

Fig. 1. *Haminoea japonica* from Wolphaartsdijk, 23 June 2018. Photo Marco Faasse.

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Haminoea japonica Pilsbry, 1895 (Gastropoda: Cephalaspidea): nieuw voor Nederland

Samenvatting. Van de familie Haminoeidae, de zogenaamde 'bubble shells' of zeepbelslakken, waren tot voor kort geen populaties van levende dieren in Nederland bekend. Op 19 juni 2018 werden duizenden exemplaren en legsels van de oorspronkelijk West-Pacifische *Haminoea japonica* waargenomen in het Veerse Meer bij Wolphaartsdijk. Vrijwel alle slakken waren ongeveer 2 cm lang. Lege schelpen waren talrijk boven de waterlijn. *H. japonica* verschilt van alle voor Europa inheemse *Haminoea*-soorten door de lange en overlappende koplobben (Malaquias & Cervera, 2006) en een strengvormig orgaan van Hancock. In 2016 is van de Duitse Oostzeekust *H. solitaria* gemeld (Zettler & Zettler, 2017), afkomstig van de Atlantische kust van Noord-Amerika, die eveneens lange, overlappende koplobben bezit (tekening in Smallwood, 1904; Du Bois-Reymond Marcus, 1972). *H. japonica* kan onderscheiden worden van *H. solitaria* aan de hand van de tandjes op de radula. De rachidiale tanden zijn driepuntig in plaats van fijn getand en de eerste laterale tanden bezitten aan de binnenzijde een bijkomend puntje in plaats van geheel glad te zijn. Vergelijk hiervoor Alvarez *et al.* (1993, als *H. callidegenita* Gibson & Chia, 1989) en/of Gosliner & Behrens (2006) met Du Bois-Reymond Marcus (1972). De slakken werden waargenomen in een strook van ruwweg 200 bij 1,5 meter langs de oever, tussen groenwieren op de betonnen oeverbekleding. In de helft van deze strook bedroeg de dichtheid ongeveer 1000 exemplaren per vierkante meter. De introductievector naar en binnen Europa is waarschijnlijk het transport van schelpdieren (Alvarez *et al.*, 1993; Hanson *et al.*, 2013a, b). In Europa is de soort nu bekend van Italië, Spanje en Frankrijk (Hanson *et al.*, 2013a). Eerder al werd *H. japonica* aan de Pacifische kust van Noord-Amerika gesignaleerd. In San Francisco werd een huidaandoening veroorzaakt door een verspreidingsstadium van parasitaire platwormpjes, cercarische dermatitis, overgebracht door *H. japonica* (Brant *et al.*, 2010). In het buitenland zijn aanwijzingen gevonden dat *H. japonica* inheemse *Haminoea*-soorten kan verdringen (Hanson *et al.*, 2013a). Als Nederlandse naam voor *Haminoea japonica* wordt 'Japanse zeepbelslak' voorgesteld.

Introduction

On 19 June 2018 several thousands of sea snails of the family Haminoeidae, the so-called 'bubble shell snails', were observed at a single locality in the Netherlands. Species of the superfamily Haminoeidea have never before been recorded alive from the Netherlands (www.nederlandsesoorten.nl). The specific identity of the snails was established and their distribution in the Netherlands was investigated.

Description of the investigated sites

Haminoea japonica was observed in the Netherlands in a sheltered marine inlet, the Veerse Meer, near the village Wolphaartsdijk (51°32'54"N, 3°49'23"E) (fig. 1). The area along the shore at the site near Wolphaartsdijk is shallow, up to about 1 m deep, with a sandy bottom densely populated by *Arenicola marina* (Linnaeus, 1758). In a band of 1.5 m along the shore concrete coastal protection has been applied. The concrete has an algal



Fig. 2. Spawn of *Haminoea japonica*, underwaterphoto, Wolphaartsdijk, 23 June 2018. Photo Marco Faasse.

cover almost exclusively consisting of the green algae *Chaetomorpha linum* (O.F. Müller) Kützing, 1845 and *Cladophora* spec. The Wolphaartsdijk site is well sheltered from wind in directions between southeast and northwest. At nine other localities around the Veerse Meer (divesite Wolphaartsdijk, Middelpaten, creek and harbour de Piet, Fletcher Hotel, de Arne boat rental, Veersedam, Geersdijk and Kortgene) *Haminoea japonica* could not be found.

Observations of *Haminoea japonica* in the field

The snails at Wolphaartsdijk were concentrated in a band of about 1.5 m wide and 100 m long along the shore on the green algae on the concrete coastal protection. The density of *Haminoea japonica* in this band was estimated at 1000 individuals per square meter. The site was visited again on 21 and 23 June 2018. Spawn was abundant on the latter dates. Spawn consists of elongate kidney-shaped gelatinous masses, containing yellow eggs in transverse rows (fig. 2). Density of snails beyond the stretch of 100 m where they abound decreased to almost zero per square meter within another 100 m. Beyond the 200 m stretch where *H. japonica* was observed algal cover was dominated by *Sargassum muticum* (Yendo) Fensholt, 1955 and *Ulva* spec. Collected specimens of *H. japonica* consumed some *Cladophora* spec., but this seems not to be digested. During windless and almost windless conditions many snails crawl up to and above the waterline. A little water movement makes them submerge to some decimetres depth. They are easily dislodged by slight water movement and it is hardly conceivable they can survive on exposed sites. Most storms in the Netherlands are from westerly directions. The site at Wolphaartsdijk is well sheltered from such storms. Just above the waterline empty shells were abundant.

Observations of collected specimens

Pilsbry (1895) described only characteristics of the shell of *Haminoea japonica* (as *Haminea binotata* var. *japonica*). According to Rudman (1971) the major distinctions between species in



Fig. 3. Shell of *Haminoea japonica* from Wolphaartsdijk, 23 June 2018. Height 11 mm. Photo Marco Faasse.

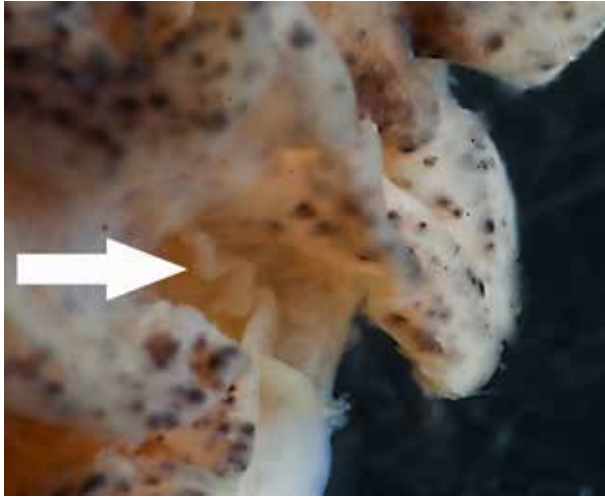


Fig. 4. Ridge-shaped/tubular Hancock's organ (white arrow) of *Haminoea japonica* from Wolphaartsdijk, 19 June 2018. Photo Marco Faasse.

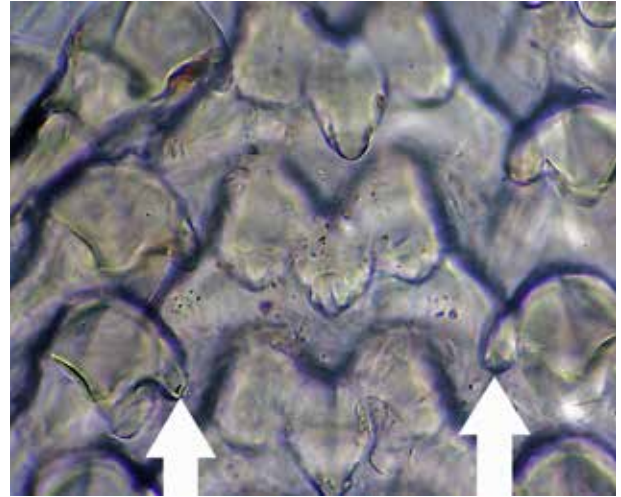


Fig. 5. Part of radula of *Haminoea japonica* from Wolphaartsdijk, 19 June 2018. Three-cusped rachidian teeth in the middle of the radula, flanked by first lateral teeth with inner secondary cusp (white arrows). Photo Marco Faasse.

the genus *Haminoea* are to be found in the soft parts: “in most cases the variations between shells are difficult to determine”. Malaquias & Cervera (2006) state that shells are very similar among species and that only one European species can be distinguished by its shell. Malaquias & Cervera (2006) present a table with characteristics of all *Haminoea*-species recorded from Europe at the time. According to this table the snails from the Netherlands (fig. 3) should be identified as *H. japonica* Pilsbry, 1895. The latter species is the only one in the table with large and overlapping cephalic lobes and with a tubular/ridge-shaped Hancock's organ. Zettler & Zettler (2017) mention *H. solitaria* Say, 1822 found on the German coast of the Baltic Sea for the first time in 2016. The cephalic lobes in *H. solitaria* are long and overlapping, similar to *H. japonica* (drawing in Smallwood, 1904; du Bois-Reymond Marcus, 1972). In both species Hancock's organ is not lamellar, but ridge-shaped/tubular (Alvarez *et al.*, 1993; Du Bois-Reymond Marcus, 1972; fig. 4). *H. japonica* differs from *H. solitaria* in details of the teeth of the radula. The rachidian teeth of *H. japonica* are three-cusped, with the central cusp bigger than the lateral cusps (Alvarez *et al.*, 1993, as *H. callidegenita*, Gosliner & Behrens, 2006), whereas in *H. solitaria* the rachidian teeth are strongly denticled (Du Bois-Reymond Marcus, 1972). The first lateral teeth are provided with an inner secondary cusp in *H. japonica* (Alvarez *et al.*, 1993; Gosliner & Behrens, 2006), whereas a secondary cusp is lacking in *H. solitaria* (Du Bois-Reymond Marcus, 1972). The teeth of the radula of the species collected in the Netherlands are similar to those of *H. japonica* (fig. 5). Specimens collected on 23 June 2018 have been deposited in the collection of Naturalis Biodiversity Center, Leiden with registration number RMNH.MOL.340733.

Discussion

The originally West-Pacific species *H. japonica* has been introduced to the west coast of North-America and to the Mediterranean and Atlantic coasts of Europe (Hanson *et al.*, 2013b). It was most likely introduced to Europe directly from Japan (Hanson *et al.*, 2013a). The species is now known from Italy, the Atlantic coast of Spain, and both the Mediterranean and Atlantic coasts

of France (Hanson *et al.*, 2013a). The northern-most published record from Europe is from Pléneuf-Val-André, northern Brittany, France (Hanson *et al.*, 2013a,b). According to Hanson *et al.* (2013b) *H. japonica* may well be more widespread than currently known, due to taxonomic confusion. They state that the native European *H. hydatis* (Linnaeus, 1758) has long cephalic lobes like *H. japonica*, citing Malaquias & Cervera (2006). However, the latter publication contains no statement to that effect, but mentions small, non-overlapping lobes for *H. hydatis*. Thompson [1976, after Tchang-Si (1931)] shows small, non-overlapping lobes in his drawing of *H. hydatis*.

The observed abundance of *H. japonica* at Wolphaartsdijk may be related to the spawning season. Smallwood (1904) writes with respect to *H. solitaria* that it moves to shallow water during the spawning season. This habit may apply to *H. japonica* as well. If this is true, the snails will have to crawl at least 20 m over muddy sand at a depth of 1 m before reaching the shore. Several specimens of *H. japonica* were seen crawling over the muddy sand without apparent directionality.

Two fragments of a presumed *Haminoea*-shell have been reported from the North Sea beach along the Brouwersdam in the southwest of the Netherlands on a Discussion platform of the Netherlands' Malacological Society. The Brouwersdam is a dam between the North Sea and the Grevelingen, a sheltered marine water body with conditions similar to the Veerse Meer, where *H. japonica* has been collected.

H. japonica has been listed as a species for which an unintentional introduction to the Netherlands should be considered as a serious possibility as defined by Verbrugge *et al.* (2015). A reason for concern with respect to this introduction is the incidence of cercarian dermatitis transmitted by *H. japonica* as observed in San Francisco. Cercarial dermatitis ('swimmer's itch') is caused by the penetration of human skin by cercariae of schistosome parasites that develop in and are released from snail hosts (Brant *et al.*, 2010). There are clear indications in North America and Europe that *H. japonica* may displace native *Haminoea* species (Hanson *et al.*, 2013a). However, the Netherlands have no native *Haminoea* species.

The introduction vector for *H. japonica* to the Netherlands cannot be deduced with certainty from the data at hand. For the introduction of *H. japonica* to Europe Hanson *et al.* (2013b) convincingly argue that transports of the shellfish *Crassostrea gigas* (Thunberg, 1793) and/or *Ruditapes philippinarum* (Adams & Reeve, 1850) from Japan or North America are the most likely vector. Considering the localities in Europe where *Haminoea japonica* occurs, i.e. not close to international harbours, secondary introductions in Europe are most likely also associated with shellfish transfers. The same holds for the site Wolphaartsdijk. According to Alvarez *et al.* (1993) *H. japonica* (as *H. callidegenita* Gibson & Chia, 1989) was found in the Eo estuary and O Grove in Spain on seed of *R. philippinarum* just imported from the Bassin de Marennes-Oléron, France.

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