

THE FIRST SPECIES OF THE INTERTIDAL GENUS *HYPHALUS* BRITTON FROM THE INDIAN OCEAN (COLEOPTERA : LIMNICHIDAE : HYPHALINAE)

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Résumé. – Première espèce du genre intertidal *Hyphalus* Britton dans l'Océan Indien (Coleoptera : Limnichidae : Hyphalinae). – Une nouvelle espèce du genre intertidal *Hyphalus* Britton, *H. crowsoni*, sp. n., est décrite de l'atoll Aldabra (îles Seychelles). Cette espèce est la première du genre à être connue de l'Océan Indien (Région éthiopienne malgache), les autres espèces provenant des Régions Orientale et Australienne de l'Océan Pacifique (Australie, Nouvelle-Zélande et archipel Ryukyu). Un commentaire est donné sur des exemples d'espèces intertidales et marines présentant de semblables distributions largement disjointes.

Abstract. – A new species of the intertidal genus *Hyphalus* Britton, *H. crowsoni*, sp. n., is described from the Aldabra atoll, in the Seychelles. The species is the first member of the genus in the Indian Ocean (Ethiopian Malagasy region), other species being from the Pacific Ocean (Australia, New Zealand and Ryukyu archipelago), in the Oriental and Australian regions. Examples of intertidal and marine species with similar widely disjunct distributions are commented.

The genus *Hyphalus* was described by BRITTON (1971) for the single species *H. insularis* Britton, 1971, an intertidal beetle from the Great Barrier Reef in Australia. A new subfamily of Limnichidae (Hyphalinae) was erected for this genus, as it could not be placed in any of the existing groups within the family due to its peculiar morphology. Subsequently BRITTON (1973, 1977) described four additional species from New Zealand, and SATÔ (1997) another one from the Ryukyu archipelago, Japan.

In revising the unclassified material of the family Limnichidae in the collections of the Natural History Museum (London) a single specimen belonging to an undescribed species of *Hyphalus* was found. This specimen was from the Aldabra atoll, in the western Indian ocean, more than 9,000 km and 70° west of the previous known members of the genus.

Methods

The specimen was partly dissected, with some loose body parts glued on a separate card. These were cleaned and mounted in DMHF (dimethyl hydantoine formaldéhyde) and studied with a compound optic microscope. The genitalia and abdominal sterna were mounted and studied in the same way. All drawings were traced from microphotographs.

Acronyms used in the text :

NHM The Natural History Museum, London.

[HW] Hand written.

RESULTS

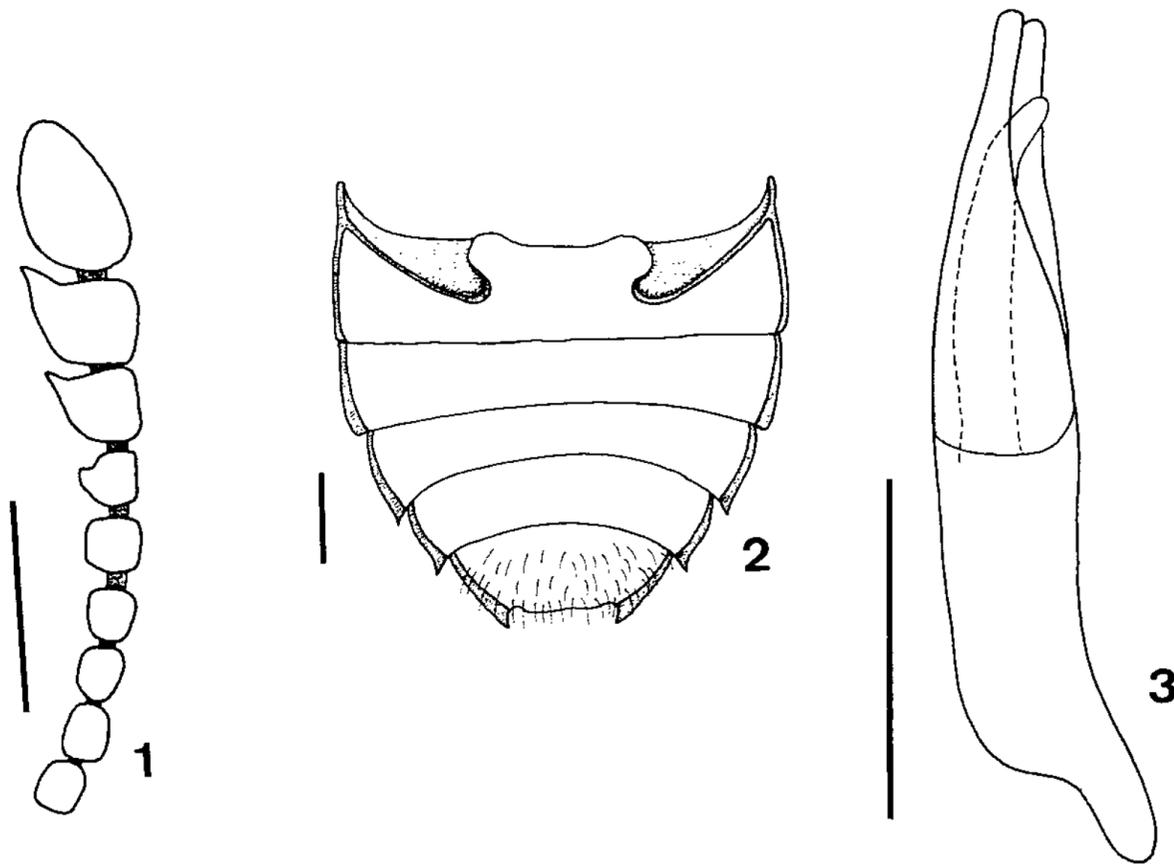
Hyphalus crowsoni, sp. n.

Type locality. – South Island, Aldabra Atoll, Seychelles.

Type material. – Holotype male (NHM) : “ALDABRA: / South Island, / Cinq Cases, 3-16.i.1968. / B. Cognan & A. Hutson.”, “Aldabra Atoll, Royal Society / Expedition, 1967-68 / B.M. 1968-333.”, “Limnichidae [HW] / det. R. A. Crowson”, with Holotype labels. One antenna, left posterior leg, right protarsus, aedeagus and abdominal sterna dissected and mounted on the same card.

Description. – 1.02 mm length, 0.55 mm width. Body stout, compact; pronotum as wide as the elytra. General colour black, legs and head appendices dark brown. Dorsal surface densely covered with a short, recumbent grey-whitish pubescence.

Head strongly and regularly punctured, almost no distance between points. Eyes small, flat and round. Labrum semicircular, covered with long erected setae. Antenna 11-segmented, covered with short dense pubescence. Last three segments of the antennae forming a loose club; last four segments asymmetrical, with a prominent denticle in the anterior inner side (fig. 1).



Figs. 1 to 3, *Hyphalus crowsoni*, sp. n. – 1, last nine segments of antenna. – 2, abdominal sterna. – 3, aedeagus in ventro-lateral view. Scale bars: 0.1 mm.

Pronotum with the same puncturation as the head, quadrangular, lateral sides slightly arched, maximum width at middle; surface without tubercles; lateral sides finely but clearly bordered; anterior and posterior margins not bordered; anterior angles rounded, not pronounced; posterior angles strongly acute. Approximately the posterior 1/4 of the surface of the pronotum glabrous, covered with small transverse striae.

Elytra with puncturation less dense and strong than on head and pronotum; apex covered with small rounded tubercles. Margin serrated. Apex strongly sinuous, forming a locking device in combination with the last abdominal sternum (see e.g. Plate 1b in BRITTON, 1971). Without metathoracic wings.

Ventral surface dark brown. Abdominal sterna glabrous, except the last one which is covered with a fine, long sparse pubescence. Margin of the last three sterna expanded, with a prominent denticle (fig. 2). Last sternum with a strong characteristic indentation in which the elytra are locked.

Legs short and robust. Tibiae and tarsi with long setae, particularly at the apex of tibiae and ventral side of tarsi and tibiae. Posterior tibiae arched. Anterior claws long and robust, strongly curved. Posterior claws less curved, not falciform, with a small inner denticle.

Aedeagus as in fig. 3, relatively elongated, structurally very simple. Parameres straight, apex narrow and rounded. Median lobe shorter than the parameres, apex rounded and slightly curved. Base asymmetrical, shorter than the parameres.

Female unknown.

Distribution. – So far only known from the type locality.

Ecology. – There is no data on the ecology of the species. All known species of the genus are intertidal, living at different levels of exposition to the sea in rocky, coral shores (BRITTON, 1971, 1973, 1977; SATÔ, 1997). It is thus likely that *Hyphalus crowsoni*, sp. n. is also an intertidal species living in coral in the atoll coast. The long claws, the erect and robust setae of the tibiae, the small eyes, the lack of membranous wings, and the locking device of the elytra could be interpreted as adaptations to live in the intertidal, rocky medium (see e.g. DOYEN, 1976). The presence of tubercles on the elytra and pronotum of some species of the genus (e.g. BRITTON, 1977) also suggests some related function of these structures.

Etymology. – Named after the recently deceased coleopterist Roy A. Crowson, who identified the specimen as a limnichid before the description of this odd genus (and subfamily).

DISCUSSION

Hyphalus crowsoni, sp. n. differs from the Australian species of the genus (*H. insularis*, *H. wisei* Britton, 1973, *H. kuscheli* Britton, 1977, *H. ultimus* Britton, 1977 and *H. prolixus* Britton, 1977) by its asymmetrical antenna (BRITTON, 1971, 1973, 1977). In addition to this character, among these species only *H. kuscheli* has tubercles on the dorsal surface of the body, although on both the pronotum and elytra (BRITTON, 1977) (*H. crowsoni*, sp. n. has tubercles only on the elytra). The species from the Ryukyu archipelago, *H. taekoa* Satô, 1997 has tubercles in the apex of the elytra and similarly asymmetrical antennae, although the 9th segment has a different structure, with a less pronounced apical prolongation (SATÔ, 1997: fig. 2). The aedeagus of the latter species has also a totally different structure, with the median lobe as long as the parameres, straight and with the apex apically narrowed in lateral view (SATÔ, 1997: figs. 4 and 5) (6 paratypes of *H. taekoa* from Cape Bise, Okinawa Island, Ryukyu archipelago, were examined).

As already mentioned, *H. crowsoni*, sp. n. is the first species of the genus in the Indian Ocean, all previous known species being found in the Pacific coast of the Oriental and Australian regions (fig. 4). There is at least another example of intertidal genus with a similar widely disjunct distribution across the Pacific and Indian oceans: *Laius* Guérin-Méneville (Melyridae) has one species in the Seychelles and eight in Japan, the Philippines and other islands in SE Asia (DOYEN, 1976; WITTMER, 1985). Other intertidal beetles have also wide disjunct distributions, as for example the closely related limnichid genera *Babalimnichus* Satô, *Mexico* Spilman and *Matinius* Spilman, the former in the Ryukyu archipelago and the latter two in the Pacific coast of Mexico and the Caribbean and Ecuador respectively (DOYEN, 1976; WOOLDRIDGE, 1988; SATÔ, 1994); or the genus *Aegialites* Mannerheim (Salpingidae), with species in the Pacific coast of north America and the Japanese archipelago (DOYEN, 1976). Among totally different groups, the coelacanth fishes (genus *Latimeria* Smith) show a very similar distribution: one species in the Comores islands, south of Aldabra (*L. chalumnae* Smith, 1939) and another recently described species in Sulawesi, Indonesia (*L. menadoensis* Pouyaud *et al.*, 1999) (HOLDER *et al.*, 1999).

Aldabra is a coralline atoll formed by four islands surrounding a lagoon, situated 9°24' south and 46°20' east, spread over a surface of 337 km² (including the inner lagoon). South Island (or "Grande Terre") is the largest, and most of it is covered in bare coral, with little soil. The present emerged area of the islands is of recent geological origin (ca. 125,000 years,

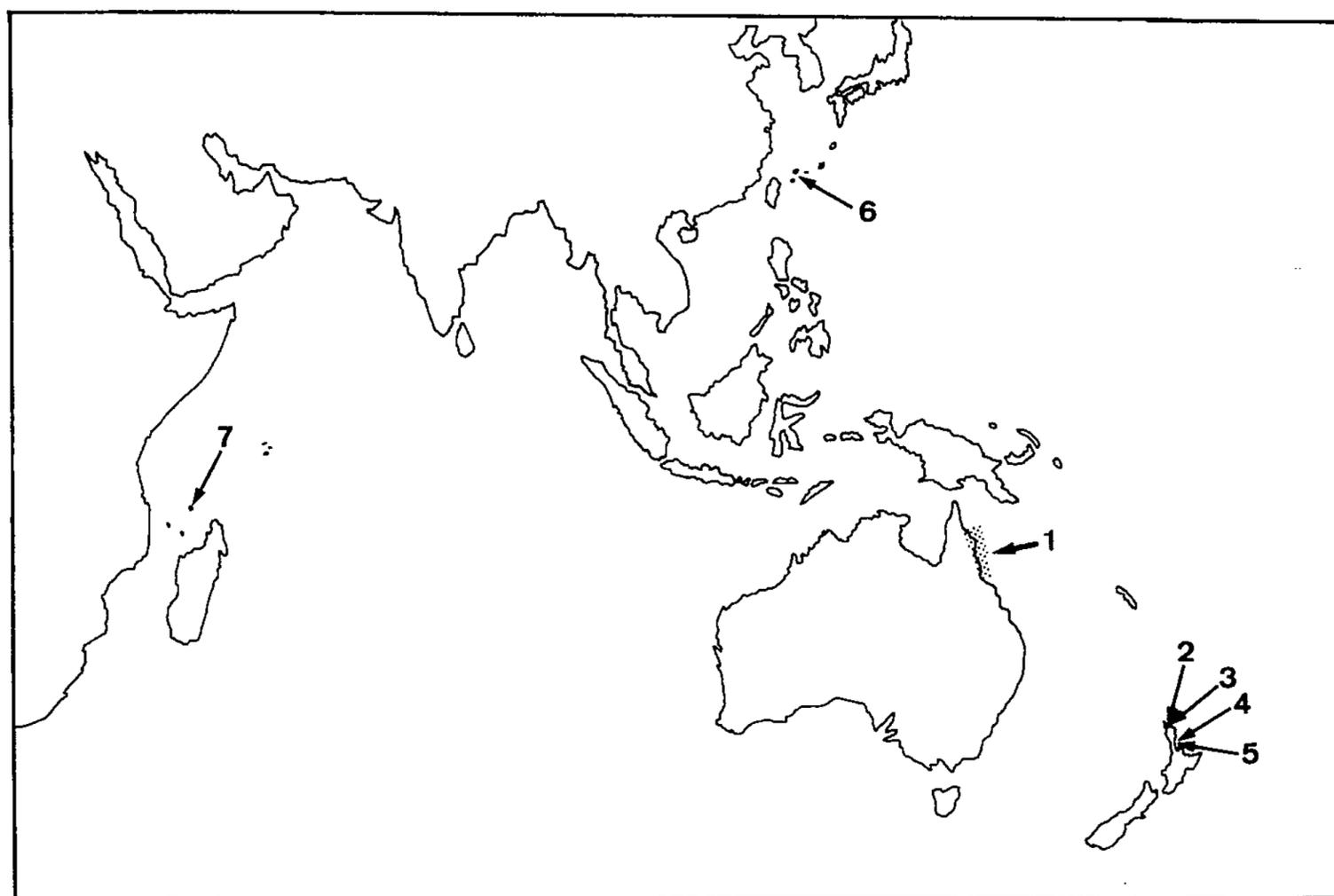


Fig. 4, distribution of the known species of the genus *Hyphalus*. 1: *H. insularis*; 2: *H. prolixus*; 3: *H. ultimus*; 4: *H. kuscheli*; 5: *H. wisei*; 6: *H. taekoa*; 7: *H. crowsoni*, sp. n.

SEATON *et al.*, 1991), although neighbouring granitic islands (e.g. Mahé or Madagascar) are of much more ancient origin. Despite this recent origin, Aldabra harbours a rich endemic fauna and flora (including a giant land turtle, *Dipsochelys dussumieri* (Gray, 1831), numerous species of plants, and 39% of the insect fauna), part of which is thought to have evolved locally (STODDART, 1984; SEATON *et al.*, 1991). The general affinities of the biota are mostly with the Ethiopian Malagasy region, although a significant proportion (e.g. ca. 1% of the insect fauna) has an Oriental origin, showing ancient relationships (STODDART, 1984; SEATON *et al.*, 1991). This would suggest a relict condition for *H. crowsoni*, but two factors have to be considered: first, the present pattern of ocean currents is from east to west, favouring long-range dispersal of Oriental and Australian species (COMBES, 1999; HOLDER *et al.*, 1999). And second, the distribution of the genus is at present most uncertain, and it is likely that new species that have so far escaped attention due to their small size and peculiar habitat will be discovered in intermediate areas.

Acknowledgements. – We thank Prof. M. Satô for providing specimens of *Hyphalus taekoa* for study, Dr. R. Prys-Jones for information on the geography and natural history of Aldabra, and two anonymous referees for comments on the manuscript.

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