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## First record of the invasive Asian date mussel *Arcuatula senhousia* (Benson, 1842) (Mollusca: Bivalvia: Mytilidae) in West Africa

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### ABSTRACT

Biological invasions can have serious consequences for native communities. The Asian date mussel *Arcuatula senhousia* is an Asian species that has been accidentally introduced into coastal areas of North America, Oceania and the Mediterranean, with significant impact on local benthic communities. Here, we present the first record of this species in West Africa, after having found one live specimen in a mudflat off the island of Bubaque, in the Bijagós archipelago of Guinea-Bissau. Given the importance of the benthic communities for wintering shorebirds and local fisheries at this key West African wetland, and considering the invasive behaviour of Asian date mussels, we recommend further monitoring to confirm whether a self-maintaining population has settled in the area.

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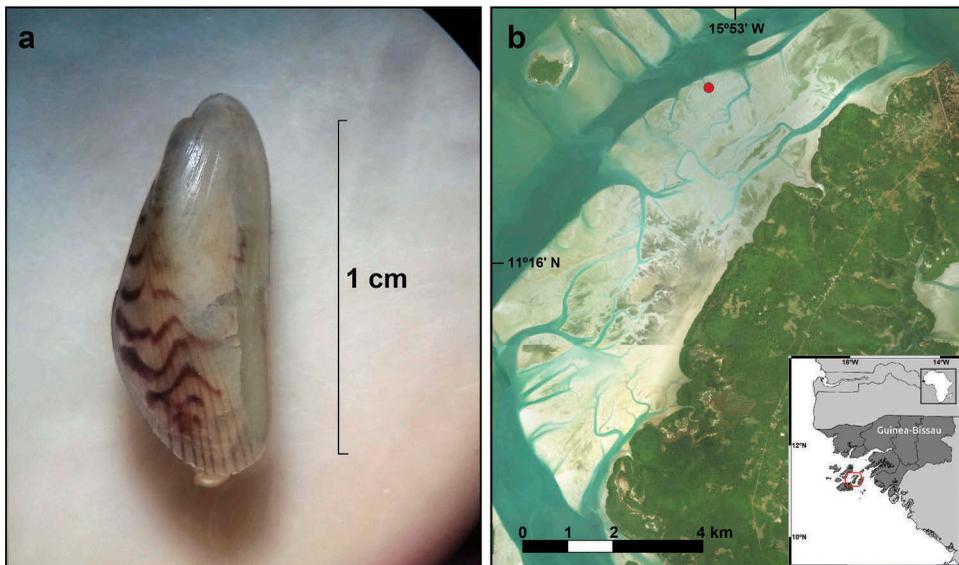
Bijagós archipelago;  
biological invasion; bivalve;  
Guinea-Bissau; intertidal;  
macrobenthos

Invasions by non-indigenous species can have profound effects on biotic communities (Vitousek 1990; Robinson et al. 2007; Simberloff et al. 2013). Invasive species can alter local communities through competition, predation, parasitism, and alterations of food webs or nutrient cycling, as well as through habitat modification or ecosystem engineering (Vitousek 1990; Williamson 1996; Robinson et al. 2007; Simberloff et al. 2013). Over the last century, the rate at which invasions take place has greatly accelerated due to the expansion of international commerce, which led to the breakdown of biogeographic barriers through massive trade in live organisms and the inadvertent transport of many other organisms in cargo ships and other means of transportation (Vitousek et al. 1997; Seebens et al. 2018).

The Asian date mussel (*Arcuatula senhousia*) is a small marine bivalve that originates from the north-western Pacific, from Siberia to Singapore, including Japan (Chuang 1961). It was accidentally introduced into the western coast of North America in the 1920s (Kincaid 1947), New Zealand in the 1970s (Willan 1987) and Australia (Willan 1987) and the Mediterranean in the 1980s (Hoenselaar and Hoenselaar 1989). To the best of

our knowledge, this invasive species has never before been recorded in West Africa (e.g. see GBIF.org 2018; Global Invasive Species Database 2018; MolluscaBase 2018). This bivalve is an opportunistic suspension feeder with a high reproductive capacity and a fast growth rate, capable of achieving high population densities and forming large mats that can change the structure of the sediment where they are settled (Crooks 1996). They are also known to alter the composition of the benthic community where they are established, in some cases completely replacing the native infaunal bivalves (Crooks 1996; Mistri et al. 2004; Hayward et al. 2008).

Here we describe the first record of Asian date mussel in the Bijagós archipelago of Guinea-Bissau, one of the largest intertidal wetlands in West Africa (Campredon and Catry 2017). A single live individual was collected in a mudflat off the island of Bubaque (Figure 1b), in January 2018, during *ad hoc* benthos collection aimed at identifying potential prey for shorebirds wintering in the area, and together with other bivalves it was stored in alcohol for later identification in the laboratory. This individual is 11.8 mm long and exhibits the typical characteristics of *A. senhousia* (Figure 1a). That is, it is equivalve, with an oval, elongated shape and a modioliform outline. The anterior end is rounded and the ventral margin slightly concave. The umbos are subterminal; the ligament and dorsal margins are not continuous and are slightly angled. There are no hinge teeth and the dorsal edge has dysodont dentition posterior to the ligament of the shell. The shell is thin with a sculpture of radiating lines posteriorly, with concentric lines only in the middle. There are several mild riblets at the anterior end that cause a crenulated anterior margin. The periostracum is shiny and has a pale greenish colour and irregular brownish-reddish markings, as well as radiating reddish lines on the posterior area.



**Figure 1.** (a) Photograph of the Asian date mussel specimen and (b) location where it was collected (circle), in a vast mudflat off the north-western coast of Bubaque in the Bijagós archipelago of Guinea-Bissau, West Africa.

Unfortunately, at the time of collection, no systematic sampling was conducted to detect more individuals and to estimate densities. Still, Asian date mussels were not detected in several other sites sampled during the same expedition to the Bijagós, both on the island of Bubaque and on the islands of Adonga and Formosa. The species had also not been detected in previous benthic sampling performed in other parts of Bubaque in 2015 (Lourenço et al. 2018). This suggests that the invasion is either very recent or that the species occurs at very low densities in the Bijagós. However, since all sampling was done in the intertidal zone and the species also occurs in shallow subtidal areas (0–10 m depth; e.g. Hayward et al. 2008), areas of higher density may have been overlooked. Previous research evidenced that the presence of predators can hinder the species' ability to achieve high densities and construct mats on the sea bed (Yamamuro et al. 2010), so the presence of large numbers of both birds and fish that feed on benthos (e.g. Lourenço et al. 2017, 2018) may prevent a full-blown invasion of the Bijagós mudflats by the Asian date mussel. This species has been known to invade new areas either by being transported together with oysters or other bivalves traded for shellfish farming (e.g. Kincaid 1947), or due to transfer in the ballast water of ships (Willan 1987; Öztürk et al. 2017), but only the second option seems likely for the Bijagós as local shellfisheries (of *Tagelus adansonii* and *Senilia senilis*) are exclusively subsistence and there was certainly no import of foreign bivalves. In fact, Chinese fishing ships routinely fish in the waters of Guinea-Bissau and come to port in Bissau, not far from the Bijagós archipelago, and this port is also visited by East Asian cargo ships – both likely pathways for Asian date mussels to arrive in Guinea-Bissau from their East Asian native range.

The benthic communities are an essential element of the trophic webs of the Bijagós (Catry et al. 2016) and any changes to these communities could seriously impact the hundreds of thousands of shorebirds that winter every year in this key West African site (Delany et al. 2009), as well as local fisheries. Therefore, considering the invasive behaviour of Asian date mussels at other invaded sites, further monitoring studies are required in order to confirm whether a self-maintaining population has settled in the Bijagós archipelago and to determine its impact on local benthic communities.

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No potential conflict of interest was reported by the authors.

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