

**Musculista senhousia (Benson in Cantor, 1842) in the western Mediterranean
(Bivalvia, Mytilidae)**

H. J. HOENSELAAR & J. HOENSELAAR

Instituut voor Taxonomische Zoölogie (Zoölogisch Museum), Postbus 4766, NL 1009 AT Amsterdam, The Netherlands

The West Pacific bivalve mollusc *Musculista senhousia* is reported from the western Mediterranean, where it might have been introduced with oyster spat from Japan, around 1978. The species has been reported as *Modiola (Arcuatula) arcuatula* from the eastern Mediterranean, into which it could have entered through the Suez Canal.

Key words: Bivalvia, Mytilidae, *Musculista*, introduced species, Mediterranean, France.

INTRODUCTION

On a collecting trip in October 1982, we visited the Étang de Thau (France, département Hérault). On a beach in Balaruc les Bains (fig. 1), in front of the boulevard we found a small mussel, unknown to us and in our opinion a non-European species.

As we are mainly interested in the European marine molluscan fauna, we requested Dr. J. J. van Aartsen to compare these shells in the collection of the Rijksmuseum van Natuurlijke Historie at Leiden. He concluded that the material belonged to *Modiolus senhousia*, a West Pacific species.

Our next problem was to find out how it was introduced in the Etang de Thau. For this reason we visited a museum, the "Musée de conchyliculture" at Bouzigues, a small village near Balaruc les Bains. This village is a famous centre for breeding mussels and oysters. An old fisherman in the museum told us that the oyster farmers had been experimenting with oyster spat from Japan around 1978. This might be the reason for the introduction of *Musculista senhousia* in this Mediterranean inland sea. Additional shells were collected in Balaruc les Bains in October 1982, April 1984, October 1985, April 1987, and April 1988. We collected empty shells as well as live specimens so we conclude that the species has been well established.

Recently, Mr R. H. de Bruyne (Amsterdam) collected *M. senhousia* in the Étang de Leucate (France, dépt. Roussillon), which is about 80 km south-west from our locality.

DISTRIBUTION

Musculista senhousia is native to the western Pacific coast from Siberia and the Kuril islands south to Singapore. The type locality is the Isle of Chusan, China.

The introduction of the species to the west coast of the United States was first reported by Smith (1944). Since 1980 it is present in the harbour of Auckland, New Zealand (Willan, 1987). In 1983 the species was found in the Swan River estuary, Perth, Western Australia (Smith-Brearily, 1987) without knowing the way of introduction.

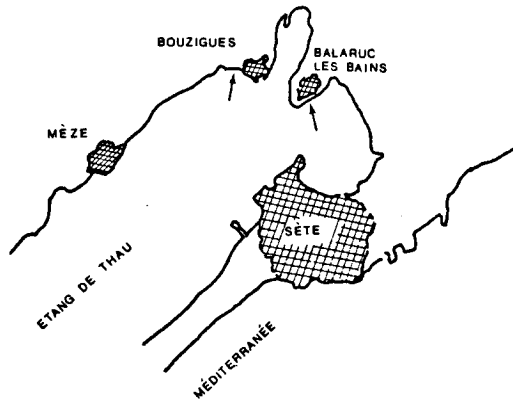


Fig. 1. Situation of the localities of *Musculista senhousia* in the Etang de Thau (arrows) (Carte Michelin No. 83, pli 16).

Under the name *Modiola (Arcuatula) arcuatula* Hanley, 1844, the species was mentioned by Barash & Danin (1971) from the beaches of Akko, Haifa, Atlit and Tel-Aviv (Israel). According to Barash & Danin (1972) the distribution ranges from the Great Bitter Lake, Suez Canal, Red Sea, Aden, Zanzibar, Madagascar, Mauritius, Indo-China, Thailand, Malaya, Japan, Philippines to New Caledonia. In their publication these authors have figured a specimen from the Mediterranean, which is without doubt *Musculista senhousia*. We came to this opinion after studying the type material of *Modiola arcuatula* (figs. 2-3; BMNH 1975094/1) and *Modiola senhousia* (figs. 4-5; BMNH 1985011/1), kindly loaned by the British Museum (Natural History), London (BMNH). Our West Mediterranean shells (figs. 6-9) are figured for comparison.

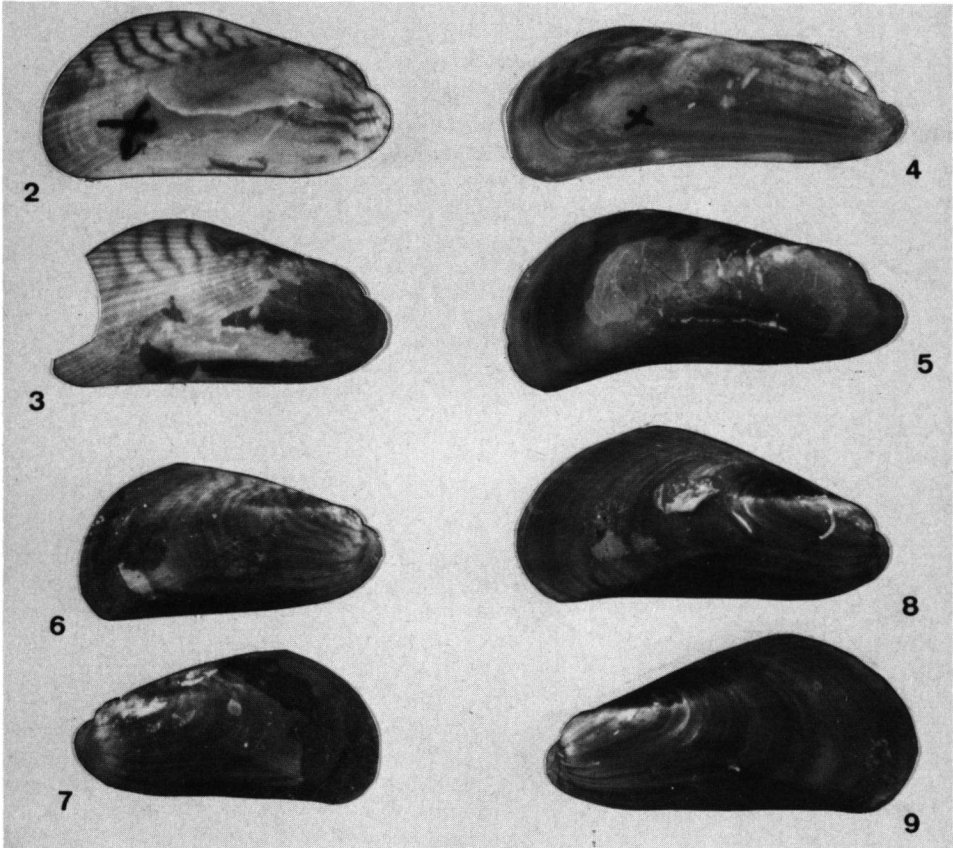
IDENTIFICATION

Musculista senhousia has a fragile shell. The maximum dimensions of Mediterranean specimens are 25 mm in length and 12 mm in width. Its colour varies from dark brown to yellowish brown; the shell is covered by a yellow greenish periostracum. There are about 6-8 small, but clearly visible ribs anterior to the umbones. Light coloured radiating lines (not ribs) and a pattern of brownish blotches are somewhat concentrically grouped on the posterior part. After removing the ligament, the shell shows crenulation. Just anterior to the ligament (below the umbo) there are 8-15 knob-like teeth.

TAXONOMICAL NOTES

The description of *Musculista senhousia* was made by Benson in a paper by Cantor on the flora and fauna of Chusan, near Shanghai (1842). Benson placed the taxon in the genus *Modiola* Lamarck, 1801 (= *Modiolus* Lamarck, 1799). Yamamoto & Habe (1958) used the genus *Musculus* and established the subgenus *Musculista*, the type being *Modiola senhousia*.

Willan (1985) considered *Musculista* a valid genus. An opinion we agree with, because the shell does not fit the description of the genus *Musculus*. This genus has ribs



Figs. 2-9. *Musculista senhousia*. 2-3. Possible syntype (BMNH 1985011/1) (2, inside left valve; 3, outside right valve). 4-5. Syntype of *Modiola arcuatula* (BMNH 1975094/1) (4, inside left valve; 5, outside right valve). 6-9. Balaruc les Bains, Hoenselaar colln., outside views (6, 8, right valve; 7, 9, left valve). Photographs Peter van Pel, all about natural size.

on the anterior as well as on the posterior part, whereas *Musculista* only has ribs on the anterior part of the shell. The specific name has been variously spelled as *senhousia*, *senhousii*, *senhousei* etc., but Willan (1985) has demonstrated that the correct spelling must be *senhousia*.

ACKNOWLEDGEMENTS

We are grateful to the British Museum (Natural History) for the loan of type material, Dr. J. J. van Aartsen for information and to Peter van Pel for making the photographs. Robert G. Moolenbeek provided some literature references and suggestions concerning the text.

REFERENCES

- BARASH, A., & Z. DANIN, 1971. Mollusca from Sparus auratus. — Argamon 2: 97-104.
- &—, 1972. The Indo-Pacific species of Mollusca in the Mediterranean and notes on a collection from the Suez Canal. — Israel J. Zool. 21: 301-374.
- BENSON, W. H., 1842. Mollusca. In T. CANTOR, General features of Chusan, with remarks on the flora and fauna of that island. — Ann. Mag. Nat. Hist. (1) 9: 486-489.
- HANLEY, S., 1844. Description of new species of Mytilacea, &c. — Proc. Zool. Soc. London 12: 14-18.
- SLACK-SMITH, S. M., & A. BREARLY. 1987. Musculista senhousia (Benson, 1842); a mussel recently introduced into the Swan River estuary, Western Australia (Mollusca: Mytilidae). — Rec. West. Aust. Mus. 13: 225-230.
- YAMAMOTO, G., & T. HABE, 1958. Fauna of shell-bearing mollusks in Mutsu Bay. Lamellibranchia (1). — Bull. Mar. Biol. Stat. Asamushi, Tohoku Univ. 9: 1-20.
- WILLAN, R. C., 1985. Successful establishment of the Asian mussel Musculista senhousia (Benson in Cantor, 1842) in New Zealand. — Rec. Auckland Inst. Mus. 22: 85-96.
- , 1987. The mussel Musculista senhousia in Australasia; another aggressive alien highlights the need for quarantine at ports. — Bull. Mar. Science 41: 475-489.