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OF THE INDO-AUSTRALIAN ARCHIPELAGO

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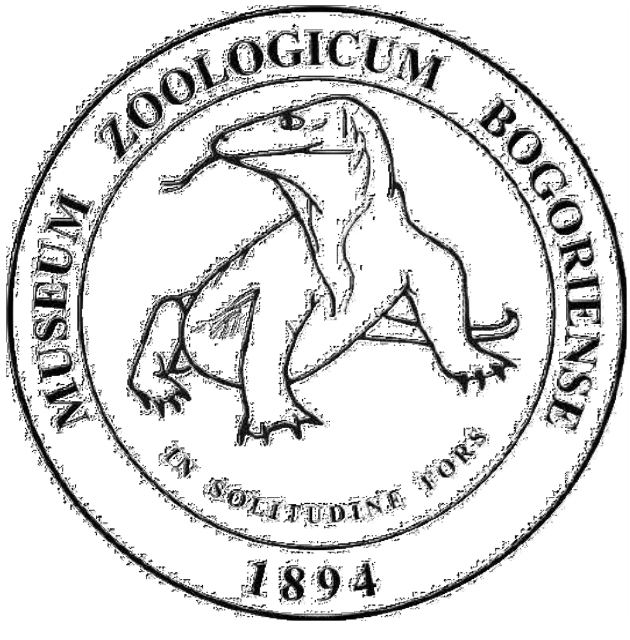

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CONTENT

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(A JOURNAL ON ZOOLOGY OF THE INDO-AUSTRALIAN ARCHIPELAGO)

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Date of issue: DECEMBER 2019

UDC: 595.76(594.53)

Yaheita Yokoi

Callidiopini beetles (Coleoptera: Cerambycidae) in the collection of Museum Zoologicum Bogoriense, Indonesia

TREUBIA, December 2019, Vol. 46, pp. 1–20.

Callidiopini species in the collection of Museum Zoologicum Bogoriense, Indonesian Institute of Sciences (LIPI) were examined. Three new species of the genus *Ceresium* Newman, 1842, are described, i.e. *C. clytinioides* sp. nov., *C. sugiartoi* sp. nov., both from Kalimantan, and *C. emarginatum* sp. nov. from Papua. One new species of the genus *Examnes* Pascoe, 1869, from Kalimantan, *E. subvermiculatus* sp. nov. is described.

(Yaheita Yokoi, Hiroshi Makihara and Woro A. Noerdjito)

Keywords: Asia, Kalimantan, longhorn beetle, New Guinea, taxonomy

UDC: 595.78.001.03(594.81)

R.I. Vane-Wright

The identity of *Euploea tulliolus goodenoughi* Carpenter, 1942, a crow butterfly (Lepidoptera: Nymphalidae, Danainae) from Papua New Guinea

TREUBIA, December 2019, Vol. 46, pp. 21–34.

The nominal taxon *Euploea tulliolus goodenoughi* Carpenter, 1942, based on a unique crow butterfly collected on Goodenough Island in 1913, is shown to represent a small, aberrant female of the locally common *Euploea leucostictos eustachius* (Kirby, 1889). This new synonymy invalidates the only previous record of the Purple Crow, *Euploea tulliolus* (Fabricius, 1793), from the islands of Milne Bay Province, Papua New Guinea. However, two female *Euploea tulliolus* collected from islands in the Louisiade Archipelago during 2010 are reported here, constituting the first valid records of the Purple Crow from the Milne Bay islands.

(R.I. Vane-Wright)

Keywords: *tulliolus* species complex, new synonymy, new records, Milne Bay islands, *Euploea leucostictos*

UDC: 595.762(594.31)

Raden Pramesa Narakusumo

Four new species of *Epholcis* Waterhouse (Coleoptera: Scarabaeidae: Melolonthinae: Maechidiini) from the Moluccas, Indonesia

TREUBIA, December 2019, Vol. 46, pp. 35–50.

Here, we provide the first record of the chafer beetle genus *Epholcis* Waterhouse, 1875 from the Moluccas, Indonesia. We describe four new species: *E. acutus* sp. nov., *E. arcuatus* sp. nov., *E. cakalele* sp. nov., and *E. obiensis* sp. nov. A lectotype is designated for *Maechidius moluccanus* Moser, 1920, which is redescribed and transferred to the genus *Epholcis* as *E. moluccanus* (Moser) comb. nov.

(Raden Pramesa Narakusumo and Michael Balke)

Keywords: Coleoptera, *Epholcis*, Maechidiini, Melolonthinae, Moluccas

UDC: 597.82(594.17)

Mediyansyah

A new tree frog of the genus *Kurixalus* Ye, Fei & Dubois, 1999 (Amphibia: Rhacophoridae) from West Kalimantan, Indonesia

TREUBIA, December 2019, Vol. 46, pp. 51–72.

Kurixalus absconditus sp. nov., a new species of tree frog of the genus *Kurixalus,* described from West Kalimantan on the basis of molecular phylogenetic and morphological evidence. The new species can be distinguished from its congeners by a combination of following morphological characters: having smaller body size, more prominent of mandibular symphysis, skin smooth on throat, vomerine odontophores two oblique series touching anterior corner of choanae and widely separated, vomerine teeth thick, buccal cavity narrow and deep, choanae with teardrop shaped, single vocal slit, weakly crenulated dermal fringe on fore- and hindlimbs.

(Mediyansyah, Amir Hamidy, Misbahul Munir and Masafumi Matsui)

Keywords: *Kurixalus absconditus* sp. nov., new species, West Kalimantan

UDC: 594.34.001.03(594.11)

Mulyadi

New records and redescription of *Labidocera rotunda* Mori, 1929 (Copepoda, Calanoida, Pontellidae) from Sebatik Island, North Kalimantan, Indonesia, with notes on its species-group

TREUBIA, December 2019, Vol. 46, pp. 73–84.

During a plankton trip around Sebatik Island, North Kalimantan, a copepod *Labidocera rotunda* Mori, 1929 (Calanoida, Pontellidae) was collected for the first time in Indonesian waters. Both sexes are redescribed and compared to previous descriptions. The geographical distribution of the species confirms that it is of Indo-Pacific origin. There has been a mix-up between *L. rotunda* described by Mori (1929) from Pusan, Korea and *L. bipinnata* from Sagami Bay, described by Tanaka (1936). Fleminger et al. (1982) have argued that the minor difference is based on the presence or absence of cephalic hooks and had synonymized *L. bipinnata* with *L. rotunda*.

(Mulyadi)

Keywords: copepods, Indonesia, *Labidocera rotunda*, new record, Pontellidae

UDC: 595.78:57.01(594.53)

Djunijanti Peggie

Biological aspects of *Papilio peranthus* (Lepidoptera: Papilionidae) as observed at Butterfly Research Facility - LIPI, Cibinong, Indonesia

TREUBIA, December 2019, Vol. 46, pp. 85–102.

Papilio peranthus is endemic to Indonesia, where it occurs on several islands and island groups. This beautiful butterfly is extensively traded, thus efforts to breed this species are very desirable. Captive breeding research was conducted on *P. peranthus* during September 2016 to December 2018. In total, 221 individuals were available for observation. Data on the life cycle of the species, together with observations on females being approached for mating, and female oviposition after mating, are presented. The result demonstrate that *P. peranthus* is not monogamous. Observations on other biological aspects are also reported.

(Djunijanti Peggie)

Keywords: egg-laying, mating, life cycle, *Papilio peranthus*, parent stocks

UDC: 599.41:001.891(594)

Susan M. Tsang

Review - Indonesian flying foxes: research and conservation status update

TREUBIA, December 2019, Vol. 46, pp. 103–113.

Flying foxes are important ecological keystone species on many archipelagoes, and Indonesia is home to over a third of all flying fox species globally. However, the amount of research on this clade belies their importance to natural systems, particularly as they are increasingly threatened by anthropogenic development and hunting. Here, we provide a review of the literature since the publication of the Old World Fruit Bat Action Plan and categorize research priorities as high, medium, or low based on the number of studies conducted. A majority of the research priorities for Indonesian endemics are categorized as medium or high priority. Low priority ratings were in multiple categories for widespread flying fox species found throughout Southeast Asia, though much of the data were from outside of the Indonesian extent of the species range. These research gaps tend to highlight broader patterns of research biases towards western Indonesia, whereas significant research effort is still needed in eastern Indonesia, particularly for vulnerable island taxa.

(Susan M. Tsang and Sigit Wiantoro)

Keywords: bats, conservation, Pteropodidae, *Pteropus*, threats

Treubia 46: 35–50, December 2019

DOI: 10.14203/treubia.v46i0.3791

FOUR NEW SPECIES OF *EPHOLCIS* WATERHOUSE, 1875 (COLEOPTERA: SCARABAEIDAE: MELOLONTHINAE: MAECHIDIINI) FROM THE MOLUCCAS, INDONESIA

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ABSTRACT

Here, we provide the first record of the chafer beetle genus *Epholcis* Waterhouse, 1875 from the Moluccan Islands, Indonesia. We describe four new species: *E. acutus* sp. nov., *E. arcuatus* sp. nov., *E. cakalele* sp. nov., and *E. obiensis* sp. nov. A lectotype is designated for *Maechidius moluccanus* Moser, 1920, which is redescribed and transferred to the genus *Epholcis* as *E. moluccanus* (Moser) comb. nov.

Keywords: Coleoptera, *Epholcis*, Maechidiini, Melolonthinae, Moluccas

ABSTRAK

Dalam makalah ini kami menyampaikan rekaman pertama dari kumbang *Chafer* marga *Epholcis* Waterhouse, 1875 dari pulau-pulau di Maluku, Indonesia. Kami mempertelakan empat spesies baru: *E. acutus* sp. nov., *E. arcuatus* sp. nov., *E. cakalele* sp. nov., dan *E. obiensis* sp. nov. Satu *lectotype* ditetapkan untuk *Maechidius moluccanus* Moser, 1920, yang dipertelakan kembali dan dipindahkan ke marga *Epholcis* sebagai *E. moluccanus* (Moser) comb. nov.

Kata kunci: Coleoptera, *Epholcis*, Maechidiini, Melolonthinae, Maluku

INTRODUCTION

The chafer beetle tribe Maechidiini (Coleoptera: Melolonthinae) contains seven genera: *Epholcis* Waterhouse, 1875, *Harpechys* Britton, 1957, *Maechidius* Macleay, 1819, *Microcoenus* Britton, 1957, *Microthopus* Burmeister, 1855, *Paramaechidius* Frey, 1969 and *Termitophilus* Britton, 1957. These beetles range from Australia to the islands east of the Weber line, New Guinea and the Moluccan Islands (Moser, 1920; Moser, 1926; Britton, 1957, 1959; Frey, 1969; Prokofiev, 2018; Weir et al., 2019). Three species of Maechidiini have been recorded from Wallacea: *Maechidius peregrinus* Lansberge, 1886, in South Sulawesi, *Maechidius moluccanus* Moser, 1920, from Gorom island and *Paramaechidius agnellus* Prokofiev, 2018, from Ceram island (Prokofiev, 2018).

There are five species of *Epholcis* known from Australia (Britton, 1957), but to date there are no records of this genus from New Guinea or Wallacea. In the collections of the Museum Zoologicum Bogoriense (MZB) and Museum Leiden (RMNH), we found four undescribed species of Maechidiini from the Moluccas Archipelago (the Indonesian provinces

of Maluku and North Maluku) which we assign to the genus *Epholcis*. We also redescribe *Maechidius moluccanus* Moser, 1920 based on the lectotype designated herein and transfer it to *Epholcis*.

MATERIALS AND METHODS

The studied specimens are deposited in the following museums:

BMNH – Natural History Museum, London, United Kingdom.

MZB – Museum Zoologicum Bogoriense, Zoology Division, Indonesian Institute of Sciences, Cibinong, West Java, Indonesia.

ZMB – Museum für Naturkunde Berlin, Germany.

NHMB – Naturhistorisches Museum Basel, Switzerland.

RMNH – Naturalis Biodiversity Center, Leiden, The Netherlands.

ZSM – Zoologische Staatssammlung München, Munich, Germany.

Our terminology follows Britton (1957) and Weir et al. (2019). Male genitalia were prepared after softening the specimens with warm water and using fine forceps. Genitalia were cleared for ten minutes in 10% KOH at 70°C. Habitus photographs were taken with a DFC495 camera with L.A.S. 4.8.0 software adapted to a Z6 APO (all from Leica Microsystems, Heerbrugg, Switzerland). Photographs of morphological details were taken with a digital imaging system composed of a Canon 5DS camera with Nikon bellows, and 5–20x ELWD Mitutoyo Plan Apo objectives attached to a Mitutoyo focus lens and an illumination by two Nikon Speedlights. Image stacks were generated using the Stackmaster macro rail (Stonemaster), and images were then assembled with the computer software Helicon Focus 4.77TM.

For comparison with other *Epholcis* species, we used the identification keys by Britton (1957) and Frey (1969). We also studied the Britton collection at the BMNH which has the most comprehensive species coverage of Maechidiini and the Frey collection at the NHMB. In the following, we do not assign our species to species groups as suggested by Britton (1957) as we noticed that this was highly ambiguous and would require further monographic work. It seems that the generic classification of the Maechidiini would benefit from phylogenetic analysis to clarify monophyly of the genera as currently delineated.

RESULTS

The genera *Epholcis* and *Maechidius* resemble each other, but Britton (1957) used the diagnostic character of the extended pronotal hypomera that forming a pocket for the reception of the antenna to distinguish *Maechidius* from *Epholcis*. In *Maechidius moluccanus*, we did not find the free edge of the pronotal hypomera to form a distinctive pocket (Fig.1c). Therefore, we transfer this species to *Epholcis.*

We delineated four new species from the collection of MZB and RMNH after scrutinizing morphological characters, especially the male genitalia, and comparing them with other Maechidiini in the collection of BMNH, NHMB and ZMB.

Epholcis arcuatus sp. nov. and *E. cakalele* sp. nov. are similar in their external characters, such as their body sculptures, and pronotum and clypeus shapes (Figs. 2a, 3a). The male of *E. arcuatus* sp. nov. also has distinctly curved metatibia (Fig. 2e), but the male genitalia provide further evidence that they are separate species (Figs. 2f, 2g, 3e, 3f). *E. obiensis* sp. nov. is smaller (4.4–5.5 mm) and lighter in color (Fig. 5a) than *E. arcuatus* sp. nov. (6.0–7.5 mm) and *E. cakalele* sp. nov (5.6–6.7mm). In addition, *E. acutus* sp. nov. has a distinctive elytral sculpture and rugged elytral disk than the others (Fig. 1d).

The distribution of *Epholcis* in the Moluccas Archipelago is Ternate, Halmahera, Obi, and Gorom Island. They can be found from sea level up to 700 m. The body length variation of Moluccan *Epholcis* is 4.4–7.5 mm. *Epholcis obiensis* sp. nov. is on average the smallest among other *Ephlolcis*.

TAXONOMY

Genus *Epholcis* Waterhouse, 1875

Type species. *Epholcis divergens* Waterhouse 1875, by monotypy.

Diagnosis. Antennae nine-segmented. Anterior edge of pronotal hypomera not produced forward, not forming pockets for reception of antenna. Ridge (if present) extending from anterior coxal cavity towards anterior angle of pronotum low and evenly curved. Lateral edges of pronotum crenulated. Lateral side of elytral humerus with one conspicuous erect seta. Protibia with two bigger teeth on apical point and one smaller tooth protrude on apical half. Protibia with one apical spur. Mesotibia with two apical spurs attached to the medial apex. Metatibia with two apical spurs of unequal length, shorter spur attached in the middle of the emargination of the apex of tibia. Claws with pulvilli.

1. *Epholcis acutus* sp. nov.

Diagnostic description. ***Holotype***, male (Fig. 1a). Length 6.3 mm. Color of body dark brown, matte; legs ferruginous. Body depressed. Head (Fig 1b); clypeus markedly produced

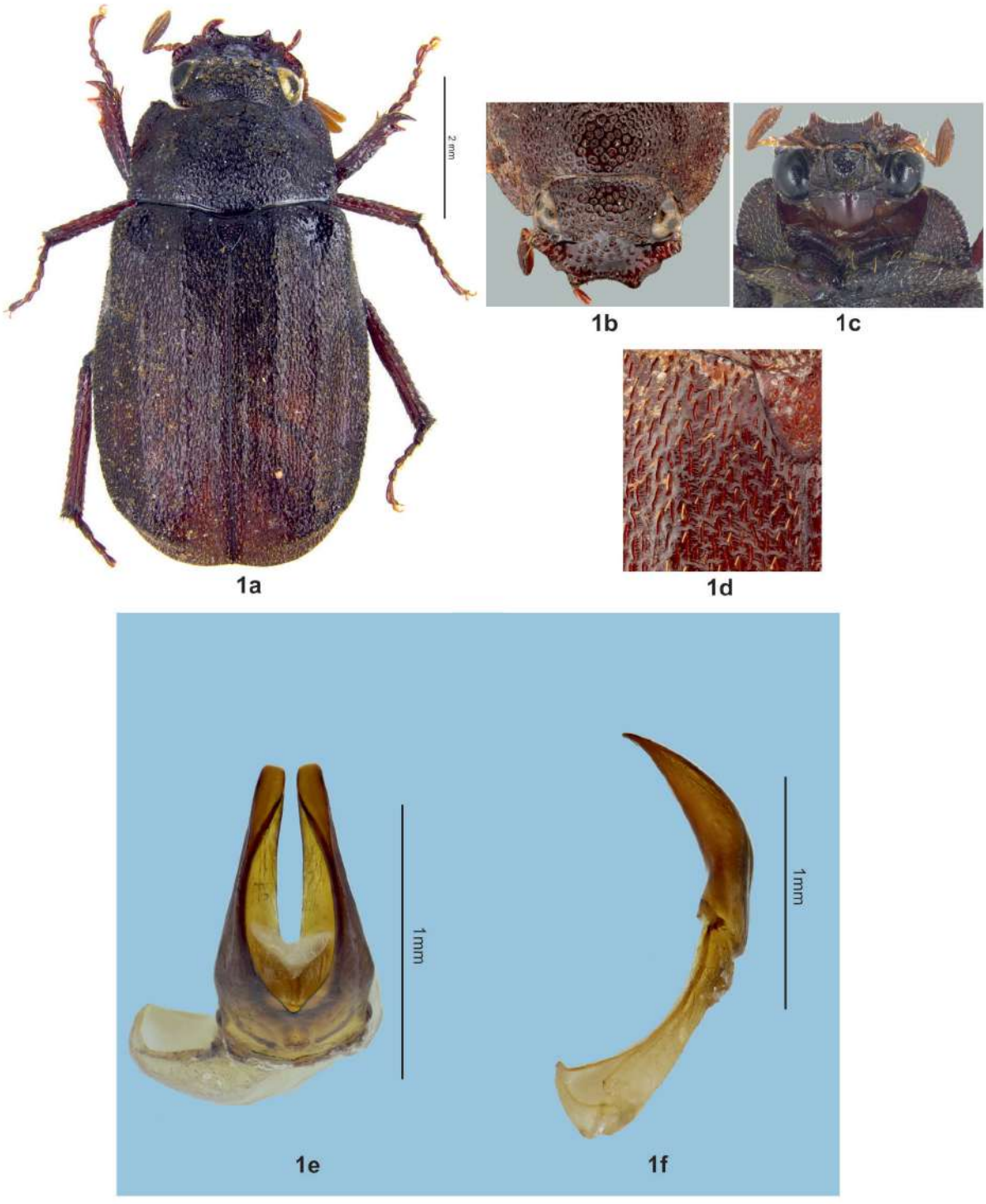

Figure 1. *Epholcis acutus* Narakusumo & Balke sp. nov., holotype; **a** habitus **b** pronotum and head dorsal **c** pronotum and head ventral **d** elytral disk. Male genitalia, **e** paramere, **f** lateral view.

and dorsolaterally with weak concave depression; anterior margin with shallow concave emargination, with outer angles produced as obtuse teeth, followed by sinuate margin towards eyes; clypeus surface with sparse annular punctures, denser towards frons; setae only along margin. Mentum concave with annular punctures. Pronotum (Figs. 1a, 1b), width : length ratio = 1.8; with basal angle acute; pronotal disk coarsely annulate–punctate, with inconspicuous short setae; lateral edges with 24–25 faint crenulations. Elytra (Fig. 1d) with longitudinal vermiculate grooves, each bearing one short seta in front, setae slightly shorter than grooves; interspaces rugose. Scutellum with small annular punctures, apical angle acute. Protibia apically with acute tooth. Posterior margin of mesofemur bearing row brush of setae. Metatibia thin and straight. Aedeagus (Fig.1e) with tips of parameres subparallel, not meeting at the end, laterally straight (Fig. 1f); basally internal margin of paramere deeply emarginate. ***Intraspecific variation***. Length 6.1–6.9 mm (n=10). Female clypeus slightly less produced than male, surface less punctures than male.

Type locality: Tuguaer-Tasoa (Pulau Halmahera, Maluku Utara, Indonesia).

Material examined. Holotype (male): Indonesia, Moluccas, Halmahera, Tuguaer –Tasoa; 150m; 20.–24.ix.1951; native collector.

Paratypes (MZB and ZSM): 36 exx., same data as holotype. 6 exx., Moluccas, Halmahera island, Akilamo; 50–100m; 9–12.ix.1951; native collector. 38 exx., Moluccas, Halmahera island, Goa Plains; 50–100m; 9–12.ix.1951; native collector. 2 exx Moluccas, Halmahera island, Kau (sea level); 26–31.x.1951; native collector. 10 exx Moluccas, Halmahera island, Tolewang; 50 m; 12–25.x.1951; native collector. 5 exx Moluccas, Ternate island, Bukunora; 50–100 m; 6–8.ix.1951; native collector. 1 ex Moluccas, Halmahera island, Mt. Sembilan; 600m; 27.ix–6.x.1951; native collector. 1 ex Moluccas, Halmahera island, Mt. Siu; 600–700m; 27.ix–6.x.1951; native collector. 1 ex Moluccas, Halmahera island (Maluku Utara), NW Halmahera 23 KM SW of Tobelo, Tunuo camp; 19–21. Sep 1995; J van Tol, B Ansari & R de Jong (RMNH).

Biology. The species latitudinal range is from sea level to 700 m.

Etymology. The species name is the Latin adjective "*acutus*" (pointed, acute) and refers to the distinct posterolateral angles at the pronotal base.

Distribution. Indonesia, North Maluku Province (Halmahera and Ternate Islands).

2. *Epholcis arcuatus* sp. nov.

Diagnostic description. Holotype, male (Fig. 2a). Length 6.5mm. Body dark brown and shiny, legs ferruginous. Body dorsally depressed. Head (Fig.2b); Clypeus markedly produced, dorsolaterally with concave depressions; anterior edge with V-shaped emargination. Clypeus surface with sparse annular punctures, setae along margin. Frons surface with dense annular punctures and sparse erected setae. Pronotum (Figs. 2a, 2b) width: length ratio = 1.8; with

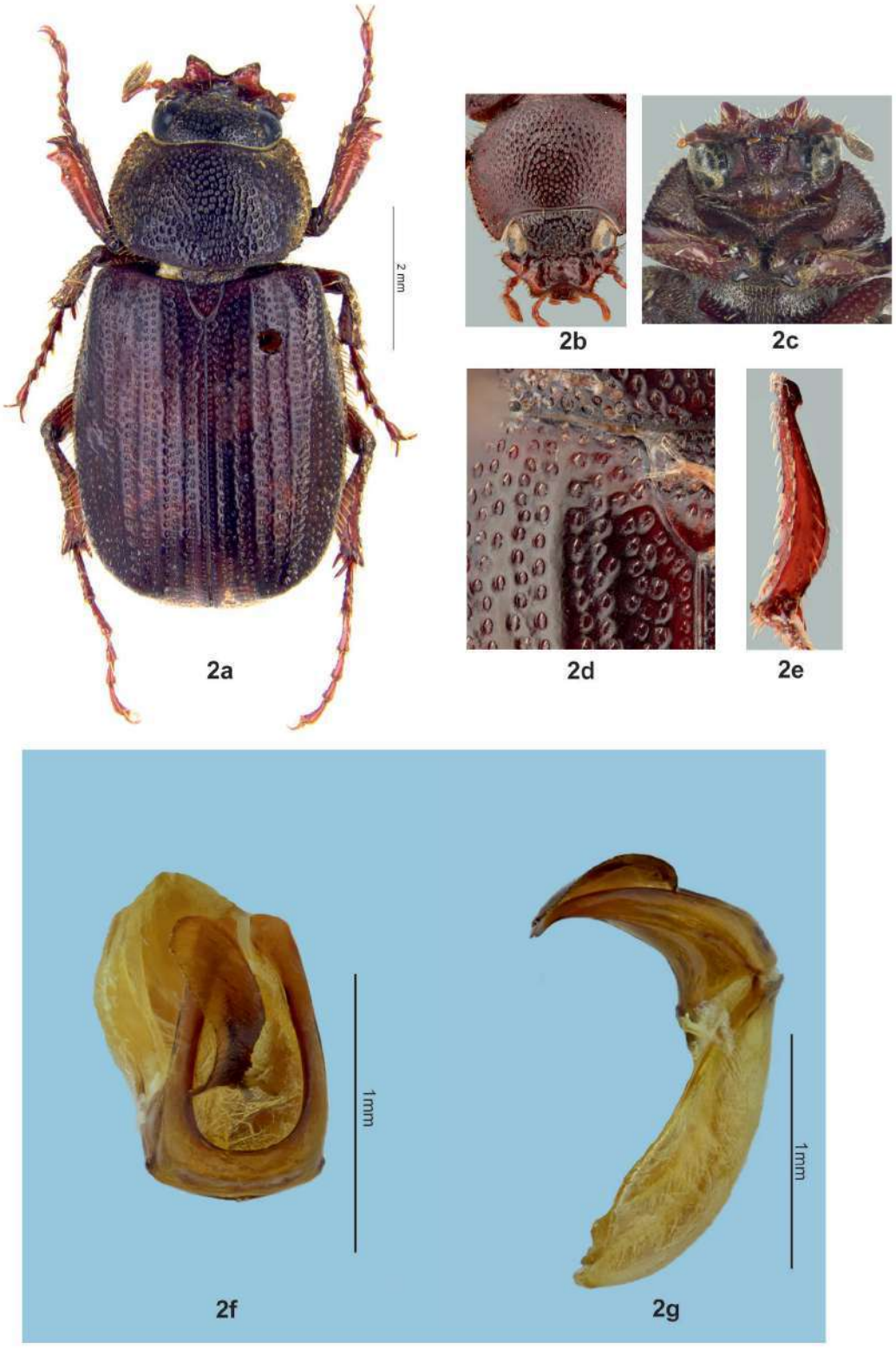

Figure 2. *Epholcis arcuatus* Narakusumo & Balke sp. nov., holotype: **a** habitus **b** pronotum and head dorsal **c** pronotum and head ventral **d** elytra disk **e** metatibia. Male genitalia, **f** paramere, **g** lateral view.

lateral margin rounded; basal angle concave; disk with dense punctures bearing short setae; lateral edges with 14–15 crenulations. Elytra (Fig. 2d) with annulate–punctate sculpture, bearing inconspicuous short setae, subequal to half the punctures´ diameter; lateral margin with row of long setae; interspaces subglabrous. Scutellum with punctures same as elytral punctures, apical angle obtuse. Protibia apically with acute angular tooth. Metatibia markedly widened in apical half, in profile arcuate (Fig. 2e). Aedeagus (Fig. 2f) with tips of the parameres meeting apically; dorsally margin subparallel; slightly bent laterally (Fig. 2g); basally internal margin of parameres slightly rounded; 'flipper' like elongate-ovate sclerite protruding asymmetrically from the internal sac. ***Intraspecific variation***. Length 6.0–7.5 mm (n=10). Female clypeus less produced, anterior margin less emarginate. Metatibia straight.

Type locality: Tuguaer-Tasoa (Pulau Halmahera, Maluku Utara, Indonesia).

Material examined. ***Holotype*** (male): Indonesia, Moluccas, Halmahera, Tuguaer–Tasoa, 150m, 20.–24.ix.1951, native collector (MZB).

Paratypes 6 exx same as holotype (MZB). 10 exx Moluccas, Halmahera island, Goa Plains; 50–100m; 9–12.ix.1951; native collector (MZB, ZSM). 5 exx Moluccas, Halmahera island, Tolewang; 50m; 12–25.x.1951; native collector (MZB). 4 exx Moluccas, NW Halmahera, c. 40 km SW of Tobelo, Along Telaga Lina; 1°31'50''N 127°50'50''E; 150–200m; 26.–28 Sept 1995; J. Van Tol; somewhat disturbed primary rainforest (in recently logged area) and semi cultivated area; at light (RMNH). 1 ex Indonesia, Moluccas, NW Halmahera, c. 40 km SW of Tobelo, Along Telaga Lina; 1°31'50''N 127°50'50''E; 150–200m; 19–21 Sept. 1995; J. Van Tol, B. Ansari & R. de Jong; along rather fast flowing stream through disturbed forest; at light (RMNH).

Biology. These chafers have been reported to eat the flowers of clove (*Syzigium aromaticum* (L.)) (Hari Sutrisno, pers. com.), and can be found in disturbed forest and vegetation along streams. Latitudinal range from 50 to 200 m. The species is attracted to light.

Etymology. The species name is the Latin adjective "*arcuatus*" (bow shaped), and refers to the shape of the male metatibia.

Distribution. Indonesia, North Maluku Province (Halmahera).

3. *Epholcis cakalele* sp. nov.

Diagnostic description. Holotype, male (Fig. 3a). Length 6.5 mm. Color dark brown and shiny, legs ferruginous. Body depressed. Head (Fig.3b); Clypeus markedly produced, dorsolaterally with concave depressions; anterior edge with strong emargination, with outer angles produced as acute teeth, followed by straight margin towards eyes; clypeus surface with sparse annular punctures, bearing long setae along margin. Frons surface with dense annular punctures and short setae. Mentum concave with annular punctures. Pronotum (Figs. 3a, 3b), width: length ratio = 1.7; with posterior basal angle concave; disk coarsely punctate,

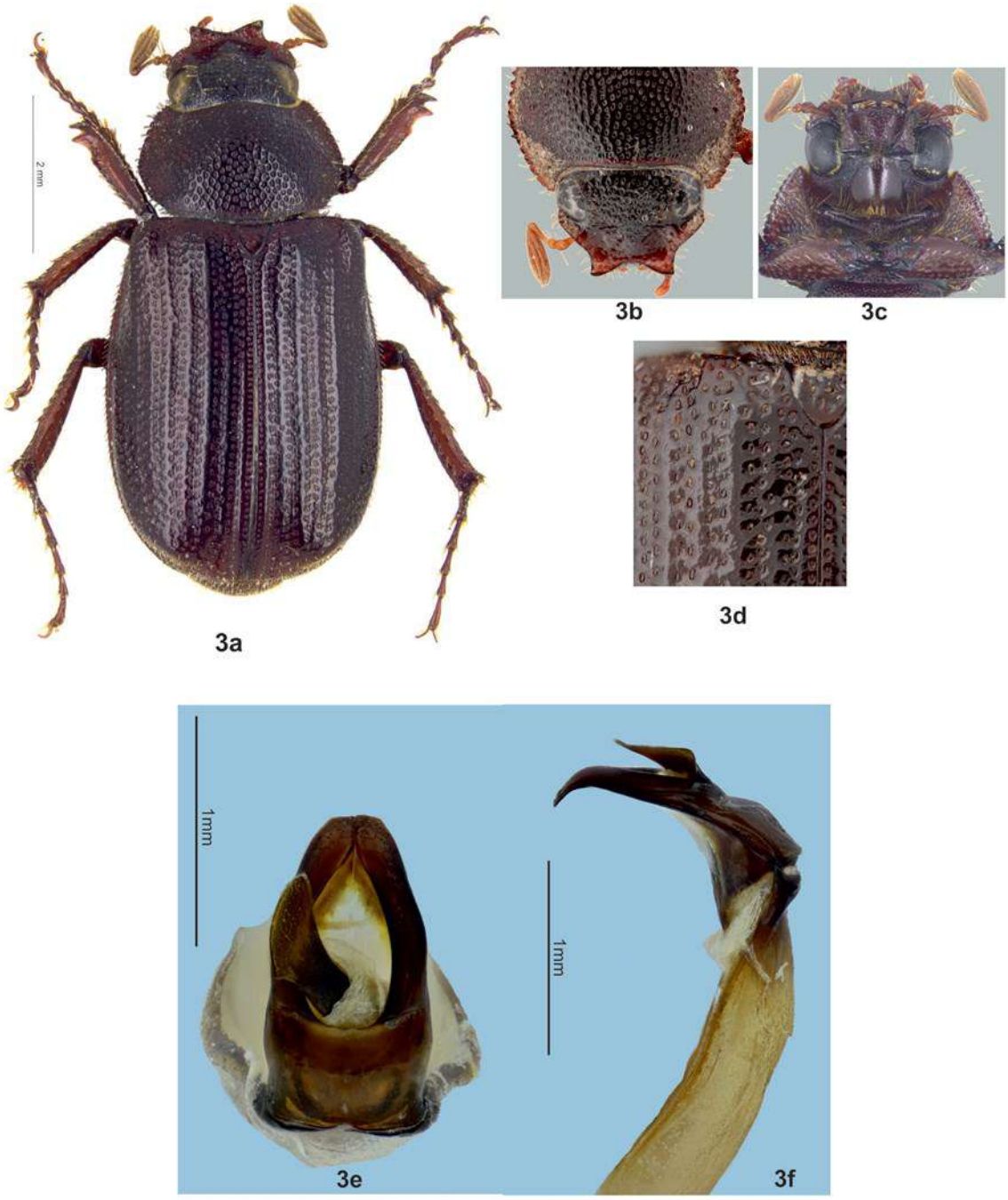

Figure 3. *Epholcis cakalele* Narakusumo & Balke, sp. nov., holotype; **a** habitus **b** pronotum and head dorsal **c** pronotum and head ventral **d** elytra disk. Male genitalia, **e** paramere, **f** lateral view.

interspaces subglabrous; each lateral edge with 16–17 crenulations. Elytra (Fig. 3d) with sculptures annulate–punctate, bearing inconspicuous short setae, setae length become longer towards apical point; interspaces subglabrous. Scutellum with punctures same as elytral punctures, apical angle obtuse. Protibia apically with acute angular tooth. Metatibia almost straight, with two terminal spurs of slightly unequal length. Aedeagus (Fig. 3e) with tips of paramere meeting apically; dorsally at apical half constricted; laterally curved (Fig. 3f); basally internal margin of paramere almost straight; 'axe' like sclerite emerging from the internal sac. ***Intraspecific variation***. Length 5.6–6.7mm (n=10). Female clypeus less produced, anterior margin less emarginate.

Type locality: Goa Plains (Pulau Halmahera, Maluku Utara, Indonesia).

Material examined. ***Holotype*** (male): Indonesia, Moluccas, Halmahera, Goa Plains, 50–100m, 9.–12.ix.1951 (MZB).

Paratypes. 184 exx same data as holotype (MZB, ZSM). 6 exx Moluccas, Halmahera island, Akilamo, 50–100m, 9–12.ix.1951, Native Collector (MZB). 1 ex Moluccas, Halmahera island, Atiengo, 50–100m, 9–12.ix.1951, Native Collector (MZB). 2 ex Moluccas, Halmahera island, Biaur, 600m, 7–12.x.1951, Native Collector (MZB). 2 exx Moluccas, Halmahera island, Mt.Sembilan, 600m, 9.ix–6.x.1951, Native Collector (MZB). 16 exx Moluccas, Halmahera island, Mt.Siu, 600–700m, 27.ix–6.x.1951, Native Collector (MZB). 5 exx Moluccas, Halmahera island, Tolewang, 50m, 12–25.x.1951, Native Collector (MZB). 60 exx Moluccas, Halmahera island, Tuguaer–Tasoa, 150m, 20–24.ix.1951, Native Collector (MZB). 2 exx Moluccas, W. Obi, Kasowari, 0–50m, viii.–ix.1953, AMR Wegner (MZB). 3 ex Moluccas, W Obi, Obi Lake, 160–260m, vii.–xi.1953, AMR Wegner (MZB). 2 ex Isl. Ternate, Bukunora, 50–100m, 6–8.IX.1951, Native Collector (MZB). 15 ex Moluccas, Halmahera island (Maluku Utara), NW Halmahera 23 KM SW of Tobelo, Tunuo camp; 19–21 Sep 1995; J van Tol, B Ansari & R de Jong (RMNH). 8 ex Indonesia, Moluccas, NW Halmahera, c. 40 km SW of Tobelo, Along Telaga Lina; 1°31'50''N 127° 50'50''E; 150–200m; 19–21 Sept. 1995; J. Van Tol, B. Ansari & R. de Jong; along rather fast flowing stream through disturbed forest; at light (RMNH).

Biology. The species latitudinal range is from 50 to 700m. These chafers are found in disturbed forest and vegetation along streams. They are attracted to light.

Etymology. This epithet is a noun in apposition based on "*Cakalele*", a folk dance of people from North and Central Maluku.

Distribution. Indonesia, North Maluku province (Halmahera, Ternate, Obi).

4. *Epholcis moluccanus* (Moser, 1920) comb. nov.

Maechidius moluccanus Moser, 1920: 16.

Diagnostic description. Lectotype, female (Fig. 4a), male unknown. Length 6 mm. Color ferruginous. Body depressed. Head (Fig. 4b); clypeus weakly produced, anterior

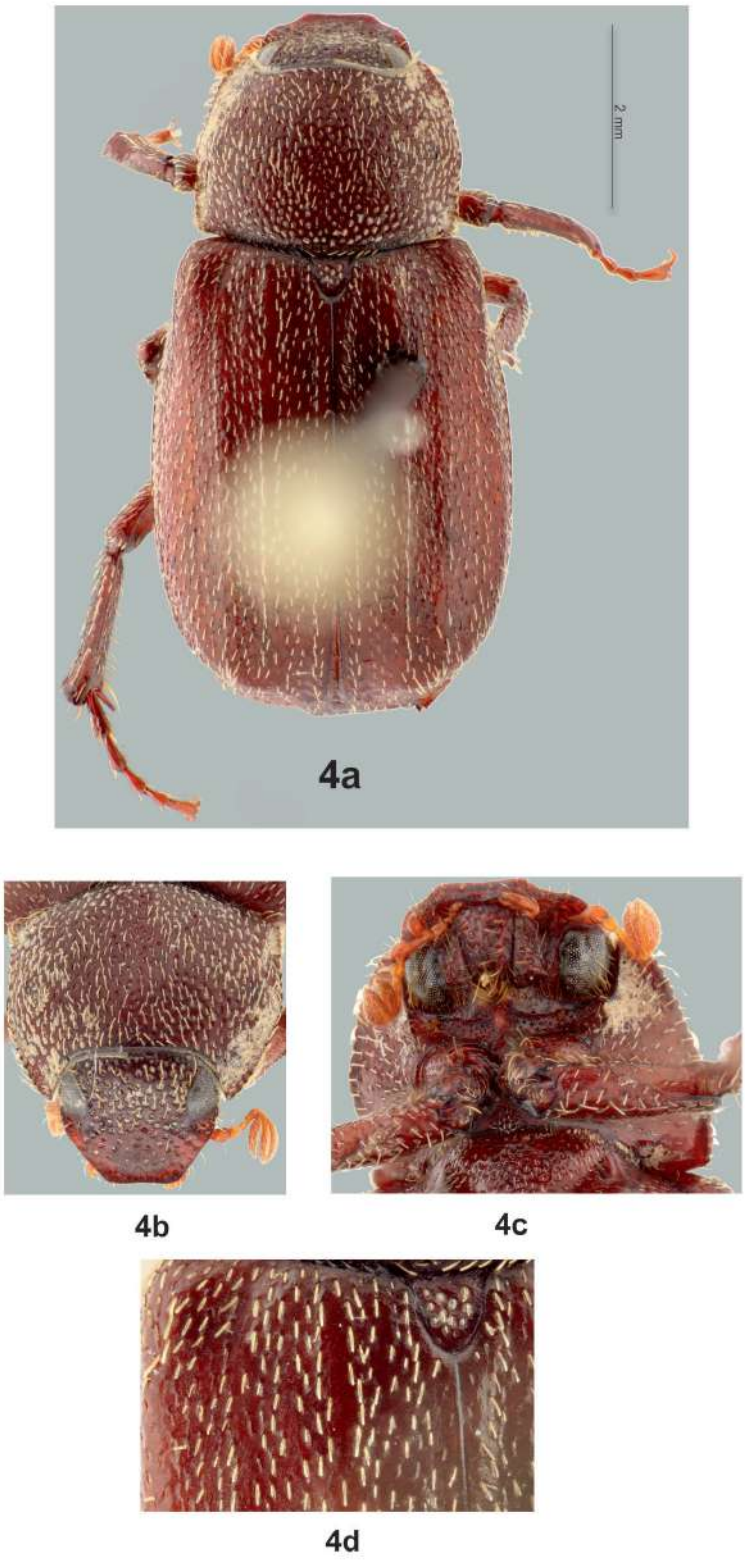

Figure 4. *Epholcis moluccanus* Moser comb. nov., lectotype; **a** habitus **b** pronotum and head dorsal **c** pronotum and head ventral **d** elytral disk.

margin almost straight, followed by straight margin towards eyes; surface with sparse annular punctures. Frons with dense setiferous punctures. Mentum concave with annular punctures bearing setae. Pronotum (Fig. 4a); width: length ratio = 1.4; disk with smaller annular punctures than head, setae denser towards lateral margin; posterior basal angle angular; lateral edge with 17 crenulations. Elytra (Fig. 4d), disk with shallow longitudinal punctures, bearing short setae, the length of the puncture as long as the setae; interspaces between punctures coarse. Scutellum with annular punctures, apical angle obtuse. Protibia with weakly projecting and obtuse teeth. Metatibia almost straight. All claws with pulvilli. ***Intraspecific variation***. Male unknown, no other material known.

Type locality: Seram: Gorom, (Maluku, Indonesia)

Material examined. Lectotype (ZMB) (here designated): "Maechidius moluccanus Type Mos" / "Kisui Ceram Island" / "0I" (could also be "I0") / "SYNTYPUS *Maechidius moluccanus* Moser, 1920 labelled by MNHUB 2015" (ZMB).

In the original description Moser (1920: 17) states as the type locality: Ceram, Gorom Island. During the Netherlands colonial time, "Kisui Island" may referred to *Kissoei* or *Kessewooi* Island (Veth, 1869), it is the same with modern Indonesian day of Kesui Island located in the Watubela Archipelago, approximately 40 km south of Gorom to Archipelago.

Biology. Unknown.

Distribution. Indonesia, Maluku Province (Gorom Island).

Note. This species is transferred from the genus Maechidius to Epholcis as it lacks an antennal pocket (Fig.4c). The species is only known from the lectotype. Possible distribution around Gorom and or Watubela Archipelago.

5. *Epholcis obiensis* sp. nov.

Diagnostic description. Holotype, male (Fig. 5a). Length 5.5 mm. Color light brown; Body depressed. Head (Fig.5b), Clypeus markedly produced, sublaterally with concave depressions; anterior edge with V-shaped emargination, with outer angles produced as obtuse teeth, followed by straight margin towards eyes. Clypeus surface with sparse annular punctures, setae along margin. Frons surface with dense annular punctures and sparse erected setae. Mentum concave with annular punctures. Pronotum (Fig.5b) width: length ratio = 1.4; with lateral edge with 18–19 crenulations. Anterior edge of pronotal hypomera not extended, forming a shallow pocket not capable of covering the antenna (Fig. 5c). Scutellum with punctures same as elytral punctures; apically obtuse. Protibia apically with acute angular tooth. Mesotrochanter bearing somewhat longer row of setae. Metatibia almost straight (Fig. 5e). Aedeagus (Fig. 5f) with tips of parameres cross apically, laterally curved (Fig.5g); basally internal margin of parameres rounded; sclerite extending from internal sac

basally broad and apically with rounded 'nose'. ***Intraspecific variation***. Length 4.4–5.5 mm (n=6). Female clypeus less produced, anterior margin less emarginate. Metatibia more slender.

Type locality: Kasowari, (Pulau Obi, Maluku Utara, Indonesia).

Material examined. Holotype (male): Indonesia, Moluccas, W. Obi, Kasowari, 0 –50m, viii.–ix.1953, AMR Wegner (MZB).

Paratypes. 3 exx Moluccas, W. Obi, Obi Lake, 160–260m, viii.–xi.1953, AMR Wegner (MZB). 6 exx Moluccas, Island Halmahera, Mt.Sembilan, 600m, 27.IX.–6.X.1951, Native Collector (MZB, ZSM). 1 ex Moluccas, Island Halmahera, Biaur, 600m, 7–12.X.1951, Native Collector (MZB). 1 ex Moluccas, Island Halmahera, Akilamo, 50–100m, 9–12.IX.1951, Native Collector (MZB).

Biology. Unknown.

Etymology. This epithet is based on the type locality, Obi Island.

Distribution. Indonesia, North Maluku Province (Obi, Halmahera).

Key to Species of *Epholcis* in Maluku

1 Clypeus apically deeply emarginated (Figs. 2b, 3b, 5b). Elytral punctures annulate (Figs. 2d, 3d, 5d) …… 2

1' Clypeus apically weakly emarginated or straight (Figs. 1b, 4b). Elytral punctures not annulate (Figs.1d, 4d) ……...… 4

2 Male metatibia with ventral edge markedly curved (Fig. 2e). Setae on lateral margin of elytra long …….……. ……...……. ***E. arcuatus* sp. nov.**

2' Male and female metatibia not curved. Setae on lateral margin of elytra short ……..... 3

3 Body length 5.6–6.7 mm. Elytral color dark brown, opaque …….. ***E. cakalele* sp. nov.**

3' Body length 4.4–5.5 mm. Elytral color light brown, somewhat translucent ……. ……...…. ***E. obiensis* sp. nov.**

4 Pronotum with smooth annulate punctures and dense setae. Elytral sculpture weakly impressed (Fig. 4d) ..……... ***E. moluccanus***

4' Pronotum with coarse annulate punctures and short setae. Elytra with elongate 'vermiculate' sculpture (Fig. 1d) ……...……...… ***E. acutus* sp. nov.**

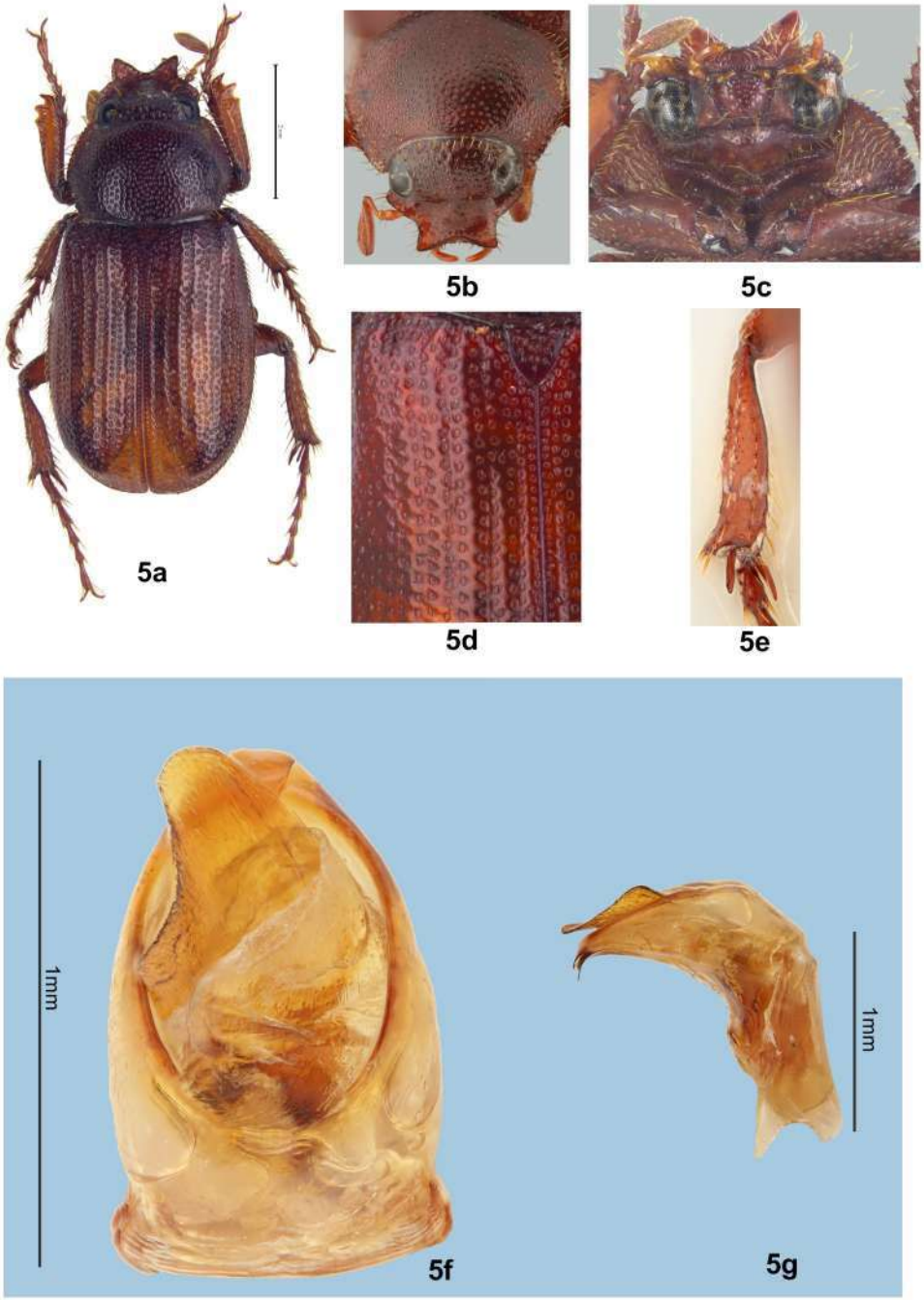

Figure 5. *Epholcis obiensis* Narakusumo & Balke, sp. nov.: **a** habitus **b** pronotum and head dorsal **c** pronotum and head ventral **d** elytra disk **e** metatibia. Male genitalia, **f** paramere, **g** lateral view (Phallobase broken).

DISCUSSION

The taxonomy of *Epholcis* appears neglected since Britton (1957, 1959) revised the Melolonthinae of Australia. The previously described *Epholcis* were *E. divergens* Waterhouse, 1875, *E. gracilis* Waterhouse, 1875, *E. bilobiceps* Fairmaire, 1877, *E. longior* Blackburn, 1898, *E. uniformis* Britton, 1957 and together with four new species described herein and one being transferred, this leads to a total of ten species of *Epholcis* from Maluku and Australia.

Almost all Australian *Epholcis* were reported to be distributed in New Queensland, Northern Territory, and New South Wales (Britton, 1957). The new species described here are from the Moluccas Archipelago (e.g. Halmahera, Obi, and Ternate Islands). Therefore, we can see the major gap is in the Papuan region from which no species of *Epholcis* has yet been reported. The reason could be that several species of *Epholcis* have been described as *Maechidius* because of its similarity, or lack of sufficient collecting, overlooked species in museum collections. we are aware of new species of other genera of Maechidiini from Sulawesi and the Lesser Sunda Islands (Balke & Narakusumo, in prep.).

Little biological information is available for *Epholcis* species. *Epholcis arcuatus* sp. nov. and *E. cakelele* sp. nov. have been collected by light traps indicating nocturnal activity. *Epholcis bilobiceps* from Australia was reported to feed on various *Eucalyptus* species (Britton, 1957; King & Lawson, 2005) in family Myrtaceae and they are often congregate in large numbers on the stem of the trees (Speight & Wylie, 2012). *Epholcis arcuatus* sp. nov. eats flowers of the clove tree (*Syzigium aromaticum*), also in family Myrtaceae.

The knowledge of Maechidiini in Indonesia remains poor, especially because the species are diverse in poorly collected areas, as in Wallacea and Papua. The latest publication on the genus *Paramaechidius* (Prokofiev, 2018) and our study presented here suggest the presence of additional members of this group in the region. Extensive fieldwork and careful morphological and perhaps molecular analyses are now needed to draw a better picture of the Maechidiini species diversity and generic classification in Indonesia and beyond.

Our study also highlights the historical significance of the MZB collection, which retains a large amount of unstudied material, in remarkably good condition, from obscure and poorly collected parts of the Indonesian Archipelago.

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REFERENCES

Britton, E.B. 1957. *A revision of the Australian chafers (Coleoptera: Scarabaeidae: Melolonthinae) Volume1*. London: British Museum (Natural History): viii + 185pp, 42 plates.

Britton, E.B. 1959. Australian Melolonthinae (Coleoptera: Scarabaeidae) in the Frey Museum. *Entomologische Arbeiten aus dem Museum G. Frey, Tutzing bei München*, 10: 276–301.

Frey, G. 1969. Revision der *Maechidius* Arten Neu Guineas. *Entomologische Arbeiten aus dem Museum G. Frey*, 20: 494–509.

King, J. & Lawson, S., 2005. Insect pests and diseases of rainforest timber species grown in plantations. In: P.D. Erskine, D.M. Lamb & M. Bristow, eds. *Reforestration in the Tropics and Subtropics of Australia Using Rainforest Tree Species*. Canberra: RIRDC Publication No 05/087, Rural Industries Research and Development Corporation: 114–128.

Lansberge J.W. van. 1886. Description de quelques Scarabaeides des Indes Nederlandais appurtenant au Musee de Leyde (Note XVIII). *Notes from Leyden Museum*, 8: 131–137.

Moser, J. 1920. Beitrage zur Kenntnis der Melolonthiden (Col.) XI. *Stettiner Entomologische Zeitung*, 81: 1–28.

Moser, J. 1926. Neue Melolonthiden und Cetoniden aus dem Süden von Holländisch Neu–Guinea. *Nova Guinea Zoology*, 15(2): 196–203.

Prokofiev, A.M. 2018. First finding of the genus *Paramaechidius* Frey, 1969 from the Indonesian province Maluku (Coleoptera: Scarabaeidae: Melolonthinae). *Baltic Journal of Coleopterology*, 18(2): 159–163.

Speight, M.R. & Wylie, F.R. 2012. *Insect Pests in Tropical Forestry*. Wallingford: CABI Publishing: 232 pp.

Veth, P.J. 1869. *Aardrijkskundig en statistisch woordenboek van Nederlandsch Indie, bewerkt naar de jongste en beste berigten (Vol. 1)*. Amsterdam: Van Kampen: 730 pp.

Weir, T.A., Lawrence, J.F., Lemann, C. & Gunter, N. 2019. 31. Scarabaeidae: Melolonthinae Leach, 1819. In: A. Slipinski & J.F. Lawrence, eds. *Australian beetles. Volume 2. Archostemata, Myxophaga, Adephaga, Polyphaga (part)*. Clayton: CSIRO Publishing: 467 pp.

Veth, P. J. 1869. *Aardrijkskundig en statistisch woordenboek van Nederlandsch Indie, bewerkt naar de jongste en beste berigten (Vol. 1)*. Amsterdam: Van Kampen: 730 pp.

Weir, T.A., Lawrence, J.F., Lemann, C. & Gunter, N. 2019. 31. Scarabaeidae: Melolonthinae Leach, 1819., in: Slipinski, A. & Lawrence, J.F. (eds): *Australian Beetles. Volume 2. Archostemata, Myxophaga, Adephaga, Polyphaga (part)*. Clayton: CSIRO Publishing: 467 pp.

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MacKinnon, J. & Phillips, K. 1993. *Field Guide to the Birds of Borneo, Sumatra, Java and Bali*. Oxford: Oxford University Press: 491 pp.

Natural History Museum 2013. Wallace100 - celebrating Alfred Russel Wallace's life and legacy. http://www.nhm.ac.uk/nature-online/science-of-natural-history/wallace/index.html 11 October 2013.

Higgins, P., Christidis, L., Ford, H. & Bonan, A. 2017. Honeyeaters (Meliphagidae). In: J. del Hoyo, A. Elliott, J. Sargatal, D.A. Christie & E. de Juana, eds. *Handbook of the Birds of the World Alive*. Barcelona: Lynx Edicions. http://www.hbw.com.

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