



Two new *Pseudorchomene* species from the Southern Ocean, with phylogenetic remarks on the genus and related species (Crustacea: Amphipoda: Lysianassoidea: Lysianassidae: Tryphosinae)

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Abstract

Two new lysianassoid amphipods of the genus *Pseudorchomene* Schellenberg, 1926 from the Southern Ocean are described: *P. debroyeri* **sp. n.** collected in baited traps deployed around the Falkland Islands, Burdwood Bank and Îles Kerguelen between 55 and 470 m, and *P. lophorachis* **sp. n.** collected in baited traps and Agassiz trawls deployed in the Scotia and Weddell Seas at depths between 847 and 1943 m. *P. lophorachis* **sp. n.** is characterized by a strongly elongated first gnathopod and by the occurrence of low posterodorsal humps on the body segments. *P. debroyeri* **sp. n.** is very similar to *P. coatsi* (Chilton, 1912) but exhibits slight differences of proportions in the articles of gnathopods 1 and 2, more spines on pereopods and more acute spines on the propodus of pereopods 3–7. Molecular data indicate the existence of a well-defined clade comprising *P. lophorachis* **sp. n.**, *P. debroyeri* **sp. n.**, *P. coatsi* (Chilton, 1912), *Abyssorchomene plebs* (Hurley, 1965) and *A. rossi* (Walker, 1903). On the other hand, *A. plebs* and *A. rossi* do not form a clade with *A. chevreuxi* (Stebbing, 1906), which is the type species of the genus *Abyssorchomene* De Broyer, 1984. The definition of *Pseudorchomene* is amended, so that it now includes *P. coatsi*, *P. debroyeri*, *P. lophorachis*, *P. plebs* and *P. rossi*. The triangular coxa 1 in these 5 species is unique for ‘orchomenid’ lysianassoids, thus considered as a putative synapomorphy. *P. coatsi* (Antarctic species) is morphologically extremely similar to *P. debroyeri* (sub-Antarctic species) but it is genetically closer to the morphologically distinct *P. lophorachis* (Antarctic species). Hypotheses for these recent speciations and the mor-

phological evolution within *Pseudorchomene* are discussed. The type species and the nomenclatural history of the genus *Tryphosa* Boeck, 1871, which is the type genus of the subfamily Tryphosinae, are discussed.

Key words: Amphipoda, Lysianassoidea, *Pseudorchomene*, *Abyssorchomene*, *Tryphosa*, Southern Ocean, systematics, new species

Introduction

The genus *Pseudorchomene* Schellenberg, 1926 belongs to the so-called 'Orchomene complex' (De Broyer 1984), which also includes the genera *Abyssorchomene* De Broyer, 1984, *Allogaussia* Schellenberg, 1926, *Falklandia* De Broyer, 1985, *Orchomene* Boeck, 1871, *Orchomenella* G.O. Sars, 1890, *Orchomenopsis* G.O. Sars, 1891, *Orchomenyx* De Broyer, 1984 and *Tryphosa* Boeck, 1871. This complex is here designed as 'orchomenids', as a shorthand reference device that has no implicit systematic connotations. The generic subdivision of this group has been the object of long debates between splitters and lumpers (Stebbing 1906; K.H. Barnard 1932; Gurjanova 1962; Barnard 1964, 1967, 1969; Bellan-Santini 1972a, 1972b; Bousfield 1973; Oleröd 1975; Shulenberger & Barnard 1976; De Broyer 1983, 1984, 1985; Barnard & Karaman 1991; Lowry & Stoddart 1997, 2003), but today the point of view of the splitters prevails. Following Barnard & Karaman (1991), the 'orchomenids' include the following genera: *Abyssorchomene*, *Allogaussia*, *Orchomene*, *Orchomenella*, *Orchomenopsis*, *Orchomenyx* and *Tryphosa*, but excludes *Falklandia* and *Pseudorchomene*. Lowry & Stoddart (1997) included *Allogaussia*, *Orchomene*, *Orchomenella*, *Orchomenyx* and *Tryphosa* in their newly-created sub-family Tryphosinae within the Lysianassidae Dana, 1849, but omitted *Abyssorchomene*. More recently, De Broyer *et al.* (2007), who treated only Antarctic and sub-Antarctic taxa, placed the genera *Falklandia*, *Orchomene*, *Orchomenella* (subdivided into the subgenera *Orchomenella* and *Orchomenopsis*), *Orchomenyx* and *Pseudorchomene* in the Tryphosinae and *Abyssorchomene* in the Uristidae Hurley, 1963, which suggests that these authors no longer consider 'orchomenids' as a clade. A review of the successive generic and familial assignation for Antarctic 'orchomenids' has been compiled in Table 1 of Havermans *et al.* (2010).

Until recently, all statements were based on morphological arguments, and the question on the subdivisions of 'orchomenids' and on the monophyly of this group remained entirely open. A recent molecular study on 'orchomenids' of the Southern Ocean (Havermans *et al.* 2010) rejected several generic subdivisions of this group proposed by authors like De Broyer (1983, 1984). The genera *Abyssorchomene* and *Orchomenella*, as well as the subgenus *Orchomenopsis*, appeared to be non-monophyletic. Furthermore, the phylogenetic results also indicated the need for a revision of the family-level systematics and do not support the scattering of these genera across the families Lysianassidae (subfamily Tryphosinae) and Uristidae but showed that all the 'orchomenid' genera from the Southern Ocean belong to a large and well-supported clade. However, Havermans *et al.* (2010) did not include lysianassoids from the northern hemisphere. Hence, the monophyly of 'orchomenids' at the global scale remains an unresolved question.

Havermans *et al.* (2010) also identified a monophyletic clade comprising *Pseudorchomene coatsi* (Chilton, 1912), *Pseudorchomene* sp. (here described as *P. lophorachis* **n. sp.**) and *Abyssorchomene plebs* (Hurley, 1965). The same cluster, now also including *Abyssorchomene rossi* (Walker, 1903), was revealed by the genetic barcoding study of Havermans *et al.* (2011). Further studies of partial mitochondrial COI sequences detected another undescribed species of the genus *Pseudorchomene*. The aim of the present paper is to define this newly detected clade nested among southern 'orchomenids'. The definition of the initially monotypic genus *Pseudorchomene* (type species *P. coatsi*) is expanded to encompass all five species of this clade. It can be separated morphologically from other 'orchomenids' by the triangular or adz-shaped coxa 1, this character state being considered as a putative synapomorphy. The genus now includes the following five species: *P. coatsi*, *P. debroyeri* **sp. n.**, *P. lophorachis* **sp. n.**, *P. plebs* (Hurley, 1965) and *P. rossi* (Walker, 1903). The first three species, which have an elongate gnathopod 1, are described fully and illustrated, whilst the other two species, which have a stocky gnathopod 1, are treated more succinctly because they have been described in detail by Hurley (1965a, 1965b). An identification key and illustrations are given for these five species. Finally, the generic assignation of some other Antarctic and sub-Antarctic 'orchomenids' and hypotheses for speciation are considered briefly.