

First record of the Asian shore crab *Hemigrapsus sanguineus* (De Haan, 1835) in Belgium (Crustacea, Brachyura, Grapsoidea)

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Introduction

The Asian shore crab *Hemigrapsus sanguineus* (De Haan, 1835) is a species native to Sakhalin island, Korea, Japan, North China, Korea and Taiwan (Shen, 1932; T. Sakai, 1965, 1976; Dai & Yang, 1991). In 1988, it has been found in New Jersey on the Atlantic coast of the USA (Williams & McDermoth, 1990). It quickly established breeding populations in its new habitat (McDermott, 1991) and colonized an extensive part of the east coast of the USA (McDermoth, 1998, 1999, 2000). The development of these populations has been so important that it has quickly become the dominant shore crab in the temperate Northwest Atlantic, replacing almost totally the green shore crab *Carcinus maenas* (Linnaeus, 1758) on some rocky shores (Kraemer & Sellberg, 2001; Lohrer & Whitlatch, 2002). According to these authors, the success of *H. sanguineus* in the USA would largely result from a much higher vulnerability of juvenile *C. maenas* than young *H. sanguineus* to predation by adult crabs (both *C. maenas* and *H. sanguineus*). In 1999, a population of *H. sanguineus* was detected in the harbour of Le Havre in France (Breton et al., 2002) and two isolated specimens were found in the Oosterschelde (Eastern Scheldt) in the Netherlands (d'Udekem d'Acoz & Faasse, 2002). In 2001, an isolated specimen was found in the Adriatic Sea (Schubart, 2003). In 2004 established populations were found in various parts the Netherlands (Faasse, 2004; Nijland & Faasse, 2005) including the Westerschelde (Western Scheldt), i.e. close to Belgium. In this note the first records on the Belgian coast are presented and discussed.

Positive and negative records

(-) Municipality of Knokke-Heist, Albertstrand, 51°20.5'N 003°17'E, lower shore, 19.viii.2005: *Cancer pagurus* Linnaeus, 1758, exuviae of about 5 young specimens on rocks of groyne; 15 *Carcinus maenas* amongst rocks and clutches of mussels; *Hemigrapsus takanoi* Asakura & Watanabe, 2005 including ovigerous females in clutches of mussels; 1 *Pilumnus hirtellus* (Linnaeus, 1761) in a clutch of mussels; washed ashore fragments of about 10 *Polybius holsatus* (Fabricius, 1798), 150 *Porcellana platycheles* (Pennant, 1777) amongst clutches of mussels (and a few specimens below stones); 1 washed ashore exuvia of *Portumnus latipes* (Pennant, 1777); no *Hemigrapsus sanguineus* were found.

(+) Municipality of Knokke-Heist, Duinbergen, 51°21'N 003°16'E, groyne, lower shore, 20.vii.2006: 1 adult female *Hemigrapsus sanguineus* caught by children with an open mussel attached to a rope (a traditional child game in Belgium), together with 150 *Carcinus maenas*. The specimen of *H. sanguineus* was not preserved.

(+) Municipality of Knokke-Heist, Albertstrand, 51°20.5'N 003°17'E, groyne, intertidal (not very low on the shore), 21.vii.2006: 1 adult male *Hemigrapsus sanguineus* between clutches of mussels, size (length x width of carapace): 21.2 x 24.4 mm (1 *H. sanguineus* for about 40 *Porcellana platycheles*, 30 *Hemigrapsus takanoi* and 30 *Carcinus maenas*). The specimen of *H. sanguineus* was preserved and has been deposited at the Royal Belgian Institute of Natural Sciences, Brussels.

(-) Further researches at Knokke-Heist in July and September 2006, with the examination of hundreds of crabs and crab-like crustaceans revealed no further *H. sanguineus*, but only *Cancer pagurus*, *Carcinus maenas*, *Hemigrapsus takanoi*, *Polybius holsatus* (dead), *Porcellana platycheles*, *Portunus latipes* (dead).

A side result of these investigations is the observation that *Porcellana platycheles*, which was rare at Knokke-Heist around 1990 and earlier (d'Udekem d'Acoz, 1990), has become very abundant in 2005 and 2006, especially amongst clutches of mussels at the lowest levels of the shore.

Systematics

Two species of *Hemigrapsus* are currently present in Belgium and Europe: the Asian shore crab *H. sanguineus* (De Haan, 1835) and the pencil crab *H. takanoi* Asakura & Watanabe, 2005. These species, which are both native to northeastern Asia, have a characteristic square carapace. At first glance they look very similar to each other, but with a little experience, adult specimens can be easily identified in the field. Male *H. sanguineus* have a small fleshy swelling at the basis of the fingers of the claws, on the inner side (fig. 2A), whilst male *H. takanoi* have instead a circular patch of fur on both sides of the claws (fig. 2C-D). Female *Hemigrapsus* spp. have neither fleshy vesicles nor patches of fur. *H. sanguineus* have a mottled/dotted colour pattern with reddish brown and greenish areas; the dorsal side of the first pereopods (pincers) is speckled with small dark reddish dots (fig. 1A, 2A); there are no antero-ventral black dots on the body and the chelae (fig. 2B). *H. takanoi* are greenish to brownish and its colour pattern is usually more uniform than in *H. sanguineus* (fig. 1B). However large symmetrical white marks are often present on the carapace of small specimens (fig. 3A); the antero-ventral surface of the body and pincers exhibits scattered tiny black dots (fig. 2D, 3B) (which are much smaller than the dorsal dark reddish spots of *H. sanguineus*); the pincers of *H. takanoi* have no dorsal dark reddish spots (fig. 2C). The infraorbital ridge

is continuous in *H. sanguineus* whilst it is divided into three parts in *H. takanoi* (see illustrations given by d'Udekem d'Acoz & Faasse (2002) and Breton et al. (2002)). Most *H. sanguineus* are about 20-30 mm wide whilst *H. takanoi* is usually about 10-15 mm. In all literature prior to 2005, *H. takanoi* was not separated from its close relative *H. penicillatus* (De Haan, 1835). So far, the true *H. penicillatus* has not been found outside northeastern Asia (Asakura & Watanabe, 2005).

Present situation and future perspectives of *Hemigrapsus* spp. in Belgium and the Netherlands

H. takanoi has recently colonized the Belgian coast where it has locally become very common (Dumoulin, 2004). On the groynes of Knokke-Heist, it is especially common amongst clutches of mussels (from mid-shore to the lowest part of the shore); these specimens remained small, rarely overreaching 10 mm in carapace width. So far, on the Belgian coast *H. takanoi* has not become as abundant as in the Oosterschelde (the Netherlands), where it has become the dominant shore crab, clearly at the expense of the native *Carcinus maenas* (personal observations in 2005). Possibly the exposed character of the Belgian coast is less favorable to *H. takanoi* compared to the sheltered lagoon/estuarine environment of the Oosterschelde. However the situation is probably not yet stabilized and could evolve as a result of further interactions with *H. sanguineus* which is likely to become much more common in the coming years. Subsequent arrival of parasites of *Hemigrapsus* spp. or even invasion by further alien crabs may further complicate the situation.

In 2005, in the Oosterschelde, *H. sanguineus* was restricted to western shores (e.g. Wissenkerke) where the sediment below boulders is sandy, and not muddy as in eastern shores such as around Yerseke. On western shores it was confined to a narrow belt at mid-shore levels, being absent from the lowest part of the intertidal zone. This affinity for high levels of the shore has also been observed in some but not all areas of Japan (Lohrer et al., 2000). This is not the case on the east coast of the USA, where *H. sanguineus* remain abundant down to the lowest levels of the shore (O'Connor, 2001; Lohrer & Whitlatch, 2002). In the future, populations of *H. sanguineus* of the Oosterschelde may become more abundant than today, but it is likely that the environmental conditions of the area are more favorable to *H. takanoi*, which has special affinities with sheltered environments (Asakura & Watanabe, 2005).

The situation in Belgium and the outer coast of the Netherlands could follow a different evolution. These coasts, which are strongly exposed to waves, consist of sandy beaches interrupted by a large number of artificial rocky jetties and groynes. Whilst the sandy stretches are apparently unsuitable to *H. sanguineus*, the rocky parts seem very favorable to this crab which is said to be typical of exposed coasts with rocks and

boulders (Fukui, 1988; Lohrer et al., 2000). On such coasts it could become a common species, and even perhaps the dominant crab on the rocky parts (at the expense of *Carcinus maenas*), as it has become the case on the east coast of the USA (Kraemer & Sellberg, 2001; O'Connor, 2001; Lohrer & Whitlatch, 2002). If such a scenario should happen, *C. maenas* could become relegated to the sandy and muddy parts of the shore and/or below tidemarks. Indeed *H. sanguineus* apparently requires the occurrence of stones, boulders, cobbles, etc..., whilst *C. maenas* may accommodate with bare soft bottoms (Lohrer & Whitlatch, 2002). However, the global and local success of an alien species in a new area depends on many biotic and abiotic factors. So it cannot be predicted with confidence that *H. sanguineus* will be as successful in Europe as in the USA.

Conclusion

Only the future will tell if the Asian shore crab *Hemigrapsus sanguineus* will forever deface ecosystems of the northeastern Atlantic in wiping out the green shore crab *Carcinus maenas*, i.e. one of the most iconic species of the European seashores.

Summary

The Asian shore crab *Hemigrapsus sanguineus* (an invasive alien species) is recorded for the first time in Belgium: two adult specimens were found in July 2006 at Knokke-Heist. The current distribution and abundance of *Hemigrapsus sanguineus* and *H. takanoi* in Belgium and the Netherlands are briefly discussed.

Samenvatting

De blaasjeskrab *Hemigrapsus sanguineus* (een invasieve exotische soort) wordt voor de eerste keer in België waargenomen: twee volwassen exemplaren werden in juli 2006 te Knokke-Heist gevonden. Het voorkomen en de huidige verspreiding van *Hemigrapsus sanguineus* en *H. takanoi* in België en Nederland worden kort becommentarieerd.

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Fig. 1.- Habitus. A, *Hemigrapsus sanguineus*, female (note the contrasted mottled/dotted colour pattern and the little dark spots on the dorsal surface of the pincer); B, *Hemigrapsus takanoi*, male (note the more uniform colour pattern). The specimens are from the Netherlands (Oosterschelde).

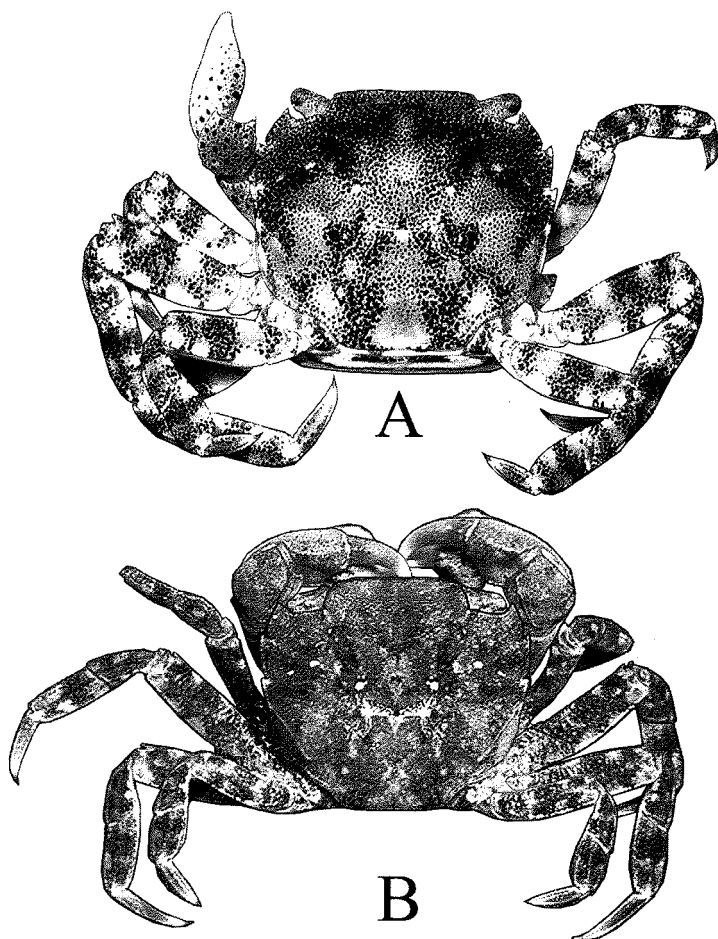


Fig. 2.- Pincers. A-B, *Hemigrapsus sanguineus*, male (note the dark spots on the dorsal surface of the pincer (fig. A) and the absence of dots on the ventral surface of the pincer and body (fig. B); note also the fleshy vesicle at the basis of the fingers of the pincers, on the inner side (fig. A)). C-D, *Hemigrapsus takanoi*, male (note the absence of dark spots on the dorsal surface of the pincer (fig. C) but instead the occurrence of dark dots on the ventral side (fig. D); note also the patch of fur on both sides of the pincer (figs. C-D)). The specimens are from the Netherlands (Oosterschelde).

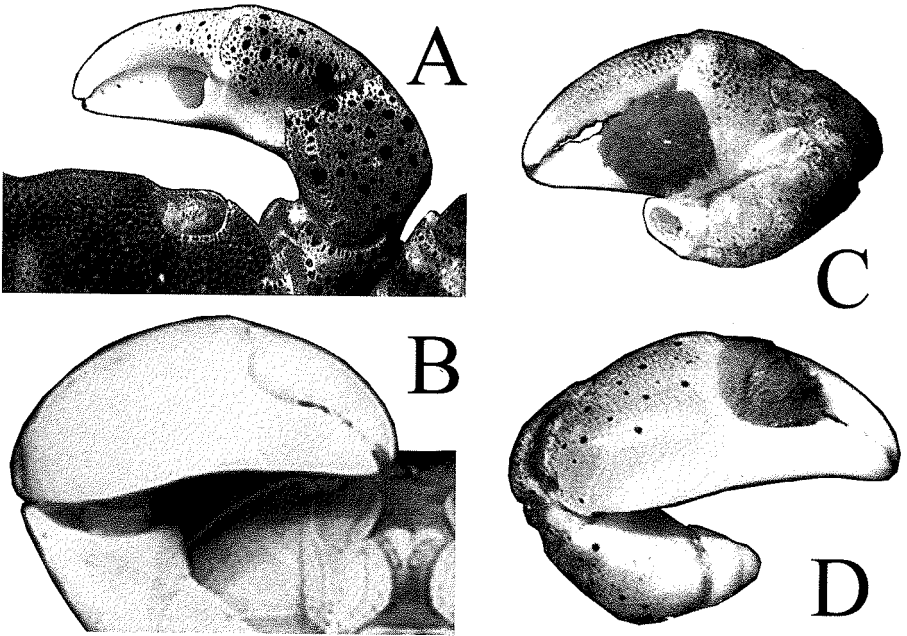
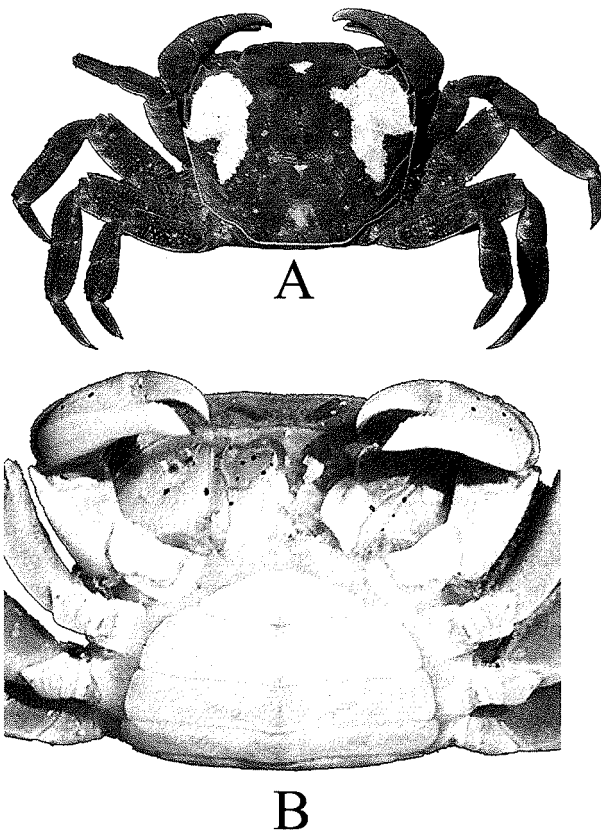


Fig. 3.- *Hemigrapsus takanoi*, female. A, habitus of a specimen with large white dorsal spots (such spots are common in small and mid-sized specimens of *H. takanoi*; they are never present in *H. sanguineus*). B, ventral face of crab showing anterior dark ventral dots on body and pincers. Note the absence of patches of fur on the pincers since the specimen is a female. The specimen is from the Netherlands (Oosterschelde).



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