Redescription of 'Polyzonium' malagassum, a new synonym of Rhinotus purpureus (Pocock, 1894), with notes about the occurrence of the order Polyzoniida on Madagascar (Diplopoda)

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Abstract

Polyzonium malagassum de Saussure & Zehntner, 1902, the only indigenous record of the order Polyzoniida from Madagascar, is redescribed after a study of the type specimens. The only male specimen is selected as the lectotype and illustrated. P. malagassum is discovered to be a synonym of the widespread tropical tramp species Rhinotus purpureus (Pocock, 1894). A mapping of additional locality data of R. purpureus shows that the species is widespread in Malagasy rainforests and montane rainforests, and occurs locally in high densities. Seven potentially indigenous Polyzoniida morphospecies also occur on Madagascar, but these undescribed species are more localized and show a lower abundance than R. purpureus. Brief notes, locality data, and Museum acronyms are given for the undescribed Polyzoniida species, which will hopefully assist future studies on Malagasy representatives of this little-known but biogeographically interesting order. With the discovery of the ubiquitous presence of R. purpureus on Madagascar, the similarity of the defense secretions of South American and of endemic Malagasy poison dart frogs (family Mantellidae) might derive from the fact that both groups prey on and sequester alkaloids from the same species of millipede.

Key words: Millipede, invasive, Mantellidae, dietary sequestration, alkaloid occurrence

Introduction

The order Polyzoniida, belonging to the 'beaked' millipedes of the superorder Colobognatha (Blanke & Wesener 2014), are with more than 70 described species one of the smaller and neglected orders of the 12,000 described species in the class Diplopoda. The order is distributed worldwide, with a conspicuous absence from all of Africa except South Africa and Madagascar (Shelley & Golovatch 2011). In Africa, only one of the three families of the Polyzoniida, the Siphonotidae, are known to occur. From South Africa three genera, Cylichnogaster, Burinia, and Rhynchomecogaster are known (Verhoeff 1937; Attems 1926), with Cylichnogaster being the only member of the whole superorder Colobognatha capable of limited volvation, which means rolling into a ball. The three genera are highly distinct, but in need of a modern revision. While recent inventories saw a large increase of the number of millipede genera and species known from Madagascar, this increase is currently limited to the Chordeumatida (Mauriès 1994; 1997), Sphaerotheriida (Wesener 2009; Wesener et al. 2010) and Spirobolida (Wesener et al. 2009; Wesener et al. 2011). Records of the order Polyzoniida from Madagascar are limited to one indigenous record, 'Polyzonium' malagassum de Saussure & Zehntner, 1902, known only from its first description. Polyzonium is a chiefly European genus (Kime & Enghoff 2011), but a century ago it was a common genus name for all representatives of the Polyzoniida. The first description was quite comprehensive, even for modern times, but the species was never revised, and the gonopods of the male never illustrated.

Further records of the Polyzoniida on Madagascar concern the widespread tropical tramp species Rhinotus purpureus (Attems 1910, originally described as Orsilochus acuticonus Attems, but synonymized under R. purpureus by Golovatch & Korsos 1992). A natural occurrence (or absence) of the order Polyzoniida on Madagascar is not only important in view of future systematic or biogeographic analyses of the order (Shelley & Golovatch 2011), but also for a better understanding of the apparently convergent evolution of defense secretions in
Discussion

Polyzoniida are restricted to the humid forests on Madagascar. No specimen records exist from the spiny forest or dry forest ecosystem. With the synonymization of *P. malagassum* under *R. purpureus* no name is available for the potentially indigenous Polyzoniida on Madagascar. *R. purpureus* is widespread throughout Madagascar (Fig. 3) and data from 12 localities exists. Its occurrence in several montane forests far away from human plantations suggests an active spread of the invasive *R. purpureus* throughout the rainforests of Madagascar. Locally, *R. purpureus* is very common, and indeed far more common than the sympatrically occurring potentially indigenous species. Furthermore, the non-*Rhinotus* polyzoniid species seem to be locally restricted, with differently sized and coloured specimens found at the different sites. It is currently unclear if the invasive *R. purpureus* replaces the indigenous Malagasy Polyzoniida. The sympatric occurrence of both introduced and indigenous species in the same forest might speak against such replacement, while the much higher abundance of *R. purpureus* at the sites might be an argument that a replacement occurs. The occurrences of seven morphospecies of potential indigenous Polyzoniida, each from a distinct locality, show that the order is an important part of the millipede fauna on Madagascar.

*Rhinotus* and the convergent evolution of defense secretions in poison frogs on Madagascar and in South America: Previous studies found a surprising similarity in some of the chemical components, all alkaloids, present in poison dart frogs from Madagascar and South America (Clark *et al.* 2005). Both groups of frogs sequester the chemicals from their arthropod prey. It is therefore not surprising that the mobile and active (and locally very abundant) *Rhinotus* millipedes are a potential part of the diet of the small frogs of the endemic family Mantellidae (Clark *et al.* 2005). Millipedes of the order Polyzoniida in general (Meinwald *et al.* 1975; Röper 1978; Wood *et al.* 2000), and especially *R. purpureus* (Saporito *et al.* 2003) are known producers of a variety of alkaloids found also in frog skins, such as polyzonimine and nitropolyzonimine. While evidence for the frogs preying on *R. purpureus* is mostly circumstantial, spiropyrrrolizidine alkaloids are only found in *R. purpureus* and not in other potential prey items of poison-dart frogs. We therefore have the curious instance that unrelated poison dart frogs from South America and Madagascar potentially feed on the same species of millipede, *R. purpureus*, to produce the same or very similar defense secretions.

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References


