

A Redescription of *Rhagophthalmus ingens* FAIRMAIRE  
(Coleoptera, Rhagophthalmidae) from Northern Vietnam,  
with Establishment of a New Genus in the Family

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**Abstract** A strange looking beetle, *Rhagophthalmus ingens* FAIRMAIRE, 1896 belonging to the family Rhagophthalmidae, is newly recorded from northern Vietnam, re-described and illustrated in detail. In addition, a new genus, *Menghuoius* is erected for it based upon some peculiarities.

### Introduction

The family Rhagophthalmidae comprises three known genera, *Rhagophthalmus* MOTSCHULSKY, 1853, *Dioptoma* PASCOE, 1862 and *Mimochotyra* PIC, 1937. The adult males are commonly characterized by the following characters: head capsule not so completely concealed by the anterior part of pronotum as in the family Lampyridae, 12-segmented antennae very short and serrate and compound eyes each with a distinct deep emargination anteriorly on the dorsum. Biological data, such as habit, mating and possession of two patterns of luminescence, were reported for the first time by GREEN (1912) for *Dioptoma adamsii* PASCOE, 1862 from Ceylon. As regards *Rhagophthalmus ohbai* WITTMER, 1994 from the Yaeyama Islands, Southwest Japan, morphological and general biological knowledges, including remarkable eating and egg-sitting habits of the species, have been constantly accumulated up to the present (WITTMER & OHBA, 1994; OHBA *et al.*, 1996).

In 1997, Mr. H. KARUBE, a curator of Kanagawa Prefectural Museum of Natural History, visited northern Vietnam and collected a peculiar beetle, which was submitted to the present author for study. At a glance the beetle was easily classified into the family Rhagophthalmidae by several characters of head and others. After a careful examination, it was identified with *Rhagophthalmus ingens* FAIRMAIRE, 1896. However, its mouth parts and pronotum are so peculiarly specialized that erection of a new genus becomes necessary. In this paper, I will redescribe and illustrate *R. ingens* in detail, and propose *Menghuoius* gen. nov. for it.

### Materials and Methods

The materials used in the present study are as described in the “materials exam-

ined". For dissection, dried materials were relaxed in hot water, and then, mouth parts and male genitalia were removed from the body, mounted on slide glasses with glycerol, observed through optical microscope (OLYMPUS CH-2, max. magnification  $\times 1000$ ) and sketched with the aid of an attached drawing tube. After examination, the dissected parts were preserved in a glass micro-vial filled with glycerol. External characters were observed and sketched with a stereoscopic microscope (OLYMPUS SZH10, max. magnification  $\times 140$ ) equipped with a drawing tube. All the materials are deposited in the author's collection. The abbreviations used herein are as follows: BL – length of body, from anterior margin of frons to elytral apex; HW – maximum width of head, including eyes; AL – length of antennae; PL – length of pronotum along mid-line; PA – apical width of pronotum; PB – basal width of pronotum; PW – maximum width of pronotum; EL – length of elytra; EW – maximum width of elytra; EHW – humeral width of elytra; TL – length of hind tibiae.

### Description

Genus *Menghuoius* KAWASHIMA, nov.

Type species: *Rhagophthalmus ingens* FAIRMAIRE, 1896.

Male. Large-sized rhagophthalmid with broad habitus and relatively short appendages. Body elongated oval, depressed and dilated towards hind body; head transverse, larger but clearly narrower than pronotum; hind body moderately long, clearly wider than head and pronotum. Moderately shiny, almost regularly clothed with pale subrecumbent pubescence.

Head large and transverse, obviously wider than long, depressed above and shallowly concave, relatively minutely punctate on the dorsal surface. Antennal sockets located on both sides of frontal area, widely separated from each other, lying anteriorly but easily visible from dorsal side. Antennae 12-segmented, very short, only reaching anterior margin of pronotum; scape clavate and the longest, serrated in 6th to 11th segments continuously. Eyes globular, large and prominent, distinctly separated from each other even on the ventral side. Labrum moderately membranous, transverse triangular and excavated mesally. Mandibles very large and slender, constantly incurved, with sharply pointed apices, recognized at first sight from dorsal view. Maxillary palpus 4-segmented, relatively long, simple and slender, truncated at the apex of terminal segment. Labial palpus 3-segmented, simple and slender, also truncated at the apex of terminal segment as in maxillary palpus.

Pronotum large, transversely subquadrate or trapezoidal in dorsal view, much broader than head, but almost as wide as the humeral width of elytra, widest at basal fifth to before the base, and then, very faintly constricted just before basal angles; anterior margin widely arcuate and produced anteriorly, anterior angles hardly angulate; both sides feebly arcuate, reflexed and forming widely flattened areas in the whole length; basal angles briefly projected outwards, each forming a minute tubercle or basal angle; basal margin bisinuate, narrowly bordered, the disc punctate and clothed with pubes-

cence, narrowly margined throughout, very shallow or sometimes feeble medio-longitudinal furrow running along the mid-line.

Scutellum triangular with rounded apex, roughly punctate on dorsal surface.

Elytra rather broad, conjointly about twice as long as wide, constantly covered with subrecumbent pubescence; humeri weakly prominent antero-laterad; sides arcuate, gradually divergent towards the widest apical third, and then narrowed towards the rounded apices, distinctly dehiscent, very narrowly margined throughout including suture, the margin being concealed at humeral portion. Dorsal surface distinctly rugulose, irregularly and closely punctate, each elytron with three vague costae, all of them obliquely running inwards posteriorly, middle 2nd costa the longest and clearest, extending onto the whole length of elytra.

All legs slender but not much longer; trochanters triangular, small and short, attached obliquely to femora; femora fusiform and moderately flattened dorso-ventrally; tibiae also feebly flattened dorso-ventrally and slender, almost straight or faintly sinuate. Tarsal formula 5-5-5; all tarsi a little shorter than tibiae; 5th tarsomere the longest, a little longer than the combined length of 2nd and 3rd; 1st to 4th gradually becoming shorter posteriad, each with membranous lingulate lamellae at ventro-api-

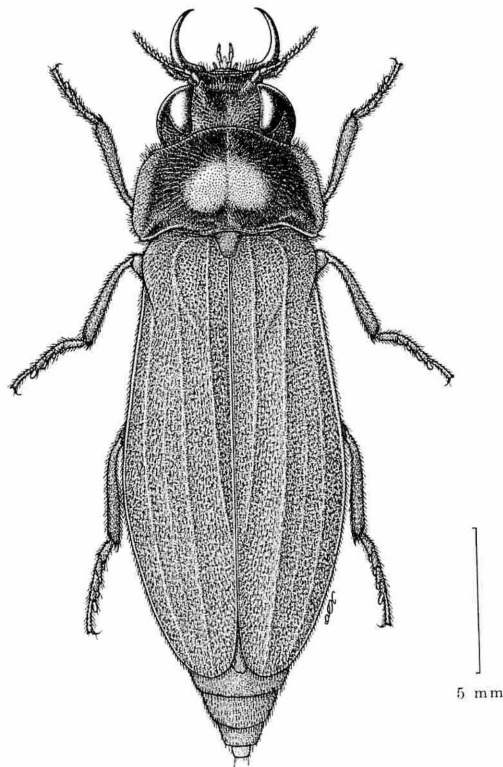


Fig. 1. Habitus of *Menghuoius ingens* (FAIRMAIRE, 1896), gen. et comb. nov., male, dorsal view.

cal parts. Claws simple, moderately dilated at the bases.

Abdomen broad, with 8 visible segments in ventral view, flattened dorso-ventrally or wholly subcylindrical; both sides parallel in basal two segments, and then gradually convergent from the 3rd segment to anal end, more or less so in some distal segments in dorso-caudal view.

Male genitalia very heavily sclerotized, trilobed and symmetrical. Aedeagus stout, parameres joining at the bases, basal plate large, widely open ventrad.

*Remarks.* This new genus is easily discriminated from the other members of the family by a combination of the following character states: 1) body gigantic, much larger than the other members of the family; 2) mandibles extremely large, easily recognized from dorsal side; and 3) eyes relatively small, never in contact with each other even on the ventral side.

*Etymology.* The generic name is derived from the name of the chieftain of an ancient influential race in Southwest China in the Shu Dynasty, MENGHUO [孟獲].

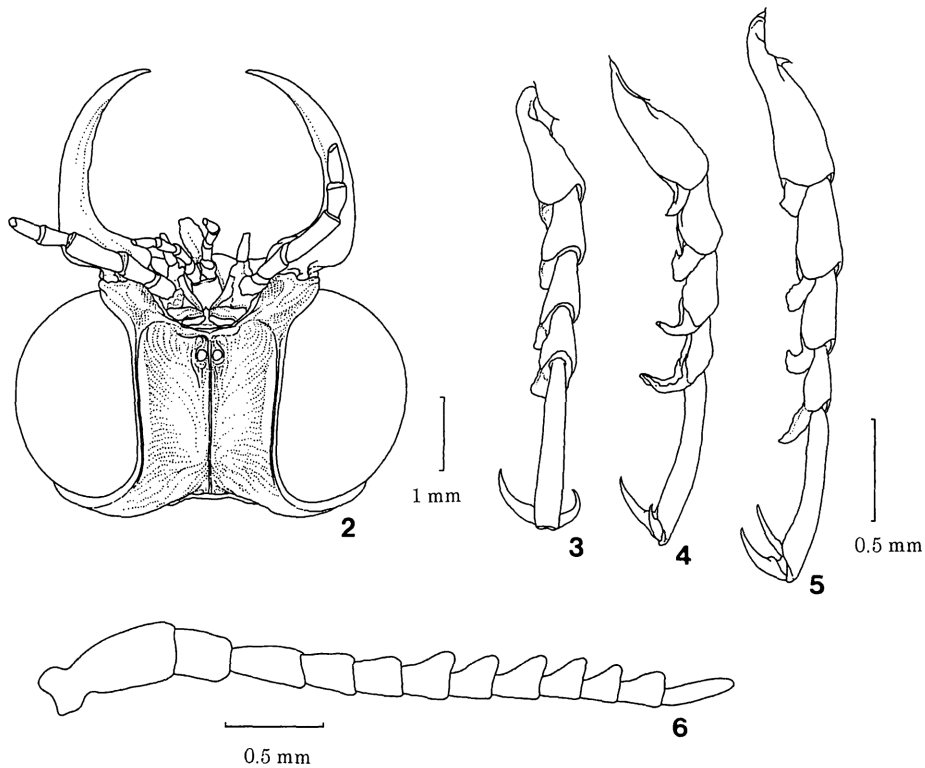
*Menghuoius ingens* (FAIRMAIRE, 1896), gen. et comb. nov.

(Figs. 1–9)

*Rhagophthalmus ingens* FAIRMAIRE, 1896, Notes Leyden Mus., **18**: 227 (type locality: Chine, probablement Hongkong). — OLIVIER, 1911, Anns. Soc. ent. Fr., **80**: 469–470 (review of the genus, redescription and key).

Male. Body moderately shiny, covered all over including appendages with golden subrecumbent pubescence. Head capsule blackish on dorsum, dark reddish brown or blackish brown on venter; antennae yellowish brown; eyes blackish; labrum yellowish to yellowish brown; mandibles blackish brown, paler towards the bases, which are tinged with dark reddish brown; maxillae yellowish brown or dark brown including palpi; labium yellowish brown or pale brown including palpi, slightly paler than maxillae; pronotum dark brown or blackish brown, more or less paler towards the flattened marginal areas; scutellum yellowish brown or pale brown; elytra olive, becoming feebly darker towards the bases, narrowly margined throughout in yellowish brown including the suture; legs almost wholly yellowish brown, except for reddish brown claws. Ventral surface of thorax and abdomen constantly yellowish brown. Male genitalia shiny, heavily pigmented; external surface almost reddish brown; inner margins of both parameres blackish on venter; inner surface and distal marginal areas of parameres paler, milky white to pale brownish.

Head (Figs. 1–2) large and transverse, evidently wider than long, depressed above and concave along the mid-line, rather minutely punctate on dorsal surface; antennal sockets located on both sides of frontal area just before eyes, widely separated from each other, oriented antieriad, easily visible in dorsal view; ventral surface as shown in Fig. 2; gula degenerated so as to make gular sutures touching each other, the sutures recognized as a deep and straight longitudinal groove running from posterior margin of labium to hind margin of head capsule, triangularly and deeply concave along the su-



Figs. 2–6. *Menghuoius ingens* (FAIRMAIRE, 1896), gen. et comb. nov., male, ventral view (2), dorsal view (3, 6), lateral view (4, 5); 2, head; 3, foretarsus; 4, midtarsus; 5, hindtarsus; 6, right antenna.

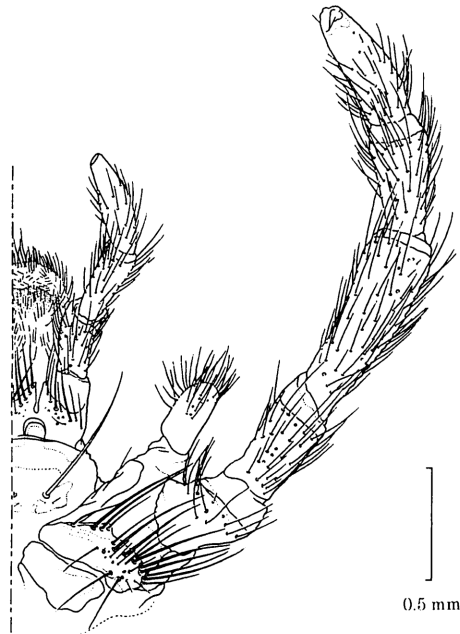
tures, with a pair of small pores just behind the mouth parts; inner margins of eyes keeled throughout.

Antennae (Fig. 6) 12-segmented, very short and serrate, only reaching anterior margin of pronotum; scape clavate and the longest, 2.42 times as long as wide; pedicel short cylindrical; 3rd to 5th flagellar segments subcylindrical, moderately becoming broader towards the apices; 6th to 11th flagellar segments serrated continuously, each with a lens-like sensillum at the protruded antero-ventral portion; apical flagellar 12th segment the most slender and spindle-shaped; relative length of each segment from scape in a specimen as follows:— 20: 12: 15: 10: 10: 9: 9: 9: 9: 8: 9: 14.5.

Eyes (Figs. 1–2) globular, large and laterally prominent, each with a deep posterior excavation on dorsal side, separated from each other by about twice the radius of an eye on dorsal side and distinctly separated by the same width even in ventral view.

Labrum (Fig. 1) moderately membraneous, transverse and extremely flattened triangular, minutely emarginate at the centre of anterior margin, usually directed towards the ventral side.

Mandibles (Figs. 1–2) extremely large and slender though robust, wholly seen



Figs. 7. *Menghuoius ingens* (FAIRMAIRE, 1896), gen. et comb. nov., male, ventral view ; 7, labium and maxilla, left halves.

from dorsal side, exteriorly expanded at a right angle near the bases, and then constantly incurved and gradually tapered towards acute apices.

Maxillae (Fig. 7) small and weakly sclerotized; cardo small and transverse subquadrate; stipes also small and transverse triangular; longer spines transversely ranged along the anterior margins; galea 1-segmented, short subcylindrical and weakly narrowed towards the rounded apex, densely covered with setae in distal half; lacinia vestigial and weakly pigmented, only recognizable as a weakly sclerotized flattened plate; palpifer short cylindrical or feebly incurved, only a little shorter than 1st segment of maxillary palpus; maxillary palpus 4-segmented, relatively long, simple and slender; 1st and 3rd segments the shortest, almost equal in length to each other; 2nd the longest, nearly twice as long as 1st or 3rd; each segment except terminal 4th subcylindrical and gradually dilated towards the apices; terminal 4th spindle-shaped, the exterior side with a transparent area, obliquely truncated at the apex.

Labium (Fig. 7) small and very weakly sclerotized; mentum almost membranous, only recognized as a pair of feebly pigmented areas on venter, each with a pair of very long spines; prementum more heavily sclerotized and pigmented than mentum; relatively long spines transversely ranged along the anterior margin, with a deep cleft along the mid-line in anterior half, and roundly excavated at the middle of the base; ligula relatively long and lingulate, elongated from the anterior margin of prementum, closely covered all over by fine setae between palpi; labial palpus 3-segmented, simple

and slenderer than maxillary palpus; each segment gradually becoming longer towards the terminal one; 1st segment the shortest, weakly dilated towards the apices, feebly outcurved; 2nd clearly dilated towards the apices; terminal 3rd the longest, spindle-shaped and obliquely and minutely truncated at the apex as in maxillary palpus.

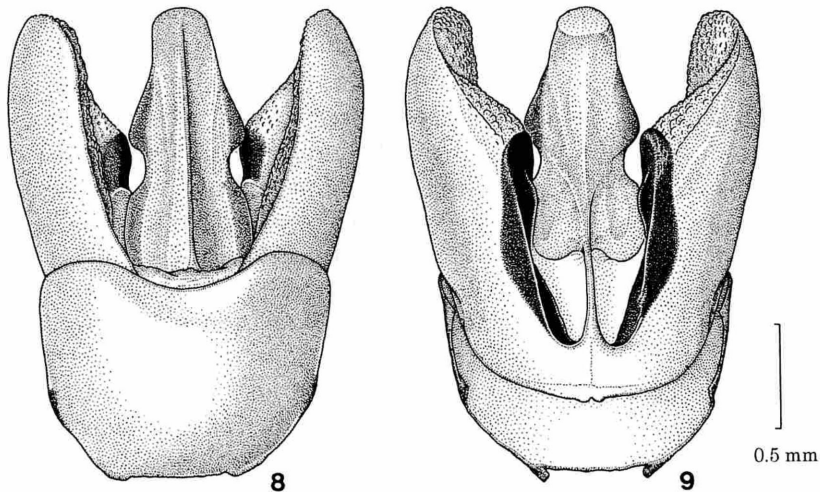
Pronotum (Fig. 1) relatively large but short, transversely semicircular or trapezoidal in dorsal view, more or less variable in shape individually, widest just before the base, across basal fifth; anterior margin widely arcuate and produced anteriorly, both exteriormost portions of the margin minutely protruded and forming minute angles; sides arcuate, feebly margined throughout, reflexed and forming widely flattened areas along the whole length, and very faintly constricted just before basal angles; anterior parts of the areas sometimes wrinkled; basal angles briefly projected outwards, each of them forming a minute tubercle; basal margin sinuate on both sides, narrowly bordered throughout; disc minutely but constantly punctate, the punctures being relatively small or minute; very shallow medio-longitudinal furrow running along mid-line, but almost disappearing in both anterior and posterior parts. PW/HW 1.35–1.45; PW/PL 1.87–1.92; PW/PA 1.30–1.34; PW/PB 1.06; PL/PW 0.52–0.54; PW/EHW 1.13–1.15.

Scutellum (Fig. 1) triangular with rounded apex, closely punctate on dorsal surface.

Elytra (Fig. 1) fairly broad, sides distinctly divergent posteriorly, widest at apical third to fourth, and then convergent to rounded apices, distinctly dehiscent in apical parts, narrowly marginated throughout including suture, the margin being concealed by humeri, which are weakly prominent anteriorly; dorsal surface distinctly rugulose, irregularly and closely punctate; each elytron with 3 vague costae, of which the middle ones are the longest and clearest, running throughout the length of elytra; exteriormost ones not reaching anterior part and disappearing; innermost ones short, very weak and more obsolete. Each costa obliquely running inwards near the elytral apices; EL/PL 4.15–4.28; EL/EW 1.91–1.92; EW/PW 1.16.

All legs (Fig. 1) not much longer but slender, trochanters small and short, attached obliquely to femora; femora fusiform and moderately flattened dorso-ventrally, 3.5 times as long as trochanters; tibiae almost straight though incurved at the bases, each with two minute tibial spurs; tarsi relatively long, only a little shorter than the length of tibiae; tarsal formula 5–5–5; tarsomeres (Figs. 3–5) except for the elongated apical ones each with membranous lingulate lamellae on ventro-apical portions; 5th tarsomere the longest, a little longer than the combined length of 2nd and 3rd, 1st to 4th gradually becoming shorter posteriorly; relative length of each tarsomere on upper margins as follows:— 18: 14: 12: 10: 38 in forelegs, 20: 14: 12: 10: 40 in midlegs, 27: 20: 16: 12: 40 in hindleg. Claws (Figs. 3–5) small and simple, weakly dilated at the bases.

Abdomen broad and flattened dorso-ventrally in dried materials, with eight visible segments in ventral view; the sides parallel in basal two segments, and then gradually convergent posteriorly from 3rd segment to anal end; several caudal segments extended and exposed from the apical parts of elytra (Fig. 1).



Figs. 8–9. *Menghuoius ingens* (FAIRMAIRE, 1896), gen. et comb. nov., male genitalia, dorsal view (8), ventral view (9).

Male genitalia as shown in Figs. 8–9, very heavily sclerotized and pigmented, symmetrically trilobed, weakly depressed dorso-ventrally, fairly broad and crown-shaped as a whole, but more or less variable in shape according to individuals; external surface moderately shiny, smooth and glabrous though the inner surface and distal marginal areas of parameres are granulate. Basal plate large, semicircular or elongated semicircular in dorsal view, widely open on venter, distal margin widely bisinuate, shallowly concave in central part, but sometimes almost straight. Aedeagus stout and of wide arrow-shape with rounded apex, wide and rather flattened dorso-ventrally, gradually bent ventrad in about distal half or third; sides parallel or subparallel in basal third, abruptly excavated roundly, and then gradually convergent towards the apical portion; a longitudinal keel running along mid-line of dorsal surface. Parameres spatulate, embracing aedeagus from left and right, joining at the bases on ventral side; the joining area with a pair of relatively deep and longitudinal grooves; external sides more or less arcuate, gradually open towards the apices, widely open and separated from each other on dorsal side, and also inner margins on dorsum gradually opening towards apices; distal half of inner margins on venter obliquely truncated outwards before apices, forming rounded angle, and then the basal half of the margins almost subparallel but feebly sinuate; straight keels running from the angles towards the base, and then connected with the exterior margins of each groove of the basal part.

*Measurement in mm.* BL: 20.6–25.1; AL: 3.3–4.1; PL: 3.6–4.6; PW: 6.9–8.6; PA: 5.3–6.4; PB: 6.5–8.1; EL: 15.4–19.1; EHW: 6.0–7.6; EW: 8.0–10.0; EL: 15.4–19.1; TL: 3.8–4.4.

Female. Unknown (probably wingless larviform).

*Materials examined* (all dried). 1♂, [N. Vietnam] Mt. Pia Oac, Cao Bang



Province, 14-V-1997, H. KARUBE leg. (genitalia removed and preserved in a pinned micro-vial); 1♂, same locality as above, V-1999, native collector (genitalia, maxillae and labium removed and preserved in a pinned micro-vial); 1♂, same data as above (genitalia not removed, and only exposed.).

*Range.* China (probably Hong Kong, in the original description by FAIRMAIRE, 1896) and northern Vietnam (new record).

*Remarks.* According to the key in the revision of *Rhagophthalmus* given by OLIVIER (1911), *R. giganteus* FAIRMAIRE, 1888 from Yunnan, Southwest China, shares the following two character states with *R. ingens*: 1) large body; 2) pronotum with dilated or expanded marginal areas on both sides. It seems reasonable to infer that *R. giganteus* belongs to the present new genus.

*Biological notes.* Up to the present, almost nothing is known about biology of this interesting beetle. A male insect collected by KARUBE is attracted to illumination of a hand-light. According to his and NIISATO's observation (pers. comm.), the insect rested on the light, then exposed its genitalia, and twisted or shook the elongated abdomen towards the source of the light. It is surmised that the unique and strange behaviour is the same as the mating one of the male towards the luminescent larviform female in *Rhagophthalmus ohbai* (OHBA *et al.*, 1996), which seems to lead to the supposition that the adult female of this species emits continuous light for inducing the male into mating.

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### 要 約

川島逸郎： *Rhagophthalmus ingens* FAIRMAIRE — 北ベトナムからの再記載および新属の創設。 — イリオモテボタル科 Rhagophthalmidae は現在3属から構成されるが、それらの雄成虫は近縁のホタル科のものとは異なり、前胸背板前縁によって隠されない頭部、12節からなる非常に細く短い触角、背面において深い欠刻をそなえるか、または大きく分割する大型の複眼をもつことで特徴づけられる特異な一群で、そのうち *Diptoma* 属 (GREEN, 1912) および *Rhagophthalmus* 属 (WITTMER & OHBA, 1994; OHBA *et al.*, 1996) の各1種では、ともに雌成虫が無翅の幼虫形を呈するうえに、二とおりの発光様式をあわせもつことが確認されている。1997年5月にベトナム北部において捕獲され、筆者のもとにもたらされた巨大な1種は、各部の諸形質を詳細に検討した結果、明らかに本科に属するもので、現段階では FAIRMAIRE (1896) によって記載さ

れた *Rhagophthalmus ingens* に同定されたことから、今回その外部形態を詳細に再記載した。しかし、その外部形態、とくに頭部や前胸部における特異な形質状態や、その他の属のものから大きくかけ離れるまでに巨大化した体軀を根拠にして、同種を基準種とする新属 *Menghuoius* gen. nov. を創設した。この興味のある甲虫の習性は未知であるが、採集者らによる情報として、照明に飛来したのちに光源に向かって交尾器を露出させ、長く伸ばした腹部をくねらせ、まともわりつかせる独特の行動をとったとされる。こうした行動は、同じくイリオモテボタル科に属する日本産のイリオモテボタル *Rhagophthalmus ohbai* WITTMER, 1994 の、誘引発光する幼形雌成虫に飛来した直後の雄成虫の配偶行動に共通しているので、この甲虫の雌成虫も連続光を放ち雄を誘引することを強く示唆している。

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