

***Emmidolium excavatum* Orchymont**
(Coleoptera: Hydrophilidae: Sphaeridiinae)
confirmed in Africa and the Arabian peninsula

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Abstract. *Emmidolium excavatum* Orchymont, 1937 is recorded from the United Arab Emirates and the Republic of the Congo for the first time. The examined specimens are compared with the type, their male genitalia are drawn, and a distribution map and habitus photographs of the species are presented. The systematic position of *Emmidolium* Orchymont, 1937 within the Megasternini, its similarity to the Neotropical species *Oosternum sculptum* Bruch, 1915, and its atypical distribution are discussed.

Keywords. Coleoptera, Hydrophilidae, Sphaeridiinae, Megasternini, *Emmidolium*, *Oosternum*, morphology, taxonomy, Afrotropical and Oriental region, distribution, introduced species.

Introduction

The monotypic genus *Emmidolium* Orchymont, 1937 was described on the basis of two specimens from Vietnam and Taiwan (ORCHYMONT 1937). Recently, it was recorded also on Ryukyu Islands (HORI & SATÔ 2002, SATÔ & HORI 2006). HANSEN (1991) mentioned it to occur also in Indonesia and Africa. This information was based on personal communication with J. Huijbregts (the Netherlands), but neither voucher specimens nor their species identification were mentioned. For this reason, HANSEN (1999) mentioned *E. excavatum* Orchymont, 1937 only for Taiwan and Vietnam, but not for Indonesia and Africa.

Without examining any voucher specimens, HORI & SATÔ (2002) adopted the comment by HANSEN (1991) implicitly for *E. excavatum*, stating that the species is widespread from Africa to south-eastern Asia. Recently, I have received some specimens of *Emmidolium* from the United Arab Emirates (via a project led by A. van Harten) and the Republic of the Congo. The study of these specimens allows to evaluate the species status of the African specimens of *Emmidolium*.

Material and methods

A portion of the African and Arabian specimens were dissected, with male genitalia placed on a plastic card below the beetle in water-soluble dimethyl hydantoin formaldehyde resin (DMHF). Male genitalia were cleared in lactic acid and examined as temporary glycerine slides under Nikon TS100 light microscope. The figures of male genitalia were traced from photographs. Habitus photos were taken using Olympus Camedia C-5060 camera attached to Olympus SZX9 binocular microscope and subsequently adapted in Adobe Photoshop 7.0, partly using the procedures described online by Darci Kampschroeder at <http://nhm.ku.edu/illustration>. The map was downloaded from On-line Map Creation at <http://www.aquarius.geomar.de/omc>.

The following codens of collection are used:

- NMPC National Museum, Praha, Czech Republic;
 IRSN Institut Royal des Sciences Naturelles de Belgique, Bruxelles, Belgium (P. Grootaert);
 HMNH Hungarian Museum of Natural History, Budapest, Hungary (Gy. Szél).
 KSEM Division of Entomology, University of Kansas Natural History Museum, Lawrence, Kansas (A. Short)

Results

Emmidolium excavatum Orchymont, 1937

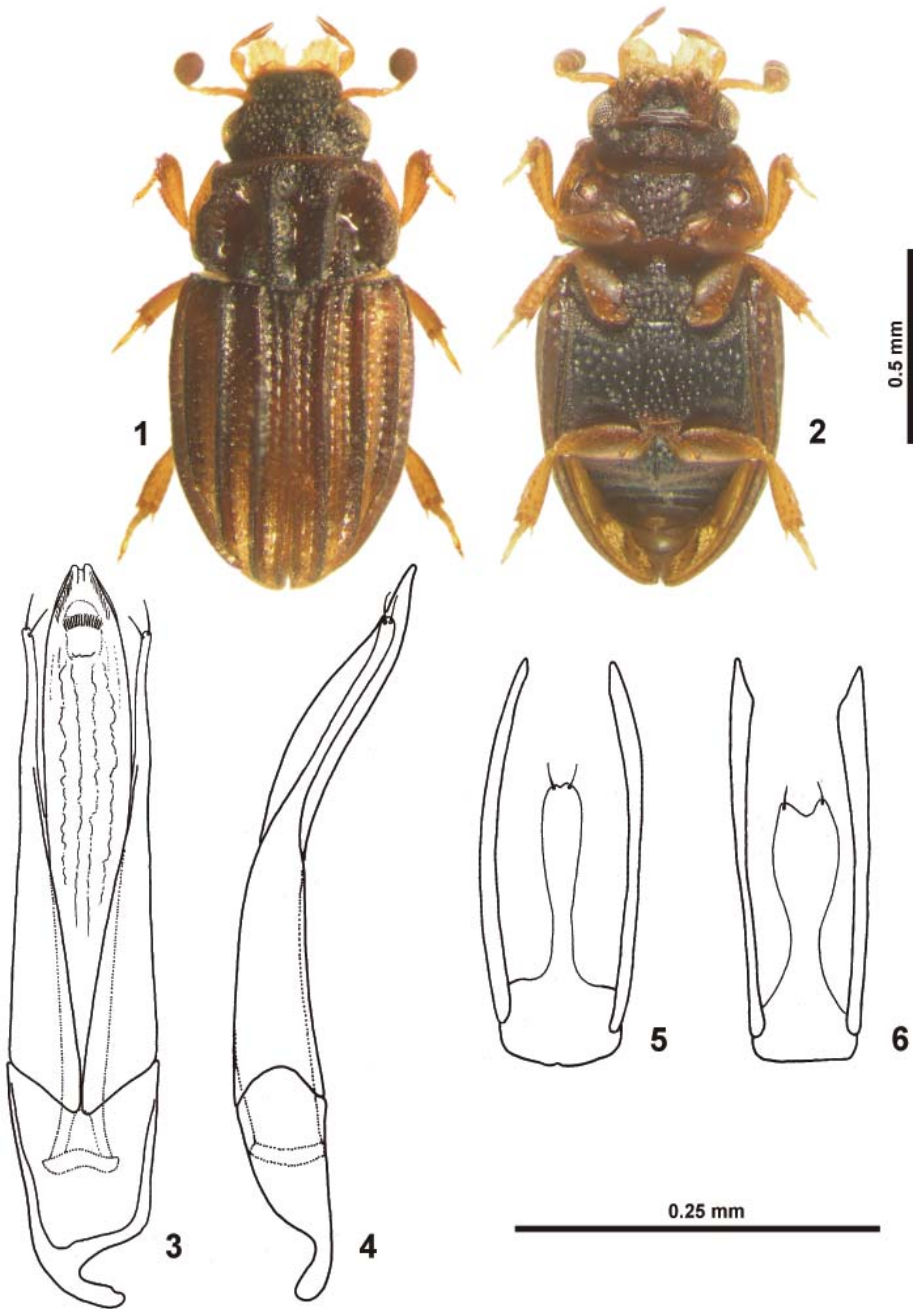
Emmidolium excavatum Orchymont, 1937: 467. Type locality: Vietnam, Tonkin, Hoa Binh.

Emmidolium excavatum: HANSEN (1991): generic revision; HANSEN (1999): catalogue; HANSEN (2004): catalogue; HORI & SATÔ (2002): redescription, distributional records; SATÔ & HORI (2006): distributional records.

Type material examined. Holotype: ♀, '♀ // Hoa – Binh (Tonkin) / A. de Cooman // A. d'Orchymont det. / *Emmidolium excavatum*. // TYPE' (IRSN).

Additional material examined. UNITED ARAB EMIRATES: ABU DHABI EMIRATE, National Avian Research Centre near Sweihan, 24°24'N 55°26'E, 29.xii.2005-22.i.2006, light traps (UAE 7055), 1 ♀, A. van Harten lgt.; Sharjah Emirate, Sharjah Desert Park, 25°17'N 55°42'E, 6.-30.iv.2005, light trap (UAE 1878), 1 ♂, A. van Harten lgt. (NMPC). REPUBLIC OF THE CONGO: Congo – Brazzaville, Mt. Fouari reservation near Gabon, Soil-zoological expedition, 14.xii.1963, singled and sifted from buffalo dung, No. 465, 1 ♂ 2 ♀♀, 3 unsexed specimens, Endrödy-Younga lgt. (HMNH, NMPC, KSEM).

Morphology. Examined specimens from Africa and the United Arab Emirates are identical in external characters, coloration and the morphology of the aedeagus (Figs. 1-4). The only difference was found in the shape of the apical part of median projection of male sternite 9, which is wider and more excised in the male from Congo (Figs. 5-6). As the projection is very weakly sclerotized and the specimens correspond to each other in all other characters including the morphology of the aedeagus, I consider this difference as intraspecific variability. Externally, all examined specimens completely correspond with the holotype. The aedeagus of the specimen from the Ryukyu Islands figured by HORI & SATÔ (2002) also seems to be identical with the specimens examined in this study. In contrast to the 'distinctly chagreened ventral surface' mentioned by HORI & SATÔ (2002), all examined specimens including the holotype lack any microsculpture on the median portions of prosternum, meso- and metaventricle (the interstices are opaque but lack any trace of microsculpture under 90× magnification). The phallobase is distinctly asymmetrical in all specimens examined (male genitalia were mentioned as symmetrical but drawn with an asymmetrical phallobase by HORI & SATÔ (2002)).



Figs. 1-6. *Emmidolium excavatum* Orchymont, 1937. 1-2 – habitus, specimen from the Republic of the Congo: 1 – dorsal view; 2 – ventral view. 3-4 – aedeagus, specimen from Sharjah Desert Park (UAE): 3 – dorsal view; 4 – lateral view. 5-6 – male sternite 9: 5 – specimen from Sharjah Desert Park (UAE); 6 – specimen from Congo.

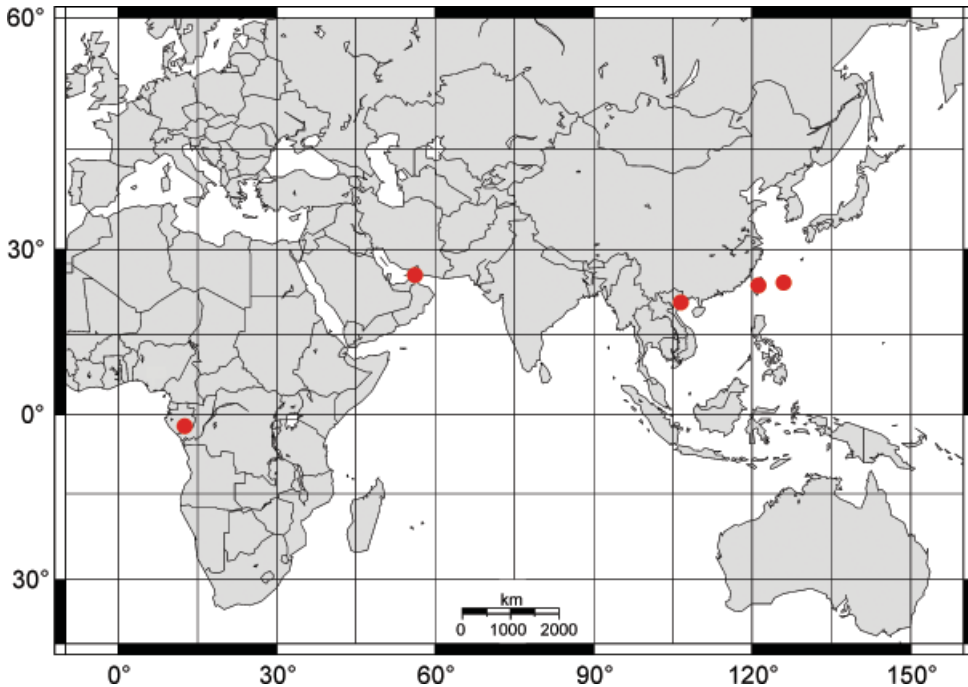


Fig. 7. Known distribution of *Emmidolium excavatum* Orchymont, 1937.

Bionomics. Most of the known specimens were collected in the dung of various herbivorous mammals (cows: HORI & SATÔ (2002), SATÔ & HORI (2006); buffalo: present record from the Republic of Congo; elephants: HANSEN (1991)). Similar to other dung-inhabiting Hydrophilidae, *E. excavatum* is a good flier and can be attracted to light (present record from the United Arab Emirates).

Distribution. Reliably recorded from the Oriental region (Vietnam, Taiwan, Ryukyu Islands), Palaearctic region (United Arab Emirates) and Afrotropical region (Republic of the Congo) (Fig. 7). Previous records from Indonesia and Africa (HANSEN 1991) most probably also concern this species but need confirmation.

Discussion

ORCHYMONT (1937) mentioned that *Emmidolium* is morphologically similar to the genera *Megasternum* Mulsant, 1844, *Pachysternum* Motschulsky, 1863, *Cryptopleurum* Mulsant, 1844, *Peratogonus* Sharp, 1884, and *Noteropagus* Orchymont, 1919 (presently, the first three are classified within the Megasternini and the latter two within the Omicrini). HANSEN (1991) confirmed its position within the Megasternini. However, the precise position of *Emmidolium* within this tribe has not been discussed recently.

The comparison of the examined specimens with other megasternine genera confirms that *Emmidolium* belongs to the *Megasternum* group of genera (formed by *Megasternum*, *Pacrillum* Orchymont, 1941, *Tectosternum* Balfour-Browne, 1958, *Cercillum* Knisch, 1921, *Cyrcillum* Knisch, 1921, *Pachysternum*, *Cyrtonion* Hansen, 1989, *Cryptopleurum* and *Pyretus* Balfour-Browne, 1950) and is most probably related to the genus *Cryptopleurum*. The following characters support this position: (1) antennal grooves large, reaching lateral margins of hypomeron; (2) median portion of prosternum in shape of broad ecarinate plate; (3) preepisternal elevation of mesothorax wide, subpentagonal in shape; (4) abdominal ventrites with large punctures; (5) median lobe of aedeagus not attached to bases of parameres; (6) phallobase with long asymmetrical manubrium.

The external morphology of *Emmidolium* is highly similar to the Neotropical species *Oosternum sculptum* Bruch, 1915. *Emmidolium* is not closely related to the genus *Oosternum* Sharp, 1882, which belongs to a group of Gondwanan genera characterized by a crescent-like male sternite 9 lacking a median projection and median lobe with restricted antero-posterior movability, attached to the base of parameres. On the other hand, *Emmidolium* and *Oosternum sculptum* share the following external characters: (1) very coarse punctation of the body surface; (2) excised anterior margin of clypeus; (3) mentum with a deep median depression; (3) plate-like median portion of prosternum (narrow in *O. sculptum*); (4) pronotum with six longitudinal ridges; (5) lateral portion of pronotum deflexed, bearing a ridge forming a false pronotal margin; (6) alternate intervals of elytra highly costate; (7) elevated portion of metaventrite nearly reaching its lateral margins. All these characters are very uncommon among other megasternine taxa and have to be considered as convergent until a more detailed phylogenetic analysis can be performed. Both *Oosternum sculptum* and *Emmidolium* represent extremely sculptured relatives of 'usual looking' (i.e. non-sculptured) megasternine taxa and the trends in their morphology are similar. Therefore, it seems that the change from non-sculptured to extremely sculptured morphology can lead to a parallel (i.e. not independent) change of external characters, resulting in a similar morphology in distantly related taxa. This suggests that extremely sculptured taxa may cause problems when external morphology will be used for phylogenetic analysis of the tribe Megasternini.

Based on the scarce data available, it is impossible to decide whether *Emmidolium* is of Oriental or Afrotropical origin. The species inhabits dung of various herbivorous mammals but was mainly collected from cattle dung. Therefore, it seems obvious that it can spread e.g. by shipping and transportation of cattle. Passive wind transport can also play its role (HORI & SATŌ 2002) because of the small beetle size and its ability to fly. However, wind can probably lead only to short-distance dispersal. More data are needed to understand the wide distribution of *Emmidolium excavatum*.

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References

- HANSEN M. 1991: The hydrophiloid beetles. Phylogeny, classification and a revision of genera (Coleoptera, Hydrophiloidea). *Biologiske Skrifter* **40**: 1-368.
- HANSEN M. 1999: *Hydrophiloidea (s.str.) (Coleoptera)*. World Catalogue of Insects. Vol. 2. Apollo Books, Stenstrup, 416 pp.
- HANSEN M. 2004: Hydrophilidae. Pp. 44-68. In: LÖBLI. & SMETANAA. (eds.): *Catalogue of Palaearctic Coleoptera. Volume 2. Hydrophiloidea – Histeroidea – Staphylinoidea*. Apollo Books, Stenstrup, 942 pp.
- HORI S. & SATÔ M. 2002: *Emmidolium excavatum* (Coleoptera, Hydrophilidae) found on Ishigaki-jima of the Ryukyu Islands, southwest Japan. *Elytra* (Tokyo) **30**: 425-429.
- ORCHYMONT A. 1937: Contribution à l'étude des Palpicornia X. *Bulletin et Annales de la Société Entomologique de Belgique* **77**: 457-475.
- SATÔ M. & HORI S. 2006: An additional note on the distribution of *Emmidolium excavatum* (Coleoptera, Hydrophilidae). *Elytra* (Tokyo) **34**: 98.