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Pseudophacusa multidentata Efetov & Tarmann, a new genus and species of Procridini from Myanmar, China and Laos (Lepidoptera: Zygaenidae, Procridinae)

K. A. Efetov & G. M. Tarmann

Abstract

A new genus, *Pseudophacusa* Efetov & Tarmann, gen. n. and a new species, *Pseudophacusa multidentata* Efetov & Tarmann, sp. n., are described from Myanmar, China and Laos. Possible mimicry between *Pseudophacusa multidentata* Efetov & Tarmann, sp. n., *Illiberis* (*Alterasvenia*) *banmauka* Efetov & Tarmann, 2014, and species of the genera *Phacusa* Walker, 1854, and *Zama* Herrich-Schäffer, 1855, is discussed. A differential diagnosis of the genera *Pseudophacusa* gen. n., *Phacusa* Walker, 1854, and *Zama* Herrich-Schäffer, 1855, is provided.
KEY WORDS: Lepidoptera, Zygaenidae, Procridinae, Procridini, *Pseudophacusa, P. multidentata*, mimicry, COI, mitochondrial DNA barcoding, new genus, new species, Myanmar (Burma), China, Laos.

Pseudophacusa multidentata **Efetov & Tarmann, un nuevo género y especie de Procridini de Myanmar, China y Laos (Lepidoptera: Zygaenidae, Procridinae)**

Resumen

Se describe un nuevo género *Pseudophacusa* Efetov & Tarmann, gen. n. y una nueva especie, *Pseudophacusa multidentata* Efetov & Tarmann, sp. n., de Myanmar, China y Laos. Un posible mimetismo entre *Pseudophacusa multidentata* Efetov & Tarmann, sp. n., *Illiberis* (*Alterasvenia*) *banmauka* Efetov & Tarmann, 2014, y especies de los géneros *Phacusa* Walker, 1854 y *Zama* Herrich-Schäffer, 1855 se somete a discusión. Se ofrece el diagnóstico diferencial de los géneros *Pseudophacusa* gen. n., *Phacusa* Walker, 1854 y *Zama* Herrich-Schäffer, 1855.
PALABRAS CLAVE: Lepidoptera, Zygaenidae, Procridinae, Procridini, *Pseudophacusa, P. multidentata*, mimetismo, COI, ADN mitocondrial códigos de barras, nuevo género, nueva especie, Myanmar (Birmania), China, Laos.

Introduction

During the last 20 years major work has been undertaken on Asian Procridinae (EFETOV, 1995, 1996, 1997a, b, c, 1998, 2000, 2001a, b, 2004, 2005a, b, 2006, 2010; EFETOV & HAYASHI, 2008; EFETOV *et al*., 2004, 2006, 2010, 2011; EFETOV & TARMANN, 1994, 1995, 1996, 1999, 2008, 2012, 2013a, b, 2014; KEIL, 2014; KIM *et al*., 2004; OWADA & INADA, 2005; SUBCHEV *et al*., 2010, 2012, 2013; TARMANN, 1994). In spite of this, there is still substantial revisionary work to be done. There are not only a number of taxa that remain undescribed, but also the correct relationships between taxa and taxa groups have to be verified. Possible mimicry has always to be taken into account in the Zygaenidae, as some species resemble not only each other but also those of other families of Lepidoptera

and even those of other orders of insects such as Hymenoptera, Diptera, Hemiptera and Coleoptera. As our studies have to be based on examination of type material and should be accompanied by field observations, these investigations are time consuming and can only be done step by step. While examining material of the subfamily Procridinae from Myanmar, Thailand, Laos and China (Yunnan), we found some male and female specimens representing a new genus and species. The description is provided below. Possible mimicry involving sympatric species and their relationship is discussed.

Pseudophacusa Efetov & Tarmann, gen. n.

Type species: *Pseudophacusa multidentata* Efetov & Tarmann, sp. n., here designated.

Diagnosis

Habitus: Wings narrow, with transparent areas, forewings almost twice as long as hindwings.

Head: Spherical, space between compound eye and ocellus without scales, chaetosemata rounded, labial palps short, porrect; antenna bipectinate to apex in both sexes, without club distally. Proboscis well developed. Wings almost transparent, with blackish brown veins, margins and fringes. Wings with all veins free from cell or r2 + r3 stalked; medial stem present in both wings; hindwing with only two medial veins. Foreleg with tibial epiphysis, hind tibia with one pair of spurs (apical).

Genitalia male: Uncus strongly sclerotized, with short pointed apex. Anal tube with longitudinal sclerotized band on dorsal wall (as in *Phacusa*). Valva subquadrate, without process at apex and on ventral margin. Aedeagus (phallus) broad, vesica with a large number of strongly sclerotized, small cornuti, their length approximately equal to their breadth.

Genitalia female: With sclerotized praebursa of irregular shape, strongly folded, with rows of spines.

Differential diagnosis: The genus most closely related to *Pseudophacusa* is *Phacusa* with which it shares the longitudinal sclerotized band on the dorsal wall of the anal tube, a character that is absent in all other Procridinae. *Pseudophacusa* differs from *Phacusa* by the absence of any process on the ventral margin and apex of sacculus and the presence of a large number of small short cornuti on the vesica seminalis. In *Phacusa* the vesica bears from two to four cornuti, and at least two of them are hook-shaped.

Derivatio nominis: The name of this new genus indicates a close relationship to the genus *Phacusa* Walker, 1854.

Pseudophacusa multidentata Efetov & Tarmann, sp. n. (Figs. 1, 2, 7, 8, 10)

Material: Holotype ♂, with printed pin-label: "MYANMAR, Sagaing province, Banmauk, 170 m, 16-25-VII-2011; leg. Native collector, E 95º 51' 29" / N 24º 23' 48", TLMF 2011-106" (Coll. Tiroler Landesmuseen, Ferdinandeum, Innsbruck, Austria). Paratypes 9 ♂♂, 4 ♀♀: Myanmar, Sagaing province, Banmauk, 170 m (E 95º 51' 29" / N 24º 23' 48"), 9 ♂♂, 1 ♀, 16-25-VII-2011 (4 specimens used for barcoding in ZYGMO project, sample ID: PPGen07#sp1#001, PPGen07#sp1#002, PPGen07#sp1#003, PPGen07#sp1#004; process ID: ZYGMO591-13, ZYGMO592-13, ZYGMO593-13, ZYGMO594-13), native collector leg., coll. Tiroler Landesmuseen, Ferdinandeum, Innsbruck, Austria, 5 ♂♂, 1 ♀ and coll. K. A. Efetov / Crimean State Medical University, Simferopol, Crimea, Russia, 4 ♂♂; China, Yunnan, Techong county, Mt. Gaoligongshan, 2000 m (E 98º 33' 31" / N 25º 07' 59"), 20-27-VI-2011, 2 ♀♀, native collector leg., coll. Tiroler Landesmuseen, Ferdinandeum, Innsbruck, Austria and coll. K. A. Efetov / Crimean State Medical University, Simferopol, Crimea, Russia; Laos, Phongsalis province, Mt. Kheukayasan, 1600 m (E 101º 54' 43" / N 22º 10' 58"), 14-28-IV-2012, 1 ♀, native collector leg., coll. Tiroler Landesmuseen, Ferdinandeum, Innsbruck, Austria. The holotype and paratypes have been supplied with printed pin-labels on red paper: "HOLOTYPUS [or PARATYPUS] male [or female] *Pseudophacusa multidentata* Efetov & Tarmann, 2015".

Description: Habitus of male and female similar. Length of body: male 8.2-8.6 mm, female 8.2-9.3 mm; length of forewing: male 12.0-13.1 mm, female 13.0-15.2 mm; breadth: male 3.1-4.2 mm, female 4.8-5.2 mm; length of hindwing: male 6.2-7.2 mm, female 6.9-8.2 mm; breadth: male 3.0-3.3 mm, female 3.1-4.2 mm; length of antenna: male 6.4-6.9 mm, female 6.3-7.4 mm. Frons as broad as compound eye in frontal view, black, occiput covered with black scales, with a tinge of blue in fresh specimens, compound eyes of normal size, black, ocelli small, chaetosemata rounded, un-scaled space between compound eye and ocellus ca 1.2 times of diameter of ocellus. Labial palps short, porrect, blackish brown. Antenna black, bipectinate to apex, tapering towards and pointed at apex, pectination long (length of pectination in middle part of antenna 0.8-0.9 mm in male and 0.5 mm in female), ratio of breadth of 4th segment from apex to breadth of 15th segment nearly 0.7, antenna with 43-46 segments in male and female. Proboscis brown, well developed. Tegulae and patagia black. Thorax and abdomen black, thickly covered with scales. Wings almost transparent, with blackish brown veins, margins and fringes. Apex of forewing upperside, space between costa and subcosta, distal margin of cell, proximal parts of medial stem and posterior wing parts slightly anterior and posterior of anal vein blackish brown, opaque; on forewing underside space between anal vein and posterior margin of wing covered with a flat layer of broad, creamy white scales. Hindwing on upperside with an opaque anterior part until medial stem and M_1 that is covered with creamy white scales that are followed by a blackish brown opaque area posteriorly which ends at the posterior margin of cell; underside of hindwing similar but anterior margin blackish brown (not creamy white) and only anterior part of cell creamy white. All veins free from cell or r2 + r3 stalked. Medial stem present in both wings. Hindwing with two medial veins situated slightly posterad of medial stem. Translucent part of upperside of wings covered with short, narrow scales (most of them having a double apex) arranged vertically to surface of wing. Scales along veins and on darker parts of wings also short, but broader (each having a single, double or triple apex) arranged in flat layers. Legs black, thickly covered with black scales; foreleg with tibial epiphysis, hind tibia with one pair of spurs (apical).

Male genitalia: Short apical part of uncus much narrower than rest of uncus, the latter 1.5 times shorter than tegumen. Dorsal wall of anal tube sclerotized. Valva broad, subquadrate, its apex and ventral margin without any process. Pulvinus well developed, covered with many short setae. Juxta ovoid, long, its distal half covered with small spicules. Aedeagus three times longer than uncus, broad, its breadth nearly equal to length of uncus, vesica with many strongly sclerotized, short cornuti.

Female genitalia: Papillae anales ovoid, covered with numerous very long setae, apophyses posteriores straight, eighth sternite slightly sclerotized, covered with many short spicules; eighth tergite strongly sclerotized, narrow, arc-shaped; ostium bursae broad, not sclerotized, proximal part of ductus bursae strongly dilated, forming a sclerotized, strongly folded praebursa of irregular shape, its internal surface covered with numerous spines placed separately as well as in two rows (one longitudinal, one transverse); corpus bursae spherical, translucent.

Differential diagnosis: In habitus, *Pseudophacusa multidentata* sp. n. (Figs. 1, 2) is extremely similar to the sympatric *Illiberis* (*Alterasvenia*) *banmauka* Efetov & Tarmann, 2014 (Fig. 3). The latter is easily distinguished externally by its yellow proboscis. Moreover, both species have very different genitalic structures. All known species of *Phacusa* and *Zama* also have a yellow proboscis. From *Phacusa* species, *Pseudophacusa multidentata* sp. n. can be easily distinguished by its genitalic morphology. Males of *Phacusa* (Fig. 9) have valvae with processes at the ventral margin, or at the apex of the sacculus, and the vesica has only a few (2-4) cornuti, some of them hook-shaped, while *Pseudophacusa multidentata* sp. n. has no processes on the valva and its vesica is covered with many short, not hook-shaped, cornuti (Figs. 7, 8). Males of *Zama* have the apex of sacculus with a process and vesica with two large cornuti, while females have a strongly sclerotized, broadly open, bowl-shaped antrum with a bottle-shaped appendix. Moreover, females of *Zama* can be easily recognised by the presence of a hair tuft at the end of the abdomen.

Bionomics: Flight of imagines from April (Laos) to June (Myanmar), depending on the region and elevation of the locality. Larval host-plant(s) unknown.

Etymology: This species is named *"multidentata*" because of the extraordinary number of tooth-like cornuti on the vesica seminalis in the male (Figs. 7, 8).

Relationship: The longitudinal sclerotized band on the dorsal wall of the anal tube is a character that is shared with *Phacusa*. So far that character was thought to represent an autapomophy of that genus, as it has not been found elsewhere (Alberti, 1954: 258). Based on morphology we can suppose that *Pseudophacusa* and *Phacusa* are sister groups. Our DNA mitochondrial barcoding (COI) results (project ZYGMO, BOLD, Life Data Systems) (Fig. 11) does not oppose the opinion that *Pseudophacusa* and *Phacusa* are closely related. These genera have the smallest genetic distance if to compare with other examined South-East Asian genera and therefore cluster in the tree on the same branch. However, the authors are aware that such trees are not a proof for a close phylogenetic relationship.

Mimicry: The fact that *Pseudophacusa multidentata* and *Illiberis* (*Alterasvenia*) *banmauka* (Figs. 1-3) are sympatric, at least at their type locality, viz. Banmauk in Myanmar where both are also sympatric with other externally similar clear-winged species of the subfamily Procridinae such as species of the genera *Phacusa* (Fig. 5) and *Zama* (Fig. 6) (see EFETOV & TARMANN, 2012), and with species of Ctenuchinae (Erebidae), suggests that mimicry may play an evolutionary role in the development of external characters of some of these involved species. However, confirmation of this can only be obtained by studies *in situ*. It is at least remarkable that so far *Illiberis (Alterasvenia*) *banmauka* is the only known species of subgenus *Alterasvenia* with such a habitus (Fig. 3). In all other known species of this subgenus the wings are less transparent as in *I.* (*A.*) *banmauka*. As an example we figure *Illiberis* (*Alterasvenia*) *cernyi* Efetov & Tarmann, 2013 (Fig. 4), the most closely related species to *I.* (*A.*) *banmauka*. The close relationship of both species and their systematic position in *Illiberis* (*Alterasvenia*) is strongly supported by genitalic morphology (EFETOV & TARMANN, 2013: 35, fig. 3; 2014: 65, fig. 3; 66, fig. 4).

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K. A. E.
Crimean State Medical University
RU-295006 Simferopol (Crimea)
RUSIA / *RUSSIA*
E-mail: efetov.konst@gmail.com
https://orcid.org/0000-0003-1468-7264

*G. M. T.
Tiroler Landesmuseen, Ferdinandeum
Naturwissenschaftliche Sammlungen
Feldstrasse, 11a
A-6020 Innsbruck
AUSTRIA / *AUSTRIA*
E-mail: g.tarmann@tiroler-landesmuseen.at
https://orcid.org/0000-0002-7360-5698

*Autor para la correspondencia / *Corresponding author*

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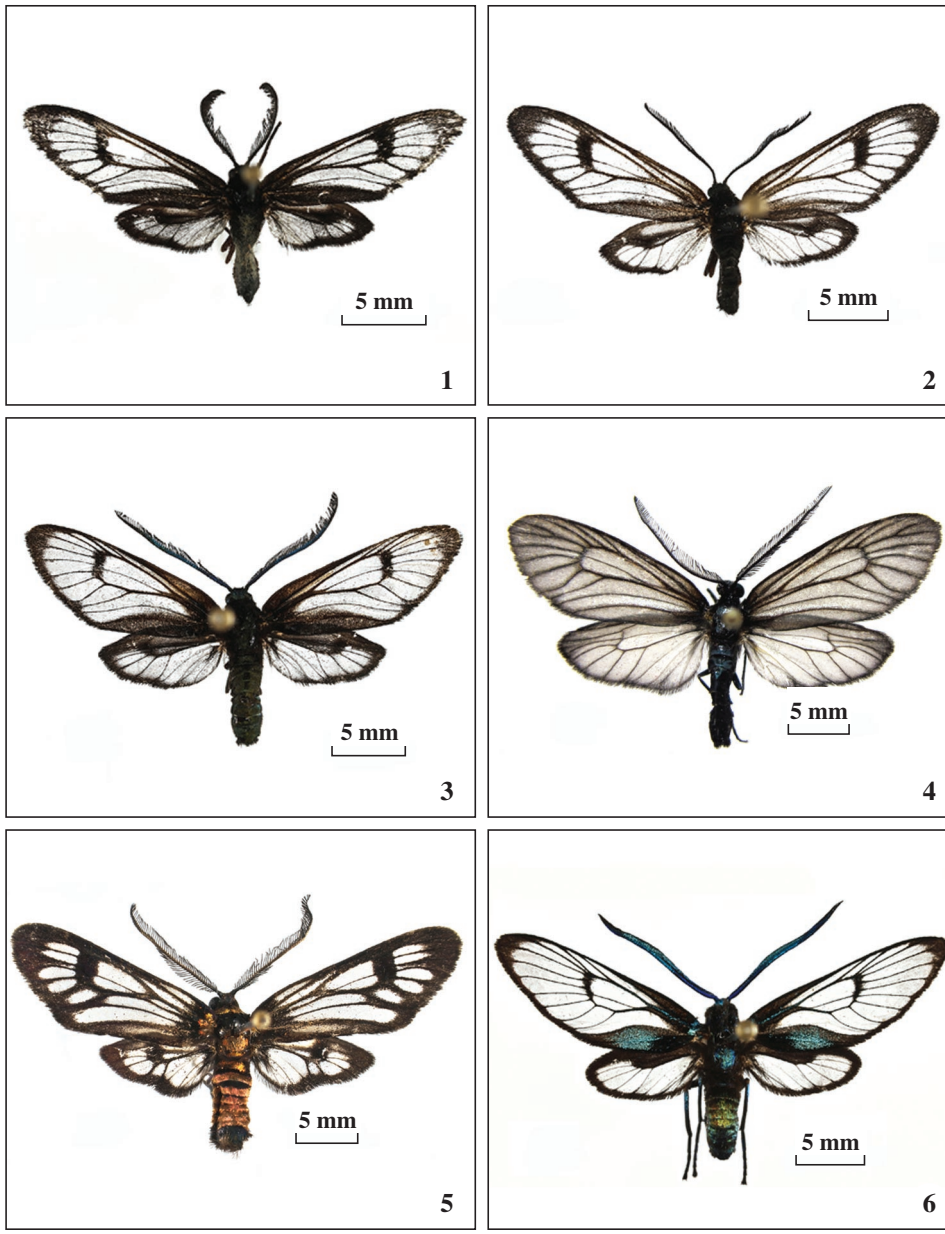
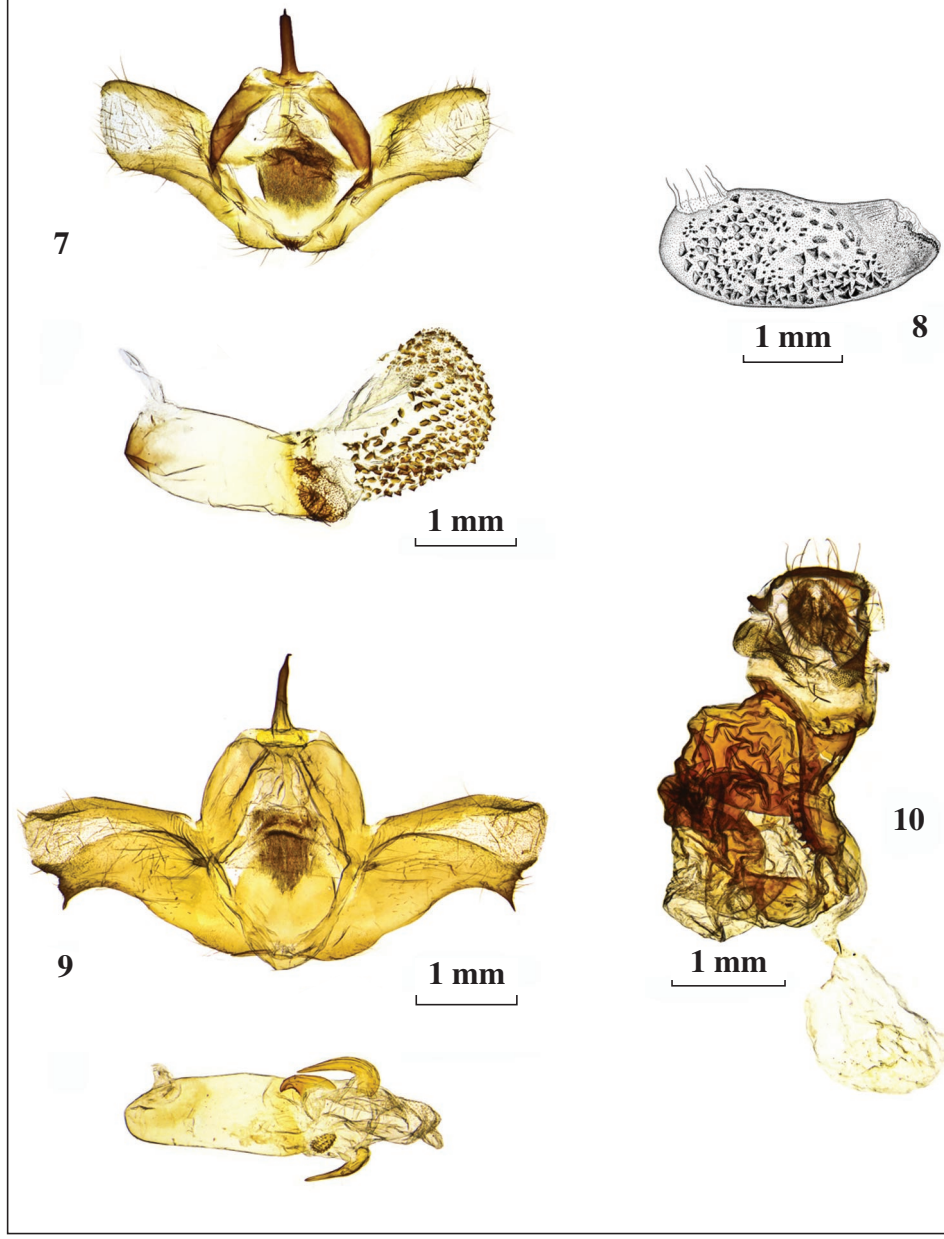


Figures 1-6.– 1-2. *Pseudophacusa multidentata* Efetov & Tarmann, sp. n. **1.** Holotype male. **2.** Paratype female from Myanmar. **3**. *Illiberis* (*Alterasvenia*) *banmauka* Efetov & Tarmann, 2014, holotype male, Myanmar. **4**. *Illiberis* (*Alterasvenia*) *cernyi* Efetov & Tarmann, 2013, holotype male, Thailand. **5**. *Phacusa birmana* (Oberthür, 1894). Male specimen from Laos. **6**. *Zama* cf. *nigrigemma* (Walker, 1854). Male specimen from Myanmar.



Figures 7-10.– 7, 8, 10. *Pseudophacusa multidentata* Efetov & Tarmann, sp. n. **7.** Male genitalia of paratype, **8**. Drawing of aedeagus of another paratype with vesica not everted. **10.** Female genitalia of paratype from China. **9.** *Phacusa tenebrosa* Walker, 1854. Male genitalia of a specimen from India (Sikkim).

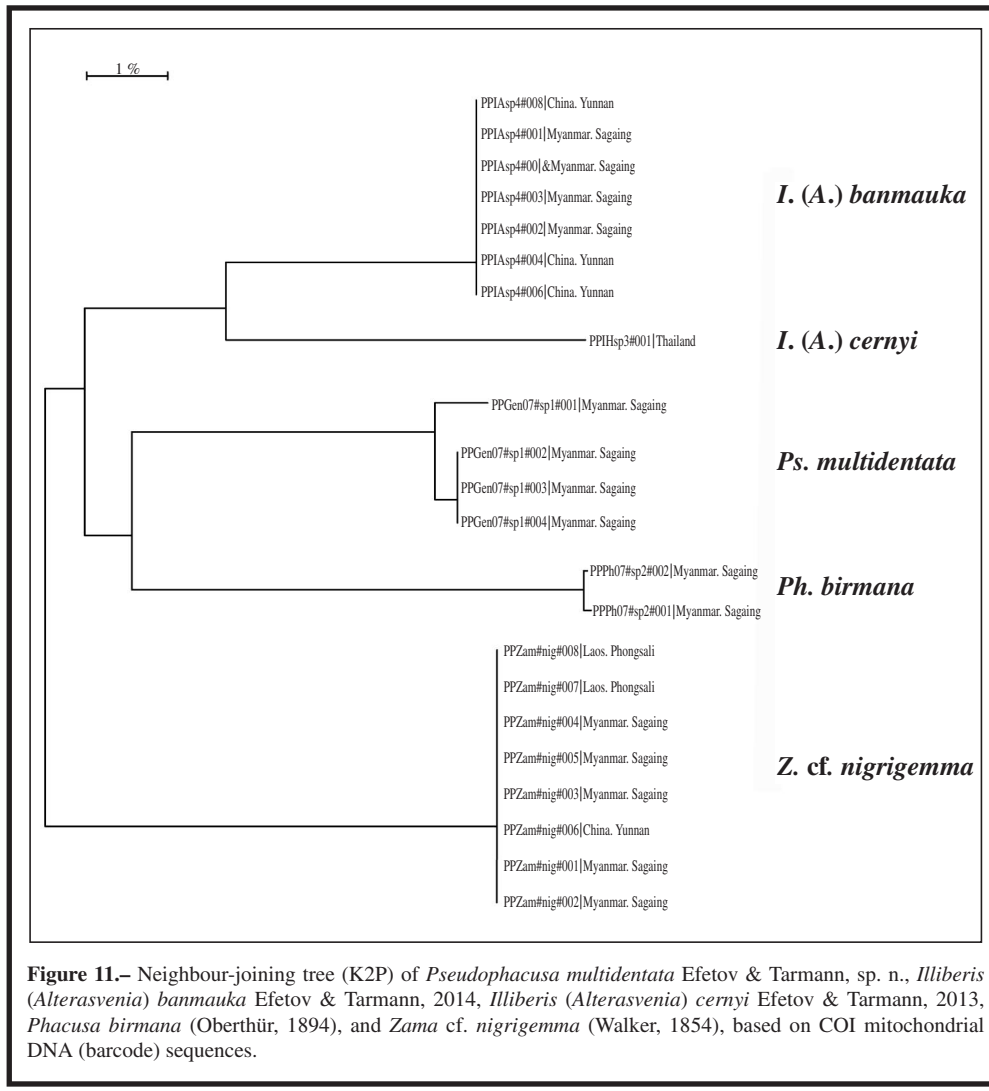


Figure 11.– Neighbour-joining tree (K2P) of *Pseudophacusa multidentata* Efetov & Tarmann, sp. n., *Illiberis* (*Alterasvenia*) *banmauka* Efetov & Tarmann, 2014, *Illiberis* (*Alterasvenia*) *cernyi* Efetov & Tarmann, 2013, *Phacusa birmana* (Oberthür, 1894), and *Zama* cf. *nigrigemma* (Walker, 1854), based on COI mitochondrial DNA (barcode) sequences.