

# A new species of *Hyphalus* BRITTON, 1971 from the Mascarene Islands (Indian Ocean) (Coleoptera: Limnichidae: Hyphalinae)

C. HERNANDO & I. RIBERA †

## Abstract

The intertidal *Hyphalus mascarenensis* sp.n. (Coleoptera: Limnichidae: Hyphalinae) is described from Rodrigues Island (Mascarene Islands) and compared with the two hitherto known species of the western Indian Ocean. Previously unnoticed peculiar morphological structures and habitat notes are provided.

**Key words:** Coleoptera, Limnichidae, Hyphalinae, *Hyphalus*, new species, intertidal, Rodrigues Island, Mascarene Islands.

## Introduction

The first species of *Hyphalus* BRITTON, 1971 described from the Indian Ocean, *H. crowsoni* HERNANDO & RIBERA, 2000, was collected on the Aldabra Atoll (Outer Seychelles). Subsequently, HERNANDO & RIBERA (2004) described *H. madli* from Silhouette Island (Inner Seychelles).

The genus was originally described from the Great Barrier Reef in Australia (BRITTON 1971). Meanwhile, a total of seven species is known from the Pacific Ocean (BRITTON 1971, 1973, 1977, SATÔ 1997, LIU et al. 2020): Japan (Ryukyu Islands), Paracel Islands, Australia, New Zealand. Several presumably undescribed species were reported from the Pacific and Indian oceans by LAWRENCE & ŚLIPIŃSKI (2013): Lord Howe Island, Norfolk Island, Cocos Islands (Australia), and Taiwan.

Here we describe *Hyphalus mascarenensis* from the island of Rodrigues (Republic of Mauritius). It is the third species of *Hyphalus* described from the Indian Ocean so far.

## Material and methods

The genitalia of several males and females were dissected and mounted directly in water-soluble dimethyl hydantoin formaldehyde resin (DMHF) on transparent cards. Specimens were studied with a Leica MZ16 stereomicroscope (Leica Microsystems, Wetzlar, Germany). Habitus images were taken using a Canon EOS 60D digital camera with attached Canon MP-E 65mm f/2.8 1-5 macro lens (Canon Inc., Tokyo, Japan). Sternites were photographed using a Canon EOS 50D digital camera attached to a Zeiss Axiostar plus compound microscope. Serial images were stacked with Zerene Stacker software (Zerene Systems, Richland, USA). For the SEM observations a specimen preserved in absolute ethanol was coated with gold (Sputter Coater, Quorum Technologies Ltd., Ashford, England). The SEM-micrographs were taken in the Phyletisches Museum (Jena, Germany) with an ESEM XL30 (Philips, Amsterdam, Netherlands) and Scandium FIVE software (Olympus, Münster, Germany).

All specimens examined are deposited in the following collections:

CHB Coll. Carles Hernando, Badalona, Catalonia, Spain

IBE Institute of Evolutionary Biology, Barcelona, Catalonia, Spain (collection will be transferred to the Museo Nacional de Ciencias Naturales, Madrid, Spain)

NMW Naturhistorisches Museum Wien, Austria



Fig. 1: Habitus of *Hyphalus mascarenensis*, holotype.

*Hyphalus mascarenensis* sp.n.

TYPE LOCALITY: Island of Rodrigues, Republic of Mauritius, Mascarene Islands, Indian Ocean.

TYPE MATERIAL: **Holotype** ♂ (NMW): "RODRIGUES / Bucht zw. [bay between] Trou d'Argent / und [and] Anse Bouteille / intertidal zone 12-13.4.[20]11, leg. M.Madl". **Paratypes**: 15 exs. (NMW), same locality data as holotype; 1 ex. (NMW): "MAURITIUS / Rodrigues, Nordende [northern tip] / intertidal zone Cotton Bay / 25.4.[20]08, leg. M.Madl"; 8 exs. (NMW: 6, CHB: 2): "MAURITIUS / Rodrigues / Anse Fumier / 2.4.[20]09, leg. M. Madl"; 14 exs. (NMW: 10, CHB: 2, IBE: 2): same data, but "19-24.4.[20]10" (Figs. 15–16).

DESCRIPTION: 1.13–1.35 mm long (head included), 0.64–0.66 mm wide. Body shape regularly oval, stout, convex (Fig. 1). Pronotum slightly narrower than elytra. Body colour black, legs and head appendages dark brown. Dorsal surface covered by dense, short and thick, recumbent silvery pubescence (Fig. 1).

Head partially retracted in pronotum; surface with fine dense punctation, with a rugose appearance. Eyes small, round and flat, composed of 33 ommatidia (Fig. 2). Clypeal suture well defined by the insertion of the antennae. Labrum emarginate, with long and erect distal setae. Antennae with 11 segments, antennomeres 4–11 clearly asymmetrical; antennomeres 9–11 forming a club (Fig. 1). Surface with very small tubercles, especially on lateral margins (Fig. 2).

Pronotum transverse; punctation as on head; lateral margins regularly arched, finely bordered; anterior and posterior margin without bead, bisinuate; anterior angles obtuse, posterior angles acute, produced.

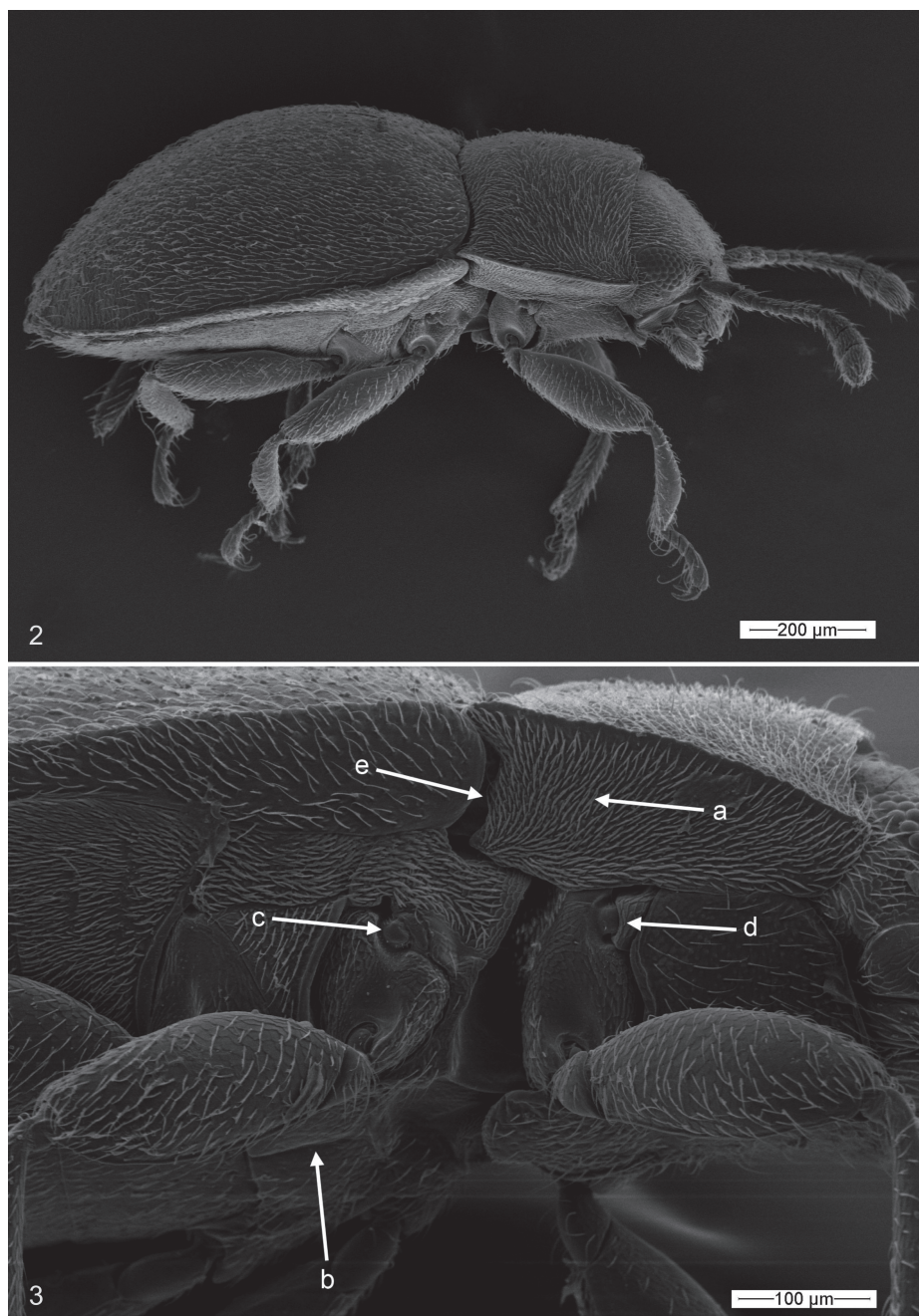
Elytral surface with punctation and pubescence similar to that on head and pronotum; covered by small sparse tubercles, somewhat denser on apex. Elytral margins serrate, denticles sparse and small, more pronounced apically. Strongly bordered. Elytral apex strongly sinuate, forming a locking device with the last abdominal ventrite. Apterous.

Ventral surface dark brown. Prothoracic hypomera flat, without striae or sulcus; surface covered with densely set, thick whitish setae, with very small interspersed tubercles (visible only in SEM images; Fig. 3). Prosternum glabrous; surface of prosternum strongly and densely punctate, with a rugose appearance. Prosternal process deeply inserted in mesoventrite; apex of prosternal process rounded, lateral margins finely bordered along entire length. Mesoventrite glabrous in middle, narrow; with a median longitudinal sulcus (Fig. 3) and a large excavation for insertion of prosternal process and procoxae, which are open distally. Metaventrite flat, as long as mesoventrite; surface of metaventrite covered with sparse fine punctation, and with sparse short recumbent setae.

First two abdominal ventrites covered with short sparse recumbent pubescence; third abdominal ventrite with some dispersed long setae; ventrites 4–5 with very dense short pubescence and many long erect setae, specially in the 5<sup>th</sup> (last ventrite). Lateral margin of the last three ventrites expanded, with a prominent denticle, last ventrite with a strong characteristic apical indentation in which the elytra are locked (Figs. 4–5). Ventrites 1–3 connate.

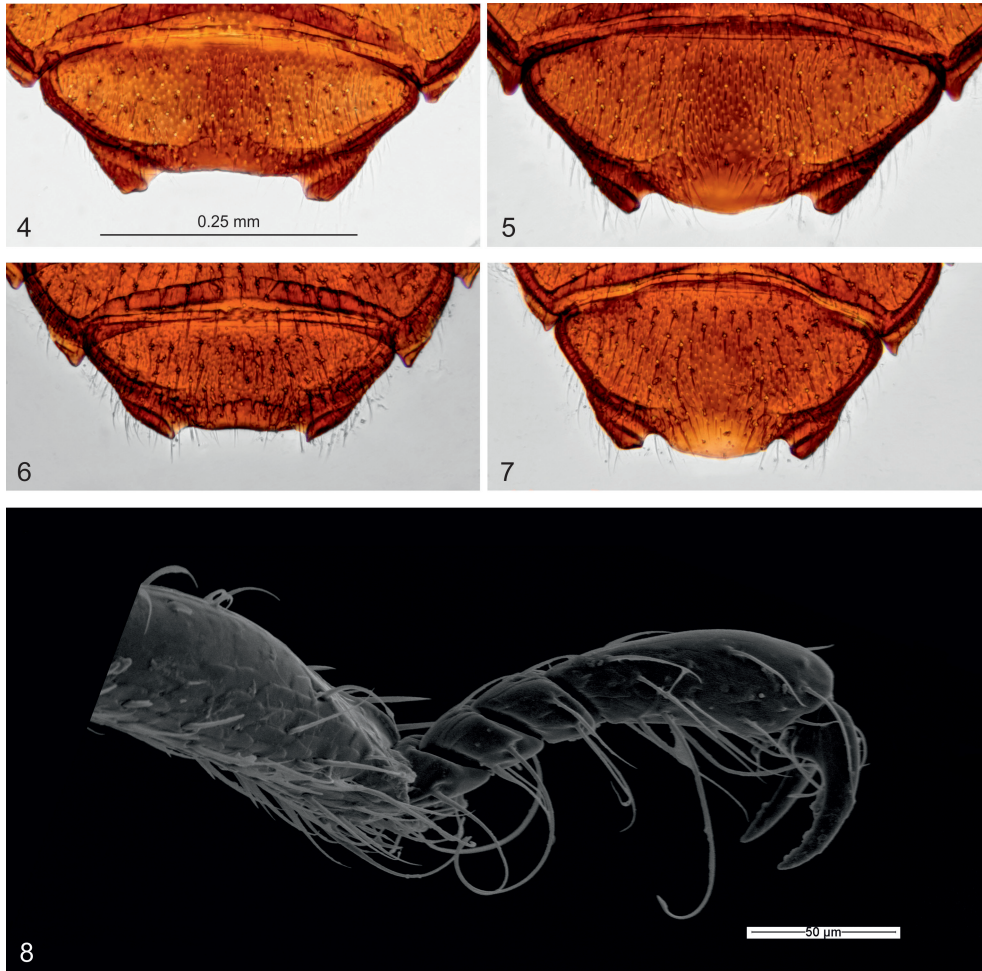
Legs short and robust, entirely pubescent. Claws long and robust, strongly curved, with small blunt denticles (Fig. 8).

Male: Last ventrite transverse, space between denticles straight (Fig. 4). Aedeagus articulated, elongated, with asymmetrical base, longer than parameres. Median lobe curved, shorter than parameres; narrowed preapically; apex of median lobe widely rounded. Struts very short, forming a lobe. Parameres robust and slightly curved (Fig. 9). Ninth genital segment spatulate (Fig. 11), wide at base; margins strongly sclerotized; apex narrow, membranous. Parameres of the 9<sup>th</sup> genital segment narrow and straight, longer than the lamina. Eighth sternite (Fig. 12) V-shaped, with apex bent outwards, without membranous expansions.



Figs. 2–3: *Hyphalus mascarenensis*; 2) habitus, lateral view; 3) ventro-lateral view of pro- and mesothorax, a) hypomera, b) mesoventrite, c) mesocoxal locking device, d) procoxal locking device, e) pronoto-elytral locking device.



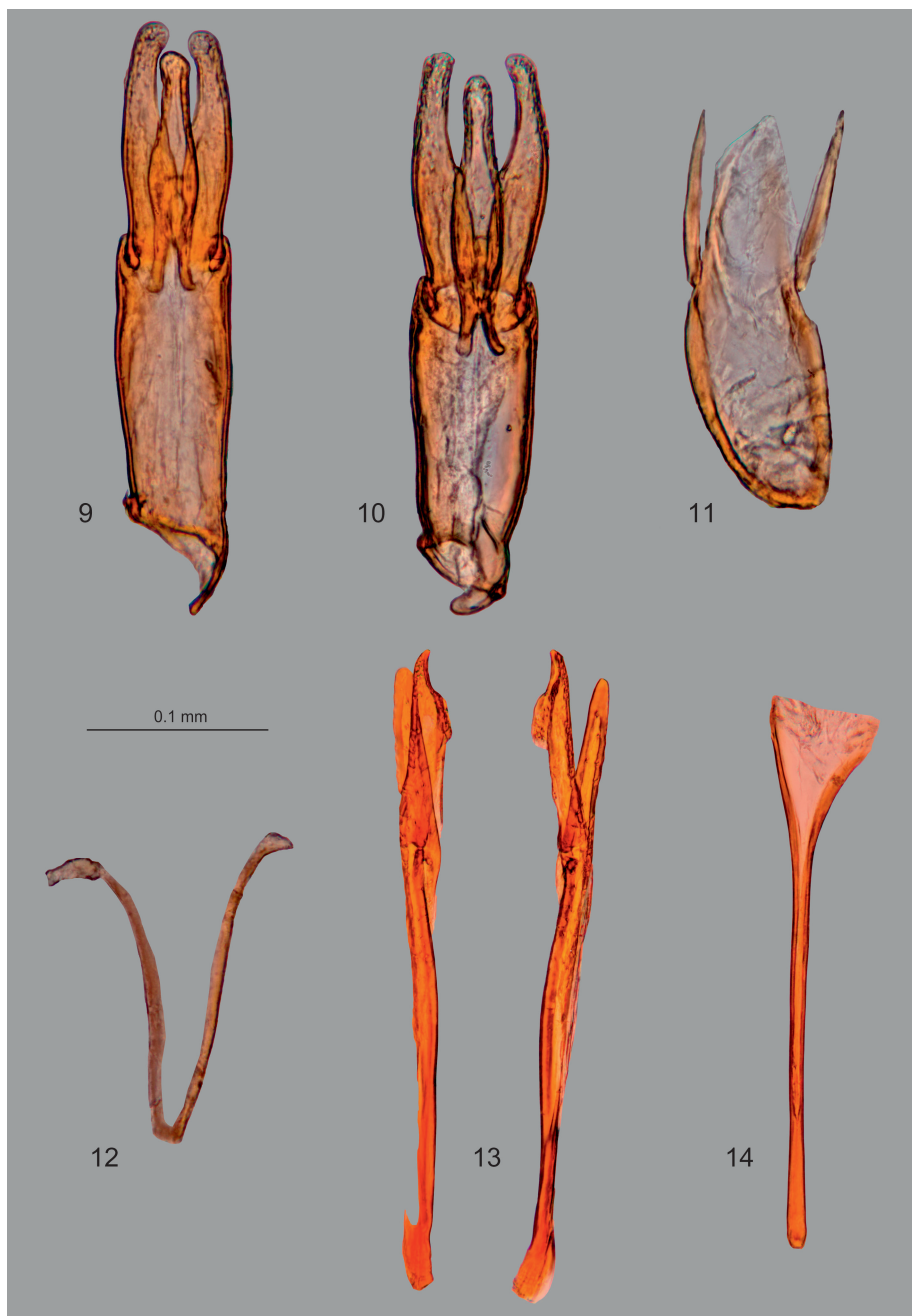


Figs. 4–7: Last abdominal sternite, ventral view; 4–5: *Hyphalus mascarenensis*, 4) male, 5) female; 6–7: *H. madli*, 6) male, 7) female.

Fig. 8: *Hyphalus mascarenensis*, protarsi and claws.

Female: Last ventrite more elongate and more acuminate than in males, space between denticles curved and protruding (Fig. 5). Ovipositor in lateral view as in Fig. 13, gonocoxal struts long. Gonocoxites long, articulated in the middle of the anterior portion of the gonocoxal struts, apex sickle-shaped. Spiculum ventrale (Fig. 14) as long as ovipositor, Y-shaped.

REMARKS: The SEM images revealed some previously unnoticed peculiar structures. Between the mesocoxa and the mesepimeron (apparently part of the mesepimeron) there is a quadrangular plate with a flat smooth surface flanked by acute spines (Fig. 3). The margin of the mesepimeron has a deep notch just over this plate, apparently not in direct contact with it (Fig. 3). There is also what seems a locking device between the procoxa and the prosternum. The base of the procoxa has a flange on its proximal face that apparently inserts in a cavity that corresponds to a small plate attached to the prosternum (Fig. 3).

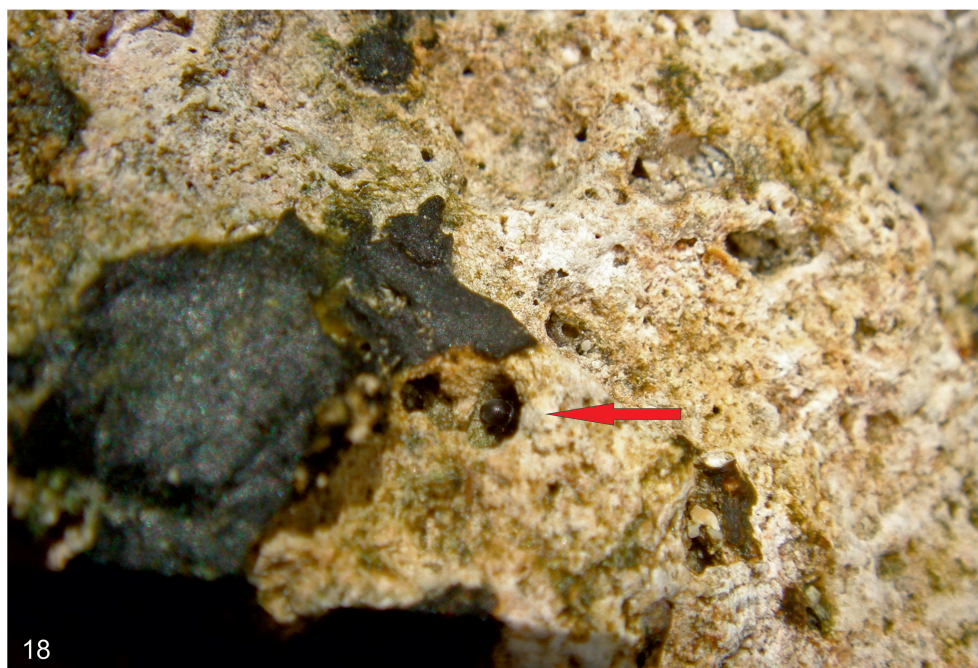


Figs. 9–14: *Hyphalus mascarenensis* (9, 11–14) and *H. madli* (10); 9–10) aedeagus, ventral view; 11) male genital segment, ventral view; 12) male sternite VIII; 13) gonocoxites and gonocoxal struts, lateral view; 14) spiculum ventrale.



Figs. 15–16: Habitat of *Hyphalus mascarenensis*, coral reef at high tide, Anse Fumier, Rodrigues Island; 15) overview; 16) close up. Photographs by M. Madl.





Figs. 17–18: Microhabitat of *Hyphalus mascarenensis*, coral reef at low tide, Anse Fumier, Rodrigues Island; 17) well camouflaged living specimen on porous rock surface; 18) specimen escaping into a pore in the rock. Photographs by M. Madl.



Both devices have the same general structure: the meso- or procoxa, a first intermediate small quadrangular plate with a flat surface flanked by spines; a second intermediate larger plate; and the mesepimeron or the prosternum respectively. But while in the pterothorax the first quadrangular plate seems to be fused with the second plate and the mesepimeron, not in direct contact with the mesocoxa, in the prothorax the flange seems to protrude from the procoxa, clearly fused to it, and apparently inserting in a cavity of the second plate (Fig. 3). The function of these structures is unknown, they may both be related with locking mechanisms.

There is another locking mechanism between the pronotum and the elytra: the distal part of the pronotal hypomera has a notch in which the protruding base of the elytral epipleura fits (Figs. 2–3). All these locking structures (between pronotum and elytra, at least procoxa with prosternum, likely between mesocoxa and mesepisternum, and between both elytra), together with the strong curved claws (Fig. 8) and the general stout body shape and robust legs may be adaptations to avoid being dislodged by the action of the waves from the small holes and pores of the coral reefs or basalt rock in which the species of *Hyphalus* live. The biology and ecology of the species of this genus is, however, still very poorly known.

**DIFFERENTIAL DIAGNOSIS:** *Hyphalus mascarenensis* seems to be closely related to *H. madli* from Silhouette Island (Inner Seychelles), about 1,900 km NNW of Rodrigues. These two species can be easily distinguished by the male genitalia and some morphological features, such as the mesoventrite and the last ventrite. *Hyphalus mascarenensis* has a more robust aedeagus, with less curved parameres, the apex of the median lobe more widely rounded, and the basal piece straight and narrow (Fig. 9), while *H. madli* has narrower, more curved parameres, the apex of the median lobe narrower, and the basal piece robust and hook-shaped (Fig. 10); the mesoventrite of *H. mascarenensis* has a median longitudinal sulcus (Fig. 3), lacking in *H. madli*; last ventrite of the males of *H. mascarenensis* provided with blunt denticles (Fig. 4), which are pointed in *H. madli* (Fig. 6); last ventrite of females of *H. mascarenensis* transverse, with the apex between the denticles regularly curved and less protruding (Fig. 5), while in *H. madli* the ventrite is more elongate, and the apex strongly protruding (Fig. 7).

The new species can be distinguished from *H. crowsoni*, described from the Aldabra Atoll (Outer Seychelles), about 2,100 km NW of Rodrigues, by its parallel-sided median lobe, which is not constricted preapically (see HERNANDO & RIBERA 2000).

**HABITAT** (Figs. 15–18): All specimens were collected with an aspirator, from three coral reefs at low tide, when the reefs were fully exposed (Figs. 17–18). When disturbed, the specimens take refuge in the small pores and crevices of the rock face (Fig. 18). During the high tide (Figs. 15–16) the reefs are fully submerged, and the beetles probably stay in these small holes.

**ETYMOLOGY:** Named in reference to the Mascarenes, to which Rodrigues Island belongs. The species name is an adjective in the nominative singular.

**DISTRIBUTION:** So far known only from three nearby localities along the east coast of Rodrigues Island, Republic of Mauritius.

### Acknowledgements

We thank Michael Madl and Manfred A. Jäch (NMW) for making available this interesting material for study, and for the habitat notes and habitat photographs.

Keith Bensusan (Gibraltar Botanical Gardens) helped with the translation of the manuscript into English. Adrián Villastrigo (IBE) edited Figs. 1–14, Harald Schillhammer (NMW) Figs. 15–18.

### References

- BRITTON, E.B. 1971: A new intertidal beetle (Coleoptera: Limnichidae) from the Great Barrier Reef. – *Journal of Entomology (B)* 40: 83–91.
- BRITTON, E.B. 1973: *Hyphalus wisei* sp.n., a new intertidal beetle from New Zealand (Coleoptera: Limnichidae). – *Records of the Auckland Institute and Museum* 10: 119–122.
- BRITTON, E.B. 1977: Three new intertidal species of Limnichidae (Coleoptera) from New Zealand. – *Records of the Auckland Institute and Museum* 14: 81–85.
- HERNANDO, C. & RIBERA, I. 2000: The first species of the intertidal genus *Hyphalus* Britton from the Indian Ocean (Coleoptera: Limnichidae: Hyphalinae). – *Annales de la Société entomologique de France (Nouvelle Série)* 36 (3): 239–243.
- HERNANDO, C. & RIBERA, I. 2004: *Hyphalus madli* sp.n., a new intertidal limnichid beetle from the Seychelles (Coleoptera: Limnichidae: Hyphalinae). – *Koleopterologische Rundschau* 74: 413–417.
- LAWRENCE, J.F. & ŚLIPIŃSKI, A. 2013: *Australian Beetles. Vol. 1. Morphology, Classification and Keys.* – Collingwood: CSIRO Publishing, viii + 561 pp.
- LIU, Z.-H., XIE, Q. & JIA, F.-L. 2020: *Hyphalus shiyuensis* sp. nov. from Xisha Islands, China (Coleoptera, Limnichidae, Hyphalinae). – *ZooKeys* 941: 91–99.
- SATÔ, M. 1997: Occurrence of a new *Hyphalus* (Col. Limnichidae) from the Ryukyu archipelago, Japan. – *Elytra* 25 (1): 109–112.

Carles HERNANDO

PO Box 118, E – 08911 Badalona, Catalonia, Spain (leptotyphlus@gmail.com)

Ignacio RIBERA †

*Institute of Evolutionary Biology (CSIC-Universitat Pompeu Fabra), Passeig Marítim de la Barceloneta 37, E – 08003 Barcelona, Catalonia, Spain*

# ZOBODAT - [www.zobodat.at](http://www.zobodat.at)

Zoologisch-Botanische Datenbank/Zoological-Botanical Database

Digitale Literatur/Digital Literature

Zeitschrift/Journal: [Koleopterologische Rundschau](#)

Jahr/Year: 2020

Band/Volume: [90\\_2020](#)

Autor(en)/Author(s): Hernando Carles, Ribera Ignacio

Artikel/Article: [A new species of Hyphalus BRITTON, 1971 from the Mascarene Islands \(Indian Ocean\) \(Coleoptera: Limnichidae: Hyphalinae\) 243-252](#)