

NEW RECORDS OF OPISTHOBANCH GASTROPODS IN THE WATERS  
OFF SLOVENIA (GULF OF TRIESTE, NORTHERN ADRIATIC SEA)

Lovrenc LIPEJ &amp; Borut MAVRIČ

Marine Biology Station Piran, National Institute of Biology, SI-6330 Piran, Fornače 41, Slovenia  
E-mail: lipej@mbss.org

Jan SIMIČ

Mediterranean Piran – The Magical World of Shells, SI-6330 Piran, Tartinijev trg 15, Slovenia

Domen TRKOV

Biodiva – Conservation biologist society, SI-6000 Koper, Kettejeva 1, Slovenia

## ABSTRACT

The paper deals with four opisthobranch molluscs, which were found in the Slovenian marine waters as new records. The pleurobranchomorph *Pleurobranchea meckeli* was found on two occasions on muddy detritic bottom in the Gulf of Piran in June of 2013 and 2014. The nudibranch *Favorinus branchialis* was found in May and June 2014 on turf vegetation in a very shallow area off the pier in Koper harbour. Its spawn with white eggs was also found nearby. The second nudibranch *Facelina rubrovittata* was found in March 2010 crawling in the intertidal zone of the Nature reserve Strunjan. The third nudibranch *Dondice banyulensis* was found in waters of the Nature Monument *Debeli rtič* on sedimentary bottom. With the finding of these four species, the total number of opisthobranchs recorded to date in the Slovenian part of the Adriatic Sea increased to 75 species.

**Key words:** opisthobranch fauna, Gulf of Trieste, Slovenia

NUOVE SEGNALAZIONI DI GASTEROPODI OPISTOBRANCHI NELLE ACQUE AL  
LARGO DELLA SLOVENIA (GOLFO DI TRIESTE, ADRIATICO SETTENTRIONALE)

## SINTESI

L'articolo riporta il ritrovamento in acque marine slovene di quattro nuovi molluschi opistobranchi. La specie *Pleurobranchea meckeli* (ordine *Pleurobranchomorpha*) è stata trovata in due occasioni su fondo detritico fangoso nella baia di Pirano, nel mese di giugno del 2013 e del 2014. Il nudibranco *Favorinus branchialis* è stato trovato in maggio e in giugno del 2014, sul basso tappeto di vegetazione chiamato *turf*, a poca profondità al largo del molo nel porto di Capodistria. Le uova bianche di questa specie sono state trovate nelle vicinanze. Il secondo nudibranco *Facelina rubrovittata* è stato trovato nel marzo 2010 nel piano mediolitorale della Riserva naturale di Strugnano. Il terzo nudibranco *Dondice banyulensis* è stato trovato nelle acque del Monumento naturale di Punta grossa, su fondo sedimentario. Con il ritrovamento di queste quattro specie, il numero totale di opistobranchi confermati fino ad oggi nella parte slovena del mare Adriatico è salito a 75 specie.

**Parole chiave:** fauna di opistobranchi, Golfo di Trieste, Slovenia

## INTRODUCTION

Although the Gulf of Trieste is considered to be a pioneer region in marine biological research, some rare, less known and even alien marine species have been discovered during recent decades. Research of sea slugs discovered in the area shows similar patterns. One of the main reasons is the fact that nowadays the number of SCUBA divers is continuously increasing and many of them are skilled underwater photographers as well.

However, the opisthobranch fauna of the Slovenian part of the Adriatic Sea did not attract particular scientific attention in the past in comparison with other Mediterranean areas. Only a few papers dealt with the opisthobranchs of the area. The very first paper was published by Graeffe (1903), who studied the mollusks in the Gulf of Trieste. However, the great majority of data mentioned are related to the harbour of Trieste and adjacent areas. In the Slovenian part of the Gulf of Trieste, the first data on opisthobranchs can be found in a catalogue on mollusks, published by De Min & Vio (1997). In a checklist of opisthobranchs in the Adriatic Sea, with particular reference to the Slovenian part, Turk (2000) presented the first data on this group in Slovenian waters. This checklist was complemented further by later works of Turk (2005a, b), Šamu (2007), Lipej *et al.* (2008, 2012), Desco (2008–2009) and Mavrič & Lipej (2012). Certain species, such as *Cumanotus beaumonti* (Turk, 2005a, b) and *Piseinot-*

*ecus sphaerifera* (Mavrič & Lipej, 2012) were previously found only in a few places in the Mediterranean and in other parts of the world's oceans.

In this paper we report on four new records of four opisthobranch species, which were found in the Slovenian marine waters.

## MATERIAL AND METHODS

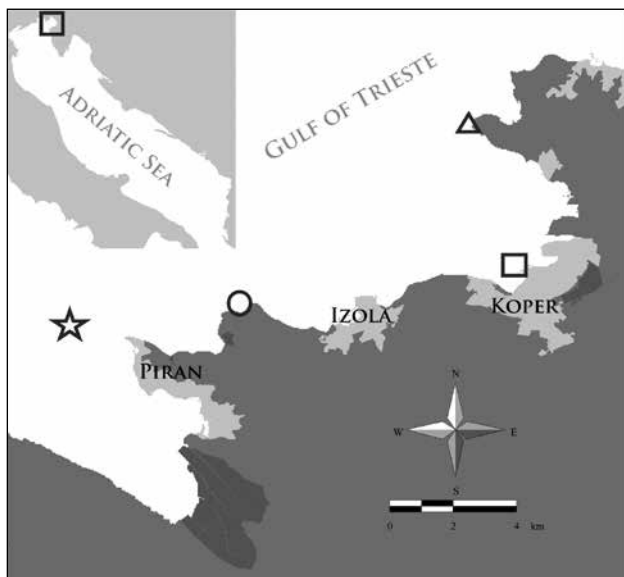
Opisthobranchs were collected using a hand net in different areas of the Slovenian coastal sea (Gulf of Trieste) during regular and occasional samplings (Fig. 1). The species identity of sea slugs has been assessed by the use of different identification keys such as Pruvot-Fol (1954), Barletta (1980), Schmekel & Portmann (1982) and Trainito (2005). Specialized internet web sites such as [www.seaslugforum.net](http://www.seaslugforum.net) were helpful as well. The taxonomy and nomenclature are in accordance with the World Register of Marine Species - WoRMS ([www.marinespecies.org](http://www.marinespecies.org)). The specimens were photographed and measured alive and subsequently fixed in 70 % alcohol solution. The material is deposited in the collection of the Marine Biology Station (MBS) of the National Institute of Biology.

## RESULTS AND DISCUSSION

**Order Pleurobranchomorpha**  
**Pleurobranchaeidae Pilsbry, 1896**  
*Pleurobranchaea* Leue, 1813  
*Pleurobranchaea meckelii* (Blainville, 1825)

Material:

6<sup>th</sup> June 2013, 2 specimens, 21 m depth, biocoenosis of detritic bottom, 1 nm W of Piran, Gulf of Piran; 7<sup>th</sup> June 2014, 1 specimen, 20 m depth, biocoenosis of detritic



**Fig. 1:** Map of the studied area with localities where opisthobranchs were found.

**Sl. 1:** Zemljevid obravnavanega območja z lokalitetami, na katerih smo našli polže zaškrgarje

**Legend / Legenda:** ☆ - *Pleurobranchaea meckelii*, ○ - *Facellina rubrovittata*, □ - *Favorinus branchialis*, △ - *Dondice banyulensis*



**Fig. 2:** A specimen of *Pleurobranchaea meckelii* caught in the Gulf of Piran by a dredge on the detritic coastal bottom in June 2014. (Photo: L. Lipej)

**Sl. 2:** Primerek vrste *Pleurobranchaea meckelii*, ujet s pridreno mrežo na obrežnem detritnem dnu v juniju 2014 (Foto: L. Lipej)

bottom, 1 nm NW of Piran, Gulf of Piran. The third specimen is housed in the collection of MBS.

Three specimens of *P. meckeli* (Fig. 2) were found within the material collected with a benthic dredge in June 2013 and 2014. The specimens were transferred into aquarium tanks; however they died some days later. This species was previously not recorded in waters off Slovenia. In the broader area, Graeffe (1903) mentioned this species in the checklist of sea slugs in the Gulf of Trieste. He pointed out that *P. meckeli* inhabits deeper areas of the Gulf and is often caught in fishermen's nets.

#### Order Nudibranchia

##### Family Facelinidae Bergh, 1889

##### *Favorinus* M. E. Gray, 1850

##### *Favorinus branchialis* (Rathke, 1806)

Material:

Koper harbour, 29<sup>th</sup> May 2014, 1 m depth, pier wall covered with turf, 1 specimen; 30<sup>th</sup> May 2014, 1 m depth, turf, 2 specimens; 3<sup>rd</sup> June 2014, turf, 1 m depth, 2 specimens, stored in the collection of MBS.

Six specimens of *Favorinus branchialis* (Fig. 3) were found on three different sampling days in May and June 2014 in the commercial harbour of the coastal town of Koper. All specimens were found on a low algal vegetation belt (known as turf) at 1 m depth. Other sea slug species, such as *Elysia viridis*, were found grazing in the same area. On 29<sup>th</sup> May the eggs of *F. branchialis* were found as well. White eggs were located in a spiral-shaped band (Fig. 4).

The specimens were easily identified due to the bulbous swelling below the top of their rhinophores (Schmaeckel & Portmann, 1982). All specimens were more or less whitish with darker cerata. The colour also de-

pends on feeding habits. *F. branchialis* was reported to feed on the eggs of other opisthobranchs (Schmekel & Portmann, 1982).

Graeffe (1903) mentioned this species as found in the Gulf of Trieste. Odhner (1914) and Vatova (1928) reported *F. branchialis* from the northern Adriatic area of Rovigno (in Thompson, 1985/1986), while recently Rinaldi (2012) mentioned this species in waters off Ravenna. Perrone (1983) found many *F. branchialis* specimens in the mediolitoral belt on or under rocks (which was also the case for our specimens) at San Vito in the Ionian Sea.

##### *Facelina* Alder & Hancock, 1855

##### *Facelina rubrovittata* (Costa A., 1866)

Material:

Single specimen, Mesečev zaliv, Nature reserve Strunjan, March 2010, < 1 m depth, bare rocks. Specimen was photographed and released.

A specimen of *F. rubrovittata* (Fig. 5) in shallow water in the intertidal zone on a rocky area. The specimen was an adult, since its rhinophores were lamellated. The studied specimen fits well with the description of Schmaeckel & Portmann (1982): large oral tentacles, cylindrical rhinophores with brown basal parts, five groups of pointed cerata on the flanks, the tail without cerata and broken reddish lines on the back.

According to Schmekel & Portmann (1982), *F. rubrovittata* feeds on colonial hydrozoan cnidarians of the genus *Eudendrium*. At the site where it was found the sandstone boulders are frequently covered with such hydroid colonies, which are grazed mainly by a nudibranch *Cratena peregrina*.

*F. rubrovittata* has been already recorded in the western Mediterranean, off the Atlantic coast of Spain



**Fig. 3:** A specimen of *Favorinus branchialis* found on turf in May 2014 in Koper harbour. (Photo: D. Trkov, L. Lipej)  
**Sl. 3:** Primerek vrste *Favorinus branchialis*, najden na turfu v maju 2014 v koprskem pristanišču (Foto: D. Trkov, L. Lipej)



**Fig. 4:** Spawn of *Favorinus branchialis* found on turf at 1 m depth in the harbour of Koper. (Photo: B. Mavrič)  
**Sl. 4:** Leglo vrste *Favorinus branchialis*, najdeno na turfu v maju 2014 v koprskem pristanišču (Foto: B. Mavrič)



**Fig. 5:** A specimen of *Facelina rubrovittata* found in the intertidal zone of Mesečev zaliv within the marine protected area of Strunjan. (Photo: N. Erbida)

**Sl. 5:** Primerek vrste *Facelina rubrovittata*, najden v bibavičnem pasu v Mesečevem zalivu znotraj Naravnega rezervata Strunjan (Foto: N. Erbida)

(Schmekel & Portmann, 1982; Rudman, 2000) and in the eastern part of the waters of southern Turkey (Yokes, 2001). Graeffe (1903) mentioned this species from the Gulf of Trieste under the name *Acanthopsole albida*. Recently a record from western part of Adriatic Sea was reported by Magnani (2006) for the Tremiti islands.

#### **Dondice Marcus, 1958**

#### ***Dondice banyulensis* Portmann & Sandmeier, 1960**

Material:

Single specimen, aquatory in front of the lighthouse, Nature Monument Debeli rtič, 9<sup>th</sup> September 2014, depth 10 m, sedimentary detritic bottom. Specimen is stored in the collection at MBS.



**Fig. 6:** A specimen of *Dondice banyulensis* on a polychaete *Spirographis spallanzani* on the bottom of the Debeli rtič Nature Monument on 9<sup>th</sup> September 2014. (Photo: B. Mavrič)

**Sl. 6:** Primerek vrste *Dondice banyulensis* na mnogoščetincu *Spirographis spallanzani* v Naravnem spomeniku Debeli rtič, fotografiran 9. septembra 2014 (Foto: B. Mavrič)

A single specimen of *D. banyulensis* was found in the eastern part of Slovenian coastal waters at the depth of 10 m. The 4 cm long specimen was crawling on the polychaete *Spirographis spallanzani* (Fig. 6) on the sedimentary detritic bottom made of the dead corallites of *Cladocora caespitosa*. The species was easily recognized due to its size, colour pattern, huge tentacles, lamellate rhinophora and three white lines, a median line and two lateral lines (see Portmann & Sandmeier, 1960; Schmekel & Portmann, 1982). Though this species is not supposed to be a rare or less known species, it was previously not reported in the Slovenian waters. Turk (2000) mentioned this species to be seasonally more frequent in the vicinity of submerged freshwater springs near Jurjevo in the northern Adriatic Sea (Croatia) with the comment that it is probably a rare species. However, there are some records of this species in the northern Adriatic reported in the [www.seaslugforum.net](http://www.seaslugforum.net).

#### **Species richness of opisthobranchs in Slovenia**

Taking into consideration the finding of the four studied species and *Piseinothercus sphaerifera*, recently recorded in the nearby area of the Koper harbour (Mavrič & Lipej, 2012), the total number of species recorded to date in Slovenia has grown to 75 species. Although the Slovenian coastal sea represents only a very small portion of the Adriatic Sea, we agree that the list of opisthobranchs will be expanded even more in the near future. Records of opisthobranchs are strongly related to three main factors: (i) their detectability, (ii) the availability of proper habitat type, in terms of feeding and grazing (*sensu* Lipej *et al.*, 2008) and (iii) the improvement of sampling techniques. The nudibranch *F. branchialis* was recorded on turf in a very shallow area in the rather polluted harbour of Koper. The inspection of turf vegetation and similar peculiar habitat types in areas of intense maritime traffic could be helpful in finding other opisthobranchs not yet recorded in the studied area, as well as non indigenous species, which are known to colonize impoverished ecosystems. In fact, the finding of the rare and less known *P. sphaerifera* occurred in a similar habitat type in the harbour of Koper (Mavrič & Lipej, 2012).

It has to be taken into consideration also the fact that Graeffe (1903) found many opisthobranchs in the broader area of the Gulf of Trieste, which have not yet been confirmed in the waters off Slovenia. The number of species inhabiting the Slovenian part of the Adriatic Sea would probably increase also with the solving of some taxonomical problems related to certain species found in the area but not yet identified.

#### **ACKNOWLEDGMENTS**

We would like to express our gratitude to our colleague Nina Erbida who provided us with photographs of the studied species. Special thanks go also to two anonymous reviewers for improving the quality of our paper.

## NOVI ZAPISI O POJAVLJANJU POLŽEV ZAŠKRGARJEV (OPISTHOBRANCHIA) V VODAH SLOVENIJE (TRŽAŠKI ZALIV, SEVERNI JADRAN)

*Lovrenc LIPEJ & Borut MAVRIČ*Morska biološka postaja, Nacionalni inštitut za biologijo, SI-6330 Piran, Fornače 41  
E-mail: lipej@mbss.org*Jan SIMIČ*

Mediterranum Piran, Čarobni svet školjk, SI-6330 Piran, Tartinijev trg 15

*Domen TRKOV*

Biodiva – Društvo varstvenih biologov, SI-6000 Koper, Kettejeva 1

## POVZETEK

Prispevek obravnava podatke o štirih vrstah polžev zaškrjarjev (*Opisthobranchia*), ki so bili najdeni v slovenskem delu Jadranskega morja. V letih 2013 in 2014 smo našli nekaj primerkov vrste *Pleurobranchia meckelii*. Gološkrjarja vrste *Favorinus branchialis* smo našli na nizki blazinasti vegetaciji v plitvem morju ob koprskemu pomolu v maju in juniju 2014. V bližini je bil tudi njegov mrest. O tej vrsti so znani zapisi iz okolice Rovinja in Ravenne. Drugega gološkrjarja vrste *Facelina rubrovittata* smo našli v Mesečevemu zalivu v naravnem rezervatu Strunjan marca 2010. Ta vrsta je bila doslej znana predvsem iz zahodnega dela Sredozemskega morja, v Jadranskem morju pa je znan le zapis z zahodne obale južnega Jadrana iz leta 2006. Tretjega gološkrjarja *Dondice banyulensis* smo odkrili na dnu naravnega spomenika *Debeli rtič*, kjer se je plazil po perjanici cevkastega mnogoščetinca *Spirographis spallanzani*. Z novimi najdbami se je število v slovenskem morju ugotovljenih vrst polžev zaškrjarjev povečalo na 75. Te najdbe potrjujejo hipotezo, da je vrstna pestrost slovenskega dela Jadranskega morja izjemno velika, hkrati pa se bo seznam novoodkritih polžev zaškrjarjev v prihodnosti nedvomno še dopolnjeval z novimi zapisi.

**Ključne besede:** polži zaškrjarji, Tržaški zaliv, Slovenija

## REFERENCES

- Barletta, G. (1980):** Guide per il riconoscimento delle specie animali delle acque lagunari e costiere italiane. 3. Gasteropodi nudi. C.N.R., AQ/1/92, Genova, 124 pp.
- De Min, R. & E. Vio (1997):** Molluschi conchiferi del litorale sloveno. *Annales, Ser. Hist. Nat.*, 7 (1), 241-258.
- Desco, K. (2008-2009):** The ecology of Opisthobranch mollusks (Mollusca: Gastropoda) of the Gulf of Trieste (Northern Adriatic). M. Sc. Thesis. Joint Study, Università degli Studi di Trieste & University of Primorska, 106 pp.
- Graeffe, E. (1903):** Uebersicht der Fauna des Golfes von Triest nebst Notizen über Vorkommen, Lebensweise, Erscheinungs- und Laichzeit der einzelnen Arten. VI. Mollusca. Arbeiten aus den Zoologischen Instituten der Universität Wien und der Zoologischen Station in Triest, 14 Bd., p. 89-136.
- Lipej, L., Ž. Dobrajc, B. Mavrič, S. Šamu & S. Alajbegović (2008):** Opisthobranch molluscs (Mollusca: Gastropoda) from Slovenian coastal waters (Northern Adriatic). *Annales, Ser. Hist. Nat.*, 18 (2), 213-226.
- Lipej, L., S. Moškon & B. Mavrič (2012):** New recordings of opisthobranch mollusks (Mollusca: Opisthobranchia) in the Slovenian portion of the Adriatic Sea. *Annales, Ser. Hist. Nat.*, 22 (2), 133-136.
- Magnani, C. (2006):** Is this *Facelina rubrovittata*? [Message in] Sea Slug Forum. Australian Museum, Sydney. Available from <http://www.seaslugforum.net/find/17536>
- Mavrič, B. & L. Lipej (2012):** On the rare and less known nudibranch *Piseinotecus sphaeriferus* (Schmekel, 1965) (Gastropoda, Nudibranchia, Piseinotecidae) in the Adriatic Sea. *Acta Adriat.*, 53, 473-476.
- Odhner, N. H. J. (1914):** Notizen über die fauna der Adria bei Rovigno. Beiträge zur Kenntnis der marinen Molluskenfauna von Rovigno in Istrien. *Zoologischer Anzeiger*, 44, 156-170.
- Perrone, A. (1983):** Opisthobranchi (Aplysiomorpha, Pleurobranchiomorpha, Saccoglossa, Nudibranchia) del litorale salentino (Elenco – contributo primo). *Thalassia Salentina*, 12, 118-144.
- Portmann, A. & E. Sandmeier (1960):** *Dondice banyulensis*, sp. nov., un Eolidien nouveau de la Méditerranée. *Rev. Suisse Zool.*, 67, 159-168.
- Pruvot-Fol, A. (1954):** Mollusques opisthobranches. Lechevalier, Paris, p. 1-457.
- Rinaldi, A. (2012):** Atlante della fauna e flora marina dell'Adriatico nord-occidentale. Editrice La Mandragora s.r.l., 639 pp.
- Rudman, W. B. (2000):** *Facelina rubrovittata* (A. Costa, 1866). [Message in] Sea Slug Forum. Australian Museum, Sydney. Available from [www.seaslugforum.net/factsheet/facerubrovittata](http://www.seaslugforum.net/factsheet/facerubrovittata).
- Schmekel, L. & A. Portmann (1982):** Opisthobranchia des Mittelmeeres Nudibranchia und Saccoglossa. Berlin, Springer Verlag.
- Šamu, S. (2007):** The survey of opisthobranch molluscs in the Slovenian coastal sea. B. Sc. Thesis. University of Maribor, Maribor, 57 pp. (In Slovenian)
- Thompson, T. E. (1985/1986):** Annotated checklist of the benthic opisthobranch molluscs of the Adriatic Sea, with special reference to localities in the Rovinj area. *Thalassia Jugoslavica*, 21/22, 99-108.
- Trainito, E. (2005):** Nudibranchi del Mediterraneo: guida ai molluschi opistobranchi. Il Castello, 96 pp.
- Turk, T. (2000):** The Opisthobranch mollusks (Cephalaspidea, Saccoglossa, Notaspidea, Anaspidea and Nudibranchia) of the Adriatic Sea with special reference to Slovenian coast. *Annales, Ser. Hist. Nat.*, 10 (2), 161-172.
- Turk, T. (2005a):** *Cumanotus* from Slovenia [2]. [Message in] Sea Slug Forum. Australian Museum, Sydney. Available from [www.seaslugforum.net/find.cfm?id=13517](http://www.seaslugforum.net/find.cfm?id=13517)
- Turk, T. (2005b):** Unusual Sea Slug from Cape Madonna (Piran, Slovenia) – the first record of *Cumanotus beaumonti* (Eliot, 1906) in the Mediterranean Sea. *Annales for Istrian and Mediterranean Studies* 15(1): 1-4.
- Yokes, B. (2001):** *Facelina rubrovittata*? from Turkey. [Message in] Sea Slug Forum. Australian Museum, Sydney. Available from [www.seaslugforum.net/find/5677](http://www.seaslugforum.net/find/5677)