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## The False Click Beetles (Coleoptera: Eucnemidae) of Laos

by Robert L. Otto

**Abstract.** The false click beetle fauna is surveyed from Laos. Six new eucnemid genera are described. They include: *Brevisegmentus* gen.nov. (type locality: Matsuyama, Japan), *Siniugum* gen.nov. (Houaphanh province, Laos), *Pseudoisarthus* gen.nov. (Borikhamxay province, Laos), *Xylofornax* gen.nov. (Khammuane province, Laos), *Graciliforma* gen.nov. (Houaphanh province, Laos) and *Miruantennus* gen.nov. (Champasack province, Laos). Fifty-three new species are described. They include: *Xylophilus hylocharoides* sp.nov. (Houaphanh province), *Xylophilus laosianus* sp.nov. (Houaphanh province), *Bioxylus barclayi* sp.nov. (Houaphanh province), *Bioxylus castaneus* sp.nov. (Houaphanh province), *Bioxylus granulatus* sp.nov. (Phongsaly province), *Hylis parallelus* sp.nov. (Houaphanh province), *Balistica cuneiforma* sp.nov. (Borikhamxay province), *Rhagomicrus cylindriciformis* sp.nov. (Houaphanh province), *Rhagomicrus haucki* sp.nov. (Houaphanh province), *Rhagomicrus tibialis* sp.nov. (Houaphanh province), *Siniugum houaphanensis* sp.nov. (Houaphanh province), *Microrhagus bolavenensis* sp.nov. (Attapeu province), *Microrhagus entomophthalmoides* sp.nov. (Houaphanh province), *Microrhagus rufoantennatus* sp.nov. (Oudomxay province), *Microrhagus rufus* sp.nov. (Houaphanh province), *Microrhagus walkeri* sp.nov. (Houaphanh province), *Dirrhagofarsus foveicollis* sp.nov. (Houaphanh province), *Prodirhagus kresli* sp.nov. (Vientiane province), *Sarpedon apicalis* sp.nov. (Houaphanh province), *Scopulifer asiaticus* sp.nov. (Borikhamxay province), *Scopulifer laosianus* sp.nov. (Luangnamtha province), *Euryostus asiaticus* sp.nov. (Houaphanh province), *Feaia geiseri* sp.nov. (Xiengkhouang province), *Heterotaxis elongata* sp.nov. (Borikhamxay province), *Semnodema punctata* sp.nov. (Houaphanh province), *Hodocerus ceratoides* sp.nov. (Borikhamxay province), *Macroscythos granulatus* sp.nov. (Louangnamtha province), *Pseudoisarthus annamensis* sp.nov. (Borikhamxay province), *Spinifornax nigradorsus* sp.nov. (Houaphanh province), *Spinifornax pacholatkoii* sp.nov. (Phongsaly province), *Spinifornax striatus* sp.nov. (Borikhamxay province), *Ceratus phoupaniensis* sp.nov. (Houaphanh province), *Fornax atriatus* sp.nov. (Houaphanh province), *Fornax brancuccii* sp.nov. (Houaphanh province), *Fornax carinicollis* sp.nov. (Borikhamxay province), *Fornax oudomxaiensis* sp.nov. (Oudomxai province), *Fornax phoupaniensis* sp.nov. (Houaphanh province), *Fornax rufoantennatus* sp.nov. (Borikhamxay province), *Dorsifornax borikhamxaiensis* sp.nov. (Borikhamxay province), *Xylofornax dromaeoloides* sp.nov. (Khammuane province), *Xylofornax piceus* sp.nov. (Attapeu province), *Dromaeolus bolavenensis* sp.nov. (Attapeu province), *Dromaeolus depressifrons* sp.nov. (Houaphanh province), *Dromaeolus divergentus* sp.nov. (Khammuane province), *Dromaeolus foveatus* sp.nov. (Xiengkhouang province), *Dromaeolus kubani* sp.nov. (Borikhamxay province), *Dromaeolus laosianus* sp.nov. (Houaphanh province), *Dromaeolus phonsavanicus* sp.nov. (Xiengkhouang province), *Dromaeolus simplicifrons* sp.nov. (Xiengkhouang province), *Dromaeolus xiengkhouangensis* sp.nov. (Xiengkhouang province), *Nematodes lateralis* sp.nov. (Houaphanh province), *Graciliforma rufoapicalis* sp.nov. (Houaphanh province) and *Miruantennus basalis* sp.nov. (Champasack province). Three new combinations have been detected. They include: *Brevisementus miyatakei* (Hisamatsu, 1955) (*Balistica*), *Spinifornax dubius* (Fleutiaux, 1899) (*Fornax*) and *Spinifornax carissae* (Fleutiaux, 1930) (*Fornax*). Dorsal habitus for 154 of the 162 species, along with lateral habitus for some are illustrated. Aedeagus has been illustrated for four species. New diagnostic keys are provided to distinguish these new species from other species in their respective groups. An annotated checklist is provided for Laotian false click beetles.

**Keywords.** Coleoptera – Eucnemidae – Laos – checklist – keys – taxonomy – new genera – new species

### Introduction

The false click beetles (Elateroidea: Eucnemidae) are a moderately sized group of rarely encountered beetles. The family is globally distributed, found on all continents except Antarctica, and comprise approximately 1900 species in 200 genera. These

beetles are predominantly distributed in the subtropical and tropical regions, with some present in the temperate and boreal regions. Eucnemidae are more diverse in the Indo-Malayan, Australasia and Oceanic regions than any other biogeographical regions of the world.

In North America the term “The False Click Beetles” has been used to differentiate the group from the click beetles (family Elateridae), based on a belief that these beetles lack a clicking mechanism. This belief has been found to be false. Eucnemidae, like several families in the superfamily, utilize a clicking mechanism involving the well-developed prothoracic sternal spine and the cavity of the mesothoracic sternum, activated through contraction of a strong muscle in the pronotum that creates pressure. The clicking mechanism varies greatly among different species, stronger in some to almost absent in a few groups. The clicking mechanism present in many species of Eucnemidae may serve a different purpose than simply a means of righting itself on its feet. MUONA (1993) postulated the clicking mechanism may serve as a defensive strategy through which these series of clicks are used to create an audible sound as a means to startle a would-be predator. Nowadays, the common name for the family is still used, but these beetles are differentiated from Elateridae in a completely different way, mainly by the subterminal attachment of the pedicel to the scape.

These unassuming beetles often have a very interesting and diverse life history. Uncovering unique mysteries of their biology creates a greater appreciation of the family, especially their immature stages and lifecycles. Understanding the lifecycles of these beetles will often lead to a better understanding of their roles in natural communities around the globe. Larvae are highly specialized and structurally diverse, with some being well sclerotized (elateriform), while others are unsclerotized (buprestiform to fusiform) (see GARDNER 1935). Larvae are predominately mycetophagous, feeding on fungal mycelia and hyphae present in the surrounding wood. MUONA & TERÄVÄINEN (1998) observed no evidence of wood fragments in the gut, from which they concluded larvae might obtain nutrition by ingesting liquids from the moist wood. They presumed this was a type of extraoral digestion through means of vomiting digestive juices in the surrounding areas to break down fungal hyphae in the wood, and re-ingesting the fluids.

Close association with fungus present in the trees and wood within the forest system is an important factor in the family’s role in forest regeneration, especially in tropical regions. Additionally, Eucnemidae are also good indicators of a diverse forest structure.

### **Materials and Methods**

The study was based on the examination of 851 dry-mounted specimens of Eucnemidae, mostly from Laos, but including some from nearby countries. Specimens were borrowed and identified from over half dozen major institutions and several private collections. Eucnemidae from the Project’s collection were also examined as noted below, along with standard codens (referenced in the text) for other collections during the course of the study:

### Abbreviations

AAC	Albert Allen Collection, Boise, ID
BMNH	Natural History Museum, London, United Kingdom
FSCA	Florida State Collection of Arthropods, Gainesville, FL
GERP	Global Eucnemid Research Project, Dept. Entomology, UW-Madison, Madison, WI
JMC	Jyrki Muona Collection, Helsinki, Finland
MNCN	Museo Nacional de Ciencias Naturales, Madrid, Spain
MNHN	Muséum national d'Histoire naturelle, Paris, France
NHMB	Naturhistorisches Museum, Basel, Switzerland
RBINS	Royal Belgian Institute of Natural Sciences, Brussels, Belgium
WSC	Wataru Suzuki Collection, Tokyo, Japan
ZSM	Zoologische Staatssammlung München, Munich, Germany

Genera are taxonomically arranged in accordance with the classification of MUONA (1993), except for six new genera; species are treated alphabetically. All existing species are redescribed and new species are also described; all taxa are provided with diagnoses. Additional nomenclatural notes are presented where appropriate.

Label data are presented verbatim, with text for each individual label separated from an underlying label by a slash (/). Specimens deposited in the collection of the Global Eucnemid Research Project (GERP) bear a green framed white label, "Collection of the Global Eucnemid Research Project, (Robert L. Otto)".

Specimens were examined under quartz halogen illumination, through a XTL-3300 series 7–90× zoom stereo trinocular microscope. Habitus and genitalic images were taken with a JVC KY-F75U digital camera attached to a Leica® Z16 APO dissecting microscope with apochromatic zoom objective and motor focus drive, using a Synchronscopy Auto-Montage® System and software, resulting image stacks were processed using CombineZP®.

For dissections and genital preparations, a representative dried beetle specimen was relaxed in hot water for 30 minutes and then transferred to a small dish of water where part of the abdomen was removed. The abdomen was placed in a beaker with 40 ml of room temperature weak KOH solution for three hours to soften the tissues around the aedeagus and then rinsed in water to neutralize the KOH. The aedeagus was dissected from the abdomen using a pair of insect pins and subsequently placed in a microvial filled with glycerine after examination and illustration. The microvial was pinned beneath the specimen for permanent storage; the dissected sclerites were secured on a glue board and also pinned beneath the specimen.

KOVALEV (2013) replaced the term clypeus with epistomal part of epicranium. Eucnemidae lack an epistomal sulcus, which would separate the clypeus from the frons below antennal insertions on the front, lower side of the head. The term, 'frontoclypeal region' will be used instead of clypeus or epistomal part of epicranium in these descriptions.

Ecoregions for particular species are listed from The Encyclopedia of Earth, which in turn follows the classification of "WWF List of Ecoregions" <<http://www.eoearth.org/view/article/51cbed7a7896bb431f692731/>>.