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Autor: Balkenohl, Michael / Aston, Paul

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Asioreicheia guenardi sp. nov. (Insecta: Coleoptera: Carabidae: Clivinini), a new peculiar species from Hong Kong

Michael Balkenohl & Paul Aston

ABSTRACT Contrib. Nat. Hist. 31: 1–12

***Asioreicheia guenardi* sp. nov. from Hong Kong is described and illustrated. Notes on how to separate this species from other Asian Reicheiina species are given with differential diagnostic separation from the closely related species *A. chinensis* (Bulirsch, Magrini & Jia, 2013)**

ZUSAMMENFASSUNG

***Asioreicheia guenardi* sp. nov. aus Hong Kong wird beschrieben und abgebildet. Die Art wird differentialdiagnostisch von der nächst verwandten Art *A. chinensis* (Bulirsch, Magrini & Jia, 2013) und von anderen asiatischen Reicheiina-Arten abgegrenzt.**

Keywords: *Asioreicheia*, Coleoptera, Carabidae, Clivinini, Hong Kong, taxonomy

Introduction

Specimens of the Clivinini subtribe Reicheiina are notoriously difficult to collect, as they are very small (at about 2 mm long), terricol, well camouflaged, move extremely slowly and cannot be captured by trapping methods normally applied by carabidologists such as pitfall and baited traps.

The first volume of the Catalogue of Palaearctic Coleoptera was published in 2003 and had a cut-off date end of 1999 at which time the Palaearctic Reicheiina fauna contained eight genera, comprising sixty species and sixteen subspecies (Balkenohl 2003). Increased interest in the group and understanding of the microhabitats they live in, combined with refined soil investigation methods such as soil sieving, hand picking leaf litter and litter washing, all in combination with Winkler Extractors, has resulted in more than doubling of

the number of known Palaearctic Reicheiina species since the cut-off date of the Palaearctic Catalogue. A revision of this catalogue is currently in preparation with the end of December 2014 as the cut-off date. Basically after fifteen years, sixty additional species and seventeen subspecies have been described (unpublished data by the senior author).

In a pilot study undertaken in the second half of 2014 to investigate the ant fauna of Hong Kong, Dr. Benoit Guénard and laboratory members of the University of Hong Kong collected a large number of Coleoptera, which he deposited with the junior author. In the material there were 3 specimens of a species of Reicheiina, which were confirmed by the senior author as belonging to the genus *Asioreicheia* erected recently (originally described as *Antireicheia* Bulirsch, Magrini & Jia, 2013, and later reassigned and corrected as *Asioreicheia* Bulirsch & Magrini &, 2014). The specimens differ from the only known Chinese species *Asioreicheia chinensis* (Bulirsch, Magrini & Jia, 2013) and represent another new species from China described below.

Material and Methods

The series of the new species consists of three specimens. In addition, the holotype and one paratype of the closely related species *A. chinensis* were restudied for comparison (NMPC, CBP). Other Eastern and Oriental Reicheiina material was studied earlier by the senior author. The holotype of *A. guenardi* sp. nov. donated by Dr. Guénard, is deposited in the NMBE.

The examined material is deposited in the following collections:

CAHK	Coll. Paul Aston, Hong Kong, China;
CBB	Coll. Michael Balkenohl, Bonstetten near Zürich, Switzerland;
CBP	Coll. Petr Bulirsch, Prague, Czech Republic;
NMBE	Naturhistorisches Museum der Burgergemeinde Bern, Switzerland;
NMPC	National Museum, Prague, Czech Republic.

In general, terms, descriptions of characters and methods follow Balkenohl (2001).

Specimens were examined with a Leica M205-C stereomicroscope at magnifications up to 160 times, with the iris diaphragm usually closed up to 55%. This provides sufficient sharpness for some of the very small character states of these tiny beetles like the number of setae of the labrum, reticulation, number and location of fine pili. Measurements were taken using an ocular micro-

meter calibrated with an objective slide. Body length was measured from the apex of the longer mandible in closed position to the apex of the longer elytron. The length of the pronotum was measured along the median line including the flange-like base, and the width was determined at the widest part. The length of the elytra was measured from the tip of the basal reflexed lateral margin to the tip of the apex of the longer elytron. The elytral width was measured at maximum width of both elytra and represents the general width of the specimen. Arithmetic means ($\bar{x}$) are provided for the values measured.

When needed the surface was cleaned, e.g. by using acetic ethyl ester, in order to recognise the fine setigerous punctures and microscopic structures. Different light quality (yellow to cold white) proved valuable in viewing the very feeble reticulation on the surface (e.g. classic bulb, focusable halogen or LED) than using filters of lamps. This method also showed the minute setigerous punctures which are much finer than the punctures of striae on the elytron, and when the arising pili are partly rubbed off.

The dissected genitalia were mounted on transparent celon cards and embedded in a medium according to Lompe (1989), others in Euparal. These cards are fixed on an object slide and can easily be used under a microscope. These very fine organs exhibit a low degree of pigmentation resulting in the inner structures being viewed clearly. Descriptions and illustrations were made from the genitalia with transmitted light using a Reichert-Jung Polyvar microscope with magnification up to 400 times. For some of the photographs 500 times was used (structures are best visible from 400 times onwards by optimized condenser with interference contrast 40, and fluorescence blue stimulation at 450–495 nm). Photographs of the median lobe of the aedeagi of *A. guenardi* sp. nov. and *A. chinensis* were taken by placing the median lobe exactly in the same position.

Habitus photographs were taken with a stereomicroscope Leica M205-C and a Leica MC170HD digital camera using a motorised focussing drive, light base Leica TL5000 Ergo, diffused light with Leica hood LED5000 HDI, subsequently processed with Leica LAS application software, and enhanced with CorelDRAW Graphics Suite X5. All information given on the labels are displayed in the description chapter as they appear on the labels.

***Asioreicheia guenardi* sp. nov.**

Type material: Holotype ♂, with printed label "Locality: Lung Fu shan C.P., Hong Kong (Adjacent to Hong Kong University Campus)"; second printed label "Leg. Dr. Benoit Guénard & M. Wong. Hong Kong University"; blue handwrit-

ten label "1–2 of 25.xi.14 H.K.U. campus, alt 156 m HKG – winkler"; backside black printed "coll: B. Guénard Hong Kong, China"; second blue handwritten label "Clivini [sic!] sp I" backside black printed "Determined Paul Aston" (NMBE).
Paratypes: 1 ♀: same data as holotype (CBB); 1 ♂, same data as holotype, but with blue handwritten label data "2 of 24.xi.14 HKU campus, HKG alt 295 m – winkler extractor"; backside black printed: "coll: B. Guénard Hong Kong, China"; second blue handwritten label "Clivinini sp I." backside black printed "Determined Paul Aston" (CAHK).

Description (Figs. 1–4; habitus Figs. 1a, b)

Measurements (n = 3): Body length 1.95–2.15 mm ($\bar{x}$ = 2.05 mm), width 0.70–0.77 mm ($\bar{x}$ = 0.72 mm), ratio length/width of pronotum 0.98–0.1.04 ($\bar{x}$ = 1.01), ratio length/width of elytra 1.53–1.55 ($\bar{x}$ = 1.55).

Colour: Head, pronotum, dorsal and ventral surface middle to dark reddish brown. Vault of supraantennal plates, lateral teeth of clypeus light brown. Mandibles middle brown with carinae and apices darkened; mandibular and maxillar palpi yellowish-beige, transparent at apical tip; femora and tibiae yellowish red brown; tarsomeres, scapus and pedicellus light brown; antennomeres 3–11 yellowish-beige.

Head (Fig. 2): A third narrower than pronotum. Clypeus and lateral teeth finely margined. Clypeus straight at anterior margin, lateral teeth moderately projecting, obtuse at tip, divided from supraantennal plates by indistinct obtuse-angular notches; clypeal field pentagonal, prolonged to frons as triangular elevation with sharp keel; frons moderately convex, with transverse rugae laterally to keel; clypeal field and frons with distinctly meshed reticulation. Supraantennal plates convex, smooth, laterally and posteriorly with distinct carina. Frontal furrows deep, diverging anteriorly and posteriorly of keel level. Anterior supraorbital setae situated at the end of supraorbital vault, the posterior ones at level of the end of genae; bilateral fovea bearing the clypeofrontal setae situated laterally and anteriorly to base of keel. Eyes reduced to a single convex to slightly globally protruding ommatidium, pointing anteriorly, surrounded by dark pigment; genae distinctly enlarged, higher than eyes, smooth. Labrum slightly trilobed anteriorly, with irregular reticulation, 5-setose. Mandible distinctly curved, acute at apex. Apical segment of maxillary palpomere slender, securiform, pointed at apex; apical segment of labial palpomere bottle-like, somewhat broadened, penultimate segment bisetose. Mentum bordered at base, lobes broadly rounded-off, apex of lobes

Figs. 1a, b: ***Asioreicheia guenardi*** **sp. nov., holotype, male, a: dorsal view, b: lateral view.**

with transverse rugae, median tooth not extending over lateral lobes; ligula with moderately long seta; antenna moderately long, extending up to posterior setigerous puncture of pronotum, scapus about as long as pedicellus, with one dorsoapical seta, third segment 1.5 times longer than wide, segments 4–10 moniliform, fully pubescent from segment 4 onwards.

Pronotum: Outline subrectangular, in lateral view moderately convex, moderately to slightly convex to base. As wide as long, maximum width at middle. Lateral border slightly convex in middle part, convexity more distinct from posterior half to base. Reflexed lateral margin distinct, reaching from rounded anterior angles up to base, not joining anterior transverse line. Lateral channel narrow but distinct. Proepisternum tumid posterolaterally, well visible from above. Median line small, sharp, distinct, deeper at base, joining finely basal constriction (seen best at 140 x magnification), not joining anterior transverse line; anterior transverse line intimated, indistinct, visible in some specimens by its pigmentation; surface shiny, with irregular reticulation (seen best at 160 x magnification). Ring-like flange moderately convex (lateral view), constriction formed by row of rough foveae.

Fig. 2: *Asioreicheia guenardi* sp. nov., holotype, male, head with mouthparts, dorsal view.

Elytra: Moderately convex on disc, distinctly convex in basal third (lateral view). Outline regularly long-oval, maximum width at middle, margined from pedunculus to apex; margin serrate up to apical third, teeth of serration sharp basally, becoming indistinct apically; base nearly straight, with fine and smooth reflexed margin; humeral angle visible, obtuse; lateral channel broad from level of humerus to apex, narrow at middle, with fold-like carina near apex crossing lateral channel, with broad setigerous tubercles; setae robust, long. Suture at base somewhat impressed. Basal granula absent; basal setigerous puncture with distinct tubercle, situated in projected extension of first interval. No scutellar stria. Striae 1–3 consisting of partly connected punctures, 1–5 reaching base but not up to basal declivity, all becoming less impressed towards apex and laterally. First interval slightly to moderately convex, others flattened. Interval 3 with 10–12 and interval 5 with 7–8 fine setigerous punctures, located with nearly equal distance to each other but with irregular distance to striae, setae pili-like, short, fine, upright.

Hind wings: Completely atrophied.

Ventral surface: Submarginal furrow of proepisternum visible from level of anterior setigerous puncture to middle of pronotum where it is turning to the disc due to convexity of the proepisternum, surface with some fine transverse wrinkles. Furrow between prosternum and proepisternum narrow, distinct. Abdominal sternites nearly smooth; terminal segment with an indistinct and irregular reticulation in male (seen best at 160 x magnification), with irregular transverse reticulation in female; two apical setigerous punctures distant.

Legs: Protibia: Surface with distinct longitudinal reticulation; lateral upper spine ventrally curved. Movable spur smaller than spine, nearly straight, ven-

Fig. 3a–c: *Asioreicheia guenardi* sp. nov., holotype, male. a: aedeagus with median lobe and parameres, ventral view; b: apical part of median lobe, ventral view; c: genital ring.

trally curved at apex. Praeapical lateral denticle robust, sharp, second one smaller. Hind legs: Tarsomere 1 longer than tarsomeres 2+3 (ratio 12:10).

Male genitalia (Figs. 3a–c): Median lobe moderately sclerotized, shape in ventral view about rectangularly arcuate in middle part, slightly flattened in apical half, somewhat distorted, apex formed by asymmetric rounded small spatula. Oroficium half as long as lobe, closing lips less sclerotized. Endophallus with numerous wrinkles, no spines or bristles visible (seen best at 500 x magnification). Parameres asymmetrically, ventral one much more slender and one third shorter than dorsal one, dorsal one twisted, each with two long setae at apex arising closely together. Genital ring wide, closed, oval-shaped, slightly distorted.

Female genitalia: Coxostylus slender (Fig. 4), dorsoventrally moderately broadened (oval-funnel like), distinctly curved apically, slightly carinate nearly up to apex; with two broader moderately long ensiform setae in middle part arising from knob-like tubercles, and one conspicuously long lateral ensiform seta at base; with two long and two medium sized nematiforme setae.

Variation: In the three specimens examined, the anterior transverse line of the pronotum is more or less distinctly visible as a clear line. The punctures of the stria on the elytra show high variation in strenght of impression and also vary in position.

Differential diagnosis: *Asioreicheia guenardi* sp. nov. differs from the most related species *A. chinensis (*Bulirsch, Magrini & Jia, 2013) by the character states provided in Tab. 1.

Other *Asioreicheia* species differ from *A. guenardi* as follows: *A. margolata* (Balkenohl, 2005) does not have setigerous punctures on interval 5 of the elytra, and has an ovate shaped elytra. In *A. vietnamica* Bulirsch & Magrini, 2014 and in *A. fedorenkoi* Bulirsch & Magrini, 2014, the pronotum is longer than wide. *Laoreicheia bulirschi* Balkenohl, 2005 exhibits two pairs of paramedian setae on the pronotum, and the elytra are completely serrate. In *Reicheia moritai* Balkenohl, 2005 the proepisternum is not visible dorsally, the pronotum is distinctly cup-shaped, and the lateral channel of the elytra is smaller. For further differences compare Balkenohl (2005) and Bulirsch & Magrini (2014).

Etymology: The name is a patronym of Dr. Benoit Guénard, Hong Kong, who collected the specimens.

Distribution: Known from the type locality in Hong Kong.

Zoogeographic considerations: Between the records of *A. chinensis* and *A. guernardi* sp. nov. there are three geographic barriers formed by: (1) the Xi and Bei river sections, (2) the Pearl delta rivers, (3) the sea. The specimens were found on Hong Kong Island, historically separated from the mainland by the sea forming a very deep 1 km wide channel.

Fig. 4: *Asioreicheia guenardi* sp. nov., paratype female, left coxostylus, dorsal view.

However, during the last ice age the sea receded for 50 km (B. Guénard, personal communication), and we have to assume that during this period this channel would have been a deep river. Heishiding National Reserve (the record of *A. chinensis*) is located between the He, Xi, and Bei river. All the rivers to the west of and including the Xi and Bei river sections are deeply cut rivers and will not have moved in 100,000's of years except for the point where the Xi meets the Bei which is on the Pearl river flood plain. The Pearl delta rivers are all massive, and there are a lot of them. But as they are on a flood plain, they will have all moved back and forth. So, it is supposed to be unlikely for a flightless terricol species to extend its distribution across these barriers and the delta.

Habitat: The specimens were collected by soil sieving in a mature disturbed secondary forest with closed canopy and very dense leaf litter at altitudes between 156 and 295 meters.

Character state	*A. chinensis*	*A. guenardi* sp. nov.
Head		
terminal maxillary palpomere	shorter	more slender, elongated to apex
eyes: ommatidium	flattened	convex, protruding
Pronotum		
lateral view before constriction	distinctly convex	flatter, slightly convex
anterior angles	angled	rounded off
median line	not joining basal constriction	joining basal constriction
proepisternum	just visible dorsally	distinctly tumid laterally
surface	smooth	irregular reticulation
Elytra		
lateral view, disk	flattened on disk	regularly convex
outline	elongated oval, more slender	regularly long-oval
humerus	intimated	distinct
lateral channel	equally developed	narrow at middle
reflexed lateral margin	serrate up to middle	serrate up to apical third
teeth of serration	indistinct, slightly rounded off	sharp up to middle
number of setae on intervals	3.: 8; 5.: 5	3.: 10–12; 5.: 7–8
carina in lateral channel at apex	missing	present
Median lobe of aedeagus		
Shape/outline	conspicuously curved, < 90°, turned differently, Fig. 5a	less curved, rectangular, turned slightly, Fig. 3a
spatula at apex	elongated, Fig. 5b	short, Fig. 3b
lips of orificium	different closing pattern	

Tab. 1: Dividing character states of *Asioreicheia chinensis* (Bulirsch, Magrini & Jia, 2013) and *A. guenardi* sp. nov.

Remark: According to the label of the holo- and paratype of *A. chinensis,* this species was collected by "sifting of moist leaf litter in the dried-up stream beds and along the streams in the primary lowland forest", and at an altitude of 190–260 meters.

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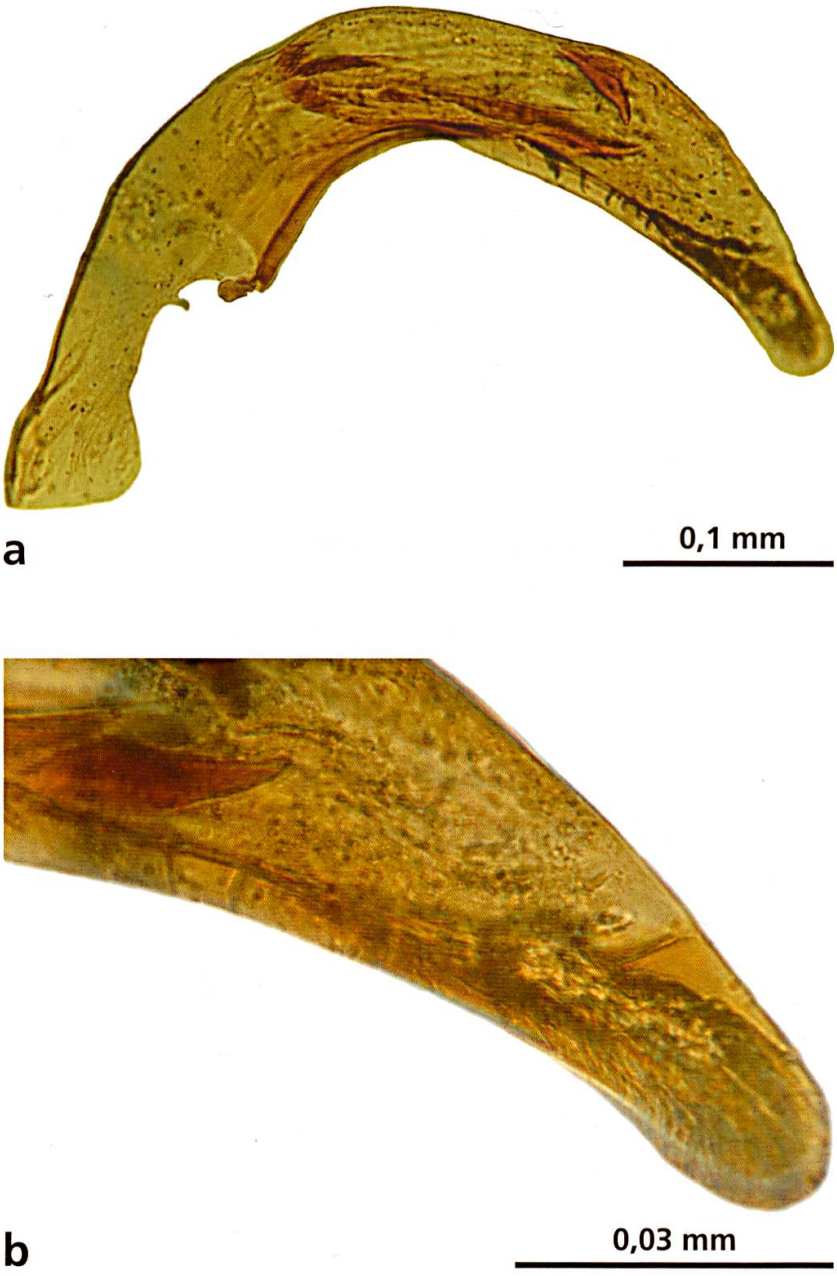

Fig. 5a, b: ***Asioreicheia chinensis*** **(Bulirsch, Magrini & Jia, 2013) a: Median lobe of aedeagus, ventral view; b: apical part of median lobe, ventral view.**

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Author's addresses:

Dr. Michael Balkenohl
Ligusterweg 9
CH–8906 Bonstetten
Switzerland
E-mail: mike.balkenohl@bluewin.ch

and

Paul Aston
2F, 102 Wang Tong, Mui Wo, Lantau
Hong Kong S.A.R.
People's Republic of China
E-mail: paulaston70@hotmail.com

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