Complementary contribution to the study of the entomological fauna of Borneo island with the description of a new subspecies in the genus *Aegosoma* Audinet-Serville, 1832 (Coleoptera, Cerambycidae, Prioninae).

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Summary

The state of Sabah in the north of the territory of East Malaysia on the island of Borneo is home to a particularly rich Prioninae fauna belonging to the *Aegosomatini* tribe and more specifically in the genus *Aegosoma* Audinet-Serville, 1832. The purpose of this study is to present the description of a new subspecies in this genus from Sabah, as well as to compare it to the nominative subspecies *A. giganteum* described by Lansberge from Indonesia (Sumatra isl.). Following the location of the holotype of the species *Aegosoma incertum* described by Gahan based on a single female, also collected in Sumatra, its examination leads us to confirm the synonymy between *A. giganteum* Lansberge, 1884 and *A. incertum* Gahan, 1907.

Résumé

L'état du Sabah au nord du territoire de la Malaisie orientale dans l'ile de Bornéo abrite une faune particulièrement riche en espèces de Prioninae appartenant à la tribu des *Aegosomatini* et en particulier dans le genre *Aegosoma* Audinet-Serville, 1832. L'objet de cette étude est de présenter la

description d'une nouvelle sous-espèce dans ce genre en provenance du Sabah, ainsi que de la comparer à la sous-espèce nominale *A. giganteum* décrite d'Indonésie (Sumatra). L'holotype de l'espèce *Aegosoma incertum* décrit par Gahan à partir d'une seule femelle, également collectée à Sumatra, a été localisé et examiné, ce qui nous amène à confirmer la synonymie entre *A. giganteum* Lansberge, 1884 et *A. incertum* Gahan, 1907

Key words: Coleoptera, Cerambycidae, Prioninae, Borneo, Malaysia, Sabah, *Aegosoma*, new sub species.

Introduction

Currently, no less than 6 taxa are described in the genus *Aegosoma* and present in the state of Sabah, East Malaysia: *Aegosoma annulicorne* (Komiya, 2001); *A. giganteum* Lansberge, 1884 ; *A. hainanense legrandi* Komiya & Drumont, 2012 ; *A. musaamani* Drumont, Do & Bosuang, 2013 ; *A. osseum* Aurivillius, 1897 and *A. pallidum* Komiya & Drumont, 2012.

Among these species, *Aegosoma giganteum* has been originally described by Lansberge from specimens collected in the island of Sumatra (Indonesia). Another specimen (female) also from Sumatra was later described in 1907 by Gahan under the name of *A. incertum*. This later taxon has been proposed as synonym of *giganteum* by LAMEERE in 1909.

After examination of a huge series of specimens identified as *A. giganteum* and originating from the ecozone corresponding to the area of Crocker range / Ranau / Mts Trus Madi, eastern part of Sabah region, Borneo (Malaysia), it appears that this population differs from specimens originating from Sumatra and objects of the original description by Lansberge, 1884. It is therefore evident that a population remaining closely related to the nominal species but with consistent differences in some of its morphological characteristics and with a smaller average size evolves in a different biotope corresponding to the above-mentioned areas with an average altitude between 750 and 1700m. This analysis is confirmed with the in-depth comparative study of the size in both sexes of the two populations, which shows a constant lower mensuration in the subspecies (see table fig. 2). Thus, the morphological characteristics observed in this population are sufficiently stable to allow the creation of a subspecies named *A. giganteum ruficolle* **ssp. nov**. and described below.

Abbreviations used for the collections examined

ADC: Alain DRUMONT private collection, Brussels, Belgium;
AWC: Andreas WEIGEL private collection, Wernburg, Allemagne;
ANPC: Alexander NAPOLOV, private collection, Riga Zoo, Latvia;
CRC: Claude RIPAILLE, private collection, Lias, France;
DJHC: Dan J. HEFFERN, private collection, Houston, Texas, USA;
EKC: Evgeny KOSHKIN private collection, Khabarovsk, Russia;
FLC: Frédéric LEDUC, private collection, Herstal, Belgium;
GDC: Gontran DROUIN, private collection, Ste-Henedine, Québec, Canada;
GVMC: Giuseppe & Valantino MARAZZI, private collection, Novate Milanese & Arese, Italia;
JBC: Joan BENTANACHS, private collection, Barcelona, Spain;
JDC: Jiří DVOŘÁČEK, private collection, Krenov, Cesky Krumlov, Czech Republic;
MSNG: Museo Civico di Storia Naturale "Giacomo Doria, Genova, Italy (Dr Roberto Poggi);
NDC: Norbert DELAHAYE, private collection, Plaisir, France;
RVC: Robert VIGNEAULT, private collection, Oka, Québec, Canada;
SIC: Sergei IVANOV, private collection, Vladivostok, Russia;
TTC: Tomáš TICHÝ, private collection, Opava, Czech Republic;
XGC: Xavier GOUVERNEUR, private collection, Rennes, France.

***Aegosoma giganteum s. str*. Lansberge, 1884** (figs 6a, 7a, 8a)

Aegosoma Giganteum Lansberge, 1884: 156.
Aegosoma gigantea; Komiya & Drumont, 2012: 91, fig. 1 (male) [Key]; Drumont, Do & Bosuang, 2013: 117 [Key].
Aegosoma giganteum; Do & Drumont, 2014: 291, 296; Do, 2015: 233, 234, 237, fig. 13 (male) [Key].
Megopis (Aegosoma) gigantea; Lameere, 1909: 140; Lameere, 1913: 39 [Catalog]; Lameere, 1919: 73 [Catalog]; Fisher, 1935: 582 [Distribution]; Hayashi, 1975: 172, pl. 1, fig. 7 [Distribution].

Male holotype *in* Rijksmuseum van Natuurlijke Historie, Leiden
Type-locality: INDONÉSIA (Sumatra): Solok (J. H. Schagen van Leeuwen *leg.*)

We have not been able to examine the holotype of *Aegosoma giganteum* Lansberge, 1884. The species has been described on a single male of 60 mm collected in Solok located in west-central part of Sumatra island.

= *Aegosoma incertum* Gahan, 1907: 68 **(synonymy proposed by Lameere in 1909 and hereby confirmed).**

Female holotype *in* Museo Civico di Storia Naturale «Giacomo Doria», Genova (fig. 1)
Type-locality: INDONÉSIA (Sumatra): Pangherang-Pisang (Elio Modigliani *leg.*)

Thanks to the courtesy of Roberto Poggi from MSNG we were able to examine digital pictures of the female holotype of *Aegosoma incertum* described by Gahan and preserved in this institution. Roberto Poggi (pers. comm.) also reported us the interesting history of this specimen which is mentioned here : *"The specimen collected by Modigliani was firstly identified by Gestro in Genoa Museum as "*giganteum *?" and sent under this name to Lameere in 1906, when Lameere asked the* Aegosoma *of Genoa Museum for his revision. The Sumatran material was just returned to Genoa by Gahan, who had it for many years in view to close his paper, delayed for health problems, which was printed in our* Annali del Museo civico di Storia naturale, Genova *on 10th April, 1907. Possibly the same Gahan had returned the specimen, in a first step, as "*giganteum *?" and in a second time, writing the paper, decided to describe it as* incertum *(the selected name could be appropriate for the doubtful situation...). Anyway the specimen remained without a proper identification label by Gahan and was returned by Lameere, with the others, on 8 March 1909 when he requested to Gestro the types of* Aegosoma incertum *supposing its synonymy with* giganteum. *On 27th March 1909, Gestro sent to Lameere all the Prionides of our collection, including* incertum. *All the specimens returned in August, 1912. In the following century nobody asked for that type."*
Our request brought to light the problem that Mr Poggi has most probably solved. The specimen is labeled (for the locality) exactly as stated by Gahan and the measurements and the morphology coincide with the description. For avoiding future doubts, a holotype label and the property label of Genoa Museum have been added to the pin (see Fig. 1).

The holotype (by monotypy) is a single female of 45 mm long (Fig. 1), so of relatively small size but exhibiting the characters showed by the species *A. giganteum*. We therefore confirm the following synonymy: *Aegosoma giganteum* Lansberge, 1884 = *Aegosoma incertum* Gahan, 1907 **(syn. confirmed).**

Fig. 1: Holotype female of *Aegosoma incertum* Gahan, 1907 (MSNG); **left**: dorsal view; **right**: labels (Photos: courtesy Roberto POGGI, ©Genoa Museum).

Material studied. – **West Malaysia:** 1♂, 1♀, West Malaysia, Pahang (CRC); 1♀, West Malaysia, Pahang, VIII.1992 (CRC); 1♀, West Malaysia, Pahang, Cameron Highlands (FLC); 1♂, West Malaysia, Pahang, Cameron Highlands (JDC); 1♀, West Malaysia, Pahang, Cameron Highlands, V.1998 (ADC); 2♂♂, West Malaysia, Pahang, Cameron Highlands (TTC); 1♂, West Malaysia, Pahang, Cameron Highlands, II.1978 (GDC); 1 ex., West Malaysia, Pahang, Cameron Highlands, Gunung Jasar, 15.V.1993 (NDC, ref. code: 3539); 1 ex., West Malaysia, Pahang, Cameron Highlands, Gunung Jasar, 15.V.1994 (NDC, ref. code: 3540); 1 ex., West Malaysia, Pahang, Cameron Highlands, env. vill. Batu, 590 m., 5-15.V.2009 (JDC); 1♂, West Malaysia, Pahang, Tanah Rata, 2-8.IV.2008 (JDC); 1♀, West Malaysia, Pahang, Tanah Rata, Cameron Highlands, 1500 m., VI.2011 (SIC); 1♀, idem, VIII.2011 (SIC); 1♂, West Malaysia, Pahang, Tanah Rata, Cameron Highlands, 1200 m., III.2013 (SIC); 1 ex., West Malaysia, Pahang, Bukit Fraser, 1524 m., 10.V.1994, leg. P. Schmit (NDC, ref. code: 498); 1♂, West Malaysia, Pahang, Fraser's Hill, Silverpark Resort Hotel, 1300 m., 22.III-1.IV.2013 (ADC); 1 ex., West Malaysia, Pahang Lubuk Ku, Kuala Lipis, 13.V.1994, leg. P. Schmit (NDC, ref. code: 501); 1♂, West Malaysia, Pahang, Genting Highlands, XII.2013 (ADC); 1♂, West Malaysia, Pahang, Genting Highlands, V.2005 (JDC); 1♀, West Malaysia, Pahang, Genting Highlands (JDC); 1♀, West Malaysia, Perak, II.1978 (GDC); 1♂, West Malaysia, Perak, 1985 (GDC); 2♀♀, West Malaysia, Perak, II.1991 (GDC); 1♀, West

Malaysia, Perak, Taiping, III.1975 (GVMC); 3♂♂, 1♀, West Malaysia, Perak, Taiping, V.1977 (JDC); 1♂, West Malaysia, Perak, Taiping, III.1978 (JDC); 1♂, West Malaysia, Perak, Taiping, II.1980, ex coll. U. Paukstadt (ADC); 1♂, West Malaysia, Perak, Taiping, 6.V.1981, ex coll. U. Paukstadt (ADC); 1♂, West Malaysia, Perak, Taiping, V.1982, leg. K. C. Liew (GDC); 1♂, West Malaysia, Perak, Taiping, 1985 (GVMC); 1♂, 1♀, West Malaysia, Perak, Bukit Larut, env. Taiping, Maxwell Hill, III-IV.1995, at light trap (GVMC); 1♂, West Malaysia, Perak, Tapah Hills, IV.2000 (RVC); 1♂, West Malaysia, Perak, Tapah Hills, VII.2015 (ADC). **Indonesia:** 1♂, Indonesia, N. Sumatra Island, Medan, VII. [without date], ex coll. Le Moult (RBINS); 1♂, Indonesia, N. Sumatra Island, Medan, 15.VII.1910, ex coll. Desbrocher (RBINS); 1♂, Indonesia, N. Sumatra Island, East Aceh, VII.1996 (ADC); 2♂♂, 1♀, Indonesia, N. Sumatra Island, Pematangsiantar, III-1994 (JBC); 1♂, Indonesia, N. Sumatra Island, Mt. Barus, III.2016 (CRC); 1♀, Indonesia, N. Sumatra Island, Sidikalang, III.2016 (CRC); 2♂♂, 1♀, Indonesia, N. Sumatra Island, Mt. Singkut, III.2016 (CRC); 1♂, Indonesia, N. Sumatra Island, Mt. Intan, env. vill. Suryan, 1100-1300 m., V.2006 (JDC); 1♀, Indonesia, N. Sumatra Island, province Nanggroe Aceh Darussalam, Kabupaten Aceh Tengah, street Takengon-Isaq, 17.3 km off Takengon, 1796 m., 04°31’57.1“ N-096°50’51.0 E, 31.III-1.IV.2008, at mv/uv light, leg. U. & L. H. Paukstadt (ADC); 1♂♀, Indonesia, N. Sumatra Island, province Nanggroe Aceh Darussalam, Kabupaten Aceh Tengah, street Takengon-Isaq, 17.3 km off Takengon, 1796 m., 04°31’57.1“ N-096°50’51.0 E, 31.25-26.IV.2008, at mv/uv light, leg. U. & L. H. Paukstadt (ADC); 3♂♂, 2♀♀, Indonesia, N. Sumatra Island, province Nanggroe Aceh Darussalam, Kabupaten Aceh Tengah, Kec. Celala, street Uning / Beutong, 38.1 km off Beutong, 1549 m., 04°30’59.5“ N-096°36’59.5 E, 27-28.II.2009, at mv/uv light, leg. U. & L. H. Paukstadt (2♂♂, 3♀♀, ADC & 1♀, FLC); 1♀, Indonesia, N. Sumatra Island, province Nanggroe Aceh Darussalam, Kabupaten Aceh Tengah, street Takengon-Isaq, 21.9 km off Takengon, 1766 m., 04°31’18.4“ N-096°51’27.4 E, 23-24-28.II.2009, at mv/uv light, leg. U. & L. H. Paukstadt (ADC); 1♂, Indonesia, C. Sumatra Island, Mt. Kerinci, IV-V.2005 (JDC); 1♀, Indonesia, C. Sumatra Island, Mt. Talang, VII.2002 (JDC); 1♂, Indonesia, C. Sumatra Island, Mt. Talang, V.2004 (JDC); 1♂, Indonesia, C. Sumatra Island, Mt. Talang, III-IV.2005 (JDC); 1♂, Indonesia, S. Sumatra Island, Mt. Dempo, III.2013 (ADC); 1♂, 2♀♀, Indonesia, S. Sumatra Island, env. Kota Bumi, I.2007 (AWC). **Singapore:** 1♂, Singapore, VI.1979, ex coll. U. Paukstadt (ADC) **(new record)**.

Size. **–** 41,4-83,1 mm (size previously recorded, see the Cerambycidae Database TITAN, accession date: 2.IV.2021), recorded in our samples: 41-81 mm (n = 41 exs); males: 68.8 ± 9.9 mm., females: 63.2 ± 8.7 mm.

Flying period and altitude preference. – Mainly from February to August (with a single data from December); altitude preference from 600 to 1800 meters based on the data set we examined.

Host Plant. **–** unknown

Distribution. **–** Indonesia (Sumatra: north, central and southern parts), Singapore (**new record**), West Malaysia (states of Pahang and Perak).

***Aegosoma giganteum ruficolle* ssp. nov**. (figs 4, 5, 6b, 7b, 8b & 9)

Material studied. **– Holotype** ♂: E. Malaysia, Borneo, Sabah state, Mts Trus-Madi, III.2004, leg. S. Bosuang, *ex* coll. ADC, sera déposé au RBINS (I.G.: 34.304). **Allotype** ♀: E. Malaysia, Borneo, Sabah state, Mts Crocker range, Keningau, V.1993, *ex* coll. ADC, sera déposée au RBINS (I.G.: 34.304). **Paratypes**: all from Borneo island, East-Malaysia, Sabah State: 1 ♀, Crocker Range, 15.IV.1995, leg. S. Bosuang (ADC); 1 ♂, Crocker Range, 23.IV.1995, leg. S. Bosuang (ADC); 1 ♂, Crocker Range, 16.IV.1999, leg. local coll. (DJHC); 1 ♀, Crocker Range, 01.VIII.2004, leg. S.

Bosuang (ADC); 1 ♀, Crocker Range, 22.V.2005, leg. S. Bosuang (ADC); 1 ♂, Crocker range, VI.2005, leg. S. Bosuang, (ADC); 1 ♂, Crocker Range, 22.VI.2005, leg. S. Bosuang (ADC); 1 ♂, 1 ♀, Crocker Range, 6.V.2006, leg. local coll. (GDC); 2 ♂♂, Crocker Range, 15.V.2006, leg. S. Bosuang (ADC); 1 ♂, Croker Range, IX.2007 (JBC); 1 ♀, Crocker Range, 1200 m., 22.IX.2014, leg. S. Bosuang (ADC); 1 ♀, Crocker Range, 1100 m., 27.IX.2014, leg. S. Bosuang (ADC); 1 ♀, Crocker Range, IV.2016, leg. S. Bosuang (ADC); 1 ♀, Crocker Range, Kipandi park, 24-30.VII.2014, leg. S. Bosuang (ADC); 1 ♂, Crocker Range, Kipandi park, 24.VIII.2014, leg. S. Bosuang (XGC); 1 ♀, Crocker Range, Kipandi park, 700 m., 5.IX.2014, leg. S. Bosuang (ADC); 1 ♂, Keningau, 10.VIII.1986, leg. local coll. (JDC); 1 ♂, Keningau, V.1990, leg. local coll. (GDC); 1 ♂, 1 ♀, near Keningau, V.1997, leg. local collector (TTC); 1 ♂, Keningau, VI.2007, leg. local collector (TTC); 1 ♂, 3 ♀♀, Keningau, VI.2009, leg. local collector (TTC); 1 ♂, Keningau, 7.VII.2011, leg. A. Klimenko (TTC); 1 ♂, 1 ♀, Keningau, 1160 m., 24.III.2012, leg. A. Klimenko (SIC); 1 ♀, Kuamut, III.2016, leg. S. Bosuang (ADC); 1 ♂, Mt Trus Madi, V.1996 (JBC); 1 ♂, Trus Madi, 13.III.1998, leg. local coll. (JDC); 1 ♂, Mt Trus Madi, VII.2003 (CRC); 1 ♂, Mt Trus Madi, 12.III.2004, leg. S. Bosuang (ADC); 1 ♂, Mt Trus Madi, 20.III.2004, leg. S. Bosuang (ADC); 1 ♀, Mt. Trus Madi, 14.III.2004, leg. local coll. (GDC); 2 ♂♂, Mt Trus Madi, 19.III.2005, leg. S. Bosuang (ADC); 1 ♂, Mt Trus Madi, 10-21.V.2005, leg. S. Bosuang (ADC); 1 ♂, Mt Trus Madi, 20-21.V.2005, leg. S. Bosuang (ADC); 1 ♀, Mt Trus Madi, 2-8.IV.2006, leg. S. Bosuang (ADC); 1 ♂, Trus Madi, 10.IV.2007, leg. local coll. (GDC); 1 ♀, Trus Madi, 1200 m., V.2007, leg. local coll. (JDC); 1 ♀, Mt. Trus Madi, 3.V.2007, leg. local coll. (GDC); 1 ♀, Trus Madi, 1200 m., 13-26.V.2007, leg. local coll. (JDC); 1 ♂, Mt. Trus Madi, V.2008, (JBC); 2 ♀♀, Mt. Trus Madi, 1500 m, V.2008, (JBC); 1 ♂, Mt Trus Madi, VI.2009 (CRC); 1 ♂, Mt Trus Madi, VII.2009, leg. S. Bosuang (ADC); 1 ♂, Trus Madi, 10.IV.2010, leg. local coll. (GDC); 1 ♂, Trus Madi, VI.2011, leg. local coll. (JDC); 1 ♀, Mt Trus Madi, IV.2012 (EKC); 2 ♀♀, Mt Trus Madi, IV.2013 (CRC & SIC); 1 ♂, Trus Madi, 1.V.2013, leg. local coll. (GDC); 1 ♂, Trus Madi, VI.2015, leg. local coll. (JDC); 1 ♀, Pensiangan, 6.V.2001, leg. S. Bosuang (ADC); 1 ♀, Ranau, 9.III.1997, leg. S. Bosuang (ADC); 1 ♂, Ranau, III.2004 (ADC); 1 ♂, Ranau, 18.III.2004, leg. local coll. (GDC); 1 ♂, 1 ♀, Ranau, 10.V. 2004, leg. S. Bosuang (ADC); 1 ♂, Ranau, 4.IV.2006, III.2004, leg. S. Bosuang (ANPC); 1 ♂, Ranau, 10.III.2006, leg. local coll. (GDC); 1 ♂, 1 ♀, Ranau, 4.VI.2006, leg. S. Bosuang (ADC); 1 ♂, Ranau, 6.V.2007, leg. local coll. (DJHC); 1 ♀, Ranau, 1000 m., 13.III.2012, leg. S. Bosuang (ADC); 1 ♀, Sipitang, 14.III.2003, leg. local coll. (GDC); 1 ♂, Sipitang, 3.II.2003, leg. local coll. (GDC); 1 ♂, Tawau, VIII.1996 (GVMC); 1 ♀, Tawau, 24.V.1998 (GVMC); 1 ♀, Tawau, 26.III.2004, leg. local coll. (DJHC); 1 ♂, 1 ♀, Tawau, 1.VIII.2004, leg. S. Bosuang (ADC); 1 ♀, Tawau, 4.VII.2005, leg. S. Bosuang (ADC).

Description. – Male (figs 4a & b, 6b, 7b, 8b & 9): *Habitus* quite similar to *A. giganteum* but a little more slender and of a smaller size on average. Lighter general colouring, especially on the head, pronotum and antennas of a fairly intense brown-red. The light brown elytra are bordered with black with a slightly translucent appearance towards the apex. The legs are thinner with the femurs of a more sustained reddish brown.

Head: reddish mandibles punctuated over 2/3 of the length, the last third smooth, slightly offset from the curve of the outer edge. Labrum rounded and ending in a tuft of golden hairs, frons and vertex of red colour, densely punctuated and covered with a short hairiness, clear central furrow starting in the axis of the antennal bulbs and going down to the anterior edge of the pronotum. Eyes kidney-shaped with the lower bulb about twice as wide as the upper.

Antennae of 11 articles exceding the elytral apex of about 3 articles, the first 6 articles reddish-brown to reddish-orange, the last 5 articles black, strongly granular scape with some vermiculation, upper edge rounded off gradually towards the base, 2nd article with a slight offset to article 3, articles 3 to 5 heavily vermiculated with the inner and outer edges denticulated but more strongly on the inner side, length of articles 4 and 5 combined greater than that of the third, articles 6 to 10 smooth,

punctuated with a progressively decreasing length, the 11th longest being apparently formed by the fusion of 2 articles.
Pronotum finely granular, covered with short, fairly dense hair except in the disc area, anterior edge straight, posterior edge rounded in the middle third, lateral edges rounded with the anterior corners more effaced in the female giving a more triangular appearance to the pronotum.
Scutellum rounded, reddish with black border.
Elytra elongated, wider at the level of the basal quarter, finely granular in appearance and with the apex armed with a spine. Costae not very prominent, the 1st joining the second at 3/4 of the length, the 2nd joining the sutural border just before the apex.
Legs reddish-brown, femurs and tibia granular (more strongly on the forelegs), tibia moderately curved outwards with fairly dense hair.
Sternites dark reddish-brown marbled with blackish areas, irregularly punctuated and with sparse hairiness, metepisternum triangular towards the rear with more abundant golden hairiness, prosternal process widened at the apex.

The description of the female (Figs 5 a & b) is identical to that of the male except for the characteristics and ratio of the antennal articles (thinner and less denticulated), and the shape of the last urosternite generally more elongated and narrowed in the lower half with the tip more indented.

Size (measured from the tip of the mandible to the elytral apex). – Males: 48 ± 7.9 mm. (holotype: 44 mm), females: 52.3 ± 6.6 mm (allotype: 54 mm). Number of specimens measured: 49 with minimum size: 35 mm and maximum size: 64 mm.

When we were starting this study, we observed that the size of the *A. giganteum* from Sabah seems to be smaller than the typical ones from Malaysia, Singapore and Sumatra island in Indonesia.

To determine whether size range of the new subspecies described in this study differs significantly from that of the generic species, we performed means' comparisons between *A. giganteum* s. str. and *A. giganteum* spp. *ruficolle* ssp. nov., (i) with specimens from both sexes, and (ii) by sex. The numbers of specimens sampled was of 41 exs for *A. giganteum* s. str. and of 49 exs for *A. giganteum* spp. *ruficolle.*

We first checked the normality of the data (Shapiro-Wilk test) and the homogeneity of the variances (Bartlett test). According to the results of these tests, we either performed a Student's t test (parametric test) or a Wilcoxon rank sum test (non-parametric test) for means' comparison.

Our results indicate that, when individuals of both sexes are considered, the mean body size of *A. giganteum* s. str. (mean ± s.d. = 66.8 ± 9.8 mm) is **significantly larger** than that of *A. giganteum* spp. *ruficolle* (50.3 ± 7.5 mm) (Wilcoxon rank sum test, $W_{89} = 1759$, p-value < 0.001; Fig. 2a). The results are similar when the sexes are inspected separately. For females, mean body sizes (± s.d.) = 63.2 (± 8.7) mm and 52.3 (± 6.6) mm for *A. giganteum* s. str. and *A. giganteum* spp. *ruficolle*, respectively (Student t test, $t_{40} = 4.4$, p-value < 0.001; Fig. 2b left). For males, mean body sizes (± s.d.) = 68.8 (± 9.9) mm and 48 (± 7.9) mm for *A. giganteum* s. str. and *A. giganteum* spp. *ruficolle*, respectively (Wilcoxon rank sum test, $W_{49} = 557$, p-value < 0.001; Fig. 2b right).

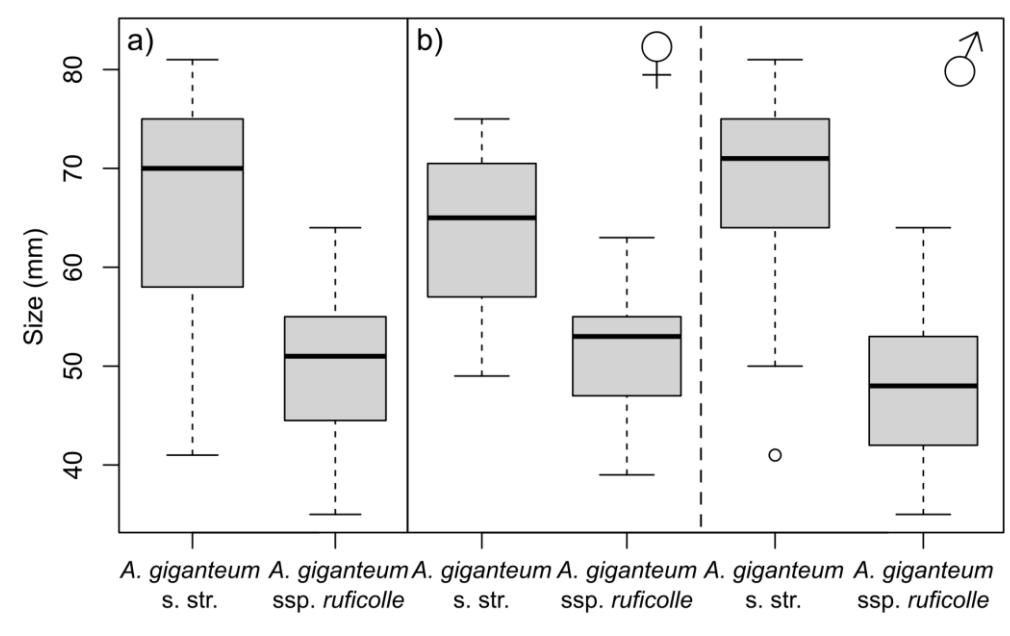

Fig. 2: Size comparison between *A. giganteum* s. str. and *A. giganteum spp. ruficolle* ssp. nov. **a**) both sexes considered, **b**) by sex: left: females, right: males.

Variability observed in the paratype series.

The shape of the pronotum may be more or less rounded in some males and have a more triangular appearance. The colouring of the head, pronotum and first antennal articles may vary from reddish-brown to reddish-orange.

Comparison with closely related taxa in the genus Aegosoma and / or occurring in Borneo island:

This subspecies is obviously very close to the generic species *A. giganteum* Lansberge, 1884 (Fig. 6a, 7a & 8a), but can easily be distinguished by the following characters:

- The more slender habitus and smaller size on average (see table Fig. 2)
- The color of antennal articles, head and pronotum more reddish and sometimes even bright red
- The upper edge of the scape is progressively rounded towards the base, whereas in *giganteum s. str*. it is almost at right angles
- The pronotum is more transverse and less rounded than in *giganteum s. str*.

The new subspecies can also be compared with another described species from the Trus Madi region, *A. musaamani* Drumont, Do & Bosuang, 2013 (Fig. 8c) with which it coexists, but is easily differentiated by the following characteristics:

- The light brown colour of the elytra with a black margin (lighter and partialy translucent in *musaamani* with a concoloured margin),
- Reddish and strongly denticulated antennal segments (yellowish and thinner in *musaamani*),
- The pronotum is reddish-brown and almost hairless (brown, smaller with white hair in *musaamani*),
- The elytral apex has a sharp spine (rounded in *musaamani*).

Finally, it could be confused with another old described species from Sabah, *A. osseum* Aurivillius, 1897 (Fig. 8d), with which the new subspecies also coexists in the Trus Madi region and differs from the former by the following characteristics:

- The light brown colour of the elytra with a dark border (whitish with an opaque appearance and concoloured borders in *osseum*).
- The 3rd antennal article very denticulated on the internal side (less denticulation in *osseum*),
- Reddish-brown coloration of the head, pronotum and first antennal articles (dark brown in *osseum*).

Etymology. – This subspecies is named *ruficolle* in reference to the reddish colour of the forebody.

Flying period and altitude preference. – From February to September; altitude preference from 700 to 1200 meters based on the dataset we examined.

Distribution. – The typical series of *A. giganteum* ruficolle ssp. nov. is defined from the Sabah state in the Malaysian part of Borneo where it is known from several localities (Fig. 3): Mt Crocker Range (including Kipandi park), Keningau, Kuamut, Mt Trus Madi, Pensiangan, Ranau, Sipitang, Tawau. This new sub species will probably still be found in other regions and localities bordering Sabah.

Fig. 3: ⯁ Distribution of *Aegosoma giganteum ruficolle* ssp. nov. in Sabah state, East Malaysia, Borneo island.

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Illustration plates

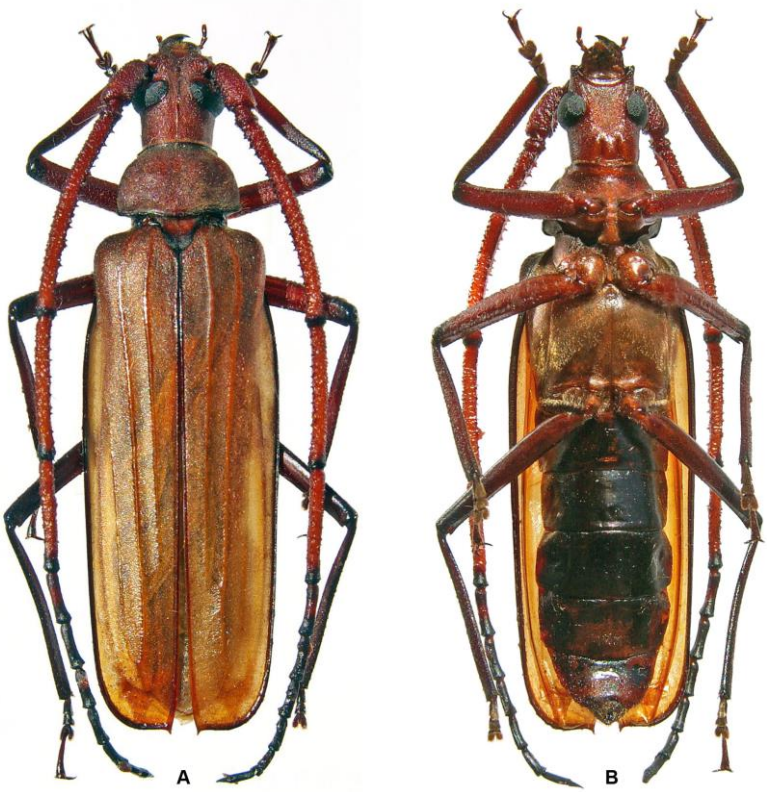

Fig. 4: ***Aegosoma giganteum ruficolle*** **ssp. nov.**, holotype ♂, 44 mm deposited in RBINS (Borneo, E. Malaysia, Sabah, Mt Trus Madi): **a**) habitus, dorsal view; **b**) habitus, ventral view.

Fig. 5: ***Aegosoma giganteum ruficolle*** **ssp. nov.**, allotype ♀, 54 mm, deposited in RBINS (Borneo, E. Malaysia, Sabah, Keningau): **a**) habitus, dorsal view; **b**) habitus, ventral view.

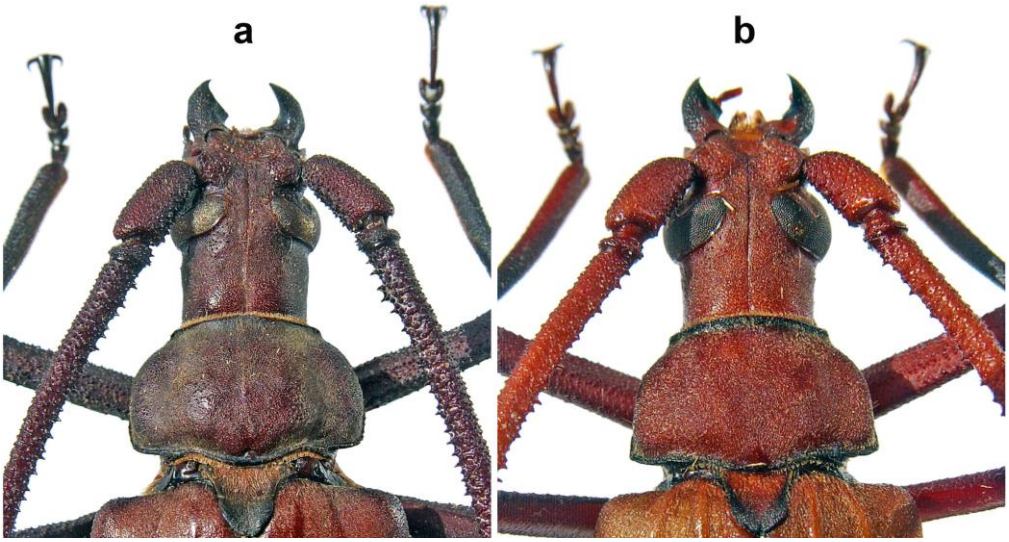

Fig. 6: *Aegosoma spp*.: magnification of the front body: **a**). *A. giganteum* male, **b**) *A. giganteum ruficolle* ssp. nov. male

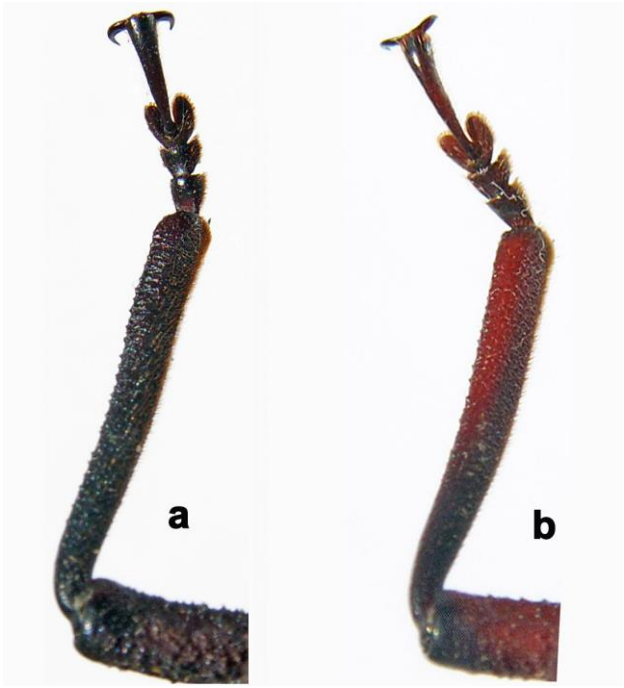

Fig. 7: *Aegosoma spp*. comparative view of anterior tibiae: a) *A. giganteum* male, **b**) *A. giganteum ruficolle* ssp. nov. male.

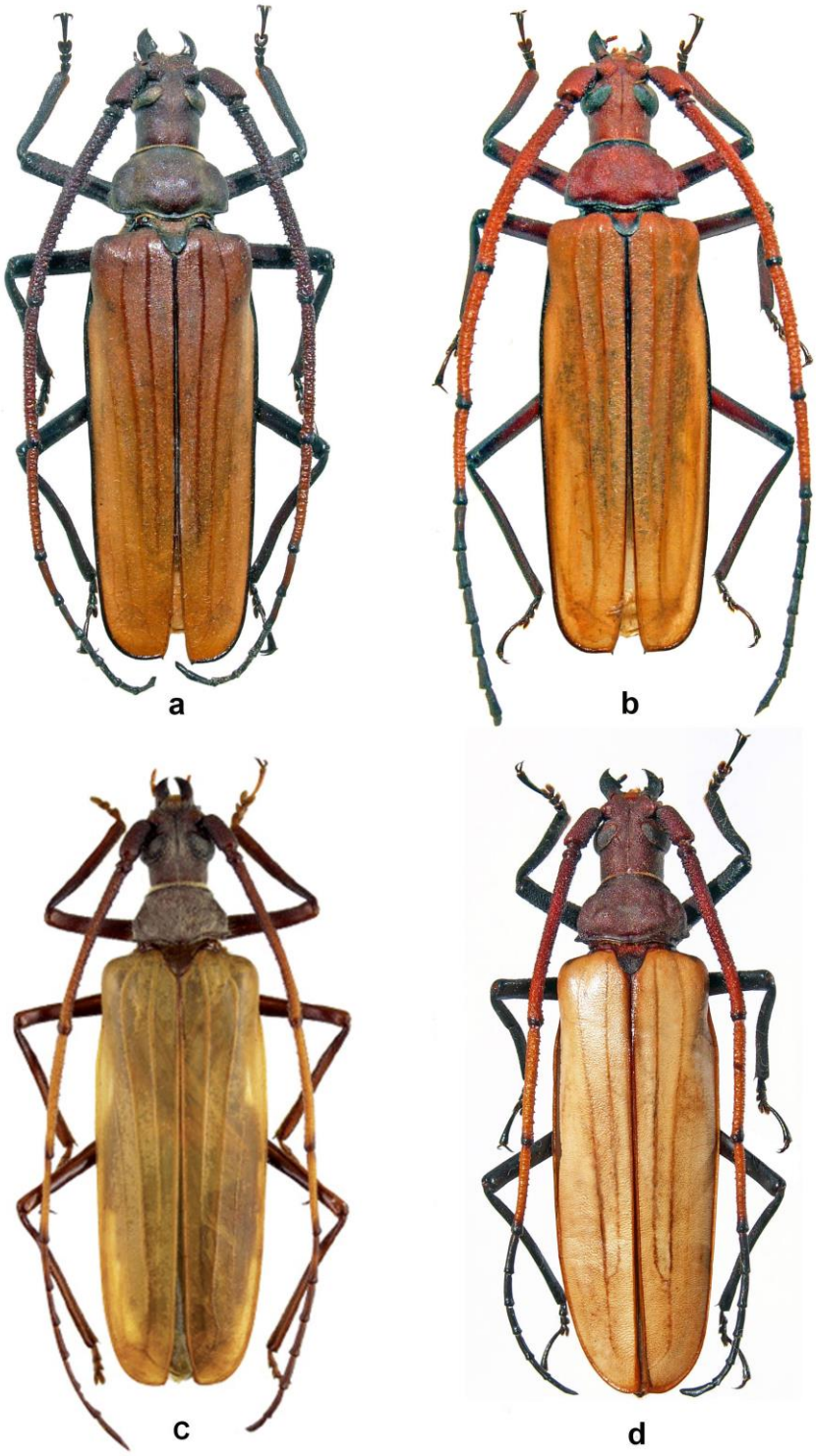

Fig. 8: ***Aegosoma spp.*** **♂, comparative dorsal view: a**). *A. giganteum* Lansberge, 1884, 58 mm (Borneo, E. Malaysia, Sabah, Trus Madi, *in* CRC); **b**). *A. giganteum ruficolle* ssp. nov., paratype ♂, 50 mm (Borneo, E. Malaysia, Sabah, Trus Madi, *in* CRC); **c**). *A. musaamani* Drumont, Do & Bosuang, 2013, 49 mm (Borneo, E. Malaysia, Sabah, Trus Madi, *in* RBINS); **d**). *A. osseum* Aurivillius, 1897, 55 mm (Borneo, E. Malaysia, Sabah, Trus Madi, *in* CRC).
(Photos 4-8: C. RIPAILLE, except 8c courtesy N. MAL).

Fig. 9: ***Aegosoma giganteum ruficolle*** **ssp. nov.,** ♂ in nature in Sabah, Crocker range, altitude 1100 m., on night time (Photo: S. BOSUANG).

Fig. 10: view of Crocker Range (Photo: S. BOSUANG).