

## First record of the invasive *Megabruchidius tonkineus* (Pic, 1904) for Switzerland (Coleoptera, Chrysomelidae, Bruchinae)

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The invasive *Megabruchidius tonkineus* (Pic, 1904) from the Oriental region living in seeds of *Gleditsia* spp. (Fabaceae) is recorded here for the first time for Switzerland. The species was recorded in Germany in the 1980s for the first time for Europe. Presently further records are known from Bulgaria, France, Germany, Hungary and Russia.

Keywords: Bruchinae, invasive species, faunistics, new record, Switzerland

### INTRODUCTION

Chrysomelidae are represented in Switzerland with more than 500 species, although an up to date faunistic checklist is still missing.

Bruchinae or seed beetles are presently assigned to the family Chrysomelidae. Their larvae develop in seeds of plants, mostly Fabaceae. Several species have agricultural importance, because their host plants are grown for human food or livestock fodder. General biology of seed beetles is discussed in detail by Southgate (1979). Apart from those introduced species that have become established, even nowadays there are cases of accidental introduction via seeds coming from abroad, but in most cases these events do not lead to establishment of the newcomers.

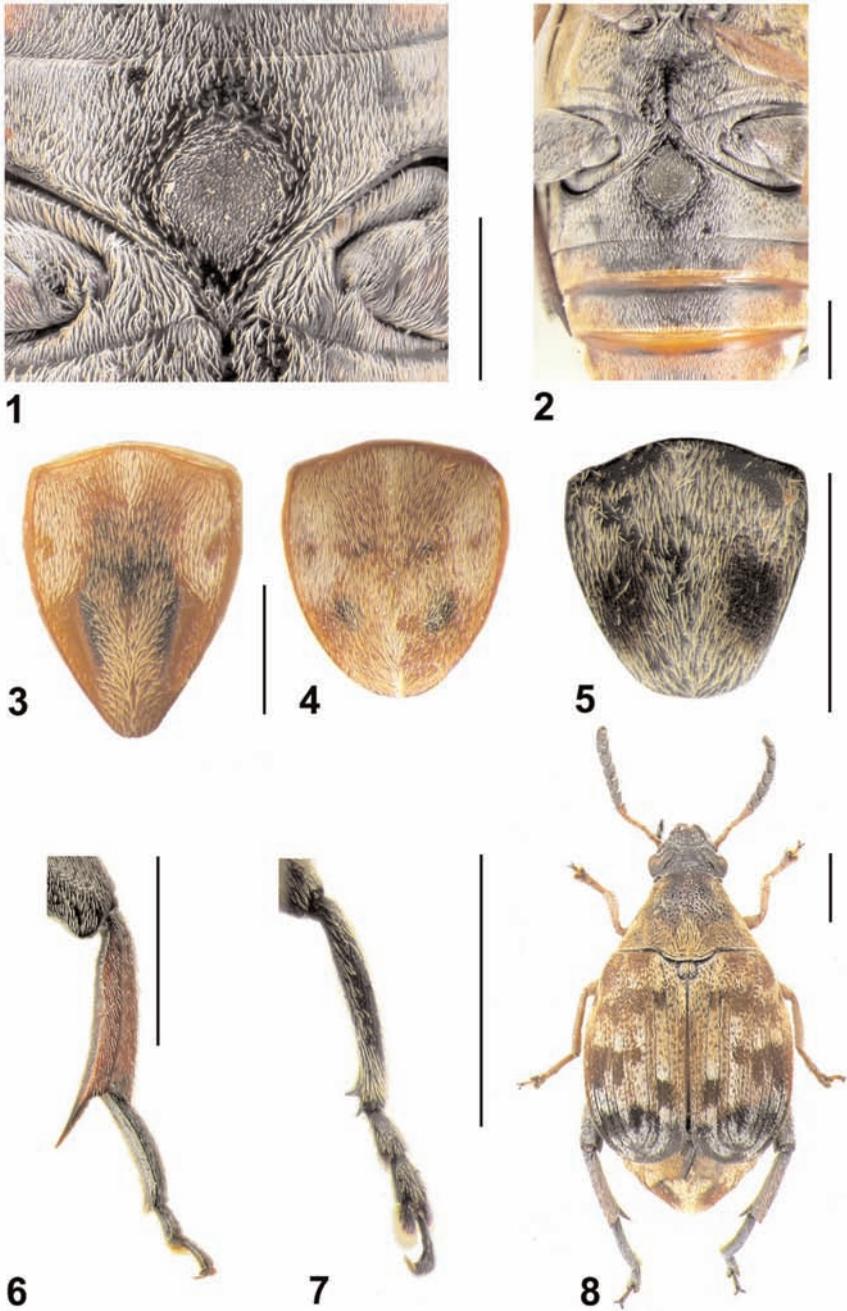
We here present the first records of the invasive *Megabruchidius tonkineus*, and we present a short synopsis of the present knowledge on Bruchinae in Switzerland.

### MATERIALS AND METHODS

Specimens were studied with a Leica MZ 12.5 stereoscopic microscope; photographs were taken with a Nikon Coolpix 4500 camera. The images were processed by Combine Z5 stacking software.

The collected specimens are deposited in the following collections:

NMBE Naturhistorisches Museum der Burgergemeinde Bern  
HNHM Hungarian Natural History Museum, Budapest  
NMLU Natur-Museum Luzern



Figs 1-4, 6, 8: *Megabruchidius tonkineus* (Pic, 1904): – 1. first abdominal ventrite with hair spot; – 2. abdomen colouration; – 3. female pygidium; – 4. male pygidium; – 6. hind leg with mucro; – 8. habitus of female. — Figs 5, 7: *Bruchus affinis* Frölich, 1799: – 5. male pygidium; – 7. male middle leg with apical denticles. Scale bars: 1 mm.

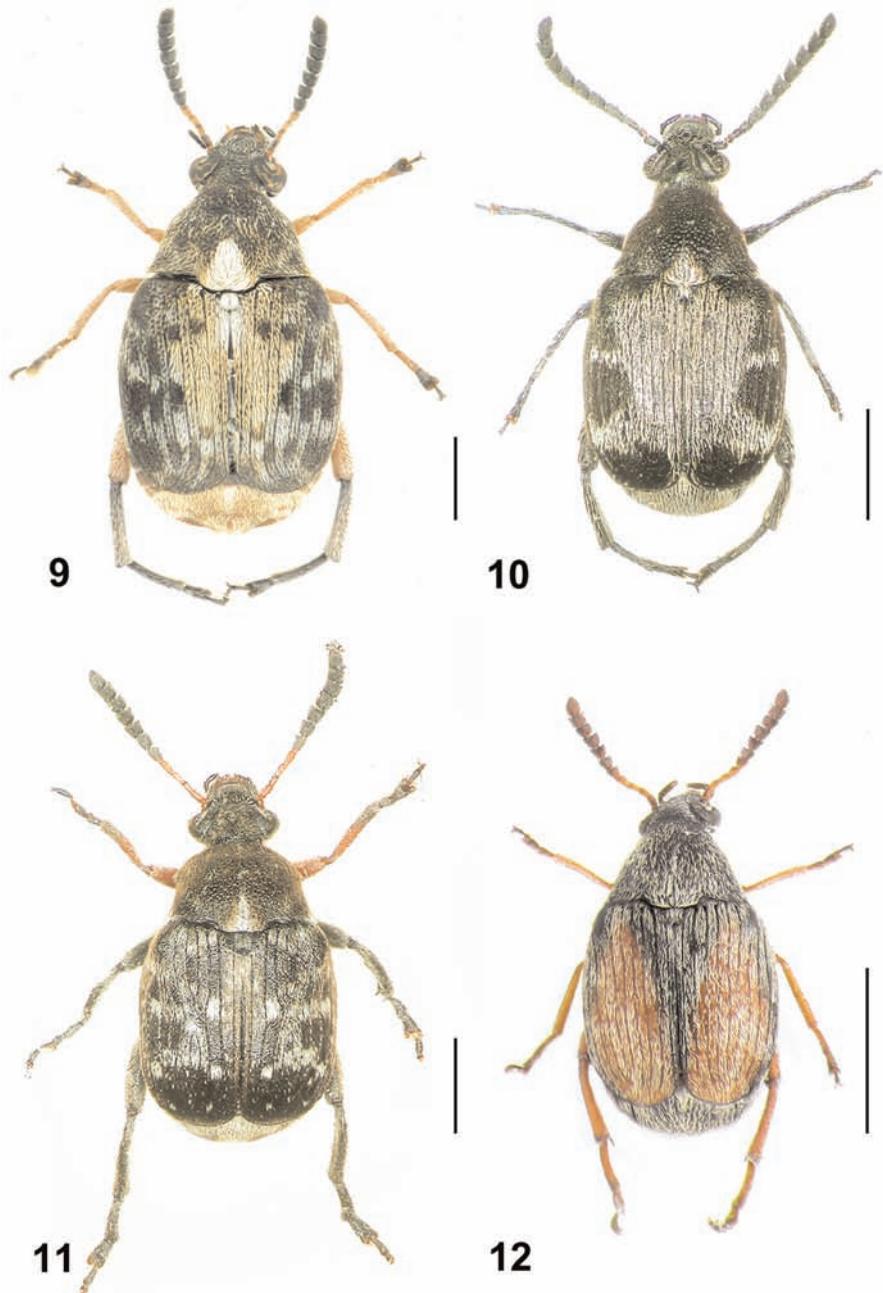
## RESULTS

Ten specimens of *Megabruchidius tonkineus* (Pic, 1904) (Figs. 1-12) were reared from pods of *Gleditsia triacanthos* (Fig. 13) planted as ornamental trees along the Fischermätteli quarter and the Loryplatz in the city of Bern. The pods were collected in autumn 2011 for decoration reasons, and beetles emerged from those pods steadily up to August 2012 (written communication by G. Zimmerli). The collected specimens were then brought to the NMBE for determination, which resulted in the present diagnosis.

An afterwards initiated search for further specimens by E. Obrecht (NMBE) was successful and two further specimens were found in collected pods under a *Gleditsia triacanthos* tree in the Ahornweg (Länggasse quarter in the city of Bern) on 30th August 2012.

*Megabruchidius tonkineus* can be confused with species of the genera *Acanthoscelides* or *Bruchidius*, although *M. tonkineus* is the largest species occurring in Switzerland, larger than the well-known Bean Weevil (*Acanthoscelides obtectus*). Its frons does not show a median carina, which is always present in species of the genus *Bruchidius*. The antennae are the same in both sexes; while most *Bruchidius* species exhibit a remarkable sexual dimorphism (antennae are generally longer and broader in males than in females). The first 5 antennomeres of *M. tonkineus* are light coloured, dorsally somewhat darker, further antennomeres are entirely black. The pronotum is elongate, not transverse, without a denticle bordered protrusion in middle of lateral margin, while the pronotum in *Bruchus* species is always transverse and the lateral margin in middle with a denticle bordered projection or at least a rounded protrusion (Fig. 11). The elytra have small basal tubercles that are always missing in the other Swiss members of the subtribe. Mesotibiae in males are without apical plates or denticles, while these are always present in males of the genus *Bruchus* (Fig. 7). The apex of the metatibia has a mucro (Fig. 6), much larger than the lateral coronal denticles. In *Bruchidius* species the apex of the metatibia has one or two spines on the internal ventral margin that are not much larger than the other coronal denticles. The elytra are quite broad. Colouration is conspicuous: whitish hairs forming a distinct pattern over brown and blackish background colour (Fig. 8). The ventrites are brownish, but black on a large area (Fig. 2). In males the middle of the first ventrite has an impression; the denser light coloured setation in it forms a drop-shaped hair spot (Fig. 1). Females also have a similar impression, but with setation of the same density, not forming a hair spot. A small whitish hair spot is present in males of *B. pusillus* but without impression. In both sexes the pygidium has two small round impressions in first basal third. Females have a black and longitudinal bare apical fovea (Fig. 3) behind each round impression; similar darker spots can be observed in males but without longitudinal impression (Fig. 4). Two spots side-by-side occur on the pygidium of other species, but with different shape and size. These spots are mostly formed by the absence or decreased density of light coloured hairs over blackish background colour (Fig. 5).

According to the Catalogue of Palaearctic Coleoptera (Anton 2010), including the present discovery and the there not mentioned record of *Bruchus tristiculus* Fähræus, 1839 (Linder, 1953), the subfamily Bruchinae is represented in Switzerland with 35 species, listed by subtribes in the following:



Figs. 9-12. Habitus of females: — 9. *Megabruchidius dorsalis* (Fåhraeus, 1839); — 10. *Bruchidius marginalis* (Fabricius, 1776); — 11. *Bruchus affinis* Frölich, 1799; — 12. *Acanthoscelides pallidipennis* (Motschulsky, 1874). Scale bars: 1 mm.

*Spermophagina* Borowiec, 1987: *Spermophagus calystegiae* (Lukjanovitch & Ter-Minassian, 1957), *S. sericeus* (Geoffroy, 1785), *Zabrotes subfasciatus* (Boheman, 1833).

Acanthoscelidina Bridwell, 1946: *Acanthoscelides obtectus* (Say, 1831), *A. pallidipennis* (Motschulsky, 1874), *Megabruchidius dorsalis* (Fähræus, 1839), *Bruchidius cisti* (Fabricius, 1775), *B. imbricornis* (Panzer, 1795), *B. lividimanus* (Gyllenhal, 1833), *B. marginalis* (Fabricius, 1776), *B. poupillieri* (Allard, 1868), *B. pusillus* (Germar, 1824), *B. pygmaeus* (Boheman, 1833), *B. seminarius* (Linnaeus, 1767), *B. unicolor* (Olivier, 1795), *B. varius* (Olivier, 1795), *B. villosus* (Fabricius, 1792), *Callosobruchus chinensis* (Linnaeus, 1758), *C. maculatus* (Fabricius, 1775).

*Bruchina* Bridwell, 1946: *Bruchus affinis* Frölich, 1799, *B. atomarius* (Linnaeus, 1760), *B. brachialis* Fähræus, 1839, *B. dentipes* (Baudi di Selve, 1886), *B. ervi* Frölich, 1799, *B. lentis* Frölich, 1799, *B. loti* Paykull, 1800, *B. luteicornis* Illiger, 1794, *B. occidentalis* Lukjanovitch & Ter-Minassian, 1957, *B. pisorum* (Linnaeus, 1758), *B. rufimanus* Boheman, 1833, *B. rufipes* Herbst, 1783, *B. signaticornis* Gyllenhal, 1833, *B. tristiculus* Fähræus, 1839, *B. viciae* Olivier, 1795.

Of the above-listed species, the following are introduced and/or invasive in Switzerland (the respective reference is added in brackets): *Bruchus tristiculus* (Linder 1953), *Acanthoscelides obtectus*, *A. pallidipennis*, *Bruchus pisorum*, *Callosobruchus chinensis* (Wittenberg *et al.* 2006), *Megabruchidius dorsalis* (Yus Ramos 2009), *Bruchus ervi*, *B. signaticornis*, *Callosobruchus maculatus* and *Zabrotes subfasciatus* (Anton 2010). However, the species *Callosobruchus chinensis*, *C. maculatus* and *Zabrotes subfasciatus* are simply introduced occasionally into our country and cannot reproduce in the wild. In the case of *Bruchus pisorum*, this species also develops in wild beans and might be indigenous (Delobel & Delobel 2006).



Fig. 13. Pods of *Gleditsia triacanthos* from Länggasse, Bern, with emergence holes of *Megabruchidius tonkineus* (Pic, 1904).

## DISCUSSION

*Megabruchidius tonkineus* is the eleventh introduced species of Bruchinae in Switzerland. *M. tonkineus* was described by Pic from Vietnam, where it feeds in the seeds of *Gleditsia australis*. *M. tonkineus* was probably introduced to eastern Europe by Vietnamese workers (Delobel & Delobel 2008), and is so far mentioned from: France, Germany (Wendt 1980), Hungary (Jermy *et al.* 2002), Bulgaria (Stojanova 2007) and Russia (Korotyaev 2011). If suitable host plants are present, *M. tonkineus* can be expected to establish, and adults are able to overwinter in our climate. The confirmed food plant in Switzerland is the American *Gleditsia triacanthos*, the same as in other European countries. In the laboratory egg laying of *M. tonkineus* was also observed on the seeds of other *Gleditsia* species as *G. caspica*, *G. delavai*, *G. ferox*, *G. japonica* and *G. macroacantha* (György 2007).

The first occurrence of the genus *Megabruchidius* Borowiec, 1984 in Switzerland was mentioned by Yus Ramos (2009) from the Basler Zoo; it was a specimen of *M. dorsalis* collected in 2008. After its erection by Borowiec (1984), the genus was revised by Yus Ramos (2009) where three species were treated: *M. dorsalis*, *M. tonkineus* and *M. sophorae* Tuda & Morimoto, 2004. The host plant range of *M. tonkineus* and *M. dorsalis* is the same (*Gleditsia* spp.). However, specimens of *M. sophorae* emerged from the fruits of *Styphnolobium japonicum* (formerly *Sophora japonica*) in Japan (Tuda & Morimoto 2004). So far this species has not yet been reported from Europe.

As the Bruchinae were not revised in the Swiss museum collections, and about 40 species are known from Germany (Köhler & Klausnitzer 1998, Anton 2010), more species can be expected for the Swiss fauna.

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