

Rapid Communication

First record of the maritime earwig *Anisolabis maritima* (Bonelli, 1832) (Dermaptera: Anisolabididae) from South Africa

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Abstract

The first records of the maritime earwig *Anisolabis maritima* from South Africa are reported. The species was first discovered in 2015 in the upper intertidal zone of an artificial rubble causeway at Port Shepstone, on the east coast of South Africa, where it appears to feed on driftline isopods and amphipods. The study site operated briefly as a harbour from 1880–1902, suggesting that this introduction took place via shipping at that time and has remained undetected for more than a century.

Key words: earwigs, alien species, rocky shores, driftline fauna, predation

Introduction

The maritime earwig *Anisolabis maritima* (Bonelli, 1832) is one of two species of maritime earwigs. The second species, *A. littorea* (White, 1846), is restricted to New Zealand and outlying islands and its distribution and biology are described by Giles (1953). Maritime earwigs are typically found in the upper littoral zone of rocky shores, hiding in moist crevices or in sand and soil under boulders, seaweed, or other debris by day, and emerging mostly at night to feed on insects and driftline crustaceans, such as isopods and amphipods (Bennett 1904; Giles 1953; Miller et al. 2011; Miller and Zink 2012; Kendall-Bar and Iyengar 2017). Females guard small batches of eggs, which are laid in a burrow excavated in the soil, also provisioning the developing young through to their second instar (Miller et al. 2011; Suzuki 2011). Considerable research has been undertaken on various aspects of the behaviour of *A. maritima*, for example on provisioning of the young by females (Suzuki 2011), maternal nest defense (Miller et al. 2011) and cannibalism (Miller and Zink 2012), as well as on combat between males (Munoz and Zink 2012) and factors affecting mate choice (Kendall-Bar and Iyengar 2017). Little or nothing has, however, been published about their mode of introduction, the

spread or prevalence of invasive populations, or their potential impacts on native biota in invaded sites.

Anisolabis maritima is thought to have originated from Asia, but as with many other earwigs, has been widely distributed by commerce. As a result, it is now virtually cosmopolitan in its distribution, with population reported from Australia, Japan, USA, Europe and many other locations. For a full listing of countries from which *A. maritima* has been reported, see the online country listing provided by the Earwig Research Centre (<http://www.earwigs-online.de>). Despite its widespread global distribution, *A. maritima* is not listed among the more than 570 alien animals reported as occurring in South Africa (Picker and Griffiths 2017), although they do list four other introduced earwigs. Neither is it listed in previous taxonomic accounts of the Dermapteran fauna of the region (Hincks 1957; <http://www.earwigs-online.de/ZA/za.html>).

Methods and results

The first specimens to be found in South Africa were 2 females, both 25 mm in length, collected incidentally by the author while undertaking a survey of distribution patterns of littoral isopods. The specimens were found along the driftline on an artificially constructed rubble causeway at the mouth of the uMzimkhulu River

(33°44'25.52"S; 30°27'32.72"E) in Port Shepstone, KwaZulu-Natal on 15 October 2015. They have been deposited in the Iziko South African Museum under catalogue number MB-A067533. Once their identity and alien status had been established, a second collecting trip was undertaken on 19 September 2017, when an additional 4 females (23–27 mm) and 2 males (23 and 18 mm, including forceps) were collected as voucher specimens. These are also deposited in Iziko South African Museum, under catalogue number MB-A067534. The species was common in debris and sand beneath loose rocks used to form an artificial breakwater and amongst associated driftwood and seaweed wrack near the high water mark along the causeway, which is only about 100 m in length. It was difficult to establish densities, due to the complex and unstable nature of the artificial habitat, which included many boulders that were too large to be moved. However, at least several individuals were seen per m² of searched habitat. Many littoral isopods (*Ligia natalensis* Collinge, 1920) and amphipods (*Orchestia* spp.) were also present under these same rocks and likely formed the prey of the earwigs. No *A. maritima* were found on adjacent natural rocky intertidal habitats, nor were they found in suitable artificial rubble breakwater habitats in either Durban Harbour (visited on 1 July 2017), or Richard's Bay Harbour (visited on 10 February 2017), although the driftline of boulder shores at both these sites appeared to comprise suitable habitat and supported dense populations of the introduced littoral isopod *Ligia exotica* Roux, 1828.

Discussion

Anisolabis maritima can be distinguished from other regional earwig species not only by its unusual marine habitat, but by the combination of relatively large size (adult length up to 25 mm including forceps), complete absence of wings and the combination of dark brown body and pale yellow legs. The only other regional earwig with which it might be confused is the Shore earwig *Labidura riparia* (Pallas, 1773), which is also large and common under wood or stones on maritime beaches, but is pale in colour, is winged and has enormous curved forceps (Picker et al. 2004). As in other Dermaptera, males (Figure 1 top) have 10 visible abdominal segments, whereas females (Figure 1 below) have eight. The shape of the forceps in this species are notoriously variable and have been reported to be asymmetrical in many populations. Asymmetric forceps have been shown to increase fighting success in contests between smaller males (Munoz and Zink 2012), but size is a more important predictor of both male dominance

(Munoz and Zink 2012) and of mate choice by females (Kendall-Bar and Iyengar 2017). The forceps in the two South Africa male specimens collected to date are, however, not noticeably asymmetrical. This may be because they were not yet fully adult. The forceps of males resemble those of females until the last moult (Bennett 1904) and he reports adults attaining a length of 35 mm, which is considerably larger than the largest specimens collected here.

It is surprising that this species has been found only at Port Shepstone, since no previous marine invasive species have been detected at this site, whereas many are reported from the other large commercial harbours in the region, Durban Harbour and Richard's Bay Harbour (Mead et al. 2011). However, the mouth of the uMzimkhulu River did briefly operate as a port between 1880 and 1902, mostly transporting goods, including wood and building materials, between Port Shepstone and Durban (du Bois 2016). The opening of the railway line between Durban and Port Shepstone in 1901 provided a cheaper and more reliable mode of transportation and the last commercial voyage from the uMzimkhulu took place in April 1902 (du Bois 2016). It thus seems most likely that shipping was the vector of this introduction and that these earwigs were imported, along with other goods, such as building materials. Assuming that to be the case, the introduction must have taken place between 1880 and 1902. The cryptic nature and small range of the population probably resulted in it remaining undiscovered until the current study, more than a century later.

As *A. maritima* are predatory and fairly common at the study site they may have considerable impact on the population densities of drift-line insects and crustaceans within this limited artificial breakwater habitat. However, there are few other suitable habitats for this species in the KwaZulu-Natal region of South Africa. *Anisolabis maritima* requires boulder shore habitat to occur in the upper intertidal zone, and natural boulder shores are particularly rare in this province (Sink et al. 2012), in which the coastline consists largely of either exposed sandy beaches or lowshore rocky platforms. There thus seems little risk of the species becoming widespread along the KwaZulu-Natal coast. It is interesting that they also appear to be absent from other regional harbours, although these do support fairly extensive stretches of artificial rubble shore, which would appear to represent suitable habitat for *A. maritima*. However, these sites are dominated by *Ligia exotica*, a larger and much more agile (personal observation) driftline isopod than the native *L. natalensis* and one which *A. maritima* may thus be unable to capture. Suitable sites in more temperate parts of the country



Figure 1. Photographs of (top) male and (below) female *Anisolabis maritima* collected from Port Shepstone, South Africa in September 2017. Photographs by C.L. Griffiths.

should also be monitored for this species, which can certainly survive in cooler climatic conditions. However recent surveys for another intertidal invasive crustacean in Saldanha Bay harbour in the Western Cape (Griffiths et al. 2018), and of driftline isopods at other sites throughout the region, including East London Harbour, (Greenan et al. 2018) have failed to detect *A. maritima* other than at this one site.

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