

The genus *Autocrates* THOMSON in China: occurrence and geographical distribution of species (Coleoptera: Trictenotomidae)

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Abstract

The distribution of the genus *Autocrates* THOMSON in China is studied in the present paper. Maps of the distribution of the genus and species in China are given, and some biogeographical conclusions proposed. The species *Autocrates aeneus* (WESTWOOD) represents a new record for China, which is the only country from which all of the four species included in this genus are reported. The body length of specimens of each species was taken and analyzed. Illustrations of heads and pronotums of male and female of all species are also provided.

Résumé

Dans le présent article, la distribution du genre *Autocrates* THOMSON est étudiée au niveau de la Chine. Des cartes de distribution pour le genre et pour les espèces présentes sont données, ainsi que des conclusions biogéographiques. L'espèce *Autocrates aeneus* (WESTWOOD) est ici signalée pour la première fois de Chine, seul pays dans lequel les quatre espèces incluses dans le genre peuvent être trouvées. La longueur du corps a été mesurée pour tous les exemplaires étudiés et analysée. Des illustrations des têtes et des pronotum des deux sexes sont fournies pour chaque espèce du genre *Autocrates* THOMSON.

Key words: Coleoptera, Trictenotomidae, *Autocrates*, *A. aeneus*, new record, China, geographical distribution, head and pronotum illustrations.

Introduction

The Trictenotomidae is a small family comprising 14 described species in 2 genera: *Autocrates* THOMSON, 1860 and *Trictenotoma* GRAY, 1832 (TELNOV, 1999; DRUMONT, 2006).

Until the beginning of the twenty-first century, this family was placed in the superfamily Tenebrionoidea after having been previously considered as Lucanidae, Cerambycidae, Pyrochroidae or even Cucujidae (LAMEERE, 1916; ARNETT, 1971; WATT, 1987; POLLOCK, 1994; LAWRENCE & NEWTON, 1995). The study of

FERRER & DRUMONT (2003) showed that this family also shows some affinities with Cerambycidae, and could be regarded as belonging to the superfamily Chrysomeloidea.

Adults of Trictenotomidae are quite similar to some Cerambycidae and Lucanidae, but they can be easily distinguished from the latter families by the morphology of the tarsi and the tarsal formula. The larvae of Trictenotomidae live in wood and show some resemblances to those of Pyrochroidae and Cerambycidae.

The genus *Autocrates* was described by THOMSON (1860), with the type species *Trictenotoma aenea* WESTWOOD, 1846, the type locality located in Northern India. VUILLET described a further two species: *A. oberthueri* VUILLET, 1910 from Yunnan province in China and *A. vitalisi* VUILLET, 1912 from Northern Vietnam. In 2006, DRUMONT described *A. maqueti* from Guizhou and Guangxi provinces in China. The genus *Autocrates* THOMSON can be distinguished by the following characters: the presence of a posterior tooth of the prothorax, head always narrower than prothorax, flattened and prognathous; eyes large, vertical, fine-faceted, and notched on frontal edge near base of antennae; mandibles formidable, prominent to front, with more or less dense rugulose surface; antennae with 11 segments, powerful and long, apical three segments serrated. Scutellum broadly rounded apically. Pubescence lower, and less than in the genus *Trictenotoma* GRAY, and sometimes body surface with shining metallic lustre (POUILLAUDE, 1914; LAMEERE, 1916; DESCARPENTRIES & VILLIERS, 1973; DRUMONT, 2006).

The occurrence of the genus *Autocrates* THOMSON in China was poorly studied in the last decades and, according to DRUMONT (2006), three species are known from this country: *A. oberthueri* VUILLET, *A. vitalisi* VUILLET and *A. maqueti* DRUMONT. In the present paper we record *Autocrates aeneus* (WESTWOOD) from

China for the first time, which means that all four *Autocrates* species are present in China. For this study, 208 *Autocrates* specimens from China were studied. Illustrations of heads and pronotum of male and female of all species are also provided for the first time and distribution maps including new localities in China are presented. Body length measurements (minimum, maximum, average) are given and analyzed. Some biogeographical conclusions are also proposed.

Material and methods

Specimens examined for this paper are deposited in:

- IZAS: Institute of Zoology, Chinese Academy of Sciences, Beijing, China
 IRSNB: (RBINS) Royal Belgian Institute of Natural Sciences, Bruxelles, Belgium
 BMNH: Natural History Museum (British Museum of Natural History), London, U.K
 CAU: China Agricultural University, Beijing, China
 ADC: collection Alain Drumont, Bruxelles, Belgium
 ZCHC: collection Zhan Chenghui, Guangdong, China
 DMC: collection Daniel Maquet, Seraing, Belgium

Body length is measured from the apex of mandibles to the apex of elytra. Maps in this paper are made with Arcview GIS 3.2. Specimen localities on the map are indicated according to the longitude and latitude of collecting counties of China.

Illustrations of head and pronotum of males and females of *Autocrates* species were based on the specimens used for the color plates in DRUMONT (2006).

The genus *Autocrates* THOMSON in China

Autocrates THOMSON, 1860, Musée scientifique ou recueil d'histoire naturelle, Paris: 28.

The genus *Autocrates* THOMSON is distributed in China, Vietnam, Laos, Cambodia, Thailand, Myanmar, India (Sikkim, Assam, Punjab, Darjeeling), Nepal, Bhutan and Malaysia (DESCARPENTRIES & VILLIERS, 1973; TELNOV, 1999; DRUMONT, 2006; DRUMONT & LI, 2007).

In China where all species are represented, the genus *Autocrates* THOMSON has a distribution range extending from 95.32°E to 117.65°E in longitude for a latitude from 18.73°N to 33.46°N (Fig. 1), and occurs in altitude varying from 400 to 3500 metres.

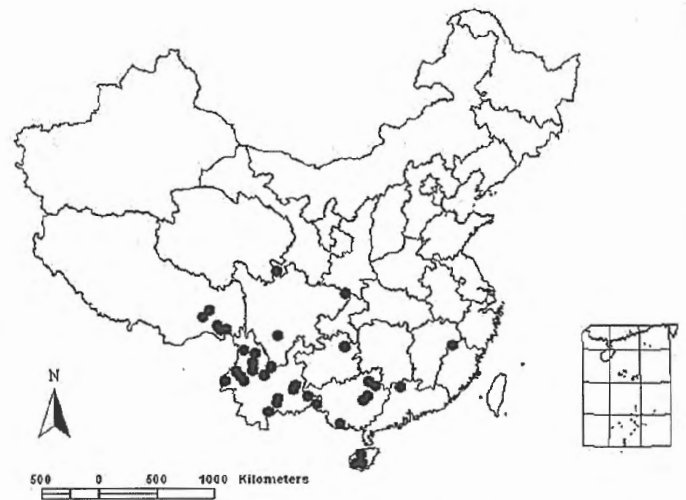


Fig. 1 — Geographical distribution map of genus *Autocrates* in China

1. *Autocrates aeneus* (WESTWOOD, 1846) **New record to China**
 (Figs 2, 7 and 8)

Trictenotoma aenea WESTWOOD, 1846, Annals and Magazine of Natural History, 18 (120): 353.

Autocrates aeneus THOMSON, 1860, Musée scientifique ou recueil d'histoire naturelle, Paris: 28.

MATERIAL EXAMINED: China: Xizang: Linzhi District, Zayü County (察隅), Shang Zayü, 1960 m, 21.VIII.2005, 1 ♀, leg. Xiaolin Chen (IZAS); Mêdog County (墨脱), 1084 m, 22.VIII.2006, 2 ♀♀, leg. Ming Bai & Zhishun Song (IZAS).

DISTRIBUTION: China (Xizang), India (Sikkim, Assam, Punjab, Darjeeling), Nepal, Bhutan.

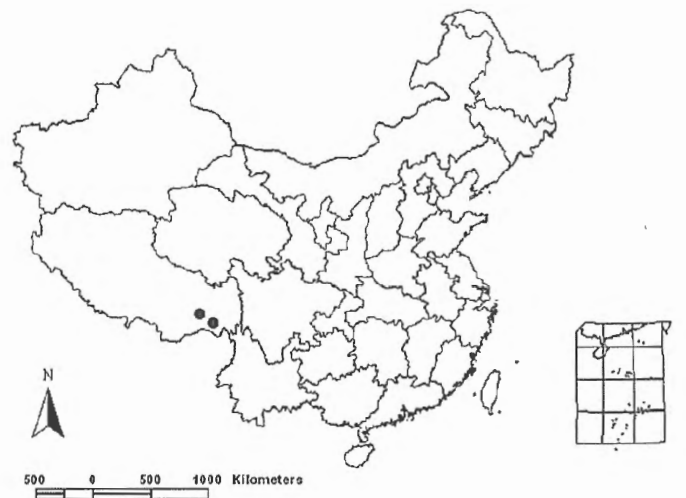


Fig. 2 — Distribution of *Autocrates aeneus* (WESTWOOD) in China

NOTES: The discovery of *A. aeneus* in Xizang province of China extends the known distribution of this species to the east in continental Asia.

2. *Autocrates maqueti* DRUMONT, 2006
(Figs 3, 9 and 10)

Autocrates maqueti DRUMONT, 2006, Les cahiers Magellanes, 61: 4.

MATERIAL EXAMINED: **China: Qinghai:** Jiuzhi county, Ningyou, 11-20.VII.2006, 2 ♂♂, 3 ♀♀ (ADC). **Guangxi:** Guilin, 20-23.VII.2004, 2 ♂♂ (PT in ADC). **Guizhou:** Sinan county, Xujiaba, 20.VII.2003, 1 ♂ (HT in IRSNB); Sinan county, Xujiaba, 11-28.V.2001, 1 ♀ (AT in IRSNB); Sinan county, Xujiaba, 11-28.V.2001, 1 ♂ (PT in IZAS); Sinan county, 20.VII.2003, 1 ♂ (PT in coll. DMC); same data, 2 ♂♂, 1 ♀ (PT in ADC); same data, 1 ♂ (PT in BMNH); Sinan county, Yanhe, 20.VII.2003, 1 ♀ (PT in ADC).

DISTRIBUTION: China (Qinghai, Guangxi, Guizhou).

NOTES: This endemic Chinese species, recently described from Guangxi and Guizhou provinces in southern China, has been now also found to occur in northern areas, in Qinghai province.

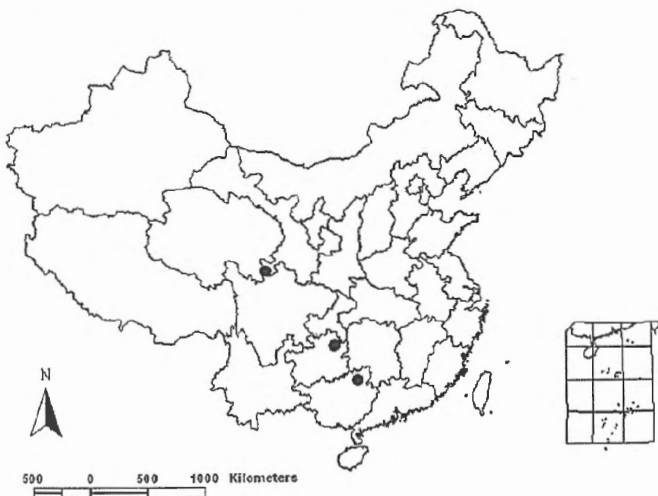


Fig. 3 — Distribution of *Autocrates maqueti* DRUMONT in China

3. *Autocrates oberthueri* VUILLET, 1910
(Figs 4, 11 and 12)

Autocrates oberthueri VUILLET, 1910, Bulletin de la Société entomologique de France, 19: 347.
= *Autocrates oberthueri* var. *diversus* Pic, 1920, L'Echange, Moulins, 36: 15.

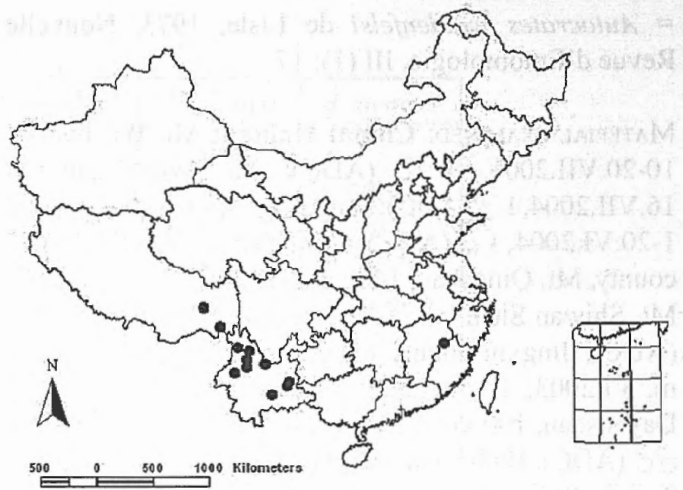


Fig. 4 — Distribution of *Autocrates oberthueri* VUILLET in China

MATERIAL EXAMINED: **China: Fujian:** Mt. Wujishan (武夷山), 650 m, 21.VII.1997, 1 ♂ (ADC); Mt. Wujishan (武夷山), 650m, 18.VII.1998, 1 ♂ (ADC); Mt. Wujishan (武夷山), 400 m, 18.VII.1998, 1 ♂ (BMNH). **Yunnan:** W., Hang-Kia-Pin (位于鸡足山北边), 400m, 1 ♂, 1 ♀ (ex. coll. Oberthur in IRSNB); E., Sse-Tsong (师宗), 2000 m, 2 ♂♂, 1 ♀ (ex. coll. Oberthür in IRSNB); S., Tche-Ping-Tcheou (石屏), 20 ♂♂, 2 ♀♀ (ex. coll. Oberthür in IRSNB); NW., Djo-Kou-La (位于永仁县), 1200 m, 13 ♂♂, 20 ♀♀ (ex. coll. Oberthür in IRSNB); env. Dali, VII.1995, 1 ♂, 1 ♀ (ADC); Bai Shui Dai, 2500 m, 4.VI.2004, 1 ♀ (ADC); Lijiang, Mt. YulongXueshan, 2000 m, VII.1995, 20 ♂♂, 1 ♀ (ADC); Weixi, 2200 m, 12-13.VI.2006, 1 ♀, leg. Jiri Klir (ADC); South of Yunnan, 5.V.1996, 1 ♂, 1 ♀ (ex coll. Sticher in ADC); Baoshan, VII-VIII.2006, 4 ♂♂, 4 ♀♀ (ZCHC); same data, 1 ♀ (IZAS). **Xizang:** Bomi county, Palung Zangbo (帕隆藏布), 2800 m, 25.VI.2004, 1 ♂ (ADC); Zayü Distr. (察隅), 3000-3500 m, VI.1999, 1 ♂, 1 ♀, leg. J. M. Bousquet (ADC).

DISTRIBUTION: China (Fujian, Yunnan, Xizang).

NOTES: Originally described from Yunnan province, this second Chinese species has been also found in Xizang and Fujian provinces which could suggest that this species may be present in the whole southern part of China.

4. *Autocrates vitalisi* VUILLET, 1912
(Figs 5, 13 and 14)

Autocrates vitalisi VUILLET, 1912, Insecta Revue, Rennes, 2: 297.

= *Autocrates waldenfelsi* de Lisle, 1973, Nouvelle Revue d'Entomologie, III (1): 17.

MATERIAL EXAMINED: **China:** **Hainan:** Mt. Wuzhishan, 10-20.VII.2001, 1 ♀ (ADC); Mt. Wuzhishan, 8-16.VII.2004, 1 ♂ (ADC); Sanya city, Mt. Jian-Feng-Ling, 1-20.VI.2004, 1 ♂ (ADC). **Guangxi:** env. Guilin, Xiling county, Mt. Qingshan, 1400 m, VII.2003, 2 ♀♀ (ADC); Mt. Shiwan Shan (十万大山), 600 m, 3.VII.1998, 1 ♀ (ADC); Jingxiu county (金秀), Mt. Dayaoshan, 1600 m, VI.2003, 1 ♀ (ADC); Jingxiu county (金秀), Mt. Dayaoshan, 100 km S.E. Liuzhou, 1200 m, IV.2005, 20 ♂♂ (ADC); Baihe, Nabo county (那坡), 5-11.VII.2006, 2 ♂♂, 29 ♀♀ (ADC & IRSNB). **Sichuan:** Wanyuan county, Mt. Hua-E-Shan, 25-28.V.2002, 1 ♂ (ADC); Miangniang (冕宁), Dmoshan, VII.2004, 2 ♂♂, 3 ♀♀ (ADC & IRSNB). **Yunnan:** Hongho (红河), VII.1996, 3 ♂♂ (ADC & IRSNB); Honghe, Mt. Wulaofeng, 2000 m, VII.2003, 1 ♀ (ADC); Simao Distr. Jiancheng county (江城), Haiming, Shimao (思茅), 20-29.VI.2005, 2 ♀♀ (ADC); Yaoan county, Sanfengshan, 2800 m, VII.2000, 1 ♂, 6 ♀♀ (ADC & IRSNB); Yingziang county (盈江), Tongbiguan, 2500m, 1 ♀ (ADC); Changlin (昌宁), Mt. Songzishan, 3000 m, VII.2000, 2 ♂♂, 5 ♀♀ (ADC); Baoshan, Longyang Distr. MangkuanXiang, Baihualing, 1560 m, 23.V.2006, 1 ♀, leg. Zhiliang Wang (CAU); Guangnan county, 13-19.VII.1993, 4 ♂♂, 14 ♀♀ (IZAS); Guangnan county, 10-20.VIII.1993, 4 ♂♂, 2 ♀♀ (IZAS); Baoshan, VII-VIII.2006, 8 ♂♂, 4 ♀♀ (ZCHC). **Guangdong:** Nanling, 10-20.VII.2006, 1 ♂, 1 ♀ (ZCHC); same data, 1 ♂ (IZAS). **Xizang:** Chayu county (察隅), Xia Chayu, 22-28.VI.2006, 1 ♂, 2 ♀♀ (IRSNB); same data, 2 ♀♀ (IZAS); same data, 4 ♂♂, 8 ♀♀ (ADC).

DISTRIBUTION: China (Guangdong, Hainan, Guangxi, Sichuan, Yunnan, Xizang), Vietnam, Laos, Cambodia, Thailand, Myanmar, Malaysia.

NOTES: Originally described based on a male collected in North-Vietnam, the species *A. vitalisi* Vuillet is now widespread in continental south-eastern Asia. In China, it is the most common *Autocrates* species and occurs in 6 provinces of this country.

Results and discussion

1. distribution patterns

The genus *Autocrates* THOMSON is mostly distributed in continental parts of the Oriental Region, mainly from Malaysia to Sichuan province in China. It can

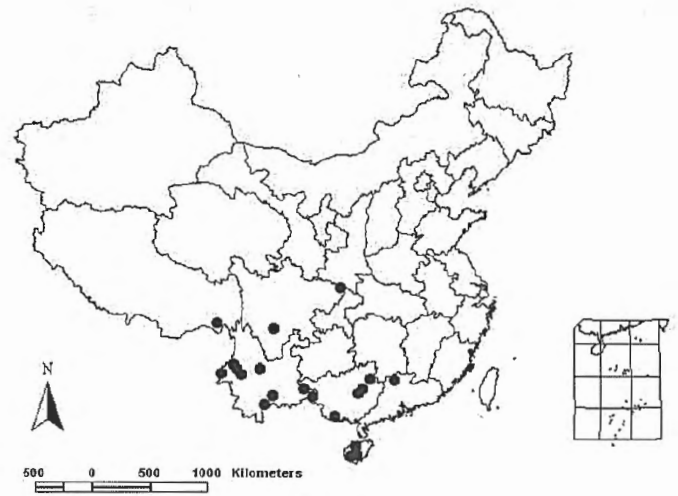


Fig. 5 — Distribution of *Autocrates vitalisi* VUILLET in China

be concluded that they inhabit in damp and seasonal forests of the tropical and sub-tropical belt. *Autocrates maqueti* seems to be an exception, with some specimens collected in Jiuzhi county (101.47°E, 33.46°N) of Qinghai province, which is located outside of Oriental Region and with annual mean temperature only 0.1 °C. This is very surprising and we can speculate that the species may have been transferred from Sichuan province through the Qing-Chuan highway (joining Qinghai province and Sichuan provinces).

Without considering the exception of *A. maqueti*, the genus *Autocrates* occurs mainly in southern China in latitude from 18.73°N (Sanya city of Hainan Province) to 32.07°N (Wanyuan County of Sichuan Province) and in longitude from 95.32°E to 117.65°E. The altitude range observed is from 400 to 3500 metres. According to the collecting records, the best collecting time for *Autocrates* is from April to August. As we observed, *Autocrates* beetles are attracted to light

South-western part of China (Yunnan, West of Sichuan) is the area where the genus *Autocrates* seems to be the best represented. We examined 2 species (*A. oberthueri* and *A. vitalisi*) with 118 specimens from Yunnan province, which accounts for 56.7% of the 208 specimens studied from China.

Considering the new record of *Autocrates aeneus* (WESTWOOD) for the Chinese fauna reported in this paper, China is the only country where all 4 species belonging to this genus occur, and at present *A. maqueti* and *A. oberthueri* are considered as endemic species.

These results may suggest that southern part of China could be regarded as the centre of origin and centre of dispersion of the genus *Autocrates* THOMSON.

Table 1 — Size data of *Autocrates* species (mm).

Species	<i>A. oberthueri</i>	<i>A. maqueti</i>	<i>A. vitalisi</i>	<i>A. aeneus</i>
Average size (males)	58.23	56.90	70.03	/
Average size (females)	57.17	57.40	70.36	69.33
STD (males)	10.10	4.56	8.91	/
STD (females)	7.09	5.77	6.21	2.52
Minimum value (males)	34	47	52	/
Maximum value (males)	76	63	88	/
Minimum value (females)	44	50	55	66
Maximum value (females)	70	64	83	71
Number of males studied	31	10	40	/
Number of females studied	35	5	84	3

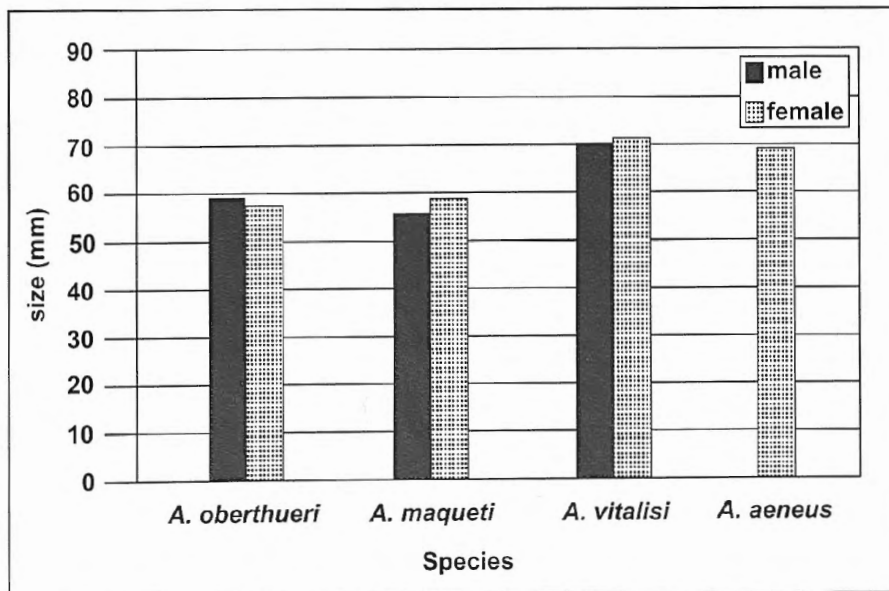
2. morphological characters

For our study, we have taken length measurements of 208 specimens from the apex of mandibles to apex of elytra. Data obtained were analyzed with Excel software. Results are presented in table 1 and figure 6.

The results show that *Autocrates* specimens are rather large beetles, and that in this genus sexual differences in size are not significant. *Autocrates vitalisi* VUILLET is the biggest species of the genus with an average size of around 70 mm for the series of the specimens observed, while the two endemic Chinese species, *A. maqueti* DRUMONT and *A. oberthueri* VUILLET, exhibit a smaller size with an average length less than 60 mm. The last species, *A. aeneus* (WESTWOOD), first reported from China in this paper seems to be classified near *A. vitalisi* VUILLET with an average size (based only on examination

of three females) slightly less than 70 mm.

Autocrates males have a series of mandible sizes which could, as was previously done with the beetle family Lucanidae, be divided into teleodont, mesodont / amphiodont, and priodont specimens. For example in *A. vitalisi*, we examined 40 males and 84 females, finding: teleodont specimens of 70-88 mm length, with a formidable mandible forming an angle of nearly 90 degrees; mesodont specimens of 62-70 mm length, with a large mandible forming an angle of about 60-80 degrees; priodont specimens of 52-62 mm length, with a medium sized mandible making a small angle, and hard to distinguish from the female mandible in dorsal view. In this case, the easiest way to identify male or female is to examine the last abdominal segment in the ventral view. If it shows an indentation in the middle part, it is a male; if it is simply rounded, it is a female.

Fig. 6 — Average size (with STD) of *Autocrates* species (mm.)

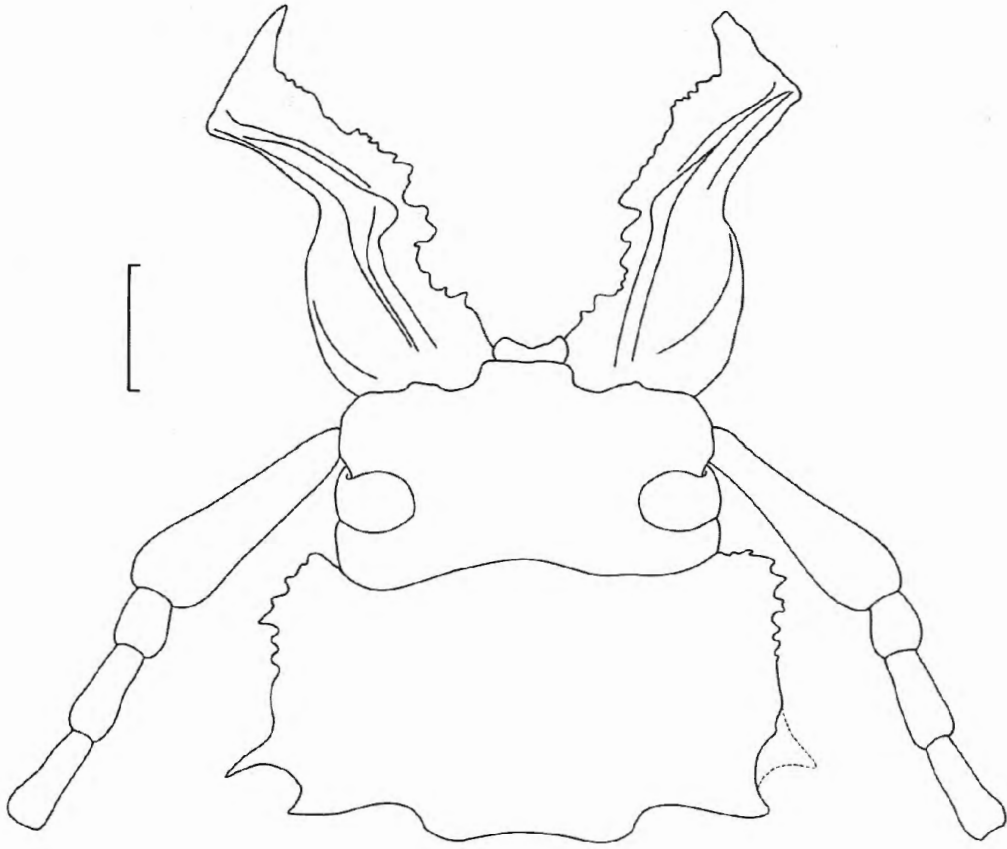


Fig. 7 — *Autocrates aeneus* (Westwood) male (scale: 0.5 cm.).

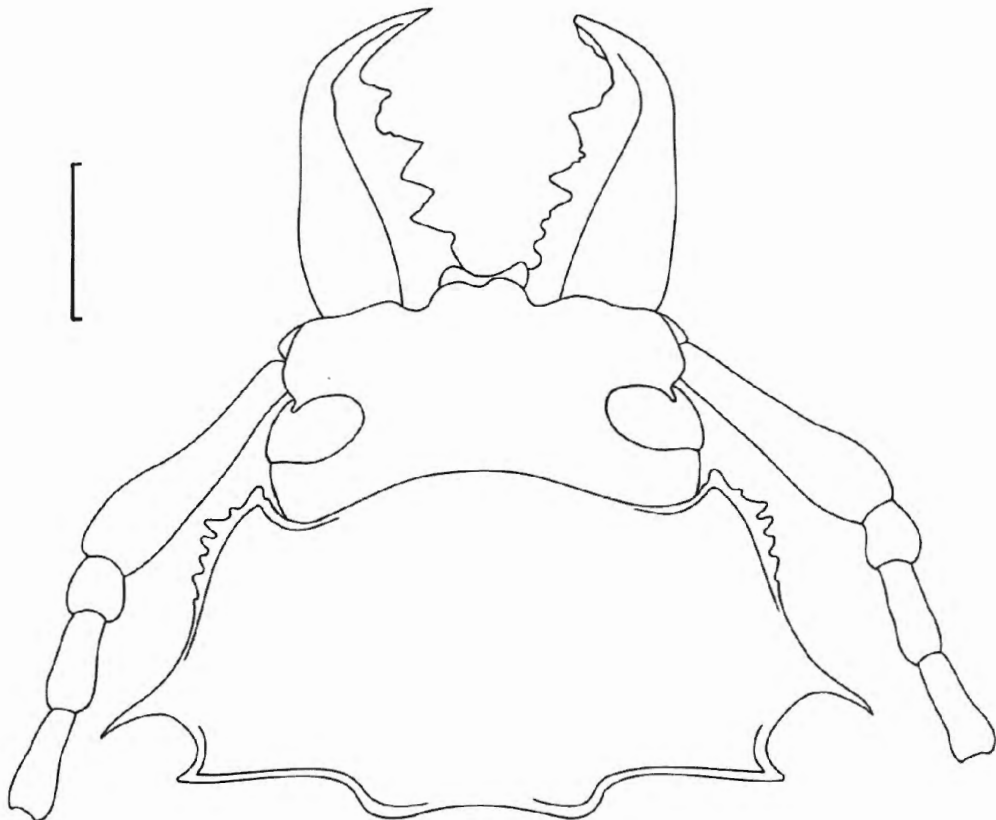


Fig. 8 — *Autocrates aeneus* (Westwood) female (scale: 0.5 cm.).

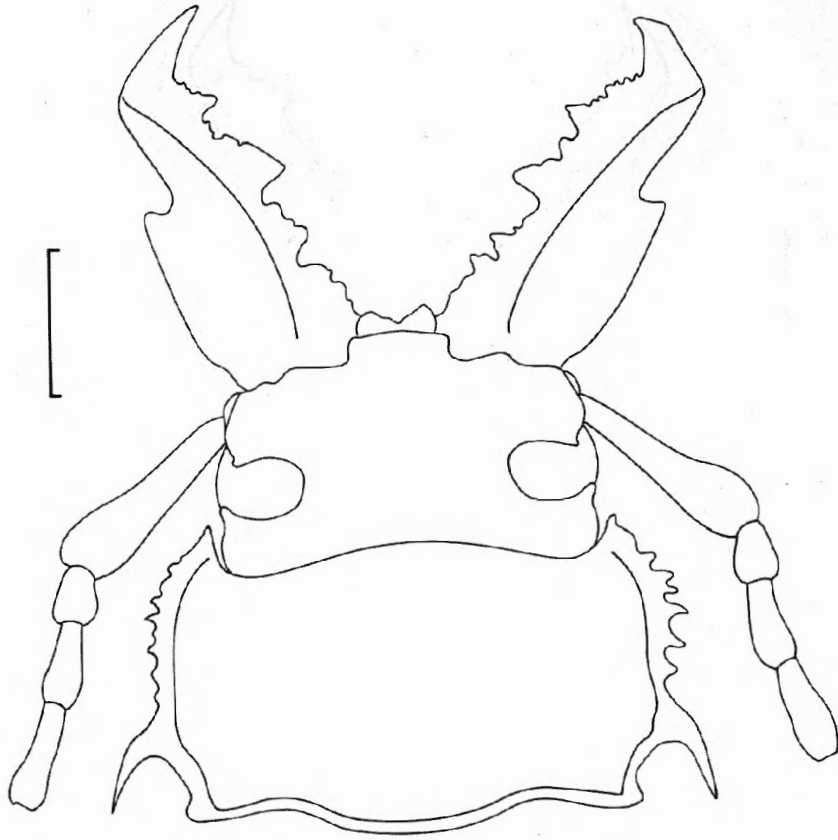


Fig. 9 — *Autocrates maqueti* Drumont male (scale: 0.5 cm.).

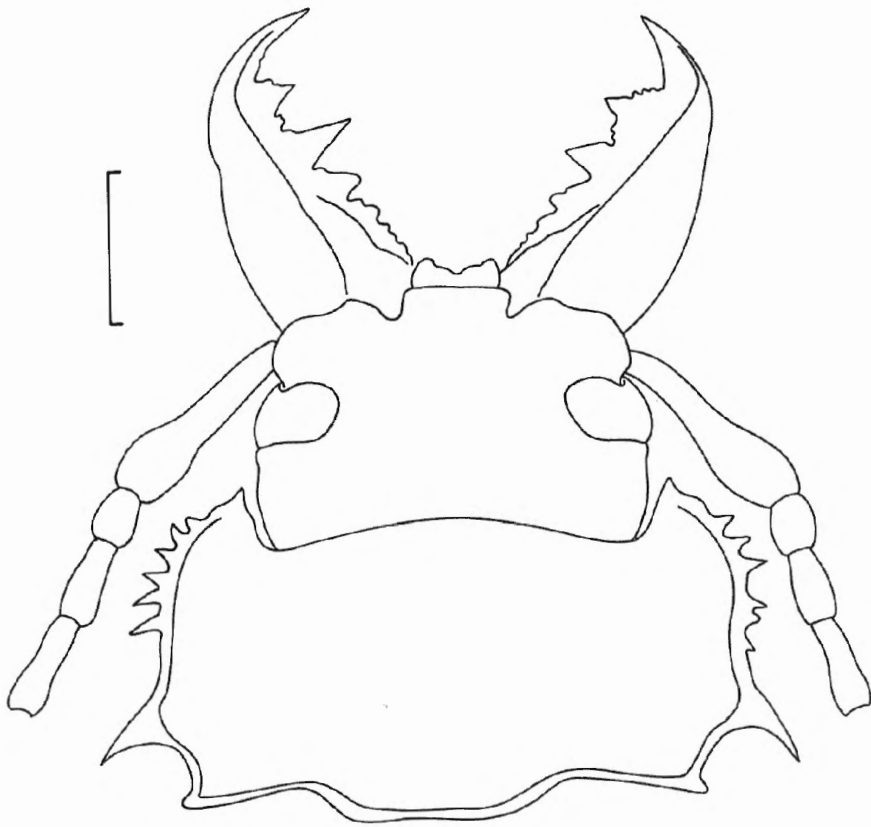


Fig. 10 — *Autocrates maqueti* Drumont female (scale: 0.5 cm.).

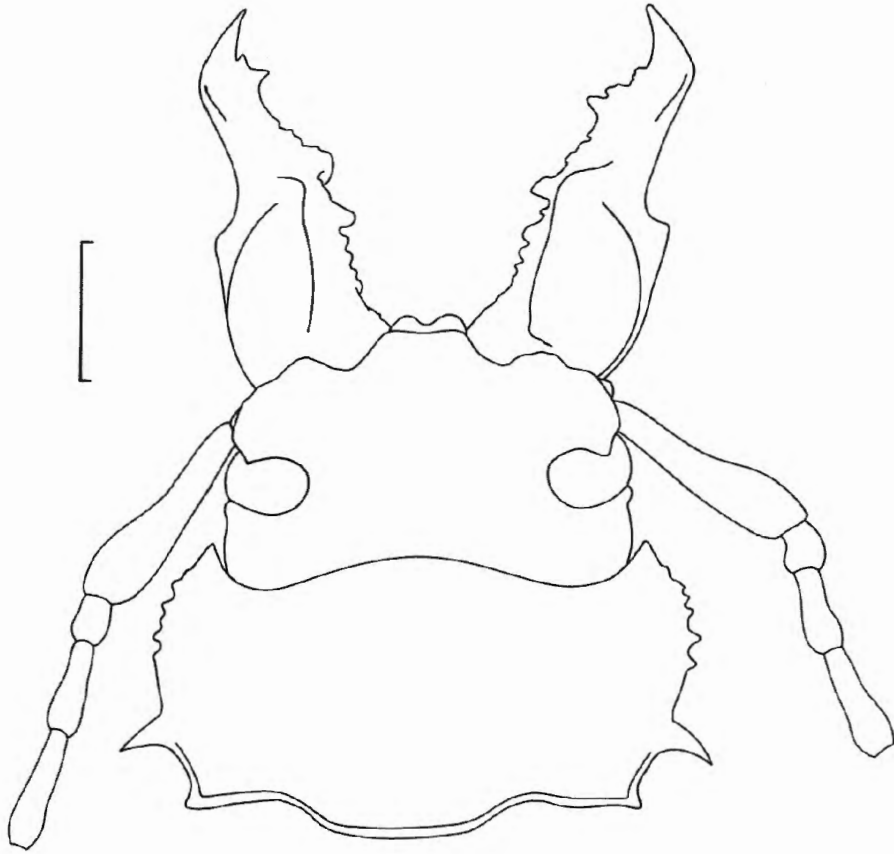


Fig. 11 — *Autocrates oberthueri* Vuillet male (scale: 0.5 cm.).

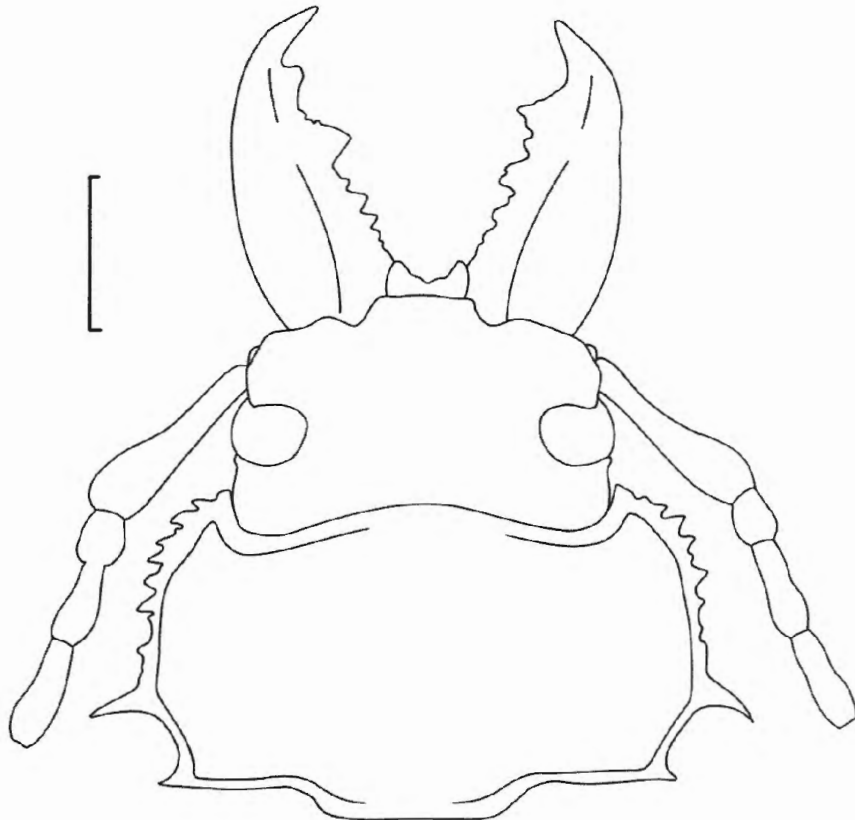


Fig. 12 — *Autocrates oberthueri* Vuillet female (scale: 0.5 cm.).

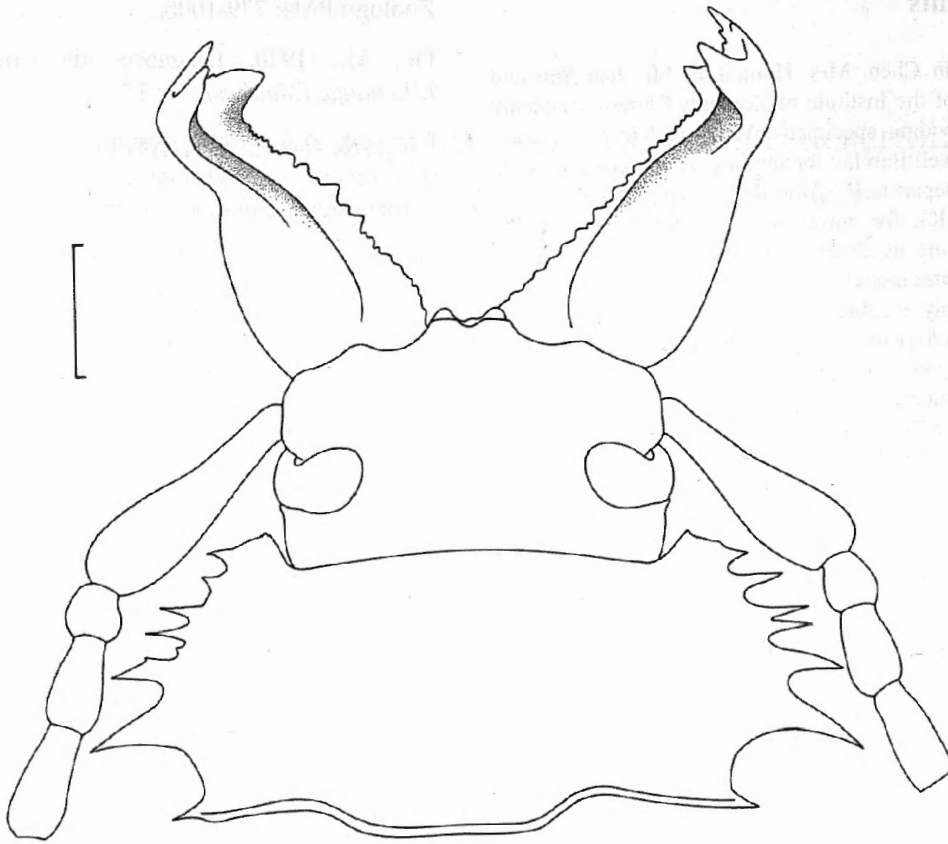


Fig. 13 — *Autocrates vitalisi* Vuillet male (scale: 0.5 cm.).

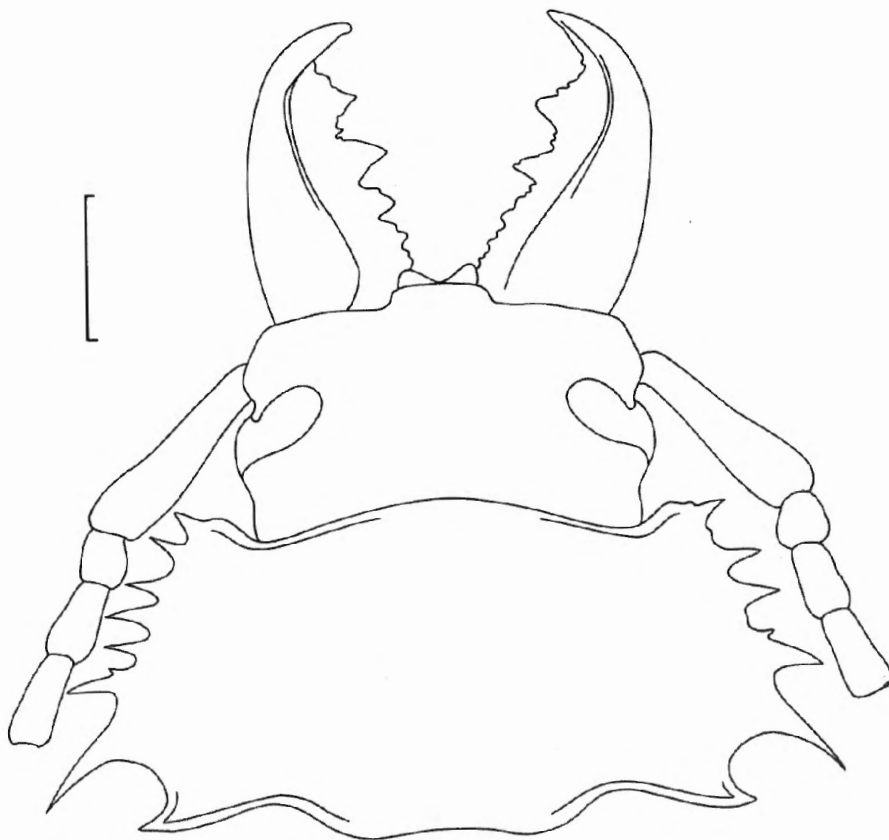


Fig. 14 — *Autocrates vitalisi* Vuillet female (scale: 0.5 cm.).

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References

- ARNETT, R. H., Jr., 1971. The Beetles of the United States. (A Manual for Identification). *The American Entomological Institute, Ann Arbor*, MI, 1, 112 pp.
- DESCARPENTRIES, A. & VILLIERS, A., 1973. Notes sur le genre *Autocrates* (Col. Trictenotomidae). *Bulletin de la Société entomologique de France*, 78: 253-256.
- DE LISLE, M. O., 1973. Description d'un nouveau coléoptère Trictenotomidae de Malaisie. *Nouvelle Revue d'Entomologie*, III (1): 17-18.
- DRUMONT, A., 2006. Contribution à l'étude des Trictenotomidae (Coleoptera) avec la description d'une nouvelle espèce d'*Autocrates* THOMSON, 1860: *A. maqueti* n. sp., originaire du sud de la Chine (Coleoptera, Trictenotomidae). *Les Cahiers Magellanes*, 61, 12 pp.
- DRUMONT, A. & LI J., 2007. First record of *Autocrates vitalisi* VUILLET, 1912 for Myanmar and Cambodia (Coleoptera, Trictenotomidae). *Bulletin de la Société royale belge d'Entomologie*, (in press).
- FERRER, J. & DRUMONT, A., 2003. Considérations sur la vraie position systématique de la famille des Trictenotomidae BLANCHARD 1845, sur base de l'étude de l'édéage (Coleoptera). *Lambillionea*, 103 (3): 457-467.
- LAMEERE, A., 1916. Trictenotomidae (Col.) de la collection du Muséum de Paris. *Bulletin du Muséum d'Histoire naturelle. Paris*, 2: 1-8.
- LAWRENCE, J. F. & NEWTON, A. F., 1995. Families and Subfamilies of Coleoptera (with Selected Genera, Notes, References and Data on Family-Group Names). In: (J.) PAKALUK & (A.) SLIPINSKI (eds.). Biology, Phylogeny, and Classification of Coleoptera. Papers Celebrating the 80th Birthday of Roy A. Crowson. Warszawa, Muzeum I Instytut Zoologii PAN: 779-1006.
- PIC, M., 1920. Diagnoses de Coléoptères exotiques. *L'Echange (Moulins)*, 36: 15.
- POLLOCK, D.A., 1994. Systematic Position of Pilipalpinae (Coleoptera: Tenebrionoidea) and Composition of Pyrochroidae. *The Canadian Entomologist*, 126: 515-532.
- POUILLAUDE, I. 1914. Trictenotomidae de la collection R. Oberthür. *Insecta Revue, Rennes*, 4: 243-251.
- TELNOV, D., 1999. Zoogeographie der *Trictenotomidae* BLANCHARD, 1845 (Coleoptera: Heteromera). *Daugavpils Pedagogiskas Universitates, 7. Ikgadejas zinatniskas konferences rakstu krajums*, A9: 95-97.
- THOMSON, J., 1860. Famille des Trictenotomides. *Musée scientifique ou Recueil d'Histoire naturelle*, 1: 25-30.
- VUILLET, A., 1910. Description d'une nouvelle espèce du genre *Autocrates* THOMS. (Col. *Trictenotomidae*). *Bulletin de la Société entomologique de France*, 19, séance du 14 décembre: 347-348.
- VUILLET, A., 1912. Description d'une nouvelle espèce du genre *Autocrates* THOMS. (Col. *Trictenotomidae*). *Insecta Revue, Rennes*, 2: 297-299.
- WATT, J.C., 1987. The Family and Subfamily Classification and New Zealand Genera of Pythidae and Scrautiidae (Coleoptera). *Systematic Entomology*, 12: 111-136.
- WESTWOOD, J.O., 1846. Proceedings of Learned Societies: Entomological Society, footnote to June 2nd 1845 meeting report. *The Annals and Magazine of Natural History*, 18 (120): 353.

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