

**Taxonomy, distribution and biology of selected
European *Dinax*, *Strongylogaster* and *Taxonus* species
(Hymenoptera: Symphyta)**

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Abstract. The Central European species of *Dinax* Malaise, 1945 (one species), *Strongylogaster* Dahlbom, 1835 (seven species) and *Taxonus* Hartig, 1837 (three species) are surveyed and briefly diagnosed. *Strongylogaster baikalensis* Naito, 1990 and *Dinax ermak* (Zhelochovtsev, 1968) are newly recorded species for the Czech Republic. The larvae of *Strongylogaster baikalensis*, *Taxonus sticticus* (Klug, 1817), *Taxonus alboscuteclatus* Niezabitowski, 1899 and *Dinax ermak* are described and illustrated for the first time and new data on their biology are provided. Identification keys for the adults and larvae of the Central European species of *Strongylogaster* and *Taxonus* are given.

Key words. Hymenoptera, Symphyta, *Dinax*, *Strongylogaster*, *Taxonus*, new records, larvae, identification keys, host plants, faunistics, Albania, Bulgaria, Czech Republic

Introduction

Since the last check-list of the Symphyta of the former Czechoslovakia (BENEŠ 1989), the number of the sawflies species known from the Czech Republic and Slovakia increased notably during the last decade (Czech Republic: MACEK 2006, 2008; Slovakia: ROLLER 1999, ROLLER & HARIŠ 2008), as long-term fieldwork combining various collecting methods (Malaise traps, yellow pan traps, sweeping and rearing of larvae) conducted in various parts of the Czech Republic provided numerous new records. This paper deals with species of *Dinax* Konow, 1897, *Strongylogaster* Dahlbom, 1835 and *Taxonus* Hartig, 1837, and is the first part of a series of planned contributions which would summarize the results of recent research on the taxonomy, distribution and host plants of sawflies in the Czech Republic.

Material and methods

All specimens mentioned in this paper are deposited in the National Museum, Praha, Czech Republic. They were predominantly collected in the last decade by flight intercept traps, pan

traps, sweeping and rearing of larvae. All photographs of the larvae have been saved in a digital image archive maintained by the museum. Map field codes for the Czech localities are based on the grid mapping system according to PRUNER & MIKA (1996). Morphological terms are based on VIITASAAARI (2002), except wing venation based on ZHELOCHOVTSEV (1988).

Abbreviations: F1 – flagellomere 1, POL – distance between the mesal margin of the two lateral ocelli; OCCL – distance between lateral ocellus and the hind margin of the head; MT – Malaise trap, YPT – yellow pan trap; NNR – National Nature Reserve, NP – National Park, NR – Nature Reserve, PLA – Protected Landscape Area; NMPC – coll. National Museum, Praha.

Results

Dinax Konow, 1897

Dinax is a Palaearctic genus with six species. Five of them occur in China (NIE & WEI 2004) and two in Russia. One of the Russian species, *D. ermak* (Zhelochovtsev, 1968), was found in Central Europe, which is so far the westernmost limit of the distribution of the genus. NIE & WEI (2004) provided the generic diagnosis and key to the Chinese species and discussed the enigmatic systematic position and relationships of *Dinax* within the Allantinae. The biology of *Dinax* is poorly known. Developmental stages were described by VERZHUTSKII (1981) for only one species, *D. jakowleffi* Konow, 1897, based on rearing on *Spiraea* sp. (Rosaceae).

Dinax ermak (Zhelochovtsev, 1968)

(Figs. 1, 21)

Material examined. CZECH REPUBLIC: BOHEMIA mer.: Třeboňsko PLA: Třeboň env., Stříbřecký most bridge (6955), 9.vi.2006, 18 larvae on *Spiraea salicifolia*, 3 adults emerged, J. Macek lgt.; Borkovice (6753), 31.v.2008, 6 larvae on *Spiraea salicifolia*, 2 adults emerged, J. Macek lgt., all J. Macek det. (NMPC).

Adult. Diagnosis. Black, pronotum, tegulae and hind margins of abdominal terga and sterna with narrow whitish strips; tibiae and tarsi whitish (Fig. 1).

Body length 7–7.5 mm. Head in dorsal view rectangular, lustrous, with temples slightly receding posteriorly; clypeus deeply incised with sharp lateral projections, surface with flat and irregular wrinkles; malar space longer than diameter of front ocellus and almost twice as long as pedicel; occipital carina incomplete, obliterated on vertex, postocellar area longer than wide (POL : OOCL = 1 : 1.5) with distinct divergent postocellar furrows, mandibles asymmetric, left one with two and right one with three teeth; antennae a little longer than abscissa of costa from wing base to pterostigma; F1 shorter than length of eye; median lobe of mesoscutum shining with sparse punctation; mesoscutellum shining with dense punctation medially, mesepisternum wrinkled in dorsal part and smooth in ventral part; abdomen wider than thorax, with finely alutaceous terga.

Notes on identification. The species has an intermediate appearance between *Monsoma pulveratum* (Retzius, 1783) (Allantinae) and *Sciapteryx consobrina* (Klug, 1816) (Tenthredininae) but differs from them by the following characters: clypeus broadly and deeply incised with narrow, sharply pointed lateral lobes; mandibles asymmetric; fore wings with oblique

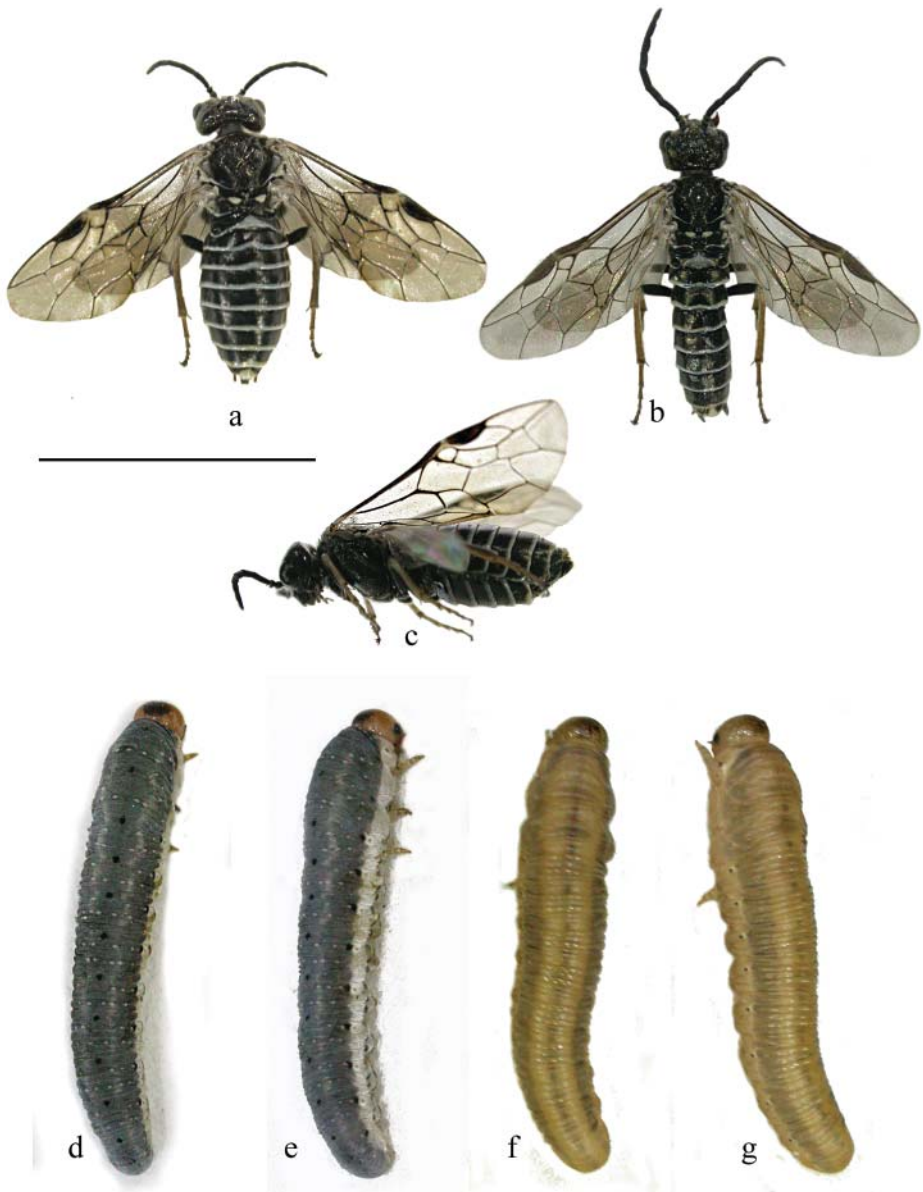


Fig. 1. *Dinax ermak* (Zhelochovtsev, 1968): a – female (dorsal view); b – male (dorsal view); c – female (lateral view); d – last instar larva (dorsal view); e – last instar larva (laterodorsal view); f – eonymph (dorsal view); g – eonymph (laterodorsal view). Scale: 5 mm.

crossvein in anal cell, medial vein fused with radial sector vein at long distance. The Czech specimens of *D. ermak* agree extremely well with the original description by ZHELOCHOVTSEV (1968).

Larva. Description of the last instar. Head amber yellow with large dark parietal spot; dorsal side of body greyish with whitish irregular longitudinal subdorsal stripe, ground colour of ventral side whitish, annulet 2 and 4 with ring of flat white warts with setae, annulet 1 with black round spot on dorsum medially; annulet 2 laterally above dark spiracle with black round spot; surpedal lobe and hypopleurit with black marks. The last feeding instar moults to glassy grey-yellowish eonymph with obliterated colour pattern.

Recognition. The last instar larva of *Dinax ermak* differs from the similar larva of *D. jakowleffi*, by distinct dark pattern on head (VERZHUTSKII 1981).

Bionomics. Univoltine. Predicted flight period from mid April to mid May; larval period from May to June. Food plant: *Spiraea salicifolia* L. (Rosaceae). The non-feeding eonymph builds a firm cocoon for pupation, in which it can diapause for up to two years.

Distribution. Russia: southern Ural, East Siberia: Magadan (ZHELOCHOVTSEV 1968); Czech Republic (new record) (Fig. 21).

Strongylogaster Dahlbom, 1835

Strongylogaster is distributed mainly in the Holarctic Region with about 60 species associated with ferns. Six of them occur in Europe and five have been recorded in the Czech Republic. MUCHE (1969a) diagnosed and keyed the Central European species. NAITO (1996) revised and keyed all species of the genus and discussed their phylogenetic relations based on morphology, geography, biology and karyology. BLANK (1998, 2002) revised and keyed the European species and consolidated the confusing nomenclature and synonymy of several species. Larvae of five European species were described and keyed by LORENZ & KRAUS (1957). WELKE (1959) provided comprehensive information on the morphology and bionomics, including their parasitoids, of adults and larvae of *S. xanthoceros* Stephens, 1835 and *S. lineata* (Christ, 1791) (= *S. multifasciata* Geoffroy, 1785).

Strongylogaster mixta (Klug, 1817)

(Figs. 4, 12)

Material examined. CZECH REPUBLIC: BOHEMIA mer.: Krivoklátsko PLA: Nižbor (5950), 1.v.2006, 2 spec., J. Macek lgt. **BOHEMIA or.:** Orlické hory PLA: Bukačka NR (5664), 24.v.1994, 2 spec.; Zvonkové údolí valley (5865), 20.v.2003, 1 spec., all J. Macek lgt. (MT); Trčkov NR (5664), 16.–25.v.1994, 2 spec., J. Hájek & J. Ježek lgt., 25.vi.2003, 1 spec., J. Hájek lgt.; Železné hory PLA: Krkanka NR (6160), 2.vi.2004, 3 spec.; Lichnice (6159), 25.iv.–25.v.1999, 3 spec., 12.v.2000, 1 spec., 18.vi.2000, 1 spec.; Strádovka NR (6160), 1 spec.; Polom NR (6160), 23.v.1996, 9 spec., 27.v.1997, 2 spec., 20.v.1998, 1 spec., all F. Bárta lgt. (MT). **BOHEMIA bor.:** Jizerské hory PLA: Rybí loučky NR (5158), 17.v.–29.v.2003, 1 spec., P. Vonička lgt. (MT); České Švýcarsko NP, Růžák NR (5152), 15.vi.2005, 1 spec., Trýzna lgt. (MT). **BOHEMIA occ.:** Sokolov distr.: Tatrovický potok brook (5742), 3.vi.2002, 3 spec., J. Ježek lgt. (MT); Lomnice (5741), 19.v.2005, 1 spec., J. Macek lgt. **MORAVIA bor.:** Beskydy PLA: Trojačka NR (6474), 6.v.1934, 1 spec., F. Gregor lgt.; Radhošť Mt. (6575), 8.v.1929, 1 spec., F. Gregor lgt.; Frenštát pod Radhoštěm (6475), 30.iv.1926, 2 spec., F. Gregor lgt.; all J. Macek det. (NMPC).

Larva. Redescription. For the diagnosis of LORENZ & KRAUS (1957) based on FORSIUS (1920) is insufficient for correct identification, the short redescription of the last instar larva is given here. Head brownish yellow with the upper half black; body in dorsal part above the spiracles greenish grey, ventral part below the spiracles white grey, suranal lobe with two black spots (Fig. 12). Annulets 2, 4 and 7 with very short fine setae and annulets 2 and 4 with two additional small conical tubercles. Prolegs with dense setation. Ground colour of the immature instars greenish with black head and no black spot on suranal lobe.

Notes on identification. The last instar larvae are easily distinguished from the other Selandrinae associated with ferns by the greenish grey ground colour of the dorsum and the black spot on the suranal lobe.

Bionomics. Univoltine. Flight period from the end of April to mid June; larval period from mid May to the end of June. Host plants: *Athyrium filix-femina* (Woodsiaceae), *Dryopteris* (= *Aspidium*) spp., *Dryopteris dilatata* (Dryopteridaceae), *Pteridium aquilinum* (Dennstaedtiaceae), *Adiantum pedatum* (Adiantaceae) (LACOURT 1999) and *Dryopteris filix-mas* (CHAPMAN 1920). I collected the larvae exclusively on *Athyrium filix-femina*.

Distribution. Palaearctic Region (central and northern Europe, Siberia, and Japan) (NAITO 1996). Distribution in central Europe: Austria, Czech Republic, Germany, Poland, Slovakia and Switzerland (TAEGER & BLANK 2008). Widespread and common in the Czech Republic, mainly in uplands and mountains.

Strongylogaster baikalensis Naito, 1990

(Figs. 3, 11, 13, 22)

Material examined. CZECH REPUBLIC: BOHEMIA centr.: Český kras PLA: Hostim env., Kačák brook (6050), 31.v.2007, 1 spec., MT, J. Macek lgt. **BOHEMIA or.:** Železné hory PLA: Krkanka NR (6160), 2.vi.2004, 11 spec., 30.vii.2004, 8 spec.; Údolí Doubravy NR (6159), 25.v.2005, 2 spec., 16.vi.2005, 2 spec., all F. Bárta (MT). **BOHEMIA bor.:** Jizerské hory PLA: Ztracený potok brook, Kyselka (5257), 2.vi.–30.vi.2006, 2 spec., P. Vonička lgt. (YPT); České Švýcarsko NP: Dolský mlýn mill (5152), 15.v.2005, 2 spec., 25.v.2005, 1 spec., 16.vi.2005, 2 spec.; Vlčí potok brook (5052), 2.vi.2008, 1 spec.; Suchá Bělá brook (5151), 22.v.2005, 1 spec., all M. Trýzna lgt. (MT); Brtnický most bridge (5052), 2.vii.2008, 1 larva on *Matteuccia*, adult emerged 30.iii.2009, J. Macek lgt. **BOHEMIA occ.:** Sokolov distr.: Dasnice (5841), 23.v.2006, 1 spec., 13.vi.2006, 1 spec.; Kaceřov (5840), 21.v.2006, 1 spec., 29.vi.2006, 1 spec.; Dolní Nivy (5741), 10.vi.2004, 2 spec., Horní Nivy (5741), 10.vi.2006, 3 spec., all J. Macek lgt. (MT) and det. (NMPC).

Adult. Redescription. Body length 6–8.5 mm. Head and thorax black, labrum, clypeus, upper angles of pronotum and tegulae whitish; legs brown; abdomen black, most of terga 2 and 3 and middle of terga 4 and 5 orange yellow, posterior margin of each tergum, laterotergites and marks on sterna white; abdomen of males mostly black with inconspicuous orange-yellow spot medially (Fig. 3). Body longitudinally cylindrical, head coriaceous with smooth, sharply margined frontal field, frontal pit larger than frontal ocellus, coriaceous; postocellar area convex with deep pits flanking posterior ocelli; temples even, clypeus finely emarginate, dull; antennae in females a little shorter than abdomen, in males as long as abdomen, antennomeres slightly shortening towards apex; mesonotum smooth and lustrous, mesoscutellum with sparse punctuation, mesopleuron finely coriaceous, wings slightly nebulous, venation black, yellowish basally; anal cell without crossvein, tarsal claw simple; abdomen finely

reticulate; ovipositor sheath slender with pointed dorsoapical projections, cerci as long as ovipositor sheath.

Notes on identification. *Strongylogaster baikalensis* differs from the similar *S. macula* by the characteristic colour pattern on the abdomen: the orange-yellow marks are reduced to the middle part of the abdomen and never merged with the white spots on laterotergites, and the abdomen is mostly black in males. Penis valve as in Fig. 13.

Larva. Description. Ground colour green, dorsal part darker and finely mottled, head orange yellow with brownish vertex; dorsal vessel more or less transparent and flanked by dark longitudinal stripes; abdominal segments with six annulets; annulets 1, 2 and 4 with 3–5 short setae and annulets 2 and 4 with two additional small conical tubercles; subspiracular and surpedal lobe with 4–5 setae and 1–2 small conical tubercles; suranal lobe densely setaceous; prolegs with 6–7 setae on outer side (Fig. 11).

Notes on identification. The larvae differ from those of *S. macula* by the finely mottled dorsal ground colour and more transparent dorsal vessel. The host plants are also different (see below).

Bionomics. Univoltine. Flight period from mid May to mid June; larval period from May to June. Host plants: *Dryopteris filix-mas* (Dryopteridaceae) and *Matteuccia struthiopteris* (Woodsiaceae) (new records).

Distribution. Russia (Baikal region) (NAITO 1990, 1996); Czech Republic (new record) (Fig. 22).

Comments. *Strongylogaster baikalensis* belongs to the *S. macula* group characterised by a peculiar form of the ovipositor sheath and yellow clypeus (NAITO 1996). It has never been found again since the description. When revising a large series of *S. macula* from various parts of the Czech Republic, I have recognized that it also includes specimens that agree well with the original description of *S. baikalensis* (NAITO 1990). Both species seem to be widely distributed throughout the Czech Republic; *S. macula* is associated with *Athyrium filix-femina* and *S. baikalensis* with *Dryopteris filix-mas* and *Matteuccia struthiopteris*.

Strongylogaster macula (Klug, 1817)

(Figs. 2, 10, 14)

Material examined. CZECH REPUBLIC: BOHEMIA bor.: Jizerské hory PLA: Rybí loučky NR (5158), 5.–14.v.2003, 1 spec., Vonička lgt. (MT); Josefův Důl, Jedlová brook (5257), 670 m a.s.l., 19.–30.v.2005, 3 spec., P. Vonička lgt (MT); České Švýcarsko NP: Bílý potok brook (5052), 23.v.2006, 1 spec., J. Macek lgt. (MT); 'U Eustacha' forest (5052), 2.vi.2008, 1 spec., M. Trýzna lgt. (MT); Brtnický potok brook (5052), 18.v.2004, 1 spec., J. Macek lgt. (MT); Vlčí potok brook (5052), 23.v.2006, 1 spec., M. Trýzna lgt. (MT); Prskyřičný důl gorge (5052), 22.v.2006, 2 spec. (MT); Limberk (5052), 22.v.2006, 2 spec. (MT), 25.v.2007, 2 spec., all M. Trýzna lgt. **BOHEMIA mer.:** Šumava NP: Nová Pec env., Smrčina Mt. (7429), 1200 m a.s.l., 26.vi.2007, 8 spec., J. Modlinger lgt. (MT). **BOHEMIA occ.:** Sokolov distr.: Kynšperk nad Ohří (5841), 23.v.2006, 1 spec., J. Macek lgt. (MT); Počerný (5742), 12.v.2005, 1 spec., J. Macek lgt. (MT); Bukovany (5841), 23.v.2006, 1 spec., J. Macek lgt. (MT); Horní Nivy (5741), 10.vi.2004, 1 spec., J. Macek lgt. (MT); Svatava (5841), 19.v.2003, 1 spec., J. Macek lgt. (MT). **BOHEMIA or.:** Orlické hory PLA: Bukačka NR (5664), 26.iii.2007, ex larva on *Athyrium*, J. Macek lgt; Trčkovská louka NR (5664), 15.–31.v.1997, 1 spec., J. Hájek lgt. (MT); Litice nad Orlicí, Litický oblouk meander (5964), 27.iv.–31.v.1997, 1 spec., J. Hájek lgt. (MT). **Železné hory PLA:** Polom NR (6160), 12.vi.1997, 1 spec., F. Bárta lgt. (MT); Krkanka NR (6160), 2.vi.2004, 1 spec., F. Bárta lgt. (MT); Slávičká obora game preserve (6160), 31.v.2006, 2 spec., F. Bárta lgt. (MT); Hubský pond (6160),

12.v.2000, F. Bárta lgt.; Včelákov (6161), 4.vi.2006, 3 spec., F. Bárta lgt. (MT). Králický Sněžník NNR, prameny Moravy springs (5866), 17.vi.2003, 1 spec., P. Chvojka lgt. (MT). **MORAVIA mer.:** Bílé Karpaty PLA: Velká Javořina Mt., Hubertka hunting-lodge (7171), 19.v.2006, 1 spec., J. Macek lgt. (MT); all J. Macek det. (NMPC).

Notes on identification. MUCHE (1969a) provided a detailed description of the adults. This species differs from the similar *S. baikalensis* by an extensive colour pattern on the abdomen, with orange-yellow marks extended laterally and thus merging with yellow spots on late-rotergites; the abdomen of males is mostly orange yellow. Male genitalia as in Fig. 14. The larva was described by LORENZ & KRAUS (1957). It differs from the larva of *S. baikalensis* by a uniformly green ground colour without mottling. The host plant in Central Europe is also different (see below).

Bionomics. Univoltine. Flight period from late April to mid June; larval period from May to June. Host plants: *Dryopteris* (= *Aspidium*) spp., *Dryopteris carthusiana*, *D. dilatata*, *Polystichum* (Dryopteridaceae), *Athyrium filix-femina* (Woodsiaceae), *Pteridium aquilinum* (Dennstaedtiaceae) (TAEGER et al. 1998) and *Arachnoides miqueliana* (Dryopteridaceae) (NAITO 1996). I collected the larvae exclusively on *A. filix-femina*.

Distribution. Holarctic Region (Central and Northern Europe, Siberia, China, Japan, Korea, North America) (NAITO 1996). Scattered occurrence in the Czech Republic from uplands to highlands.

Strongylogaster multifasciata (Geoffroy, 1785)

(Figs. 6, 9)

Material examined. **CZECH REPUBLIC:** **BOHEMIA or.:** Železné hory PLA: Hubský pond (6160), 6.vi.2000, 1 spec.; Mokřadlo NR (6260), 6.vi.2000, 1 spec., all F. Bárta lgt. (MT). Orlické hory PLA: Pod Sfingou rock (5764), 21.v.2003, 1 spec., J. Hájek lgt. **BOHEMIA bor.:** Bělá u Děčína (5251), 14.vi.1957, 5 spec., Z. Bouček lgt. České Švýcarsko NP: Limberk hill (5052), 25.v.2007, 2 spec.; Křínice stream (5052), 2.vi.2008, 1 spec.; Růžák NR (5152), 25.vi.2007, 1 spec.; Mlýny hill (5152), 16.v.2007, 1 spec., 6.vi.2007, 1 spec.; Zadní Jetřichovice (5052), 29.vi.2004, 1 spec., 6.vi.2007, 2 spec.; Ponova louka NR (5151), 20.vi.2006, 1 spec.; Bílý potok brook (5052), 15.vi.2006, 1 spec.; Vlčí potok brook (5052), 23.v.2006, 3 spec., 17.vii.2006, 1 spec.; Suchá Bělá brook (5151), 15.vi.2005, 1 spec.; Brtnický potok brook (5052), 29.vi.2004, 1 spec., all M. Trýzna lgt (MT); Brtnický potok brook (5052), 29.viii.2005, larva on *Pteridium aquilinum*, 1 spec., J. Macek lgt. **BOHEMIA centr.:** Brdy Mts.: Tok Mt. (6249), 862 m a.s.l., 5 spec., J. Macek lgt. **Český kras PLA:** Kačák brook (6050), 31.v.2007, 1 spec., J. Macek lgt.; Dobříš (6250), 10.vi.1959, 1 spec., Z. Pádr lgt. **ALBANIA:** Mali Dajti, 1408 m a.s.l., 28.v.1959, J. Moucha lgt. **BULGARIA:** Petric, 29.vi.[no year], 1 spec., Mařan & Táborský lgt.; all J. Macek det. (NMPC).

Adult. Notes on identification. The adults differ from the similar *S. xanthocera* by a deep median incision of the last sternum, black antennae and tricoloured (black, orange and white) hind femora in females and orange-yellow (except the first two tergites) abdomen in males (Fig. 6).

Larva. Redescription. The larva was first described by LORENZ & KRAUS (1957) and WELKE (1959) under the name *S. lineata* (Christ, 1791). Green with dark transparent dorsal vessel; head in younger instars orange yellow, in last instar with two dark parietal spots; abdominal segments with seven annulets; annulets 2 and 4 with two small conical tubercles and 6–8 setae; annulet 7 with only five setae; subspiracular lobe with one conical tubercle and 6–8 setae; surpedal lobe with two conical tubercles and 8–10 setae; postspiracular lobe with two conical tubercles and five setae (Fig. 9).

Notes on identification. Last instar larva differs from that of *S. xanthocera* by the presence of two dark parietal spots on the head (compare to *S. xanthocera* below). Moreover, the larvae appear later (June to July).

Bionomics. Univoltine. Flight period from late May to early July; larval period from June to July. Host plants: *Dryopteris* (= *Aspidium*), *Polystichum* (Dryopteridaceae), *Matteuccia struthiopteris* (Woodsiaceae) and *Pteridium aquilinum* (= *Eupteris aquilina*) (Dennstaedtiaceae) (TAEGER et al. 1998). I collected the larvae exclusively on *P. aquilinum*.

Distribution. Palaearctic Region (Europe, Siberia, China, Japan, Korea) (NAITO 1996). Scattered occurrence in the Czech Republic from uplands to highlands.

Strongylogaster xanthocera (Stephens, 1835)

(Figs. 7, 8)

Material examined. CZECH REPUBLIC: BOHEMIA centr.: Milovice (5755), 5.v.2006, 2 spec.; 25.v.2006, one larva on *Pteridium aquilinum*, 1 spec.; Těptín (6153), 8.v.2000, 1 spec., all J. Macek lgt. BOHEMIA bor.: České Švýcarsko NP: Vlčí potok brook (5052), 2.vi.2005, 1 spec., J. Macek lgt. (MT); 22.v.2006, 1 spec., M. Trýzna lgt. (MT); Mlýny hill (5152), 16.v.2007, 2 spec.; Zadní Jetřichovice (5052), 6.vi.2007, 1 spec., M. Trýzna lgt.; Dolský mlýn mill (5152), 15.vi.2005, 3 spec., 22.v.2005, 1 spec.; M. Trýzna lgt.; Suchá Bělá brook (5151), 15.vi.2005, 1 spec., M. Trýzna lgt.; Růžák NR (5152), 15.vi.2005, 2 spec.; Srbská Kamenice (5152), 15.vi.2005, 1 spec.; Ponova louka NR (5151), 19.vi.2006, 2 spec., 16.v.2007, 1 spec.; Limberk hill (5052), 25.v.2007, 2 spec., M. Trýzna lgt. (MT). BOHEMIA occ.: Karlovy Vary distr., Nová Role env., Vlčí potok brook (5742), 2.vi.2005, 3 spec., J. Macek lgt. (MT); Nová Role env., Černý potok brook (5742), 22.vi.2005, 2 spec., J. Macek lgt. (MT); all J. Macek det. (NMPC).

Adult. Notes on identification. Redescription was given by MUCHE (1969a). It differs from the similar *S. multifasciata* by feebly inflexed posterior margin of last sternum, the orange yellow antennae and bicoloured (black and white) hind femora in females and with more or less extensive black pattern on abdomen in males. Habitus as in Fig. 7.

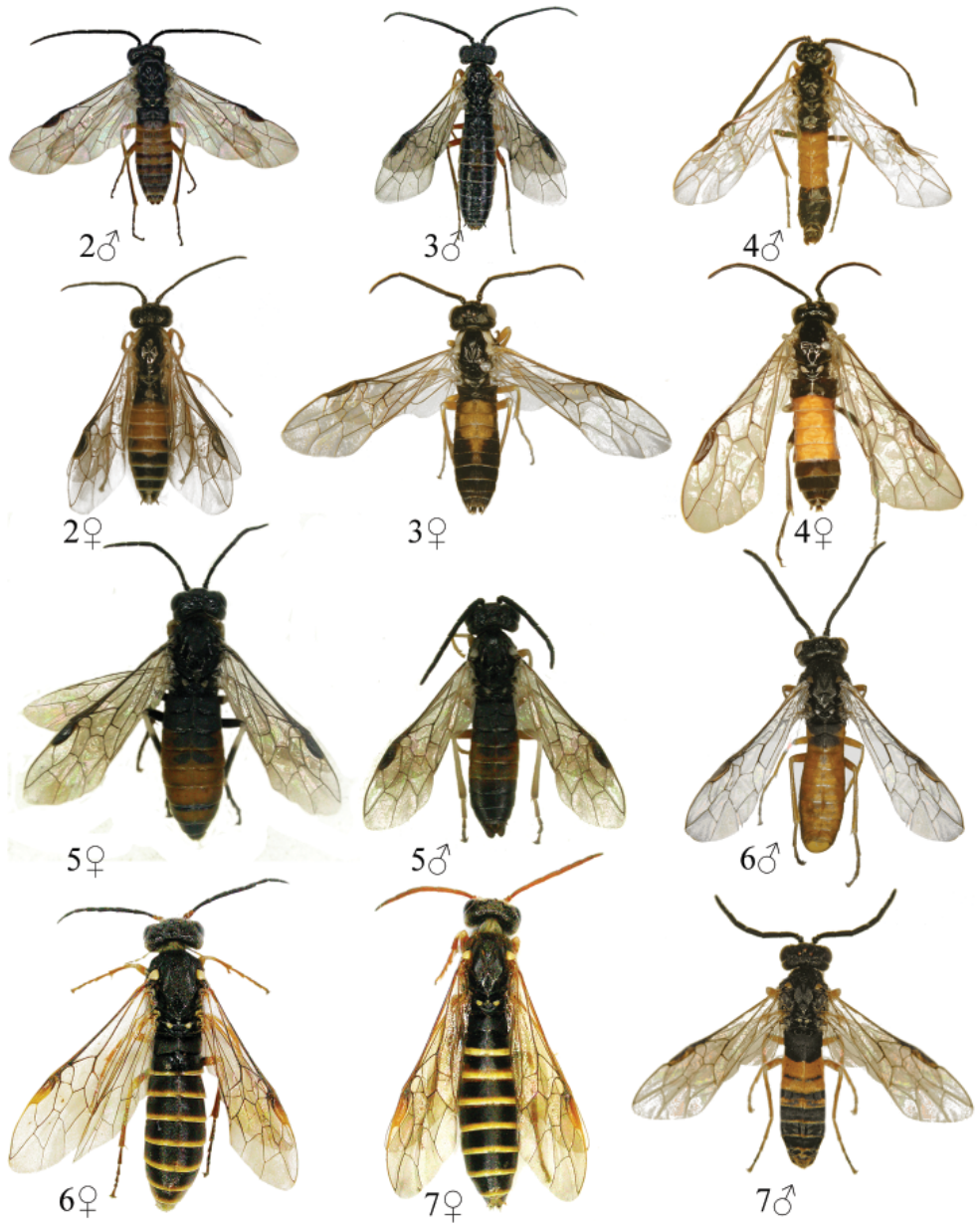
Larva. Redescription. The larva was first described by LORENZ & KRAUS (1957) and WELKE (1959). Body ground colour green with translucent dorsal blood vessel (Fig. 8). Head orange yellow with variable dark pattern varying according to the stage of development: young instars with head orange yellow without dark pattern, older instars with variable pattern consisting of two parietal spots (as in *S. multifasciata*), last instar with dark upper half of head.

Notes on identification. The last instar larvae differ from the similar *S. multifasciata* by the black upper half of the head. The larvae also appear earlier (May to June).

Bionomics. Univoltine. Flight period from late April to early June; larval period from May to June. Host plants: *Dryopteris* (= *Aspidium*), *Polystichum* (Dryopteridaceae), *Athyrium* (Woodsiaceae) and *Pteridium aquilinum* (Dennstaedtiaceae) (TAEGER et al. 1998). I collected the larvae exclusively on *P. aquilinum*.

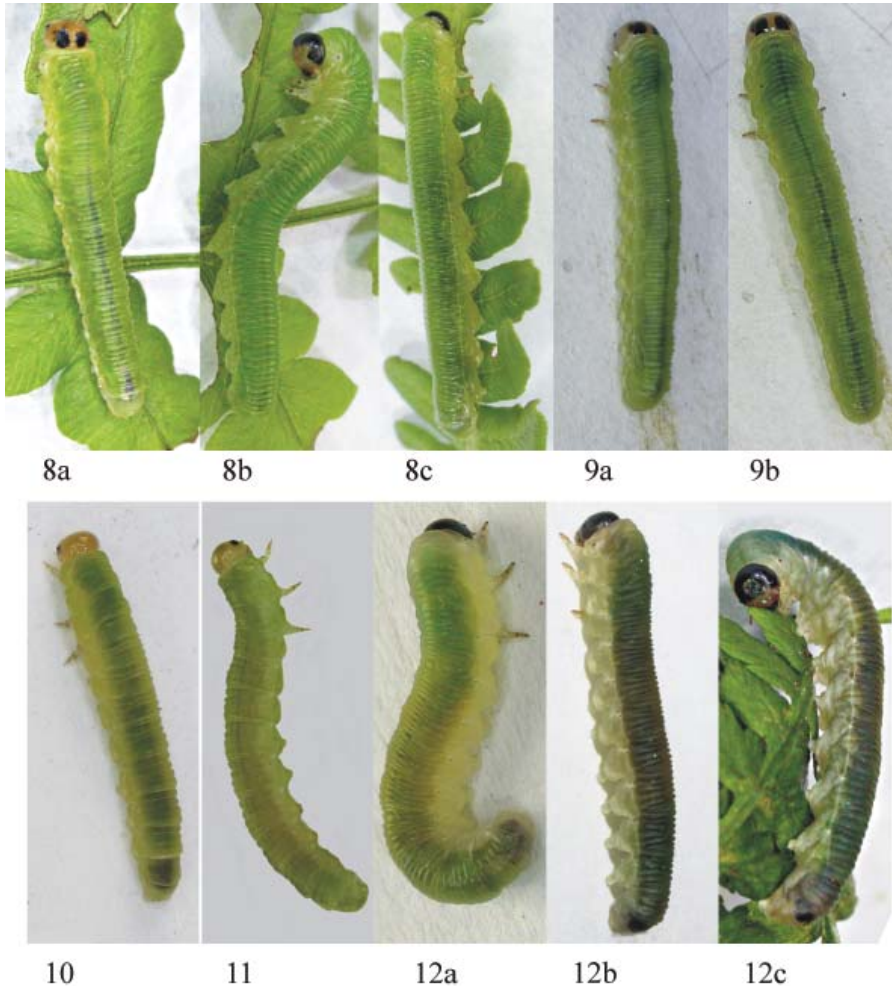
Distribution. Palaearctic Region (central and northern Europe, Siberia, China, Japan) (NAITO 1996). Scattered occurrence in the Czech Republic from uplands to highlands.

Comments. Both *S. xanthocera* and *S. multifasciata* are closely related and frequently occur at the same localities but have clearly separate flight periods. *Strongylogaster xanthocera* is a vernal species with the flight period from the end April to the end of the May, while *S. multifasciata* is mostly a summer species flying from early June to mid July, with partial



Figs. 2–7. *Strongylogaster* Dahlbom, 1835, adults: 2 – *S. macula* (Klug, 1817); 3 – *S. baikalensis* Naito, 1990; 4 – *S. mixta* (Klug, 1817); 5 – *S. filicis* (Klug, 1817); 6 – *S. multifasciata* (Geoffroy, 1785); 7 – *S. xanthocera* (Stephens, 1835). Scale: 10 mm.

overlap in late May and early June. The larvae of *S. xanthocera* feed on the bursting fronds of *Pteridium* and are grown up by early June, when the first instar of *S. multifasciata* appears. The larval period of *S. multifasciata* extends from June to early August before the ripening of the fern sori of *Pteridium*. Eonymphs of both species bore into bark for hibernation (WELKE 1959) and in captivity they also accept dry rotten wood (my observation).



Figs. 8–12. *Strongylogaster* Dahlbom, 1835, larvae: 8 – *S. xanthocera* (Stephens, 1835): a – immature instar (dorsal view); b – last instar (lateral view); c – last instar (laterodorsal view). 9 – *S. multifasciata* (Geoffroy, 1785): a – last instar (laterodorsal view); b – last instar (dorsal view). 10 – *S. macula* (Klug, 1817): last instar (laterodorsal view). 11 – *S. baikalensis* Naito, 1990: last instar (laterodorsal view). 12 – *S. mixta* (Klug, 1817): a – immature instar (laterodorsal view); b – last instar (lateral view); c – last instar (lateral view). Scale for last instar larva: 10 mm.



Figs. 13–14. *Strongylogaster* Dahlbom, 1835, penis valve, lateral view: 13 – *S. baikalensis* Naito, 1990; 14 – *S. macula* (Klug, 1817). Scale: 0.5 mm.

Strongylogaster filicis (Klug, 1817)

(Fig. 5)

Material examined. CZECH REPUBLIC: BOHEMIA bor.: Bělá u Děčína (5251), 14.vi.1957, 2 spec., Z. Bouček lgt.; České Švýcarsko NP: Vlčí potok brook (5052), 23.v.2006, 1 spec., M. Trýzna lgt. (MT); all J. Macek det. (NMPC).

Notes on identification. MUCHE (1969a) provided a diagnosis for adults. They are easily distinguished from the other *Strongylogaster* species by the short ovipositor sheaths, which are swollen at middle and not divided and lobed at apex, and the presence of a crossvein in the anal cell of the fore wing.

Bionomics. Univoltine. Flight period from May to June. Host plant: *Pteridium aquilinum* (Dennstaedtiaceae) (LACOURT 1999).

Distribution. Palaearctic Region (Europe, Siberia, Korea, Japan) (LACOURT 1999); distribution in central Europe: Austria, Czech Republic, Germany (TAEGER & BLANK 2008). Very rare in the Czech Republic, recorded only twice from northern Bohemia (MACEK 2006).

Key to adults of *Strongylogaster* species in the Czech Republic

- | | | |
|------|---|--|
| 1 | Tarsal claws simple. | 2 |
| – | Tarsal claws with small ventral denticle. | 4 |
| 2(1) | Clypeus and labrum black. | <i>S. mixta</i> (Klug, 1817) (Fig.4) |
| – | Clypeus and labrum pale. | 3 |
| 3(2) | Ground colour of abdomen predominantly orange yellow; orange-yellow pattern more or less confluent with yellow spots on laterotergites; abdomen of male extensively orange yellow. | <i>S. macula</i> (Klug, 1817) (Fig. 2) |

- Ground colour of abdomen predominantly black, dorsal orange yellow pattern confined to middle of abdominal terga, not confluent with white spots on laterotergites; abdomen of male almost entirely black with white laterotergites. *S. baikalensis* Naito, 1990 (Fig. 3)
- 4(1) Anal cell of fore wings with crossvein; labrum yellow; ovipositor sheaths tapering towards apex. *S. filicis* (Klug, 1817) (Fig. 5)
- Anal cell of fore wings simple; labrum black, ovipositor sheaths diverging towards apex. 5
- 5(4) Flagellum black, last sternum with deep median incision (females); last sternum always red, abdomen except tergite 1 and 2 red (males).
- Flagellum yellow to reddish, last sternum feebly inflexed posteriorly (females); last sternum mostly black, abdomen with more or less extensive black pattern (males).
- *S. multifasciata* (Geoffroy, 1785) (Fig. 6)
- Flagellum yellow to reddish, last sternum feebly inflexed posteriorly (females); last sternum mostly black, abdomen with more or less extensive black pattern (males).
- *S. xanthocera* (Stephens, 1835) (Fig. 7)

**Key to sawfly larvae associated with ferns in the Czech Republic
with emphasis on *Strongylogaster***

- 1 Endophagous, mining in fern axis. 2
- Exophagous, feeding on fern fronds. 3
- 2(1) Mine in fern axis short and straight with two openings; rear opening with a mass of froth-like spittle. *Blasticotoma filiceti* Klug, 1834 (Blasticotomidae)
- Mine in fern axis long, with one opening, descending down and upwards causing leaf malformation and crumpling; without froth-like spittle.
- *Heptamelus ochroleucus* (Stephens, 1835) (Tenthredinidae: Selandriinae)
- 3(1) Abdominal segments with six annulets. 4
- Abdominal segments with seven annulets. 5
- 4(3) Ground colour of body uniformly green. Host plant: *Athyrium*.
- *Strongylogaster macula* (Klug, 1817) (Tenthredinidae: Selandriinae) (Fig. 10)
- Ground colour green, on dorsum finely mottled with slightly transparent dorsal blood vessel. Host plants: *Dryopteris* and *Matteuccia*.
- *Strongylogaster baikalensis* Naito, 1990 (Tenthredinidae: Selandriinae) (Fig. 11)
- 5(4) Annulets 2 and 4 with distinct white conical tubercles.
- *Tenthredo* Linnaeus, 1758 (Tenthredinidae: Tenthredininae) (in part)
- Annulets 2 and 4 without or at most with indistinct conical tubercles. 6
- 6(5) Prolegs with fine scattered setae; body surface smooth.
- *Aneugmenus* Hartig, 1837 (three species) (Tenthredinidae: Selandriinae)
- Prolegs bare; body surface granulose. 7
- 7(6) Annulets with stiff setae on upraised warts.
- *Stromboceros delicatulus* (Fallén, 1808) (Tenthredinidae: Selandriinae)
- Annulets with tiny, short setae and without warts. 8
- 8(7) Ground colour grey, anal segment with black spot. Host plant: *Athyrium*.
- *Strongylogaster mixta* (Klug, 1817) (Tenthredinidae: Selandriinae) (Fig. 12)
- Ground colour green, anal segment without black spot. Host plant: *Pteridium*. 9

- 9(8) Last larval instar with two black parietal spots on head. Larvae in May to June.
 .. *Strongylogaster multifasciata* (Geoffroy, 1785) (Tenthredinidae: Selandriinae) (Fig. 9)
 – Last larval instar with black upper half of the head. Larvae in June to early August. ..
 *Strongylogaster xanthocera* (Stephens, 1835) (Tenthredinidae: Selandriinae) (Fig. 8)

Taxonus Hartig, 1837

Taxonus is a heterogeneous, predominantly Holarctic genus which is present also in the Oriental Region. Three species occur in Europe and all of them are known from the Czech Republic. The Euro-Siberian species were revised and keyed by TAEGER (1986). The larvae of *Taxonus* are similar to those of *Apethymus* Benson, 1939 and *Allantus* Panzer, 1801, but differ from them by the absence of white conical tubercles on annulets 2 and 4 of the abdominal segments. Only the larva of *Taxonus agrorum* Fallén, 1808 has been known (LORENZ & KRAUS 1957); the larvae of both remaining European species, *T. sticticus* Klug, 1914 and *T. alboscuteclatus* Niezabitowski, 1899, are newly described here. The larvae of all three European species are associated with Rosaceae.

Taxonus agrorum Fallén, 1808

(Figs. 15, 18)

Material examined. CZECH REPUBLIC: BOHEMIA or.: Hradčany env., Báh NR (5857), 31.v.2005, 2 larvae on *Rubus caesius*, breeding failed; all J. Macek lgt. and det. (NMPC); Orlické hory PLA: Pod Svingou rock (5763), 25.viii.2004, 3 larvae on *Rubus idaeus*, 1 adult emerged 6.iv.2005; Bukačka NNR (5664), 26.viii.2004, 1 larva on *Rubus idaeus*, breeding failed.

Adult. Notes on identification. The diagnosis was given by MUCHE (1969) and the taxonomy was discussed by TAEGER (1986). From the similar *T. sticticus*, it differs by two medial cells on the hind wing in females and a closed peripheral vein on the hind wing in males. Habitus as in Fig. 15.

Larva. Notes on identification. The diagnosis was given by LORENZ & KRAUS (1957). From the similar *T. sticticus*, *T. agrorum* differs by a blue-green ground colour with fine pruinose coating and two dark parietal spots on the head (Fig. 18). Moreover, the larvae feed exclusively on *Rubus*.

Bionomics. Mesophilous and silvicolous. Univoltine. Flight period from May to July; larval period from May to August. Host plants: *Rubus idaeus*, *R. caesius*, *R. fruticosus* (Rosaceae) (LISTON 1995, LACOURT 1998).

Distribution. Palaearctic Region (widespread throughout Europe). Widespread in the Czech Republic in forest areas.

Taxonus sticticus (Klug, 1817)

(Figs. 16, 19)

Material examined. CZECH REPUBLIC: BOHEMIA centr.: Český kras PLA: Hlásná Třebáň (6051), 6.vii.2005, 4 larvae on *Rosa canina*, 1 adult emerged 25.iv.2006. Příbram – Lazec (6349), 9.vii.2006, 1 larva on *Rosa canina*, breeding failed. MORAVIA mer.: Bílé Karpaty PLA: Machová NR (7171), 25.vi.2005, 6 larvae on *Rosa canina*; 1 adult emerged 1.iv.2006; Čertoryje NNR (7170), 29.v.2006, 2 spec., 20.vi.2006; Hutě NR (7073), 25.vi.2006,

2 spec., U Petrůvky NR (6872), 3.vi.2008, 2 spec., Ploštiny NR (6874), 27.vi.2006, 1 spec. Podyji NP: Šobes (7161), 12.–30.v.1997, 3 spec.; 30.v.–9.vi.1997, 3 spec.; all J. Macek lgt. and det. (NMPC).

Adult. Notes on identification. The diagnosis was given by MUCHE (1969b) and the taxonomy was discussed by TAEGER (1986). From the similar species *Ametastegia equiseti* (Fallén, 1808), *T. sticticus* differs by a larger size (*T. sticticus*: 8–10 mm; *A. equiseti*: 5.5–7 mm) and white basal part of pterostigma (whole pterostigma brown in *A. equiseti*). Moreover, *T. sticticus* differs from *Taxonus agrorum* by the absence of the medial cell on the hind wing in females and the absence of the peripheral vein on the hind wing in males. Habitus as in Fig. 16.

Larva. Description. Head amber yellow with red-brown vertex; body green with only slightly paler venter. Abdominal segments with six annuli; cuticle very finely granulose; annulus 2 and 4 with short setae and tiny conical bristles, anal segment with very short setae on suranal lobe; subspiracular lobe with fine setae and 2–3 small conical tubercles, surpedal lobe with short setae and one conical tubercle (Fig. 19).

Notes on identification. From the similar *Apethymus apicalis* (Klug, 1818), also feeding on roses, *T. sticticus* differs by the very tiny inconspicuous conical bristles on annulets 2 and 4 (with distinct conical tubercles in *A. apicalis*), rather uniform coloration (venter distinctly paler than dorsum in *A. apicalis*). The larvae of *T. sticticus* appear later (June to July) than the larvae of *A. apicalis* (May to June).

Bionomics. Mesophilous to xerothermophilous species. Univoltine. Flight period from May to June; larval period from June to July. Host plants: *Rosa* spp. (Rosaceae).

Distribution. Austria, Bulgaria, Croatia, Czech Republic, Hungary, Italy, Romania, Slovakia, Switzerland, Turkey (TAEGER & BLANK 2008). Very local and rare in the Czech Republic.

Taxonus alboscuteallatus Niezabitowski, 1899

(Figs. 17, 20)

Material examined. CZECH REPUBLIC: BOHEMIA or: Orlické hory PLA: Bukačka NR (6456), 12.ix.2005, 1 larva on *Filipendula ulmaria*, adult emerged 28.iii.2006; 26.vii.2004, 1 larva on *Rubus idaeus*, breeding failed; all larvae J. Macek lgt.; Bukačka NR (6456), 18.vii.–5.viii.1994, 1 spec. (MT); 28.vi.–18.vii.1994, 5 spec. (MT), all J. Hájek lgt. **BOHEMIA bor:** Jizerské hory PLA: Jizerka, Bukovec (5159), 31.v.2003, 7 spec., J. Preisler lgt.; Jizerka, Pralouka (5159), 7.vi.2004, 3 spec., P. Vonička & J. Preisler lgt., 27.vi.2004, 2 spec., P. Vonička & J. Preisler lgt. (MT). **MORAVIA bor:** Jeseníky PLA: Velký Kotel Mt. (5969), 14.vii.–29.vii.1994, 2 spec. J. Ježek lgt. (MT); all J. Macek det. (NMPC).

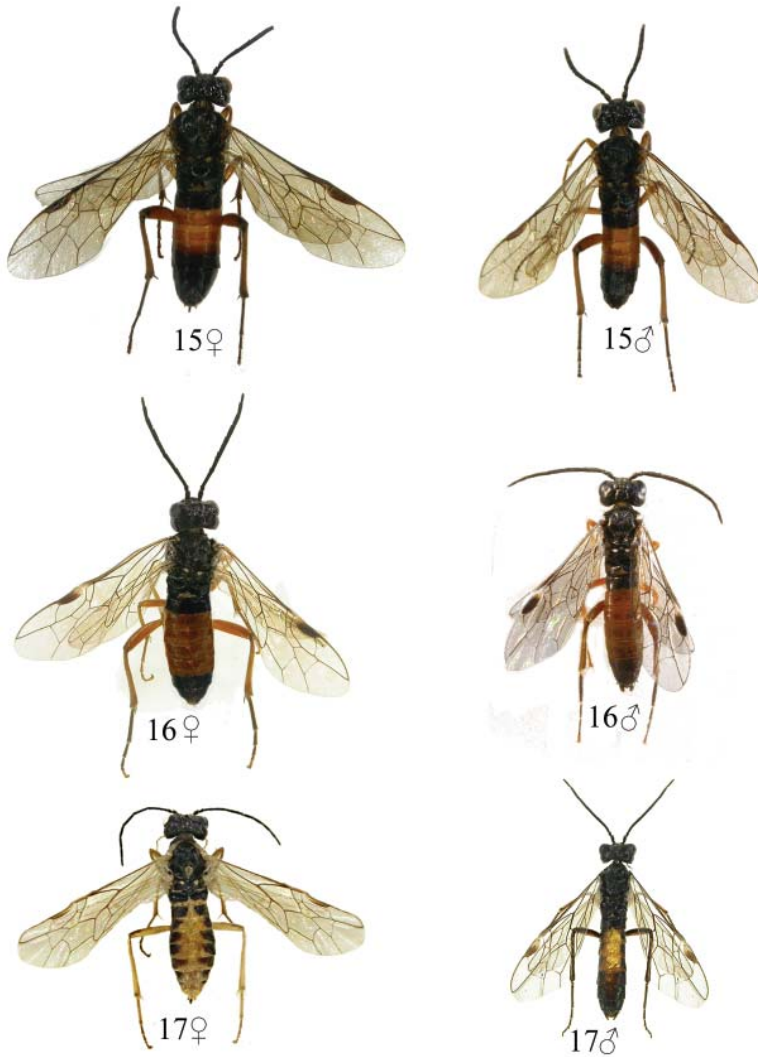
Adult. Notes on identification. The diagnosis was given by TAEGER (1986). From the similar *Ametastegia perla* (Klug, 1818), *T. alboscuteallatus* differs by a larger size (*T. alboscuteallatus*: 7–8 mm; *A. perla*: 6–7 mm) and three radial sector cells in the fore wing (two in *A. perla*). Habitus as in Fig. 17.

Larva. Description. Head pale brown, dorsum grey green with more or less distinct mottling in contrast to uniformly greyish venter, annulet 1 with two more or less distinct white spots. Abdominal segments with six annuli; cuticle very finely granulose; annulus 2 and 4 with short inconspicuous setae and tiny conical bristles combined (Fig. 20).

Notes on identification. The larva of *T. alboscuteallatus* differs from the similar larva of *Pachyprotasis antennata* (Klug, 1817) by the presence of six annulets on each abdominal

segment (seven in *P. antennata*) and one white spot on annulet 1 (white spots on the three annulets of each abdominal segment in *P. antennata*).

Bionomics. Hygrophilous and silvicolous species. Univoltine. Flight period from May to July; larval period from July to September. Host plants: *Rubus idaeus* and *Filipendula ulmaria* (Rosaceae) (MACEK 2008).



Figs.15–17. *Taxonus* Hartig, 1837, adults: 15 – *T. agrorum* Fallén, 1808; 16 – *T. sticticus* (Klug, 1817); 17 – *T. alboscuteclatus* Niezabitowski, 1899. Scale: 10 mm.

Distribution. Known so far only from mountains in central Europe (Sudeten, Carpathians); recorded from Germany, Slovakia, Ukraine (TAEGER & BLANK 2008) and the Czech Republic (MACEK 2008). In the Czech Republic very local and rare, recorded so far from the Jizerské hory Mts., Orlické hory Mts. and Jeseníky Mts.



Figs. 18–20, *Taxonus* Hartig, 1837, last instar larvae: 18 – *Taxonus agrorum* Fallén, 1808: a – bare larva (lateral view); b – bare larva (dorsal view); c – pruinose larva (lateral view). 19 – *T. sticticus* (Klug, 1817): a – laterodorsal view; b – dorsal view. 20 – *T. alboscuteellatus* Niezabitowski, 1899: a – dorsal view (plain form); b – laterodorsal view (plain form); c – dorsal view (patterned form). Scale: 10 mm.

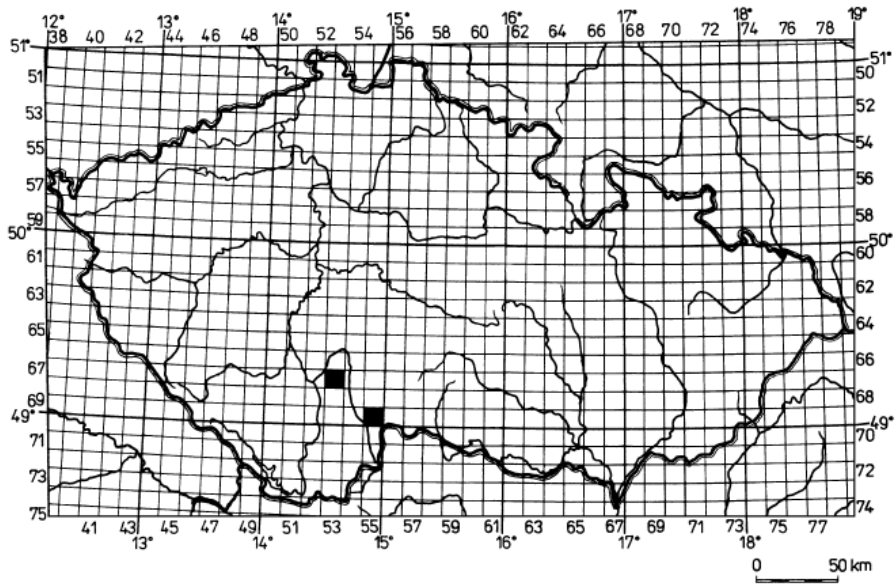


Fig. 21. Known localities of *Dinax ermak* (Zhelochovtsev, 1968) in the Czech Republic.

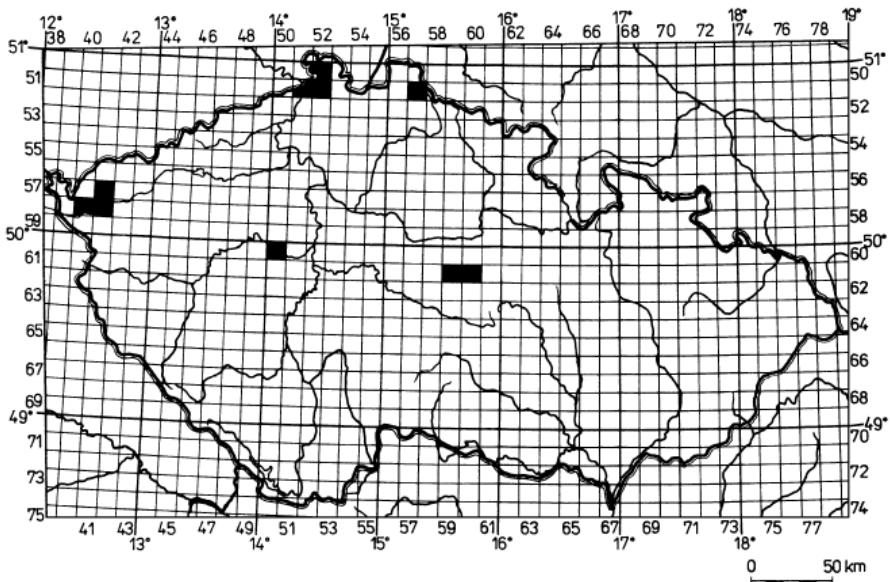


Fig. 22. Known localities of *Strongylogaster baikalensis* Naito, 1990 in the Czech Republic.

**Key to the larvae of Allantinae feeding on Rosaceae
with emphasis on *Taxonus* species**

- 1 Abdominal annulets 1, 2 and 4 with conical tubercles or bristles. 2
 – Abdominal annulets 2 and 4 with conical tubercles or bristles; annulet 1 lacking conical tubercles or bristles. 3
 2(1) Abdominal annulet 1 with bristles, lacking conical tubercles.
 *Empria* Lepeletier & Serville, 1828
 – Abdominal annulet 1 both with bristles and conical tubercles.
 *Allantus* Panzer, 1801
 3(2) Abdominal annulets 2 and 4 with conical tubercles.
 *Apethymus apicalis* (Klug, 1818)
 – Abdominal annulets 2 and 4 with conical bristles instead of conical tubercles. 4
 4(3) Body with dorsal part with mottled pattern and small white spots on annulet 1.
 *Taxonus alboscuteellatus* Niezabitowski, 1899 (Fig. 20)
 – Body uniformly green. 5
 5(4) Body with pruinose covering; head with dark parietal spots. Host plant: *Rubus*.
 *Taxonus agrorum* (Fallén, 1808) (Fig. 18)
 – Body green, not pruinose; head lacking dark parietal spots, amber yellow with darker vertex. Host plant: *Rosa*. *Taxonus sticticus* (Klug, 1817) (Fig. 19)

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