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CONTENT

TREUBIA

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Date of issue: 30 JUNE 2020

UDC: 595.78(594.73)

David J. Lohman

Syntopic *Elymnias agondas aruana* female forms mimic different *Taenaris* model species (Papilionoidea: Nymphalidae: Satyrinae) on Aru, Indonesia

TREUBIA, June 2020, Vol. 47, No. 1, pp. 1–12.

Wing patterns of female *Elymnias agondas* (Boisduval, 1832) butterflies are highly variable, presumably to mimic different *Taenaris* species throughout New Guinea and surrounding islands. Labels on most *E. agondas* museum specimens lack precise locality information, complicating efforts to match *E. agondas* female wing patterns with presumed *Taenaris* model species. This paucity of data also makes it impossible to determine where different forms occur and whether they are strictly allopatric. During fieldwork on the Aru Archipelago, we found two distinct forms of *E. agondas* females occurring syntopically. The "light form" resembles *T. catops*, while the "dark form" seems to mimic *T. myops* and *T. artemis*. We discuss the significance of this finding and illustrate species in the *Taenaris* mimicry ring encountered on Aru.

(David J. Lohman, Sarino, and Djunijanti Peggie)

Keywords: adaptation, Batesian mimicry, butterfly, mimicry ring, polymorphism

UDC: 598.2:910.4(594.4)

Tri Haryoko

Recent ornithological expeditions to Siberut Island, Mt. Talamau and Rimbo Panti Nature Reserve, Sumatra, Indonesia

TREUBIA, June 2020, Vol. 47, No. 1, pp. 13–38.

Siberut Island, Mt. Talamau, Rimbo Panti Nature Reserve, and intervening locations in West Sumatra Province were visited during two expeditions in 2018-2019 by ornithologists from the Museum Zoologicum Bogoriense-Indonesian Institute of Sciences (LIPI), Louisiana State University Museum of Natural Science, and Andalas University. The main objective of these expeditions was to obtain data and tissue-subsample rich museum specimens for morphological and genetic studies of phylogeny and population genetics of Southeast Asian birds aimed at understanding the causes of avian diversification in the region. We also observed, photographed, and audio-recorded numerous bird species during the expeditions and archived these data. In total, 285 species were identified, and specimen material was collected from 13 species and 26 subspecies not previously represented in tissue resource collections. Here, we provide complete lists of birds found at each location, highlight distributional discoveries, and note cases of potential taxonomic, ecological, and conservation interest.

(Tri Haryoko, Oscar Johnson, Matthew L. Brady, Subir B. Shakya, M. Irham, Yohanna, Rusdiyan P. Ritonga, Dewi M. Prawiradilaga, and Frederick H. Sheldon)

Keywords: birds, distribution, diversity, conservation, West Sumatra

UDC: 598.813.063(59)

Elize Y. X. Ng

Integrative taxonomy reveals cryptic robin lineage in the Greater Sunda Islands

TREUBIA, June 2020, Vol. 47, No. 1, pp. 39–52.

Southeast Asian avifauna is under threat from both habitat loss and illegal poaching, yet the region's rich biodiversity remains understudied. Here, we uncover cryptic species-level diversity in the Sunda Blue Robin (*Myiomela diana*), a songbird complex endemic to Javan (subspecies *diana*) and Sumatran (subspecies *sumatrana*) mountains. Taxonomic inquiry into these populations has previously been hampered by a lack of DNA material and the birds' general scarcity, especially *sumatrana* which is only known from few localities. We demonstrate fundamental bioacoustic differences in courtship song paired with important distinctions in plumage saturation and tail length that combine to suggest species-level treatment for the two taxa. Treated separately, both taxa are independently threatened by illegal poaching and habitat loss, and demand conservation action. Our study highlights a case of underestimated avifaunal diversity that is in urgent need of revision in the face of imminent threats to species survival.

(Elize Y. X. Ng, Arya Y. Yue, James A. Eaton, Chyi Yin Gwee, Bas van Balen, and Frank E. Rheindt)

Keywords: bioacoustics, bird trade, passerines, songbird crisis, taxonomic neglect

UDC: 595.76:591.46(594.53)

Arif Maulana

A contribution to the taxonomy and ecology of little-known Indonesian *Afissa* ladybird beetles (Coccinellidae, Epilachnini)

TREUBIA, June 2020, Vol. 47, No. 1, pp. 53–62.

We collected the little-known ladybird beetle *Afissa incauta* in the mountainous region of Bandung, West Java. The beetle occurred sympatrically with the very similar species *A. gedeensis*. Here, we provide an update to the current knowledge for these two species. The *A. incauta* we collected have a slightly smaller and duller body compared to the previously known specimens of *Afissa incauta*, with convergent elytral maculation similar to *A. gedeensis*.

(Arif Maulana, Tri Atmowidi, and Sih Kahono)

Keywords: *Afissa gedeensis*, *Afissa incauta*, Coleoptera, Epilachnini, ladybird beetle

UDC: 595.733:574.2(594.57)

Ainun Rubi Faradilla

The life history and microhabitat ecology of a phytotelm-breeding damselfly *Pericnemis stictica* in Jatimulyo forest, Yogyakarta

TREUBIA, June 2020, Vol. 47, No. 1, pp. 63–75.

This study aims to understand the life history and microhabitat ecology of a phytotelmata-breeding species, *Pericnemis stictica*. Data was collected at 46 breeding sites in the Jatimulyo Forest, Kulonprogo. Several parameters were recorded from each breeding site, i.e. plant species, diameters, depth, water depth, water volume, water pH, and water turbidity. Naiads and imagoes of *P. stictica* were measured morphometrically. The data taken was analyzed descriptively using Minitab 19. The results showed that 17 naiads of *P. stictica* were found in 13 bamboo stumps. The bamboo species most commonly used by *P. stictica* as a breeding site was *Dendrocalamus asper*. Naiads of *P. stictica* were found in the same habitat as mosquito larva from genera *Toxorhynchites*, *Aedes*, *Armigeres*, and *Culex*. During the rearing process, it was recorded that *P. stictica* naiads can eat more than ten mosquito larvae a day. Four males and one female imagoes of *P. stictica* were found. The imagoes were mostly found in a secondary forest with shady ravine areas. Imago's average total length was 7.19 cm. Naiad's final instar average size was 16.7 mm. Water depth, water temperature, bamboo depth, bamboo volume, and humidity were all positively correlated to *P. stictica's* phytotelmata-breeding behavior.

(Ainun Rubi Faradilla, Mariza Uthami, Bella Andini, and Hening Triandika Rachman)

Keywords: breeding, *Pericnemis*, phytotelm, Yogyakarta

Treubia 47 (1): 53–62, June 2020

DOI: 10.14203/treubia.v47i1.3858

A CONTRIBUTION TO THE TAXONOMY AND ECOLOGY OF LITTLE-KNOWN INDONESIAN *AFISSA* LADYBIRD BEETLES (COCCINELLIDAE, EPILACHNINI)

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ABSTRACT

We collected the little-known ladybird beetle *Afissa incauta* in the mountainous region of Bandung, West Java. The beetle occurred sympatrically with the very similar species *A. gedeensis*. Here, we provide an update to the current knowledge for these two species. The *A. incauta* we collected have a slightly smaller and duller body compared to the previously known specimens of *Afissa incauta*, with convergent elytral maculation similar to *A. gedeensis*.

Keywords: *Afissa gedeensis*, *Afissa incauta*, Coleoptera, Epilachnini, ladybird beetle

ABSTRAK

Kami mengoleksi spesies kumbang lembing yang kurang dikenal, *Afissa incauta*, di area pegunungan Bandung, Jawa Barat. Kumbang ini dijumpai simpatrik dengan spesies berperawakan serupa, *A. gedeensis*. Disini, kami menyajikan pembaruan informasi terhadap kedua spesies tersebut, yang saat ini belum banyak diketahui. *A. incauta* yang kami koleksi berperawakan lebih kecil dan lebih kusam dibandingkan dengan spesimen yang diketahui sebelumnya, dengan pola totol elitra yang konvergen dengan *A. gedeensis*.

Kata kunci: *Afissa gedeensis*, *Afissa incauta*, Coleoptera, Epilachnini, kumbang lembing

INTRODUCTION

In the major revision of the ladybird tribe Epilachnini (Coleoptera: Coccinellidae, Coccinellinae) by Tomaszewska & Szawaryn (2016), a number of nomenclatural changes have been made (Fujiyama & Katakura, 2018). These changes were based on the recent generic classification by Szawaryn et al. (2015), which suggested a redefinition of the traditionally recognized genera *Afidentula* Kapur, *Afidenta* Dieke, *Afissula* Kapur, *Epilachna* Chevrolat, *Henosepilachna* Li, and *Toxotoma* Weise.

The monophyly of *Epilachna* (in the traditional definition), the largest Epilachnini genus (Jadwiszczak & Węgrzynowicz, 2003), was rejected. The genus was redefined and is now restricted to New World species. The Asian *Epilachna* species along with most *Afissula* species were moved to the genus *Afissa* Dieke, with the type species *Coccinella flavicollis* Thunberg 1781 (Szawaryn et al., 2015; Tomaszewska & Szawaryn, 2016).

Afissa was described by Dieke (1947) who identified differences from *Epilachna* (equal to *Henosepilachna* Jadwiszczak & Węgrzynowicz 2003) including the male genitalia without a basal knife-edge, no setae on the aedeagus and the parameres without apical thorn. However, Dieke (1947) noticed the morphological diversity among the species of the genus *Afissa* and subdivided it into six species groups (*A. admirabilis*, *A. fallax*, *A. complicata*, *A. flavicollis*, *A. szechuana*, and *A. chapini* groups). Li & Cook (1961) synonymized *Afissa* with *Epilachna* (Dejean, 1837), considering the shared characters of toothless tarsal claws and the sixth abdominal sternite of the female being not split. The validity of *Afissa* was questioned by some authors (Richards, 1983; Ślipiński, 2007) until resurrected from synonymy (Szawaryn et al., 2015).

To date, little is known about *Afissa*, a member of the non-pest phytophagous ladybird beetle. Recently, only the former *A. fallax* and *flavicollis* species groups (*sensu* Dieke, 1947) remain in the genus *Afissa* together with other former *Afissula* species distributed in south and south-eastern Asia with only a number species occur in Indonesia.

According to Katakura et al. (2001) work on Sumatran and Javan epilachnine beetles, six species of *Afissa* occur in Indonesia, i.e.: *A. gedeensis* Dieke, 1947; *A. incauta* Mulsant, 1850; *A. orthofasciata* Dieke, 1947; *A.* sp. K; *A.* sp. B; *A.* sp. J. Katakura treated all as *Epilachna*, *sensu* Li & Cook (1961).

Afissa gedeensis is highly specialized on the Urticaceae species, *Elatostema acuminata* and *Elastostema strigosum*, while *Afissa incauta* depends on Urticaceae species such as *Boehmeria macrophylla* and *Leucosyke candidissima* in West Java (Katakura et al., 2001; Katoh et al., 2014). The rest of the Indonesian *Afissa* species depend on plants that belong to the Vitaceae family. In addition to the taxonomical works, very little is known about the biology and ecology of this genus (Katakura et al., 1994; Nakano et al., 2001).

During a recent collecting project to the mountainous region of Bandung, West Java, we discovered an *Afissa* species on *Boehmeria clidemioides* (Urticaceae). The external morphology is very similar to *A. gedeensis* that occurs sympatrically in the same area. We found out the male genitalia are identical with *A. incauta* despite other morphological characteristics that are somewhat different from Katakura *et al.* (2001) description. Here, we provide a morphological and ecological examination as an update and contribution to the existing information of this little-known ladybird species.

MATERIALS AND METHODS

Terminology

Terminology used here for the beetle morphology follows Lawrence et al. (2011), except for specific terminology used in Coccinellidae follows Ślipiński (2007) and Ślipiński &

Tomaszewska (2010). Some terms of Dieke (1947) are also followed. Terminology for immature stages follows LeSage (1991).

Collections and depository of specimens

All specimens examined were obtained from field surveys between September 2019 and January 2020. We first discovered this beetle by chance while working on another research project at Mount Patuha, Rancabali, West Java. After the first encounter, we conducted a survey of this beetle in the tropical montane forest of Mt. Patuha, Mt. Tikukur, Mt. Pasir Cadas Panjang, and Mt. Pasir Cadas Dayang (Fig. 1). We also collected specimens of *A. gedeensis* from Selabintana, Mt. Gede, Sukabumi, West Java. During the experiment, we kept more than 50 wild beetles from Patuha, ten beetles from Tikukur, and seven individuals of *A. gedeensis* from Mt. Gede. Half of the dry-mounted specimens will be deposited in Museum Zoologicum Bogoriense (MZB), Indonesia, and the rest tentatively in the Division of Animal Biosystematics and Ecology, Department of Biology, IPB University (Bogor Agricultural University). Coordinates (WGS84) of localities were taken with a GPS device or determined as accurately as possible from a map. Microspatial distribution of the beetle with its host plant prepared using a relief map on the basis of the Global30-Arc-Second Elevation Data (GTOPO30) from the U.S. Geological Survey and Seamless Digital Elevation Model 0.27-arcsecond (DEMNAS) from the Indonesian Geospatial Information Agency. The map is prepared using QGIS 3.10 (QGIS Development Team 2020) and Adobe Photoshop CC 2019.

Morphological protocol

New samples were collected by handpicking and were anaesthetized using ethyl acetate and preserved in Kahle solution (ethanol/formalin/acetic acid/water = 17/6/2/28 in volume). Half of the specimens were fixed in 75–96% ethanol or pinned dry. Specimens were cleared in 10% potassium hydroxide, disarticulated, and washed in 10% lactic acid. Digital photographs were made using OptiLab and Indomicro HDMI camera mounted on Olympus SZ61 and Olympus CX33 microscope (Olympus, Tokyo, Japan). Image stacking was performed with CombineZP (Alan Hadley, 2010; http:/www.hadleyweb.pwp.blueyonder.co.uk/). Standard biometric parameters were taken from each beetle using measurement software: total body length (TL; measured from the apical margin of clypeus to apex of elytra), pronotum length (PL; measured from the middle of anterior margin to margin of basal foramen), pronotum width (PW), elytral length (EL; measured along suture including scutellar shield), elytral width (EW; measured at the widest part) and elytral height (EH; measured in lateral view).

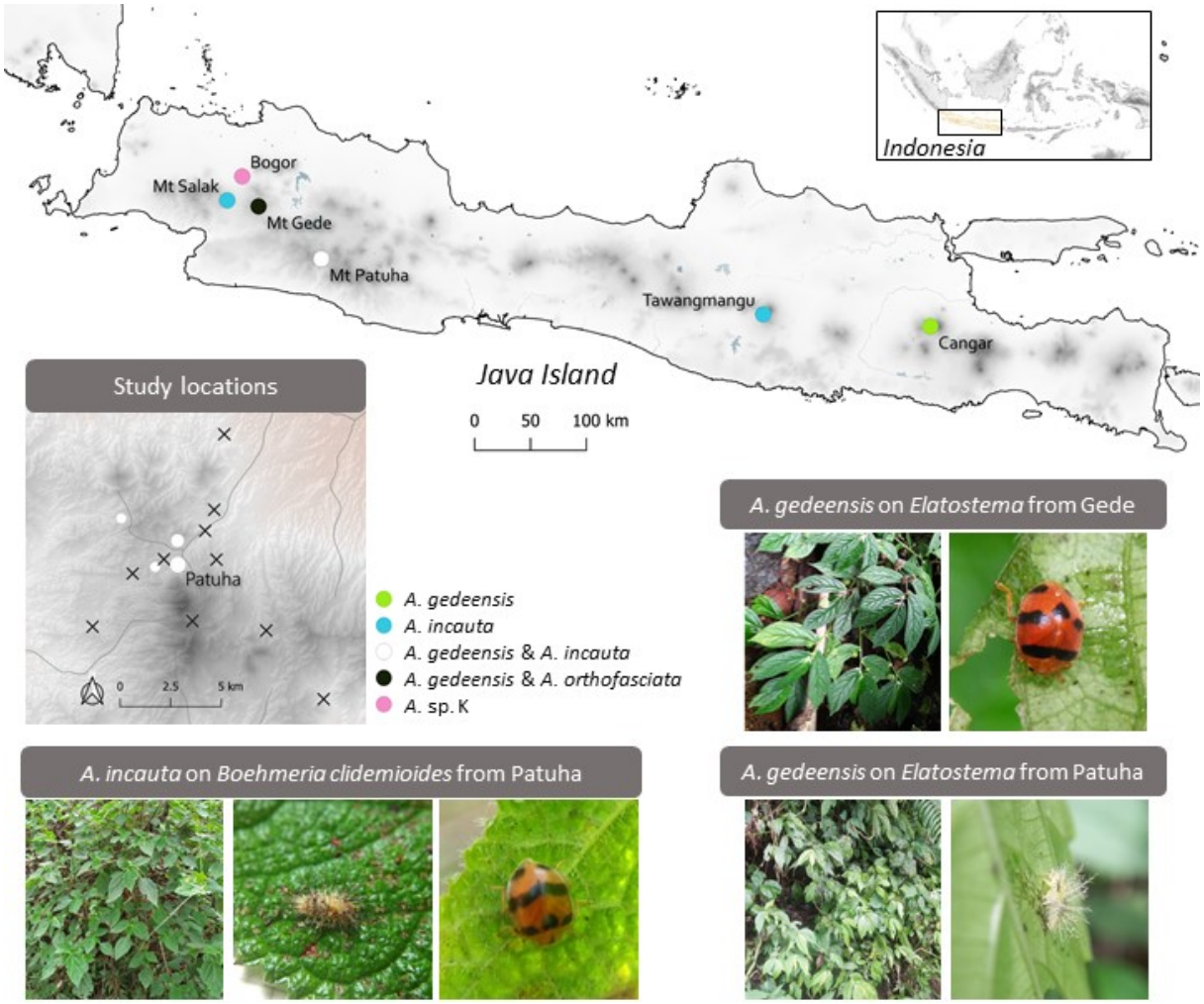

Figure 1. Indonesian *Afissa* species and its distribution in Java. Distribution data was based on Katakura *et al.* (2001) report. The area surveyed shown in the upper left panel showing a sympatric occurrence of *Afissa incauta* and *Afissa gedeensis* in and around Mt. Patuha, West Java. The habitus of *A. gedeensis* infested *Elatostema* and *A. incauta* infested *Boehmeria* from several localities were shown in respective panels.

Host preference and acceptance test

We tested the preference and acceptance of wild beetles for the two host plants, *Boehmeria* and *Elatostema,* by using two sympatric populations from Patuha and *A. gedeensis* from Selabintana. Adult beetles were separated individually in plastic boxes (9 cm × 5 cm × 1.5 cm) with the bottom covered with a sheet of moist filter paper. The experiments were conducted in a controlled room (20 °C and approximately 12h light: 12h dark) at the Animal Experimental House, Department of Biology, IPB University.

A piece of fresh leaf from each host (*Boehmeria* and *Elatostema*) was placed into the boxes and the beetles were allowed to feed freely for 24 hours (see Matsubayashi et al., 2011). The individual acceptances were recorded whether they would eat only one of the leaves, both leaves, or neither. For the acceptance test, we tested the beetle's acceptance on the original host plant followed by acceptance on the alternative host plant in the next day (Matsubayashi et al., 2019).

RESULTS

The newly discovered form of *A. incauta* seems to be widespread in the highlands of Rancabali, about 40 km from the city of Bandung. Based on our survey, the species can be found in other mountains around Mt. Patuha, such as Mt. Tikukur, Mt. Pasir Cadas Panjang, and Mt. Pasir Cadas Dayang (Fig. 1, study locations).

In Patuha, the habitat is located in a transition area between natural vegetation and an area cleared many years back for *Eucalyptus* tree and coffee plantation at about 1,600—1,700 m. The beetle-infested Urticaceae species identified as *Boehmeria clidemioides*, but we frequently encounter this beetle on neighboring plants that become the host for other sympatric epilachnine species, such as *Dicliptera* sp. (host for *Henosepilachna diekei* Jadwiszczak & Węgrzynowicz, host race; Matsubayashi et al*.,* 2016a, Matsubayashi et al*.,* 2016b) and *Isodon* sp. (*Diekeana isodontis* Ohta-Matsubayashi & Katakura, host plant; Ohta-Matsubayashi, 2016). We found the abundance of this beetle being relatively stable during September-February observation with the number of immatures increasing during the rainy season. A small patch of *Elatostema* with feeding marks and two larvae also occur sympatrically (Fig. 1, Patuha). We identified it as *A. gedeensis*.

A less abundant beetle population was also observed in Tikukur. Here, both *Boehmeria* and *Elatostema* occur sympatrically. Larger *Elatostema* populations with feeding marks, immatures, and two *A. gedeensis* adults were found. In other study locations (Mt. Pasir Cadas Panjang and Mt. Pasir Cadas Dayang), both host population occur, but no feeding marks on *Elatostema*.

Morphological diagnoses

Material examined:

A. incauta

INDONESIA • 20♀, 15♂; West Java, Rancabali, Mt. Patuha; 07°08’39.0’’S, 107°23’47.1’’E; alt. 1656m; 2 Okt. 2019; Arif Maulana leg.; host plant *Boehmeria clidemioides*; MZB COLE 139050–51 • 2♀, 2♂; West Java, Rancabali, Mt. Tikukur; 07°07’58.9’’S, 107°23’51.5’’E; 9 Feb. 2020; Arif Maulana leg.; host plant *Boehmeria clidemioides*; MZB COLE 139052–53 • 2♀, 2♂; West Java, Rancabali, Mt. Patuha; 07°08’39.0’’S, 107° 23’47.1’’E; alt. 1656m; 9 Feb. 2020; Arif Maulana leg.; host plant *Boehmeria clidemioides*; MZB COLE 139054 –55.

A. gedeensis

INDONESIA • 2♀, 1♂; West Java, Rancabali, Mt. Tikukur; 07°07’58.9’’S, 107°23’51.5’’E; 28 Jan. 2020; Arif Maulana leg.; host plant *Elatostema*; MZB COLE 139048–49.

Morphometrical measurements of *A. incauta*: Average for female (N=20) / followed by male (N=15). TL: 4.41 mm / 4.25 mm; EL: 3.49 mm / 3.39 mm; EW: 1.74 mm / 1.66 mm; EH: 1.63 mm / 1.76 mm; PL: 0.87 mm / 0.88 mm; PW: 1.98 mm / 1.89 mm.

Both beetles are very similar in terms of morphological character, but several minor details were identified as key characters during closer observation. In terms of size, the new form of *A. incauta* is slightly smaller than *A. gedeensis* with the elytral color being duller (Figs. 2A, G), while the elytral pattern is also similar to *A. gedeensis*, except in the basal fascia which is not always present, and the shape of the basal fascia that form V shape as in the medial fascia (4+3+5). The apical part of the mandible is a bit longer compared to *A. gedeensis* (Figs. 2E, K). Major differences were found in the structure of male genitalia, which *A. incauta* has curved apical part of the penis guide and distantly separated from the paramere (Figs. 2F, L). The paramere hair is also longer than *A. gedeensis* with a slight bending on the tip of the penis.

We also observed the morphology of the 4th instar larvae (Fig. 1). The newly discovered beetle has two larvae variations. The first is identical with *A. gedeensis* characterized by whitish larvae with white head and mouthparts, strumae, and scoli (some scoli appears dark grey-black) and the second is with dark head and mouthparts, strumae, and scoli. A detailed larval description will be discussed elsewhere.

Habitat isolation

Preference test was conducted to see whether or not both species are isolated by divergent host specialization. The experiment shows adult wild beetle prefer its original host plant (Table 1). Different from the previous test result, the larvae of *A. gedeensis* did not show specific preference to any host plant while the larvae of *A. incauta* only choose their original host plant. Host acceptance test shows the same result.

DISCUSSION

Afissa incauta and *Afissa gedeensis* are morphologically very similar species that exclusively utilize Urticaceae as a food plant (Kobayashi et al., 2009; Katoh et al., 2014). Both share a nearly identical habitus (see Fig. 1) and are nearly indistinguishable without genital dissection. Katakura et al. (2001) description of *A. incauta* reported a stable spot pattern, in which only five spots in each elytron, with spot one on suture and spot three reaching suture. Here, we find a new spot variation with two transverse fascia and a pair of apical spots, convergent with *A. gedeensis* that are occurring sympatrically in the forest habitats of Mount Patuha and its vicinity (Fig. 2). The range of the *A. incauta*

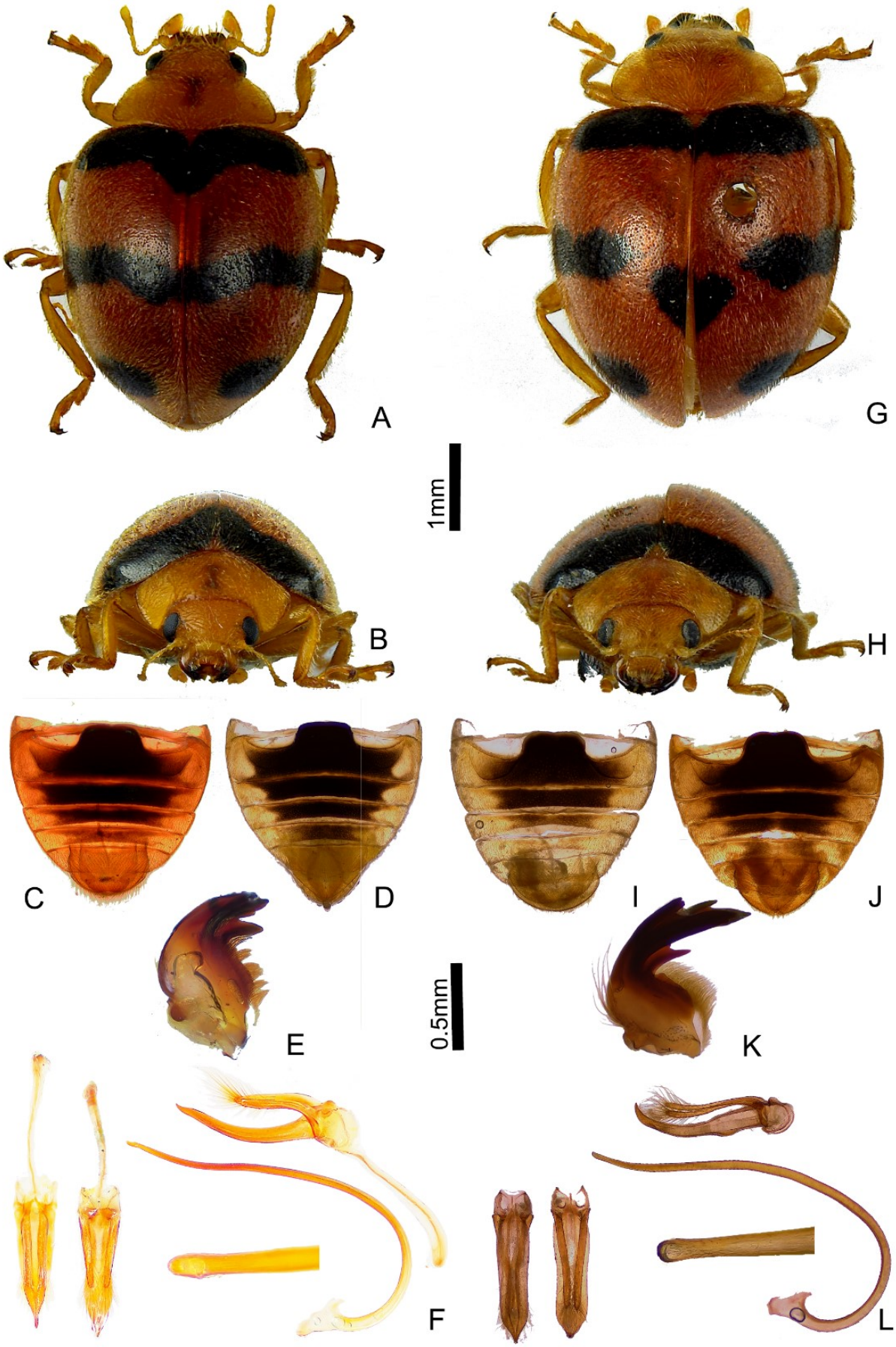

Figure 2. Morphological comparison between two similar *Afissa* species. **A-F.** *Afissa incauta*. **G-L.** *Afissa gedeensis*. **A, G.** habitus in dorsal view. **B, H.** head in anterior view. **C-D, I-J.** Abdominal ventrite of male followed by female. **E, K.** Mandible. **F, L.** Male genitalia.

Table 1. Preference and acceptance of the two similar *Afissa* on two host plants, *Elatostema* and *Boehmeria*. The number of individuals that accepted neither host plant is denoted as 'null choice'.

Species	**Site**	**Sex**	***N***	**Fed *Elatostema***	**Fed *Boehmeria***	**No. of null choice**
Host preference test						
A. gedeensis	Gede	-	7	7	0	0
	Tikukur	Female	2	1	0	1
		Male	1	1	0	0
		Larvae	2	2	2	0
A. incauta	Patuha	-	50	1	50	0
	Tikukur	Female	2	0	2	0
		Male	4	0	3	1
		Larvae	2	0	2	0
Host acceptance test						
A. gedeensis	Patuha	-	7	-	0	-
	Tikukur	Female	2	-	0	-
		Male	1	-	0	-
		Larvae	2	-	2	-
A. incauta	Patuha	-	50	1	-	-
	Tikukur	Female	2	0	-	-
		Male	3	0	-	-
		Larvae	2	0	-	-

specimens'sizes in the study area is also smaller than previously reported (♂ 5.0–5.5 mm; ♀ 5.3–5.7 mm) from several localities, including West Sumatra and Java (Mt. Salak and Karanganyar).

Little biological information is available for genus *Afissa*. *Afissa incauta* laid scattered single eggs on the underside of *Boehmeria* leaves. *Afissa gedeensis* was also known to have the same oviposition patterns (Nakano et al., 2001). The immatures of these beetles were generally similar in colour but quite distinguishable from one another.

The host use patterns of both larvae and adults showed inconsistency (Table 1). Both species tend primarily to prefer their native host, but a small number of individuals were able to utilize an alternative host. It seems that even though both species were specific in terms of their host plant choice, both were able to use the alternative host as a food plant, considering the sympatric nature of the beetles and its host plants.

There might be many undiscovered variations and species in poorly collected areas of Indonesia. More focused survey works in unexplored forests and mountains are needed, and a combined approach from morphology and molecular analysis may reveal the presence of undiscovered members of Epilachnini in Indonesia. After twenty years since Katakura et al. (2001) published the work, it seems a review of all known Indonesian epilachnine beetles with more detailed descriptions of morphological features, better images, and updated information were indispensable.

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