



Additions to the knowledge of alien Opisthobranchia of Greece

Antonios Daskos¹ and Argyro Zenetos^{2*}

¹*Q-Training, K. Varnali 11, Chalandri, GR 152 33, Greece*

²*Hellenic Centre for Marine Research, Institute of Oceanography, Anavissos GR 19013, Attica, Greece*

*Corresponding author

E-mail: zenetos@ath.hcmr.gr

Received 5 March 2007; accepted in revised form 19 June 2007

Abstract

Two alien opisthobranch gastropod species are recorded from Greece in 2003-2004: *Chromodoris annulata* is a new record for the Mediterranean Sea, while *Bursatella leachii* is newly reported from Crete and Saronikos Gulf. *Chromodoris annulata* may have been introduced by shipping, whereas *B. leachii* has long been considered to have immigrated via the Suez Canal.

Key words: Alien Opisthobranchia, *Chromodoris annulata*, *Bursatella leachii*, Aegean, Greece, Mediterranean

Studies of Mediterranean mollusca have shown a great diversity of about 400 species of Opisthobranchia (Cattaneo-Vietti and Thompson 1989) including 21 alien species (Zenetos et al. 2004). Since the early eighties, a small but steadily increasing number of Indo-Pacific opisthobranch species have been reported in the Mediterranean Sea, the latest records by Yokes and Rudman (2004). In Greece the Opisthobranchia have been studied by Thompson and Jaklin (1988); Koutsoumbas and Koukouras (1993); Koutsoumbas et al (1993). According to a compilation of alien mollusca, 7 opisthobranch

species had been reported by 2004 (Zenetos et al. 2005) whereas their number had risen to 9 by December 2005 (Pancucci et al. 2005). The present work reports the geographic expansion of one alien opisthobranch already known in Greek waters and the finding of one more alien opisthobranch, hitherto unknown in Greek waters.

Recent research by scuba diving and free diving in several coastal localities of the south Aegean Sea has revealed the presence of two alien opisthobranch species namely *Chromodoris annulata* (Eliot, 1904) and *Bursatella leachii* (de

Blainville, 1817). These specimens were photographed and returned to the sea. Details on their localities can be seen in the Annex.

Chromodoris annulata (Eliot, 1904)

Order: Nudibranchia Blainville, 1814
Superfamily: Eudoridoidea Odhner, 1934
Family: Chromodorididae Bergh, 1891



Figure 1. *Chromodoris annulata*
Photo: A. Daskos

This specimen (Figure 1), is from the coastal area of Salamina Island (Saronikos Gulf), located only 1 nautical mile from the main port of Piraeus. It was found in the area Peristeria (see Annex) at 12m depth (August 2004). Water temperature 21°C. This single specimen was found alive in a rock pool.

Chromodoris annulata is considered to be a tropical species commonly found in both the western and northern Indian Ocean. It is present in the Red Sea (Rudman 1987) with many sightings since 1957 along the Red Sea coasts of Egypt (Gohar and Aboul-Ela 1957, Poddubetskaia 2002, Tov 2003, Mrutzel 2005).

Our specimen is an interesting colour form of *C. annulata* with a purple line joining the two purple rings and only a few yellow spots. This colour form is known only from the Arabian Gulf and the Gulf of Oman at the NW corner of the Arabian Sea (Rudman, 2004, 2005). Through most of its range, including the Red Sea, this species lacks the purple line and has more yellow spots, suggesting the presence of this animal in Greek waters is not the result of Lessepsian migration.

Although its heat tolerance is unknown, it could possibly live in Greek waters since the bottom sea temperature varies: Winter - north:

12-15°C, south: 15-17°C, Summer - north: 14-16°C, south: 15-20°C (Kontoyiannis et al. 2005). The species *Chromodoris annulata* is reported from Greek waters for the first time. Moreover, this is the first sighting of the species in the Mediterranean Sea. Although, the appearance of *Chromodoris annulata* could be one more case of progressive immigration via the Suez Canal, its absence from the Levantine Sea, combined with the finding of the Arabian colour form near a port area (Piraeus), leads to the assumption that the species has been transported via shipping.

Bursatella leachii (de Blainville, 1817)

Order: Anaspidea Fischer, 1883
Superfamily: Aplysioidea Lamark, 1809
Family: Aplysiidae Rafinesque, 1815



Figure 2. *Bursatella leachii* (de Blainville, 1817)
Photo: A. Daskos

This specimen (Figure 2) is from Cape Balos (Chania, Kriti). It was found at 18m depth. Another specimen was found in the Gulf of Korinthiakos (Milokopi area) at 22m depth. Both specimens were found grazing in soft bottom.

Bursatella leachii is a circumtropical species widespread along the temperate water of the Indo-Pacific and Atlantic Ocean. Due to its absence in the Spanish and Algerian coasts (the westernmost area of the Mediterranean), the penetration of this species in this sea has probably been progressive through the Suez Canal. Very common from the eastern Levantine Sea to the Italian coasts (Zenetos et al 2004). In the western Basin it is only known from Sardinia (Zenetos et al 2004). The species has already been recorded in Northern Greece: Chios isl., Lesbos (Barash and Danin 1986) and in the

Thermaikos and Chalkidiki (Koutsoubas 1992) as well as in the Aegean Turkey coasts (Swennen 1961) but it is the first time it has been reported in the Greek south Aegean: Kriti island and Saronikos Gulf.

References

- Barash A and Danin Z (1986) Further additions to the knowledge of Indo-Pacific Mollusca in the Mediterranean Sea. *Spixiana* 9: 117-141
- Cattaneo-Vietti R and Thompson TE (1989) Mediterranean Opisthobranch Molluscs: A zoogeographic approach, *Bolletino Malacologico* 25(5-8): 183-200
- Gohar HAF and Aboul-Ela IA (1957) The development of three chromodorids (with the description of a new species). *Publications of the Marine Biological Station, Al-Ghardaqa Egypt* 9: 203-228
- Kontoyiannis H, Krestenitis I, Petihakis G and Tsirtsis G (2005). Coastal areas: circulation and hydrological features. Pp 95-103 In *SoHelMe, 2005. State of the Hellenic Marine Environment*. E. Papathanassiou and A. Zenetos (eds) HCMR Publications 360pp
- Koutsoubas D (1992) Contribution to the study of the gastropod molluscs of the continental shelf of the North Aegean Sea. Ph.D. thesis, Biology Dept., Aristotelion University of Thessaloniki, 585pp (in Greek with English summary)
- Koutsoubas D and Koukouras A (1993) An account of our knowledge on the opisthobranch mollusc fauna of the Aegean sea. *Bolletino Malacologico* 29(5-8): 191-200
- Koutsoubas D, Koukouras A and Thomson TE (1993) Sacoglossa and Nudibranchia (Opisthobranchia) from the Aegean Sea: New Records for the Eastern Mediterranean Fauna. *Mitteilungen aus dem Zoologischen Museum in Berlin* 69(1): 155-163
- Mrutzel M (2005 - Jan 3) *Chromodoris annulata* from the Egyptian Red Sea. [Message in] Sea Slug Forum. Australian Museum, Sydney. Available from <http://www.seaslugforum.net/find.cfm?id=12876>
- Pancucci-Papadopoulou MA, Zenetos A, Corsini-Foka M and Politou CH-Y (2005) Update of marine aliens in Hellenic waters. *Mediterranean Marine Science* 6 (2): 147-158
- Poddubetskaia M (2002 -Apr 18) *Chromodoris annulata* from the Red Sea. [Message in] Sea Slug Forum. Australian Museum, Sydney. Available from <http://www.seaslugforum.net/find.cfm?id=6727>
- Rudman WB (1987) The Chromodorididae (Opisthobranchia: Mollusca) of the Indo-West Pacific: *Chromodoris epicura*, *C. aureopurpurea*, *C. annulata*, *C. coi* and *Risbecia tryoni* colour groups. *Zoological Journal of the Linnean Society* 90 (3): 305-407
- Rudman WB (1999) *Chromodoris annulata* (Eliot, 1904). Available from <http://www.seaslugforum.net/factsheet.cfm?base=chroannu>
- Rudman WB (2004 -Dec 30). Comment on *Chromodoris annulata* - colour markings by Dr. Iain Andrew Macdonald. [Message in] Sea Slug Forum. Australian Museum, Sydney. Available from <http://www.seaslugforum.net/find.cfm?id=12822>
- Rudman WB (2005 - Dec 16) Comment on *Chromodoris annulata* ? from Bahrain by Michael Arora. [Message in] Sea Slug Forum. Australian Museum, Sydney. Available from <http://www.seaslugforum.net/find.cfm?id=15481>
- Swennen C (1961) On a collection of Opisthobranchia from Turkey. *Zoologische Mededelingen* 38: 41-75
- Thompson T.E and Jaklin A (1998) Eastern Mediterranean Opisthobranchia Elysiidae (Sacoglossa = Ascoglossa), *Journal of Molluscan Studies* 54: 59-69
- Tov IB (2003 -May 9) *Chromodoris annulata* from the Red Sea. [Message in] Sea Slug Forum. Australian Museum, Sydney. Available from <http://www.seaslugforum.net/find.cfm?id=977>
- Yokes B and Rudman WB (2004) Lessepsian Opisthobranchs from southwestern coast of Turkey; Five new records from Mediterranean. *Rapports et Proces-Verbaux des Reunions. Commission Internationale pour l'Exploration Scientifique de la Mer Mediterranee* 37
- Zenetos A, Koutsoubas D and Vardala-Theodorou E (2005) Origin and vectors of introduction of exotic molluscs in Greek Waters. *Belgian Journal of Zoology* 135 (2): 279-286
- Zenetos A, Gofas S, Russo G and Templado J (2004) CIESM Atlas of Exotic Species in the Mediterranean Vol. 3 Molluscs. CIESM, Monaco. (www.ciesm.org/atlas), 376pp.

Annex

Records of alien opisthobranch gastropod species from Greece in 2003-2004

Location	Location coordinates		Date of record	<i>Chromodoris annulata</i>	<i>Bursatella leachii</i>	Collector
	Latitude, °N	Longitude, °E				
Peristeria, Salamina, Saronikos Gulf	37°52'38"	23°27'30"	August 2004	1	-	A. Daskos
Milokopi, Korinthiakos	38°03'10"	24°54'25"	May 2003	-	1	A. Daskos
Balos cape, Kriti	35°34'13"	23°35'20"	July 2004	-	1	A. Daskos