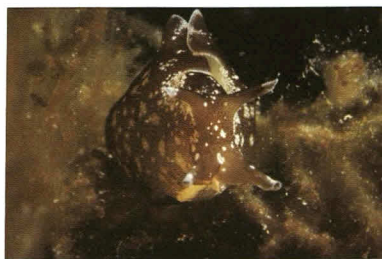


Fig. 14: *Aplysia punctata*



Fig. 15: *Trapania lineata*



Fig. 16: *Trapania maculata*



Fig. 17: *Diaphorodoris papillata*



Fig. 18: *Crimora papillata*



Fig. 19: *Doris bertheloti?*



Fig. 20: *Doris sticta*



Fig. 21: *Archidoris pseudoargus*



Fig. 23: *Chromodoris krohni*



Fig. 24: *Chromodoris luteorosea*



Fig. 25: *Chromodoris purpurea*



Fig. 26: *Hypselodoris fontandraui*



Fig. 27: *Hypselodoris orsinii*



Fig. 28: *Hypselodoris picta*



Fig. 29: *Hypselodoris tricolor*



Fig. 30: *Hypselodoris villafranca*



Fig. 31: *Discodoris atromaculata*



Fig. 32: *Platydoris argo*



Fig. 33: *Dendrodoris grandiflora*



Fig. 34: *Dendrodoris limbata*



Fig. 35: *Phyllidia flava*



Fig. 36: *Tethys fimbria*



Fig. 37: *Janolus cristatus*



Fig. 38: *Aeolidiella alderi*



Fig. 39: *Berghia coerulea*



Fig. 40: *Berghia verrucicornis*



Fig. 41: *Spurilla neapolitana*



Fig. 42: *Eubranchus farrani*



Fig. 43: *Eubranchus tricolor*



Fig. 44: *Cratena peregrina*



Fig. 45: *Dondice banyulensis*

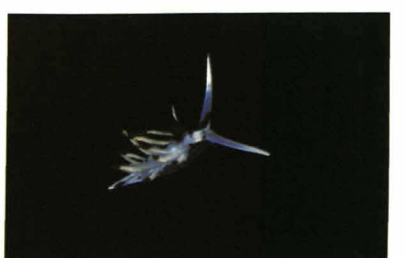


Fig. 46: unidentified species

Fig. 47: *Flabellina affinis*Fig. 48: *Flabellina ischitana*Fig. 49: *Flabellina pedata*

the Tyrrhenian Sea. However, this species appeared to be very common in the Adriatic, too. Many pictures from various locations exist. Some specimens (particular those from Punta Madona of Piran) have bright red cerata that distinguish them from the less brightly coloured specimens inhabiting other locations.

49. *Flabellina pedata* (Montagu, 1815)
= *Coryphela pedata* (Montagu, 1815)

Common, recently renamed species known from many localities. Feeds on hydrozoans. Certain individuals have brighter red colour of the cerata than others (Bay of Piran).

DISCUSSION

Forty-nine species of opisthobranch mollusks were found and photographed by means of Scuba diving and underwater photography. Most of the photographs were made *in situ*; only few were taken of live specimens in petri dish filled with seawater. Of the 49 species, 45 were positively identified, one species tentatively (Fig. 19, marked with ?), while two species remain unidentified although a suggestion as to the possible species has been made (Figs. 12, 46). The number of recorded species is rather small compared to about 230 species described from the Mediterranean merely for the order Nudibranchia (Cattaneo-Viatti *et al.*, 1990). However, we are describing more than half of the species reported for the Adriatic Sea by Thompson (1986), a bit less than half reported by Jaklin (1989) who listed 125 opisthobranch species and above twice as many as mentioned in the malacological survey for the shore waters near Červar (Vio & De Min, 1999). The number of species in Thompson's paper was based on his personal collection from the vicinity of Rovinj and supplemented with previous observations and collections. A large portion of his data originate from half a century ago, which makes the records less reliable and of lesser significance for today's biodiversity. On the other hand, more than 90% of our records were made during the last five years and none of the data is more than 20 years old. Of the 49 species described in our paper, 23 (Figs. 1, 3, 4, 5, 10,

11, 14, 16, 19, 21, 24, 26, 32, 33, 34, 36, 39, 40, 41, 44, 47, 48, 49) were recorded in the Slovenian part of the Adriatic Sea in a short stretch of shallow coastal waters between Strunjan and the Marine Biological Station in Piran. Some of them (Figs. 1, 5, 10, 11) may well represent the only photographic record known to us in the eastern part of the Adriatic Sea.

Most of the opisthobranch species are considered rare and are seldom seen even by Scuba divers, while some can be observed regularly. It appears that some species are more frequent at certain localities and absent or extremely rare in the others. This is probably true for the Adriatic, too. There are some locations where many species can be observed during particular time of the year, including the species that are absent or extremely rare at all other localities. One of such localities, as experienced by us, is a few kilometres long stretch of the sea in the Velebit Channel between Sv. Juraj and Ždralova Bay with its many underwater fresh springs. The conditions of decreased salinity and lower water temperature in this particular locality could be the reason for the high biodiversity of opisthobranchs, particularly those of boreal zoogeographical distribution. Another such locality is Punta Madona in the Bay of Piran, a place known for its high biodiversity index in which nudibranchs play an important part.

It is difficult, however, to claim that a certain species is rare or not known from a particular locality. We do not have sufficient data, and it is quite possible that a particular species is common but not frequently observed since it is cryptic or reaches its peaks during that particular part of the year when there is not much underwater human activity. As an example, before the times of Scuba diving, the today's very common species *Discodoris (Peltodoris) atromaculata* that one can see almost during every dive under dark overhangs, was considered extremely rare. By 1954, only a single specimen of this species had been recorded. Therefore, even today we should be cautious in claiming that a certain species is absent or rare at certain locality. In this paper, the comments considering the abundance of certain species are based on personal experience and observations and should be taken as such.

One should be careful in interpreting the abundance

of certain species. As an example, the prominent opisthobanch species *Umbraculum umbraculum* is considered very rare or even absent in the northern Adriatic, but quite common in the southern Adriatic, or may even occur in mass numbers in some other parts of the Mediterranean Sea (Di Martino & Stancanelli, 1999). Another example are nudibranchs that are listed as boreal species. In the Adriatic they could be sometimes present, according to our observations, even in substantial numbers at certain localities. These areas are characterised with lower water temperatures and decreased salinity due to the large inflow of fresh cold water from underwater springs. Boreal species, such as *Crimora papillata*, *Eubrancheus farrani* and *E. tricolor*, were found only at such localities, which is also true of the endemic Mediterranean species *Dondice banyulensis*. The latter is present in quite large numbers and could be found on hydrozoan colonies or *Cystoseira* algae in the vicinity of underwater springs. However, the presence of such species is short lived. At least during the warmer period of the year they reach their peaks in late spring, but completely disappear by the end of June. By then, the inflow of fresh water is almost gone and the water temperature rises to about 20 °C.

On the other hand, the species such as *Cratena peregrina*, *Flabellina pedata*, *Flabellina ischitana*, *Flabellina affinis* and *Discodoris atromaculata* are more or less common all year round. The reason for their constant presence might be the yearlong availability of their prime diet. The first four species are specialists feeding on hydrozoan colonies, while *Discodoris* feeds on marine sponge *Petrosia ficiformis*.

The discovery of a nudibranch specimen of the genus *Halgerda* that has an Indo-Pacific tropical zoogeographical distribution in the northern Adriatic came as a big surprise. The specimen from Cres Island show the visual characteristics of *Halgerda willeyi* Elliot, 1903, but may well represent a yet unidentified species. A closer and more detailed morphological inspection of the specimen would be necessary for positive identification. *Halgerda willeyi* is a well known species that could be found on coral reefs from the Red Sea to New Caledonia. Only one specimen was found at the southern tip of the island of Cres and to our best knowledge this is the only specimen of the tropical genus *Halgerda* that has ever been found in the Mediterranean Sea. We can only speculate how it made it so far to the north, but there are at least two reasonable explanations. There is an increasing number of Indo-Pacific species entering the Mediterranean through the Suez Canal. A typical example as far as mollusks are concerned is the large anaspidean opisthobanch *Bursatella leachi* Blainville, 1817 that has been found on several occasions even in the Gulf of Trieste and near Grado (Jaklin & Vio, 1989; De Min & Vio, 1998). There are many reports on this species from the coast of Turkey and Italy, some of them

being as many as 60 years old. This clearly points to a slow but steady spreading of the species towards the north. In the case of the single find of *Halgerda* sp. such distribution is less likely since this is the only record in the Mediterranean and on top of it made 12 years ago. Since then, the warming of the Mediterranean Sea has been in progress (see Bethoux *et al.*, 1990; Bethoux & Gentile, 1995) but there are no new records of this species not even from the southeastern Mediterranean basin that is known for its larger numbers of lessepsian immigrants from the Red Sea. Therefore, in the case of *Halgerda* sp. a distribution by means of ship ballast waters is more likely. If the larva was transported in a week or so and then released into the northern Adriatic waters, a veliger could have been transformed into an adult animal in just a few weeks. For most of the tropical nudibranchs the entire developing process from veliger to an adult individual is rather short and could be completed within few weeks (lecithotrophic larva). In principle, such a development could be completed even in the northern Adriatic, where the temperatures of surface water layers easily match, during the summer months, those of the tropical seas. However, for a development into an adult individual, we should also consider the availability of a suitable diet, which is especially problematic with highly specialised species that feed only on particular food. Food specialisation is widespread within nudibranchs. Marine sponges, bryozoans, tunicates and cnidarians are their most popular diet. Still, it is possible that *Halgerda willeyi* is not a specialist and could have survived by feeding on locally available food. The recent paper of Marshall and Willan (1999) lists *Halgerda willeyi* as a species that preys on different marine sponges, and the authors consider it a non-specialist.

Finally, we would like to point at some aspects of taxonomic confusion regarding the dorid nudibranchs belonging to the genus *Hypselodoris*. A taxonomic revision has been made recently and some new names introduced that are currently valid. Since at least three Mediterranean species are very similar in appearance, it is difficult to make a proper identification based only on a visually evident differences. We believe that *Hypselodoris orsinii* (formerly *H. tricolor*), *H. fontandraui* (formerly *H. messinensis*; *H. coelestis*) and *H. tricolor* (formerly *Doris gracilis*) were properly identified and a valid name was assigned to each of them according to the existing literature and pictures therein. There are two additional species that also belong to the group of blue, white and yellow coloured Mediterranean dorids: *H. cantabrica* and *H. picta* (formerly *H. valenciennesi*; *H. elegans*). In addition, a valid name for the very similar but formerly separate species *H. webbi* is now also *H. picta*. A great help in the attempts to clarify the problems in the systematics of bluechromatic dorids is the work of Ortea *et al.* (1996).

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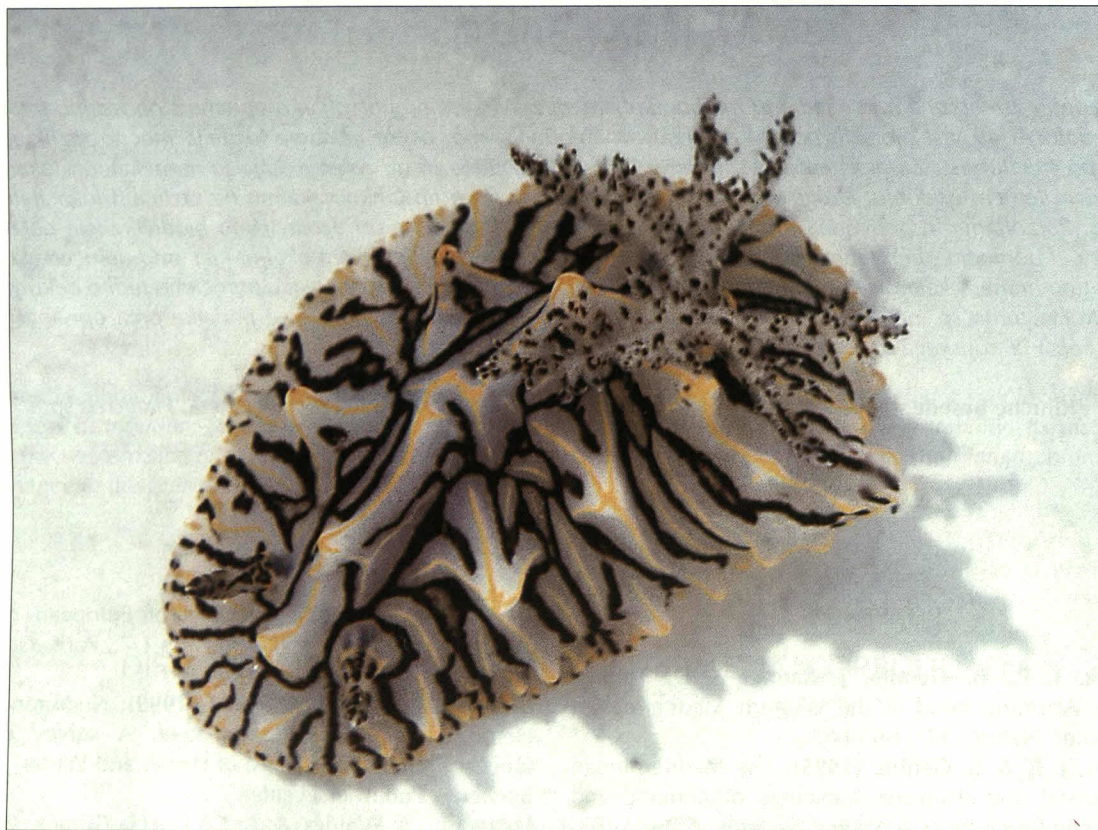


Fig. 22: *Halgerda* sp.

POLŽI ZAŠKRGARJI (CEPHALASPIDEA, SACCOGLOSSA, NOTASPIDEA,
ANASPIDEA IN NUDIBRANCHIA) V JADRANSKEM MORJU,
S POSEBNIM Poudarkom NA SLOVENSKEM OBALNEM MORJU

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POVZETEK

V zadnjih 20 letih nam je v Jadranu med potapljanjem z avtonomno potapljaško opremo s podvodno fotografijo uspelo določiti 49 vrst morskih polžev zaškrjarjev. Ugotovili smo, da se nekatere lokacije močno razlikujejo od drugih po številu vrst. Za nekatere vrste lahko trdimo, da so redke in da se pojavljajo le na nekaterih lokacijah v določenem letnem obdobju. Druge vrste so razmeroma pogoste in jih lahko najdemo na različnih lokacijah skozi vse leto. Potapljanje in podvodna fotografija sta dragocena pripomočka pri ugotavljanju biodiverzitete polžev zaškrjarjev. S pomočjo obeh tehnik lahko pridobimo tudi podatke o življenjskem okolju, kjer smo določenega polža našli, o tipu hrane, s katero se prehranjuje, o obliki mresta, ki ga odlaga, itd. V članku poročamo tudi o odkritju tropske vrste *Halgerda sp.* na skrajnem jugu otoka Cresa, kar je glede na razpoložljive podatke prva opisana najdba golega polža iz tropskega rodu *Halgerda* v Sredozemlju.

Ključne besede: Opisthobranchia, Nudibranchia, podvodna fotografija, biodiverzitet, *Halgerda sp.*

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