

First instar larva of *Xenion ignitum* (Coleoptera: Carabidae: Pterostichini) and the phylogenetic relationships of the genus

Karel HÚRKA

Department of Zoology, Charles University, Viničná 7, CZ–128 44 Praha 2, Czech Republic;
e-mail: hurka@natur.cuni.cz

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Abstract. The first instar larva of *Xenion ignitum* (Kraatz, 1875), reared ex ovo, are described and illustrated. Rearing proved the breeding type with larval dormancy in the annual reproduction cycle. Both larval and adult synapomorphies suggest the evident relationships among *Myas* Sturm, 1826 sensu lato and *Xenion* Tschitschérine, 1902.

Larval taxonomy, phylogenetic relationships, Coleoptera, Carabidae, Pterostichini, *Xenion*, *Myas*, Palaearctic region

INTRODUCTION

Xenion Tschitschérine, 1902, a monotypic genus consisting of a single species *Xenion ignitum*, is distributed in Bulgaria and Macedonia in two subspecies: *X. i. ignitum* (Kraatz, 1875) and *X. i. laticolle* Mařan, 1930. It is a woodland species of the middle and high mountains: Middle Stara planina Mts., Vitosha Mt., Sredna Gora Mts., Rila Mts., Pirin Mts., Mesta valley, West Rhodopi Mts. (nominotypical subspecies), and Slavyanka Mts. (*laticolle*); adults were found from May to August in the elevations of 800 to 2400 m (Guéorguiev & Guéorguiev 1995: 119).

According to Csiki (1929) the genus *Xenion* (Fig. 2) belongs, with four other genera: *Aristochroa* Tschitschérine, 1898 (Fig. 1), *Myas* Sturm, 1826 (Fig. 3), *Trigonognatha* Motschoulsky, 1857 (Fig. 4) and *Steropanus* Fairmaire, 1888, in the subtribe Myadi. Allen (1980) described in his “review” of the subtribe Myadi a new genus *Neomyas*, endemic to North America (he has not studied *Steropanus*). In his phylogenetic conclusion Allen postulated, *Xenion ignitum* represents one of the three lineages arising from the hypothetical ancestor of Myadi which has apparently changed very little from the ancestor. Some authors have regarded *Myas*, *Trigonognatha* and *Neomyas* as closely related and have treated these taxa as subgenera of a single genus *Myas*. Sciaky (1996) has studied the type specimen of *Steropanus forticornis* Fairmaire, 1888, the type species of the genus; according to the aedeagus examination, *Steropanus* belongs to the genus *Pterostichus* Bonelli, 1810 as a subgenus, and it is not related to the *Trigonognatha*. Bousquet (1999) has recently discussed the relationships among this group, based on both larval and adult characters.

Only the larvae of *Myas* (*Neomyas*) *cyanescens* Dejean, 1828, in the third instar (Thompson 1979a, b, Bousquet 1985, 1989, 1999) and of *Myas* (*Myas*) *chalybaeus* (Palliard, 1825), in all three instars (Zetto Brandmayr & Marano 1996), are described and illustrated, from the group Myadi.

MATERIAL AND METHODS

One male and two females are found in the Pirin Mts. (Bulgaria), “Khizha [= hut] Pirin”, 1640 m, 20. viii. 1983, D. Král leg. The specimens were raised in the laboratory conditions following the technique described by Húrka

(1996). From October 24, 1983 to March 19, 1984 the adults hibernated. After hibernation the specimens were kept again in the laboratory conditions at the mean temperature 20 ± 1 °C and under natural photoperiod ($50^{\circ} 06' N$, $14^{\circ} 16' E$). On September 19 one female was found dead, on September 24 sex first instar larvae appeared in the container. One larva was fixed for the taxonomic description, other larvae were kept individually in the Petri dishes (food: pieces of *Tenebrio mollitor* larva) and all were found dead till October 12, 1984.

One fixed larva and all the material used for habitual drawings (Figs 1–4) are deposited in the Collectio Hůrka, Department of Zoology, Charles University, Praha. In description, the notation of setae and pores follows the papers by Bousquet & Goulet (1984) and Bousquet (1985).

RESULTS

Xenion ignitum (Kraatz, 1875), first instar larva (Figs 5–12)

DESCRIPTION. Coloration. Yellow ochre, urogomphi darker.

Microsculpture. Head on parietale with flat meshes, dorsal aspect of prementum pointed; granulated microsculpture on pronotal pre- and postscutum and on postscuta of meso- and metanotum and of tergites I–VIII, scuta of abdominal tergites finely pointed to multipointed, urogomphi and pygidium pointed.

Chaetotaxy. Adnasale (Fig. 6) with 3 setae (FR₈, FR₉, one additional), on frontale one small additional seta instead of pore FR_c, on parietale setae PR_{4,5,8} very small, seta MX₆ on lacinia as long as seta MX₅ (Fig. 9), setal group gMX with about 15 setae; seta LA₄ on prementum absent, seta LA₆ about half as long as length of palpomere I, setae PR₁₂ on pronotum, ME₁₃ on meso- and metanotum and TE₁₀ on abdominal tergites I–VIII of normal length; tergites I–VIII with only three distinct setae: TE_{7,9,10} (TE₉ longer than TE₁₀), setae TE_{1,6,11} present, but very minute (Fig. 11); seta UR₂ on abdominal tergite IX distinctly longer than seta UR₃, urogomphi with 5 distinct setae (UR₄–UR₈).

Head. Cephalic capsule slightly transverse (index width/length=1.15), sides convex apicad (Fig. 5); distinct preocular grooves present; cervical grooves indistinct dorsally, short ventrally and almost extended to level of seta PA₁₅; coronal suture apparent, nearly as long as length of antennomere IV; nasale finely convex, adnasalia almost straight, both nasale and adnasalia denticulate (Fig. 6); stemmata of the lower row distinctly smaller than that of the upper row; egg burster forming a linear keel composed of about 20 small, closely spaced blunt teeth, reaching base of seta FR₂, about as long as antennomere I; mandibles sickle-shaped, cutting edge finely serrulated, retinaculum about in the middle, penicillus absent (Fig. 7); antennomeres stout (Fig. 8); maxillary stipes shorter than palpus, without membranous area, lacinia apparent (Fig. 9); prementum with no protruding ligula (Fig. 10); width of head capsule 0.57 mm.

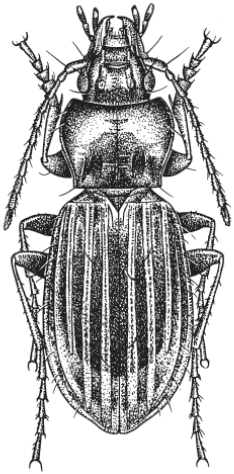
Legs. Two claws slightly unequal in length, inner claw a little shorter.

Abdomen. Urogomphi short, curved inward in apical half (Fig. 12); abdominal pleura without additional sclerite near epipleurite.

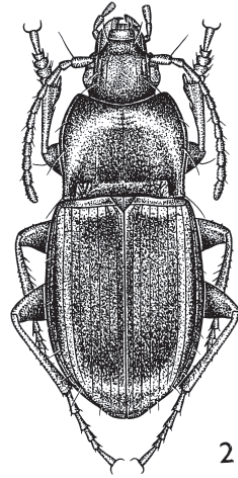
DIAGNOSIS. In the loss of penicillus the larva of *Xenion ignitum* agree only with the larvae of *Myas chalybaeus* and *M. cyanescens*. Members of both genera distinguish by this apomorphic larval character state among known Pterostichini. *Xenion ignitum* differs from the *Myas chalybaeus* first instar larva by the finely convex and denticulate nasale and by the distinct coronal suture, nearly as long as antennomere IV. The size of the larva is smaller (width of head capsule 0.57×0.90 mm).

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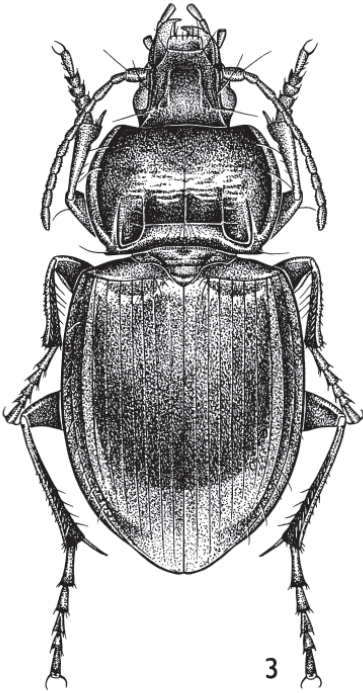
Figs 1–4. 1 – *Aristochroa casta* Tschitschérine, male (W Sichuan, 6. vii. 1994, 29.36 N 102.06 E, 1900–2900 m, Gouggashan-Hailuogou, J. Farkač & D. Král leg.); 2 – *Xenion ignitum* (Kraatz), male (Bulgaria, Rodopi Mts., Čepelare 1250–1500 m, 14. vii. 1976, K. Hůrka leg.); 3 – *Myas (Myas) chalybaeus* (Palliard), male (Bulgaria, Sozopol, 10. vii. 1977, Havlas leg.); 4 – *Myas (Trigonognatha) fairmairei* Sciaky, female (China: W Sichuan, 20 km N Sábde, 3200 m, 29.35 N 101.23 E, 10.–16. vii. 1998, J. Farkač leg.). Scale = 5 cm (Orig. Z. Čadová).



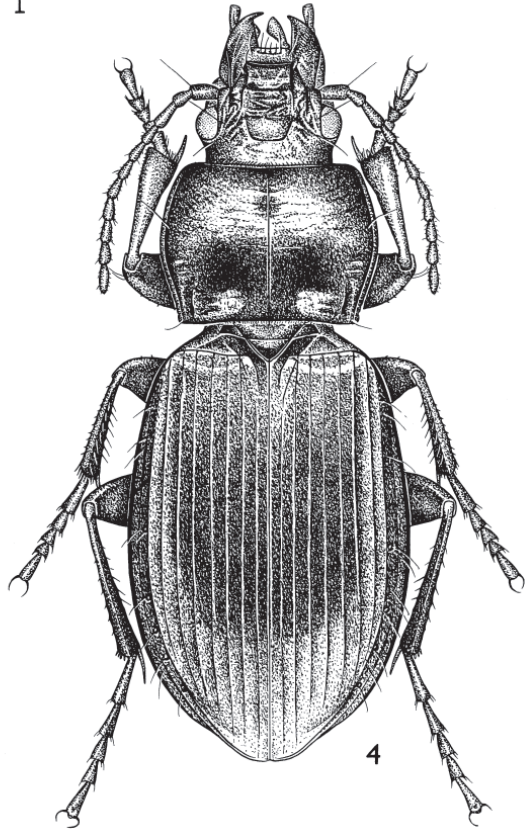
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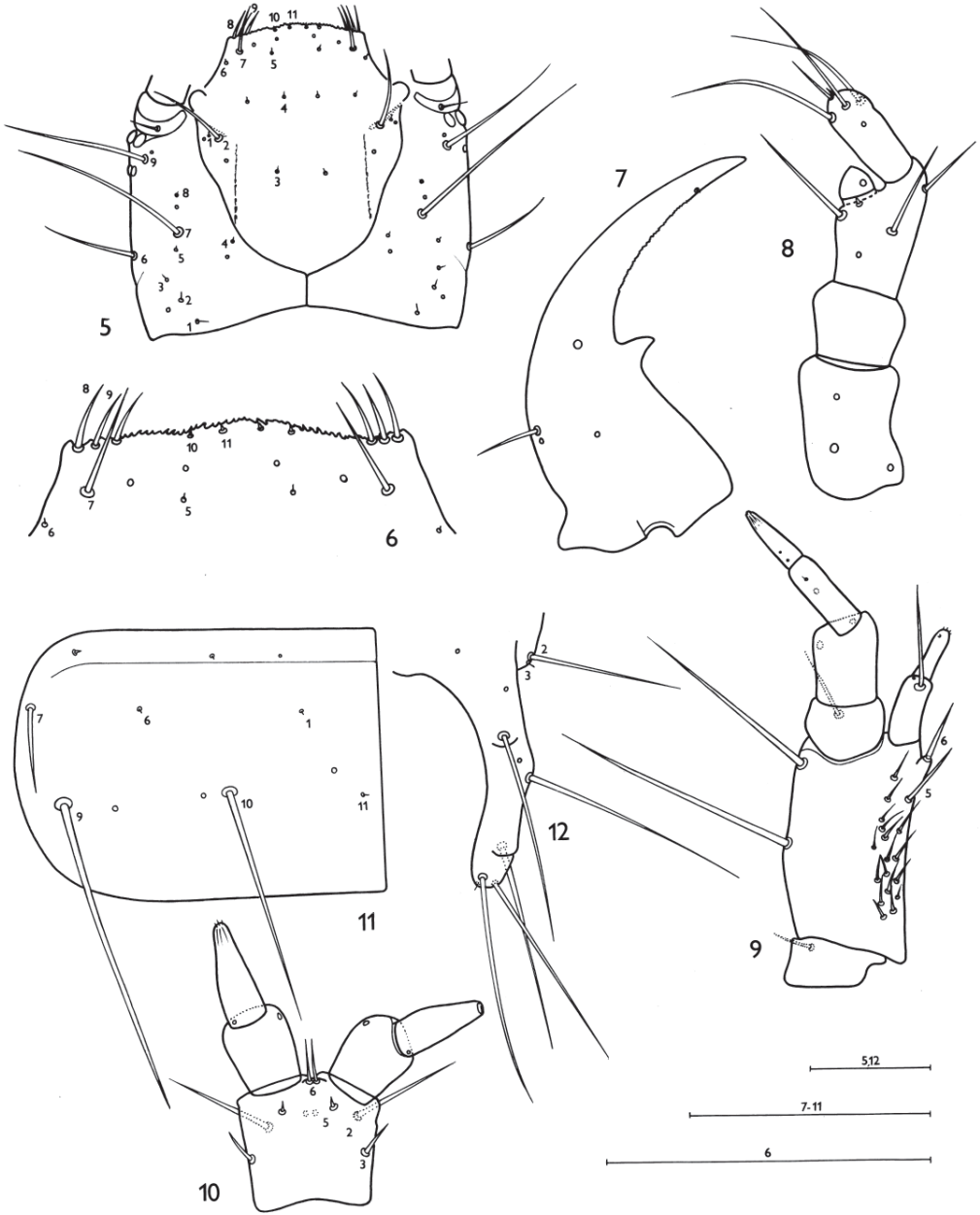
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DISCUSSION

The species of the genera *Myas* sensu lato, *Xenion* and *Aristochroa* are linked in the adult stage by the possession of more than two setae (four to six) on the apical margin of the glossal sclerite. In contrast to the *Neostomus* Bousquet, 1983, having also four setae, the medial pair in the three above named genera is longer than the lateral pair(s) (Bousquet 1999).

From the synapomorphies of members of the genus *Myas* sensu lato (including *Trigonognatha* and *Neomyas*), in the adult stage, given by Bousquet (1999), namely:

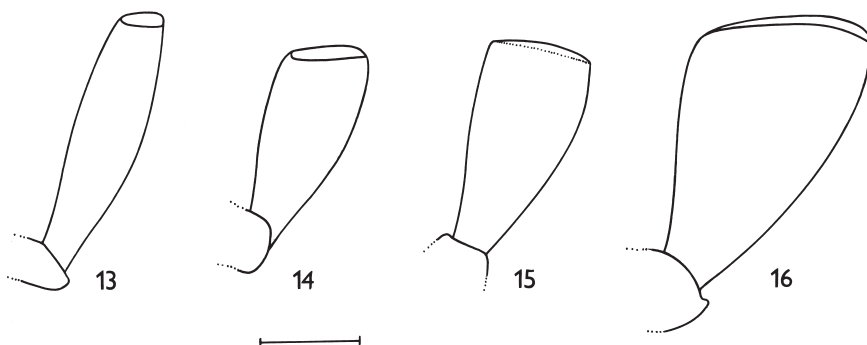
- (a) last labial palpomere apically widened (Figs 15, 16),
 - (b) absence of setigerous punctures on the third elytral interval,
 - (c) indistinct metatarsal carina on all tarsomeres,
 - (d) presence of a very elongate spermathecal gland,
- the character states given under a) (Fig. 14) and partly also under (c) are found also in *Xenion ignitum* (metatarsal carina weakly distinct only on tarsomere I). On the third elytral interval there are two setiferous punctures, consequently the apomorphic character state as the absence of setiferous punctures. The spermatheca was not examined.

The larval synapomorphies of *Myas* (*Myas*) *chalybaeus*, *Myas* (*Neomyas*) *cyanescens* and *Xenion ignitum* are:

- (a) penicillus absent,
- (b) urogomphi moderately to markedly curved inwardly,
- (c) one additional seta on adnasale in L1 (2 and more in L3),
- (d) setae PR_{4, 5, 8} and TE_{1, 6, 11} minute,
- (e) mandible with finely serrulated edge of terebra in L1.

The larvae of *Trigonognatha* and *Aristochroa* are not known.

From the course of my laboratory rearing experiment with *Xenion ignitum* follows the main breeding type with a larval dormancy in the annual reproduction cycle. Zetto Brandmayr & Mariano (1996) indicated that *Myas* (*Myas*) *chalybaeus* belongs to the same main breeding type ("au-



Figs 13–16. Last labial palpomere of adults. 13 – *Aristochroa casta* Tschitschérine (male); 14 – *Xenion ignitum* (Kraatz) (male); 15 – *Myas* (*Myas*) *chalybaeus* (Palliard) (male); 16 – *Myas* (*Trigonognatha*) *fairmairei* Sciaky (female). Scale = 0.2 mm.

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Figs 5–12. Larva of *Xenion ignitum* (Kraatz), first instar. 5 – cephalic capsule (dorsal view); 6 – nasale and adnasalia; 7 – left mandible; 8 – left antenna; 9 – left maxilla (dorsal view); 10 – labium (dorsal view); 11 – abdominal tergite IV; 12 – tergum IX and urogomphus. Scales = 0.2 mm.

tumn breeder without imaginal dormancy”). Bousquet (1999) have seen two third instar larvae of *Myas* (*Neomyas*) *cyanescens* collected in Canada in July and August.

The common larval and adult apomorphic features of *Myas* s. l. and of *Xenion*, as well as the same main breeding type, suggest the evident phylogenetic relationships of both taxa.

A c k n o w l e d g e m e n t s

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