

***Megastigmus* and *Torymus* species associated with berries of *Sorbus aucuparia* and *Amelanchier spicata* in Finland (Hymenoptera: Chalcidoidea, Megastigmidae and Torymidae)**

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The Nearctic species *Megastigmus amelanchieris* and *Torymus aea* are reported from South Finland. They were collected from berries of *Amelanchier spicata* in Janakkala in 2019–2024. In Finland the first females of *M. amelanchieris* were captured already in 1976 in Nurmijärvi and Lammi, but were overlooked previously. Their characters are described and they are compared with closely related species *Megastigmus brevicaudis* reared from berries of *Sorbus aucuparia* and *A. spicata*, and *Torymus aucupariae* swept on berries of *S. aucuparia*. The male of *M. brevicaudis* is described. *Torymus druparum* was collected from berries of *A. spicata* in Janakkala.

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Introduction

Three chalcidoid species *Megastigmus brevicaudis* Ratzeburg, *Torymus aucupariae* (Rodzianko) and *T. druparum* Boheman develop in the seeds of rowan (*Sorbus aucuparia* L.) in Europe (Graham & Gijswijt 1998, Roques & Skrzypczyńska 2003), and they have also been reported from Finland (Hellén 1934, Grönbloom 1940, Vikberg 1982). One species of the closely related genus *Amelanchier* Medik., *A. spicata* (Lam.) C. Koch, was first cultivated in Finland, but has long ago become established in a large part of South Finland (Jalas 1965). In North America, one species of *Megastigmus* Dalman, *M. amelanchieris* Cushman, and one species of *Torymus* Dalman, *T. aea* (Walker), has been reared from the seeds of *Amelanchier canadensis* (L.) Medik. In June 2022, dark females of *Megastigmus* were collected on *A. spicata* in Janakkala, South Finland. They differed distinctly from females of *M. brevicaudis* raising the question, whether they could represent the same species which had been reared in North America from the closely related *Amelanchier* species.

The purpose of this article is to study which chalcidoid species develop in the seeds of *S. aucuparia* and especially in seeds of *A. spicata* in Finland.

Material and methods

All specimens of *M. brevicaudis* in the collection of the Finnish Museum of Natural History (MZH) were studied by the author VV to see if earlier specimens of *M. amelanchieris* had been

found from Finland. However, many Finnish observations of *M. brevicaudis* included in the Finnish Biodiversity Info Facility (FinBIF) could not be checked for this article. The females collected after 1970 and included in FinBIF are not mentioned here, because some of them can be specimens of *M. amelanchieris*.

Most specimens of *M. brevicaudis* in MZH had been identified earlier by the author MK. Specimens of *M. amelanchieris*, *T. aea*, *T. aucupariae* and *T. druparum* were identified by the author VV.

The coordinates are presented in parentheses in the Finnish Uniform grid system (YKJ) or in the ETRS-TM35FIN system (ETRS). Province names refer to Finnish biogeographical provinces.

Abbreviations: MZH = Finnish Museum of Natural History Luomus, University of Helsinki. VVT = private collection of V. Vikberg, Turenki.

Results

***Megastigmus amelanchieris* Cushman, 1918**

Cushman (1918) reared the new species *M. amelanchieris* from the seeds of the eastern shadbush (*Amelanchier canadensis*) from West Virginia and Pennsylvania. Later the species has

been recorded from Minnesota, New Hampshire, New York and Vermont (Grissell 1979); all these are states of North-Eastern USA. Other host plants of the species in North America are *Amelanchier laevis* x *humilis*, *A. sanguinea* (Pursh) DC. and *Sorbus aucuparia* (Milliron 1949, Grissell 1979).

Specimens studied

Finland. Uusimaa: Helsinki, Kannelmäki (YKJ 6682:3383), 15.6.1981 1 ♀, 25.6.1981 8 ♀♀, leg. M. Koponen (MZH). Nurmijärvi, Rajamäki (YKJ 6715:3376) 30.5.1976 1 ♀, 26.6.1977 1 ♀, 28.6.1980 3 ♀♀, 17.7.1981 1 ♀, 16.6.1985 1 ♀, leg. M. Koponen (MZH). **Satakunta:** Huittinen, Karhiniemi (YKJ 6799:3266) 29.5.1993 3 ♀♀, leg. M. Koponen (MZH). Sastamala, Vammala, near church (YKJ 6820:3288), 28.6.1993 1 ♀, leg. M. Koponen (MZH). **South Häme:** Hämeenlinna,

Lammi, biol. station, (YKJ 6773:3394) 6.7.1976 2 ♀♀, leg. M. Koponen. Hartola, adult education college (YKJ 6829:3449) 11.6.1987 1 ♀, leg. M. Koponen (MZH). Janakkala, Hangastennmäki (ETRS 6752:369), 18.6.2000 1 ♀, 19.6.2022 1 ♀, leg. V. Vikberg (VVT). Janakkala, Kalpalinna (YKJ 6760:3370) 12.6.1988 1 ♀, leg. M. Koponen (MZH), (ETRS 6757:370), on *Amelanchier spicata*, 4.6.2023 6 ♀♀, 5.6.2023 8 ♀♀, 7.6.2023 1 ♂ 14 ♀♀, 16.6.2023 1 ♀, 23.6.2023 1 ♀, leg. V. Vikberg (VVT). Janakkala, Tarinmaa (ETRS 6753:369), on *A. spicata*, 9.6.2022 2 ♀♀, 12.6.2022 6 ♀♀, 17.6.2023 2 ♀♀, leg. V. Vikberg (VVT). Janakkala, Turenki (ETRS 6756:371), on *A. spicata*, 18.6.2023 2 ♀♀, leg. V. Vikberg (VVT). Janakkala, Turenki, Kuumola (YKJ 6758:3372) 12.6.1983 2 ♀♀, leg. M. Koponen (MZH), (ETRS 6755:372), on *A. spicata*, 6.6.2023 2 ♀♀, leg. V. Vikberg (VVT). Janakkala, Turenki, Kuumola, Paronintie 1 (ETRS 67554:3728), on *A. spicata*, 26.5.2024 3 ♀♀, 2.6.2024 31 ♀♀, 6.6.2024 8 ♀♀, 16.6.2024 4 ♀♀, leg. V. Vikberg (VVT). Janakkala, Turenki, Kuumola, Rotarypuisto (ETRS 6755:372), 20.6.2022 2 ♀♀, 27.6.2023 1 ♀, 2.7.2023 1 ♀, swept on *Sorbus aucuparia*, leg. V. Vikberg (VVT). Janakkala, Turenki, Kuumola, Siilotie (ETRS 6755:372), on *A. spicata*, 10.6.2019 9 ♀♀, 16.6.2019 1 ♀, 16.6.2023 2 ♀♀, leg. V. Vikberg (VVT). Kouvola, Jaala, Kimola (YKJ 6740:3465) 16.6.1975 1 ♀, leg. M. Koponen (MZH). **North Karelia:** Liperi, cemetery (YKJ 6938:3623), 3.7.1994 1 ♀, leg. M. Koponen (MZH). **Central Ostrobothnia:** Haapavesi, hostess school (YKJ 7123:3407) 12.7.1995 2 ♀♀, leg. M. Koponen (MZH).



Fig. 1. *Megastigmus amelanchieris* female from Janakkala (side view). Photo taken by Pekka Malinen [<http://id.luomus.fi/GP.114258>].



Fig. 2. *Megastigmus amelanchieris* male from Janakkala (side view). Photo taken by Pekka Malinen [<http://id.luomus.fi/GP.114256>].

The largest measured female of *M. amelanchieris* from Liperi is 2.55 mm long, its head width 0.71 mm, head width/head length 1.58, fore wing 2.5 mm, hind tibia 0.75 mm, gaster 1.05 mm, sheath 1.05 mm or as long as gaster. The ocelloccipital line shorter than ocellocular line which is half as long as posterior ocellar line. Malar space 0.38 times as long as eye height. Pronotum is 1.5 times as wide as long. Flagellum 1.06 times as long as head width and pedicel plus flagellum 1.15 times as long as head width. Scape as long as pedicel, anellus and F1 together. Pedicel slightly longer than F1, but distinctly shorter than anellus plus F1.

Fore wing with oval stigma which is 1.5 times as long as wide and surrounded by faint infumation, basal part of stigmal vein half as long as width of stigma, broadened at junction with stigma, uncus short, 0.25 times as long as length of stigma. Postmarginal vein 1.08 times as long as marginal vein.

Head black, with a brownish yellow spot above eye. Lower face, gena, parascrobal area and lower 0.82 of temple yellow. Scape and pedicel below yellow, flagellum dark brown, below pale brown.

Pronotum seen from above black, with an ovoid yellow spot posterolaterally and seen from side with a large triangular yellow spot surrounded by brown. Mesoscutum and scutellum black, with fine transverse sculpture, scutellar frenalium smooth

and shining, without any sculpture. Scutellar setae (4–5 per side) are rather long, whitish. Mesosoma black, tegula medially brownish yellow, acropleuron brown. Legs, including fore coxa, yellow, midcoxa basally and hind coxa entirely black. Wings subhyaline, with dark brown setae. Basal vein present, thin, basal cell with 4 setae.

Gaster black, lower part of terga partly and sterna brown, sheath black.

Variation of Finnish females (Fig. 1) ($n = 138$): body 1.90–2.55 mm long, gaster 0.8–1.12 mm long and ovipositor sheath 0.70–1.05 mm long or ovipositor sheath 0.85–1.12 times as long as gaster.

Only one male (body 2.0 mm) has been found in Finland (Fig. 2). In North America they are rare and Milliron (1949) could study only the allotype and one other paratype. They are similarly coloured as females, but the pronotum is laterally entirely yellow which is confluent with spots on posterolateral corners. Vestiture of thoracic dorsum is whitish.



Fig. 3. *Megastigmus brevicaudis* female from Huittinen (side view). Photo taken by Pekka Malinen [<http://id.luomus.fi/GP.117227>].



Fig. 4. *Megastigmus brevicaudis* male from Huittinen (side view). Photo taken by Pekka Malinen [<http://id.luomus.fi/GP.17018>].

The species is new to Finland and Europe. *Amelanchier spicata* is a new host plant for the species.

Megastigmus brevicaudis Ratzeburg, 1852

Ratzeburg (1852) described the females which Bouche had reared from berries of *Sorbus aucuparia* in Germany. The female of the species was further described by Rodzianko (1908); he reared three females from seeds of *S. aucuparia* in Poltava (now in Ukraine). Milliron (1949) gave a detailed re-description of one Rodzianko's female and described the form of the female sex based on reared specimens from Sweden and Minnesota, USA. He summarized that the colour pattern appeared to be rather stable, except on the head, pronotum, scutellum and abdomen. He described various colour forms. Roques and Skrzypczyńska (2003) designated a neotype female for the species from Poland and described its characters. They studied additional females from France and Poland and regarded the body colour stable.

The male of *M. brevicaudis* is rare, and most studies dealt with only females, but Lessmann (1974) reared 1 ♂ for 127 ♀♀. In the key to the West European species, Bouček (1970) gave characters of the male as follows: in both sexes middle funicle segments subquadrate, and body size of the male 1.6–2.2 mm. Zerova and Seryogina (1994) described the male as follows: Body length 2 mm, thorax brighter than in female, sternum, head and abdomen darker; legs including coxae yellow, stigma wider than in female. Jensen and Ochsner (1999) keyed males and females of 14 Danish species of *Megastigmus* (one of them is now *Bootanomyia dorsalis*). Also the male of *M. brevicaudis* was keyed.

In Finland, *M. brevicaudis* was first reported from 2 localities in Åland, 5 localities in Varsinais-Suomi and 5 localities in Uusimaa by Hellén (1934). One further locality was Valamo (= Valaam) (leg. Woldstedt) which now is part of the Republic of Karelia, Russia. Vikberg (1967) reported the first reared specimens from seeds of *S. aucuparia* and *Amelanchier spicata* from Tampere (South Häme).

Specimens studied

Finland. Åland: Brändö, 11.7.–12.7.1920 1 ♀, leg. M. Hellén (MZH). Föglö, >1934 1 ♀, leg. R. Forsius (MZH). Föglö (YKJ 6673:3142) 30.6.1984 1 ♀, leg. M. Koponen (MZH). **Varsinais-Suomi:** Halikko (YKJ 6704:3283) 8.6.2008 1 ♀, leg. M. Koponen (MZH). Karjalohja, 7 ♀♀, leg. R. Forsius (MZH). Karkkila ("Pyhäjärvi, U.I."), (YKJ 671:334) 12.7.1967 1 ♀, leg. Vikberg (VVT). Parainen, Korppoo, >1934 1 ♀, leg. R. Forsius (MZH). Lohja, >1934 1 ♀, R. Forsius (MZH). Lohja ("Lohjan kunta") (YKJ 6693:3334) 19.6.1992 1 ♀, leg. M. Koponen (MZH). Parainen, Nauvo, >1934 1 ♀, leg. R. Forsius (MZH). Parainen, Nauvo (YKJ 668:321), 9.6.1937, 1 ♀, leg. I. Hellén (7689); MZH). Parainen, Nauvo, Seili (YKJ 669:322)

18.7.1978 1 ♀, leg. M. Koponen (MZH). Salo, Halikko, Rikalanmäki (YKJ 6704:3283) 8.6.2008 4 ♀♀, leg. M. Koponen (MZH). Salo, Uskela, 1 ♀, leg. F. W. Mäklin (MZH). Turku, 1872 1 ♀, leg. H. Ingelius (MZH). Uusikaupunki, 24.7.1923 1 ♀ (1217), 25.7.1923 2 ♀♀, leg. M. Hellén (MZH). Uusikaupunki, 11.7.1923 1 ♀, 15.7.1923 2 ♀♀, 29.7.1923 2 ♀♀, 2.8.1923 3 ♀♀, 1 ♀, 1 ♀, 27.8.1923 1 ♀, 29.8.1923 1 ♀, leg. W. Hellén (MZH). Vihti, >1934 1 ♀, leg. R. Forsius (MZH). **Uusimaa:** Elimäki (YKJ 673:346) 16.6.1984 1 ♀, leg. M. Koponen (MZH). Espoo, Kasberget (YKJ 6870:3371) 13.5.1917 1 ♀, leg. W. Hellén (MZH). Espoo (YKJ 667625:337604), window trap 24.6. –1.7.2011 1 ♀, leg. P. Rassi (MZH). Hanko, 11.6.1931 1 ♀ (39), 17.6.1931 1 ♀ (499), 28.6.1931 1 ♀ (1002), leg. W. Hellén (MZH). Hanko >1934 1 ♀, leg. A. Wegelius (MZH). Hanko, Lappvik >1934 1 ♀, leg. R. Forsius (MZH). Hanko, Tvärminne >1934 1 ♀, leg. A. Wegelius (MZH). Hanko, Tvärminne 17.7.1977 1 ♀, leg. V. Vikberg (VVT). Hanko (YKJ 6641:3276) 17.6.1980 1 ♀, leg. M. Koponen (MZH). Helsingin mlk. >1934 1 ♀, leg. R. Forsius (MZH). Helsinki >1934 1 ♀, leg. R. Forsius (MZH). Helsinki 1 ♀, leg. W. M. Linnaniemi (MZH). Helsinki (YKJ 6680:3390) 13.6.1975 1 ♀, leg. M. Viitasaari (MZH). Helsinki, Haaga 27.4.1919 1 ♀, Helsinki, Kannelmäki (YKJ 6682:3383) 26.6.1980 1 ♀, 15.6.1981 2 ♀♀, 22.6.1981 2 ♀♀, leg. M. Koponen (MZH). Helsinki, Munkkiniemi (YKJ 667:338), 23.9.1915 1 ♀, leg. W. Hellén (MZH). Helsinki Munkkiniemi 8.5.1919, 1 ♀, leg. M. Hellén (MZH). Kirkkonummi (YKJ 6654:3355) 23.7.1991 1 ♀, 24.7.1991 1 ♀, leg. M. Koponen (MZH). Nurmijärvi, Rajamäki (YKJ 6715:3376) 21.6.1975 1 ♀, 22.6.1975 6 ♀♀, 4.7.1976 1 ♀, (YKJ 6715:3376) 30.6.1985 5 ♀♀, (YKJ 6714:3385) 14.7.1991 2 ♀♀, (YKJ 6705:3379) 2.6.1992 1 ♀, (YKJ 6705:3378) 24.6.1992 2 ♀♀ 1 ♂, (YKJ 6707:3379) 5.7.1992 1 ♀, (YKJ 67112:33783) 18.6.1994 1 ♀, (YKJ 6708:3380) 29.6.1996 13 ♀♀, leg. M. Koponen (MZH). Raasepori (YKJ 6662:3317) 15.6.2012 2 ♀♀, leg. M. Koponen (MZH). Sipoo (YKJ 6684:3400) 15.6.1983 1 ♀, leg. M. Koponen (MZH). Tuusula, Ruotsinkylä 23.6.1975 2 ♀♀, leg. M. Koponen (MZH). **South Karelia:** Virolahti, Virojoki (YKJ 6717:3538) 18.6.2016 3 ♀♀, leg. M. Koponen (MZH). Ylämaa (YKJ 6760:3550) 6.7.1990 1 ♀, leg. M. Koponen (MZH). **Satakunta:** Huittinen, Karhiniemi (YKJ 6799:3266), 29.5.1993 450 ♀♀ 2 ♂♂, 30.5.1993 5 ♀♀, leg. M. Koponen (MZH). Pori, Ahlainen, Rankkuu, 16.7.1958 1 ♀, leg. V. Lauro (MZH). Pori, Reposaari, 3.7.1958 7 ♀♀, ad lucem, 6.7.1958 1 ♀, 9.7.1958 2 ♀♀ ad lucem, 9.7.1967 1 ♀ ad lucem, 11.7.1967 1 ♀ ad lucem, leg. V. Lauro (MZH). Rauman mlk. (YKJ 6798:3207) 2.7.1986 1 ♀, (YKJ 6796:3209) 3.7.1986 1 ♀, leg. M. Koponen (MZH). Sastamala, Vammala (YKJ 6820:3288) 28.6.1993 8 ♀♀; (YKJ 6814:3286) 1.7.1993 4 ♀♀, (YKJ 6821:3289) 2.7.1993 1 ♀, leg. M. Koponen (MZH). **South Häme:** Hämeenlinna (YKJ 676:336) 3.7.1965 3 ♀♀, 5.7.1965 5 ♀♀, 17.6.1967 5 ♀♀, 13.7.1969 1 ♀, 25.7.1976 1 ♀, leg. E. Valkeila (MZH), Hämeenlinna, Aulanko 15.6.1978 1 ♀, leg. V. Vikberg (VVT). Hämeenlinna, Hätilä, 22.6.1976 1 ♀, leg. V. Vikberg (VVT). Hämeenlinna, Lammi, biological station

(YKJ 6773:3394) 15.7.1976 1 ♀, leg. M. Koponen (MZH). Hämeenlinna, Vanaja, 1962 5 ♀♀ and 1965 4 ♀♀ reared from berries of *Sorbus aucuparia*, leg. E. Valkeila (MZH). Hattula (YKJ 677:335), 25.6.1975 1 ♀, leg. E. Valkeila (MZH). Kangasala, Kaivanto 20.6.2010 2 ♀♀, leg. M. Koponen (MZH). Janakkala, Kalpalinna (ETRS 6757:370), *Amelanchier spicata*, 4.6.2023 2 ♀♀, 5.6.2023 1 ♀, 23.6.2023 2 ♀♀, *S. aucuparia* 1.7.2023 2 ♀♀, leg. V. Vikberg (VVT). Janakkala, Turenki, Kuumola (6752:3372) 14.6.1981 1 ♀, (ETRS 6755:372), *S. aucuparia*, 6.6.2023 1 ♀, leg. V. Vikberg (VVT). Janakkala, Turenki, Kuumola (ETRS 6755:373), *S. aucuparia*, 19.6.2023 11 ♀♀, 30.6.2023 40 ♀♀, 5.7.2023 4 ♀♀, 8.7.2023 3 ♀♀, 14.7.2023 1 ♀, leg. V. Vikberg (VVT). Janakkala, Turenki, Kuumola, Paronintie 1 (ETRS 67554:3728), on *A. spicata*, 6.6.2024 1 ♀, leg. V. Vikberg (VVT). Janakkala, Turenki, Kuumola, Rotarypuisto, (ETRS 6755:372), 26.6.2022 1 ♀, 14.6.2023 1 ♀, 17.6.2023 1 ♀, 20.6.2023 4 ♀♀, 26.6.2023 21 ♀♀, 27.6.2023 14 ♀♀, 29.6.2023 9 ♀♀, 6.7.2023 2 ♀♀, 10.7.2023 3 ♀♀, swept on *S. aucuparia*, leg. V. Vikberg (VVT). Janakkala, Turenki, Kuumola, Siilotie (ETRS 6755:372), *A. spicata*, 11.6.2022 2 ♀♀, leg. V. Vikberg (VVT). Janakkala, Turenki, Lyylinpuisto (ETRS 6756:372), *A. spicata* 3.7.2023 1 ♀, leg. V. Vikberg (VVT). Janakkala, Turenki, Mäntyniemi (ETRS 6756:370); rearing: 1.8 liter of overwintered berries of *S. aucuparia* were taken on 17.5.2022 to room temperature; 31.5.2022–1.6.2022 6 ♀♀ emerged, leg. V. Vikberg (VVT). Lahti (YKJ 6769:3431) 5.6.1993 1 ♀, leg. M. Koponen (MZH). Nastola (YKJ 6774:3436) 22.6.1980 1 ♀, leg. M. Koponen (MZH). Tampere (YKJ 682:322), 2 ♀♀, reared from berries of *A. spicata*, taken in 1965, emerged 1966; 2 ♀♀ reared from berries of *S. aucuparia*, taken in 1965, emerged 1966, leg. V. Vikberg (VVT). **South Savo:** Imatra (YKJ 6789:3596) 4.7.1975 1 ♀, leg. M. Koponen (MZH). Mäntyharju, Pertunmaa (YKJ 6810:3465) 22.6.1983 2 ♀♀, leg. M. Koponen (MZH). Mikkeli (YKJ 6829:3503) 28.6.1975 1 ♀, (YKJ 6830:3502) 29.6.1975 1 ♀, (YKJ 6830:3501) 5.6.1983 2 ♀♀, (YKJ 6830:3502) 11.6.1995 1 ♀, leg. M. Koponen (MZH). Mikkeli, Ristiina (YKJ 6826:3502) 27.6.1992 1 ♀, leg. M. Koponen (MZH). Mikkeli, Tuoppitie (YKJ 6840:3514) 13.6.2016 3 ♀♀, leg. M. Koponen (MZH). Mikkeli, Urpola, Myllykoski (YKJ 68407:35144) 16.6.2018 1 ♀, leg. M. Koponen (MZH). Ruokolahti (YKJ 6798:3598) 2.7.1975 6 ♀♀, leg. M. Koponen (MZH). Taipalsaari, Kyläniemi (YKJ 6800:3564) 3.7.1975 1 ♀, leg. M. Koponen (MZH). **Ladoga Karelia:** Parikkala, Laurila 1 ♀, 1 ♀ 13. 6.1945, 1 ♀ 18. 6.1945), 1 ♂ 18.6.1945, 1 ♀ 25. 6.1945), 1 ♀ 16.7.1945, leg. W. Hellén (MZH). Parikkala (YKJ 6831:3633) 30.6.1990 1 ♀, (YKJ 6825:637) 2.7.1990 1 ♀, leg. M. Koponen (MZH). **South Ostrobothnia:** Malax, Brinkens hembygdsmuseum, 15.6.2014 3 ♀♀, leg. I. Österblad (MZH). Närpiö (YKJ 6934:3211) 26.6.1978 1 ♀, leg. M. Koponen (MZH). **North Häme:** Pihtipudas, Suvannonlahti (YKJ 7025:3427) 1.7.2004 1 ♀, leg. M. Koponen (MZH). **North Savo:** Kuopio (YKJ 6957:3528) 10.7.1993 3 ♀♀, leg. M. Koponen (MZH). Pielavesi (YKJ 7032:3477) 28.6.1991 1 ♀, leg. M. Koponen (MZH). **North Karelia:** Liperi (YKJ 6950:3622)

2.7.1994 3 ♀♀, (YKJ 6938:3623) 3.7.1994 6 ♀♀, leg. M. Koponen (MZH). Polvijärvi (YKJ 6961:3626) 5.7.1994 2 ♀♀, leg. M. Koponen (MZH). **Central Ostrobothnia:** Haapavesi (YKJ 7123:3407) 12.7.1995 8 ♀♀, leg. M. Koponen (MZH). Kokkola, Halkokari (YKJ 7090:3309) 20.6.2022 1 ♀ on *Sorbus aucuparia* (photo), Isokari (YKJ 7087:3304) 24.6.2022 1 ♀ (photo), kirkkolehto (YKJ 7086:3309) 1 ♀ (photo), photographed by Pentti Ketola, Kokkola. Pietarsaari (YKJ 7075:3283) 3.7.1981 1 ♀, leg. M. Koponen (MZH). **Kainuu:** Kuhmo, Kiekinkoski (YKJ 7107:3658) 10.7.1980 1 ♀, leg. M. Koponen (MZH). **Oulu Ostrobothnia:** Pudasjärvi (YKJ 7255:3499) 3.7.2000 19 ♀♀, (YKJ 7278:3498) 4.7.2000 3 ♀♀, (YKJ 7255:3499) 5.7.2000 3 ♀♀, (YKJ 7272:34983) 5 ♀♀, leg. M. Koponen (MZH). **Outer Ostrobothnia:** Kemi (YKJ 7288:3386) 6.7.1982 1 ♀, leg. M. Koponen (MZH). **Koillismaa:** Kuusamo 18.7.1949 1 ♀, leg. E. K. Lahtiperä (MZH). Taivalkoski (YKJ 7265:3591) 29.6.1998 4 ♀♀, leg. M. Koponen (MZH). Taivalkoski (YKJ 727:358) 4.7.1998 4 ♀♀, leg. M. Koponen (MZH). **Kittilä Lapland:** Kittilä (YKJ 7491:3402) 8.7.1989 1 ♀, leg. M. Koponen (MZH). Kolari, Ylläs (YKJ 7501:3380) 6.7.1997 1 ♀, leg. M. Koponen (MZH).

Russia. Leningrad region, Räisälä (= Melnikovo), 1 ♀ (1974), leg. W. Hellén (MZH). Karelian Republic, Valamo (= Valaam), >1900 1 ♀, leg. F. W. Woldstedt (MZH).

Estonia. Saaremaa, Salme 31.5.1990 2 ♀♀, leg. M. Koponen (MZH), Pärnu county, Puhtu 29.5.1990 1 ♀, leg. M. Koponen (MZH), Pärnu county, Häädemeeste, Jaagupi 3.6.1990 1 ♀, leg. M. Koponen (MZH).

The largest female of *M. brevicaudis* from Huittinen (Fig. 3) is 2.8 mm long, head width 0.70 mm, head width/head length 1.63, fore wing 2.4 mm, hind tibia 0.70 mm, gaster length 1.13 mm, and sheath 0.80 mm or 0.71 times as long as gaster.

Lower face, gena and parascrobal area brownish yellow. Vertex and occiput black, eye surrounded by brownish yellow, temple mainly dark brown. Antenna brown, scape anteriorly brownish yellow, pedicel partly brownish yellow and flagellum pale brown below. Pronotum brownish yellow, with brown colour anteriorly. Mesonotum black, lateral lobe slightly brown and scutellum with brown spot. Tegula brownish yellow. Sides of thorax and propodeum black, acropleuron brown. Terga and sterna dark brown, basal parts of terga 2–6 yellowish brown. Sheath black.

Pedicel plus flagellum 1.14 times as long as head width, flagellum as long as head width. Scape as long as pedicel, anellus. F1 and half of F2. Pedicel distinctly longer than F1, F1 longer than broad, F5 as long as broad and F7 distinctly broader than long. Postocellar distance 1.7 times as long as ocellular distance. Malar space 0.52 times the height of an eye. Pronotum 1.43 times as broad as long.

Fore wing with stigma 1.45 times as long as broad, uncus 0.32 times as long as stigma.

Variation of Finnish females of *M. brevicaudis* (n = 861): Body 1.6–2.8 mm long, gaster is 0.75–1.15 mm and ovipositor sheath 0.65–0.85 mm long or ovipositor sheath is 0.58–0.93 times as long as gaster. Flagellum/head width 0.92–1.0. Pedicel plus flagellum/head width 1.03–1.08.

Lower face often with brown colouration which may be extensive.

Pronotum has often brown colouration in different configuration, in extreme case (especially in small females) it is so extensive that brownish yellow can be hardly seen.

Mesonotum can be entirely black, but often side lobe and scutellum has brown or yellowish brown colour. Even frenum is sometimes brown.

Gaster can be almost black or pale brown, tergum 1 can be pale brown.

The head is often deformed (compressed more in anterior half) and then head width/head length is 1.5 or even 1.4. In one female from Karjalohja (leg. R. Forsius) head width/head length index is 1.15.

The shape of stigma: sometimes it is narrower than usual oval and length/ width can be 1.65.

The largest male of *M. brevicaudis* from Huittinen (Fig. 4) is 2.7 mm long, head width 0.67 mm, head width/head length 1.56, fore wing 1.97 mm, gaster 1.15 mm. Pedicel 0.82 times as long as anellus and F1 together. Pedicel plus flagellum 1.13 times as long as head width, flagellum about as long as head width. Scapus 0.9 times as long as pedicel, anellus, F1 and F2 combined.

Lower face, gena and parascrobal area yellow, with pale hairs. Head dorsally black. with brown stripe near top of eye, temple black.

Mesosoma, including pronotum black. Tegula and acropleuron brownish yellow. Scutellum with 4–5 brownish setae on either side. Legs yellow, base of fore and midcoxa brownish and hindcoxa entirely black. Gaster dorsally blackish, ventrally partly brownish.

Fore wing with stigma 1.4 times as long as wide, uncus 0.30 times as long as stigma.

Variation of Finnish males of *M. brevicaudis* (n = 4): Body is 2.1–2.7 mm long, fore wing 1.75–1.97 mm, gaster 0.90–1.15 mm. Head width 0.58–0.67 mm, head width/head length 1.56–1.60. Pedicel 0.82–0.94 times as long as anellus and F1 together.

er. Pedicel and flagellum/ head width 1.13–1.25. Flagellum/ head width 0.99–1.11.

***Torymus aea* (Walker, 1843)**

= *Callimome aea* Walker, 1843

= *Syntomaspis amelanchieris* Cushman, 1918

Cushman (1918) reared the new species *Syntomaspis amelanchieris* from the seeds of the shad bush (*Amelanchier canadensis*) from West Virginia and Pennsylvania in company with *Megastigmus amelanchieris*. Later the species has been recorded from New York, New Jersey; Minnesota. Utah and California in USA (Grissell 1979).

Milliron (1949: 393–395) showed that the larva of this species develops in an *Amelanchier* seed first as an external parasite on the larva of *M. amelanchieris* and, after having consumed it, becomes phytophagous and completes its development by feeding on the seed itself.



Fig. 5. *Torymus aea* female from Janakkala (side view) and scutellum from above. Photos taken by Pekka Malinen [<http://id.luomus.fi/GP.114261>].

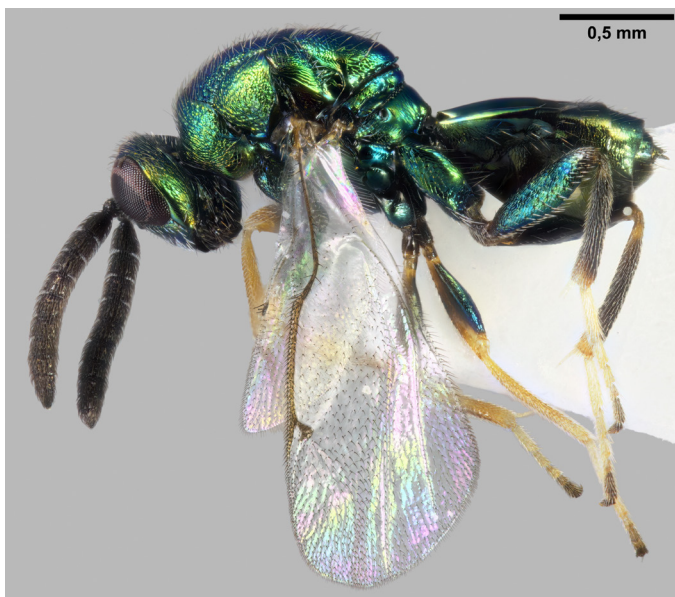


Fig. 6. *Torymus aea* male from Janakkala (side view). Photos taken by Pekka Malinen [<http://id.luomus.fi/GP.114263>].

Burks (1975) synonymized *S. amelanchieridis* with *Torymus aea*. The lectotype female of this species was collected near New York (in BMNH) (not studied).

Specimens examined

Finland. South Häme: Hausjärvi, Ryttylä (ETRS 67439:3776), *Amelanchier spicata*, 28.6.2023 3 ♀♀ 1 ♂, leg. V. Vikberg (VVT). Janakkala, Kalpalinna (ETRS 6757:370), *A. spicata*, 4.6.2023 5 ♂♂, 5.6.2023 5 ♂♂, 7.6.2023 31 ♂♂, 16.6.2023 2 ♀♀ 12 ♂♂, 23.6.2023 16 ♀♀ 1 ♂, 1.7.2023 12 ♀♀, 7.7.2023 2 ♀♀, 15.7.2023 2 ♀♀ 1 ♂, leg. V. Vikberg (VVT). Janakkala, Tarinmaa, (ETRS 6753:369), *A. spicata*, 17.6.2023 2 ♀♀ 1 ♂, leg. V. Vikberg (VVT). Janakkala, Turenki (ETRS 6756:371), *A. spicata*, 18.6.2023 1 ♀, leg. V. Vikberg (VVT). Janakkala, Turenki, Kuumola (ETRS 6755:372), *A. spicata*, 11.7.2023 4 ♀♀, leg. V. Vikberg (VVT). Janakkala, Turenki, Kuumola, Paronintie 1 (ETRS 67554:3728), on *A. spicata*, 2.6.2024 12 ♂♂ 3 ♀♀, 6.6.2024 11 ♂♂ 7 ♀♀, 16.6.2024 3 ♂♂ 20 ♀♀, 3.7.2024 33 ♀♀, leg. V. Vikberg (VVT). Janakkala, Turenki, Kuumola, Rotarypuisto (ETRS 6755:372), 27.6.2023 1 ♀, swept on *Sorbus aucuparia*, leg. V. Vikberg (VVT). Janakkala, Turenki, Kuumola, Siilotie (ETRS 6755:372), *A. spicata*, 10.6.2019 3 ♀ 3 ♂, 16.6.2023 1 ♀ 5 ♂♂, 26.6.2023 8 ♀♀ 1 ♂, 10.7.2023 2 ♀♀, leg. V. Vikberg (VVT). Janakkala, Turenki, Lyylinpuisto (ETRS 6756:372), *A. spicata*, 3.7.2023 12 ♀♀ 2 ♂♂, 16.7.2023 16 ♀♀, 22.7.2023 1 ♀, 24.7.2023 1 ♀, 30.7.2023 2 ♀♀, leg. V. Vikberg (VVT).

The body length of Finnish females (Fig. 5) ($n = 154$) 2.1–2.5 mm and males (Fig. 6) ($n = 94$) 1.35–2.3 mm. Ovipositor sheath/gaster length 1.22–1.26 and ovipositor sheath/hind tibia length 1.87–2.07.

The Finnish females fit rather well to the original description of *Syntomaspis amelanchieris* (Cushman 1918).

The species is new to Finland and Europe. *Amelanchier spicata* is a new host plant for the species.

***Torymus aucupariae* (Rodzianko, 1908)**

= *Syntomaspis aucupariae* Rodzianko, 1908

= *Callimome aucupariae* Rodz.; Nikolskaya, 1952

= *Syntomaspis aucupariae* Ratzeburg (sic); Nikolskaya & Zerrova, 1978

= *Torymus aucupariae* (Rodzianko); Graham & Gijswijt, 1998

Rodzianko (1908) described the female and male of the new species *Syntomaspis aucupariae*. He reared 2 males and 84 females from seeds of *Sorbus aucuparia* together with *Megastigmus brevicaudis* in Poltava (now in Ukraine).

Nikolskaya (1952) keyed *Callimome aucupariae* and gave its characters using Rodzianko's original description. She described fore and mid-femora yellow, with light metallic sheen,

hind femora green, yellow at apex; tibiae and tarsi yellow, hind tibiae slightly darkened medially. Length of female 1.75–2.66, of male 2.0 mm.

Nikolskaya and Zerova (1978) keyed *S. aucupariae* and recorded it widely distributed in European part of U.S.S.R., north up to Leningrad district. They described fore and middle femora yellow. Body blue-green, with golden-red tone, length of female 2.0–2.6 mm.

Graham and Gijswijt (1998) keyed female and male of *Torymus aucupariae* and gave their characters in the keys. They gave ovipositor index as 1.95–2.25. Distribution was given shortly as Holarctic.

Noyes (2019) gives the known distribution: Denmark, Russia, Sweden, Ukraine, USA (Minnesota). Vikberg (1982) reported *Torymus (Syntomaspis) aucupariae* from Hattula, Parola and Janakkala, Turenki in South Häme, Finland. From Sweden Hedqvist (2003) reported *Torymus aucupariae* from Uppsala and Pite lappmark.

Specimens examined

Finland. South Häme: Hämeenlinna (YKJ 677:336) 21.VII.1975 14 ♀♀, leg. E. Valkeila (MZH). Hattula (YKJ 677:335) 20.VII.1975 2 ♀♀, leg. E. Valkeila (MZH). Janakkala, Kalpalinna (ETRS 6757:370), *Sorbus aucuparia*, 1.7.2023 2 ♀♀, 7.7.2023 2 ♀♀, *Amelanchier spicata*, 15.7.2023 2 ♀♀, leg. V. Vikberg (VVT). Janakkala, Koveronkulma (ETRS 6755:367), 13.7.2023 1 ♀, leg. V. Vikberg (VVT). Janakkala, Turenki, Kuumola (ETRS 6755:373), *S. aucuparia*, 27.6.2023 1 ♀, 8.7.2023 14 ♀♀, 14.7.2023 57 ♀♀, 22.7.2023 50 ♀♀, 27.7.2023 30 ♀♀, 30.6.2023 1 ♀, 1.8.2023 7 ♀♀, 4.8.2023 11 ♀♀, 9.8.2023 5 ♀♀, 14.8.2023 6 ♀♀, 17.8.2023 1 ♀, leg. V. Vikberg (VVT). Janakkala, Turenki, Kuumola, Rotarypuisto (ETRS 6755:372), *S. aucuparia*, 26.6.2023 1 ♀, 27.6.2023 2 ♀♀, 29.6.2023 3 ♀♀, 2.7.2023 3 ♀♀, 4.7.2023 19 ♀♀,

5.7.2023 27 ♀♀, 6.7.2023 17 ♀♀, 10.7.2023 19 ♀♀, 12.7.2023 11 ♀♀, 16.7.2023 30 ♀♀, 19.7.2023 78 ♀♀, 25.7.2023 69 ♀♀, 30.7.2023 31 ♀♀, 3.8.2023 3 ♀♀, 6.8.2023 10 ♀♀, 14.8.2023 1 ♀, leg. V. Vikberg (VVT). Janakkala, Turenki, Lyylinpuisto (ETRS 6756:372), *A. spicata*, 22.7.2023 5 ♀♀, *S. aucuparia*, 24.7.2023 24 ♀♀, 6.8.2023 11 ♀♀ on *Sorbus commixta*, leg. V. Vikberg (VVT). Janakkala, Turenki, Suokulma (ETRS 6755:371), on *S. aucuparia*, 17.7.1975 31 ♀♀, 18.7.1995 7 ♀♀, leg. V. Vikberg (VVT). On 17.7.1975 four females were observed when they laid eggs in berries of *S. aucuparia*.

The body length of Finnish females (Fig. 7) ($n = 592$) 1.75–2.4 mm. The ovipositor sheath/hind tibia length 2.26–2.67 ($n = 10$), it is higher in small specimens. No males have been found in Finland.

Comparison of Finnish females of *Torymus aea* and *T. aucupariae*

When using the key of Graham and Gijswijt (1998) to European females of the genus *Torymus*, both run to couplet 24 and *Torymus aucupariae*. The female of *T. aea* is dark green, pro- and mesofemora and metatibia are darker and metasomal tergum 2 has purple colour only little medially. The female of *T. aucupariae* is not dark green, it has purple colour on hind part of mesepisternum, propodeum and large purple area on terga 2–3 and pro- and mesofemora are paler.

They differ distinctly from each other by the sculpture of scutellum: In *T. aea* (Fig. 5b), the microsculpture on scutellum consists of small roundish cells, on frenum there is also slight transverse sculpture. In *T. aucupariae* (Fig. 7b), the sculpture is not roundish, but consists of angular cells and the frenum is smooth.

Torymus druparum Boheman, 1834

Boheman reared the species from seeds of *Scandosorbus intermedia* (Ehrh.) Sennikov (= *Sorbus scandica*). Another host plant genus for the species is *Malus* Mill. (Olsson 1924). The species has been long confused with *Torymus varians* (Walker) which is associated with *Crataegus* L. Graham & Gijswijt (1998) designated a neotype for *T. druparum*.

In Finland, the species was reported as *Callimome druparum* from Tampere, South Häme by Grönblom (1940). It occurred numerous in seeds of *Aria edulis* (Willd.) M. Roem. (= *Sorbus aria*) and it was also found in seeds of *Hedlundia hybrida* (L.) Sennikov & Kurtto (= *Sorbus fennica*) and *S. aucuparia*. Hoffmeyer (1931) has reared the species from berries of *Sorbus aucuparia* in Denmark.

Specimens examined

Finland. South Häme: Janakkala, Turenki, Kuumola, Paron-



Fig. 7. *Torymus aucupariae* female from Janakkala (side view) and scutellum from above. Photos taken by Pekka Malinen [<http://id.luomus.fi/GP.114265>].

intie 1 (ETRS 67554:3728), on *Amelanchier spicata*, 29.6.2024 5 ♀♀, leg. V. Vikberg (VVT). Janakkala, Turenki, Kuumola, Rotarypuisto (ETRS 6755:372), on *Larix sibirica* near *Sorbus aucuparia*, 16.7.2023 1 ♀, leg. V. Vikberg (VVT). Janakkala, Turenki, Lyylinpuisto (ETRS 6756:372), *A. spicata*, 30.7.2023 3 ♀♀, leg. V. Vikberg (VVT). Janakkala, Turenki, Suokulma, Liinalammintie 11 (ETRS 6756:371), rearing 1: overwintered fruits of *Malus* sp. were taken on 11.5.2023, 2 ♀♀ 4 ♂♂ emerged 28.5.–31.5 2023, rearing 2: overwintered fruits of *Malus* sp. were taken on 20.3.2025, 16 ♀♀ 7 ♂♂ emerged 14.4.–21.4 2025 leg. V. Vikberg (VVT): Janakkala, Turenki, Suokulma, Vartiotie (ETRS 6756:371), 28.7.2023 2 ♀♀, 3.8.2023 2 ♀♀, 7.8.2023 1 ♀, all swept on *A. spicata*, leg. V. Vikberg (VVT). Lahti, reared from seeds of *Malus* 17.4.1959 6 ♀♀ 2 ♂♂, leg. Yrjö Olkkola (MZH). Reared females are 3.2–4.4 mm long, with ovipositor sheath 4.2–5.0 mm long. Males are 3.6–3.8 mm long. Tampere, 5 ♀♀, leg. T. Grönblom (MZH). All females bear a seed of *Sorbus* sp. with exit hole of the insect, One female bears 8.6.1940 date label. Body of females 2.6–3.2 mm, with sheath 3.5–4.2 mm.

Body length of all Finnish females studied is 2.5–4.4 mm, their sheath 3.0–5.0 mm, of males 2.0–3.8 mm.

Amelanchier is a new host genus for the species.

Discussion

Finnish females of *Megastigmus amelanchieris* fit well the description of the species by Milliron (1949).

Also Finnish females of *Megastigmus brevicaudis* fit rather well with earlier descriptions of the species. Already Ratzeburg (1852) mentioned the brown spot on scutellum in one female of his reared specimens. His syntypes were lost during the second world war (not the holotype, as stated by Roques and Skrzypczyńska (2003), because no type was mentioned in the original description).

Milliron (1949) described the colour variation in detail and similar colour forms are found in Finnish females. Roques and Skrzypczyńska (2003) did not describe colour variation, but their material was rather small. They gave head width/head length of the neotype as 1.2 which means that the head is strongly deformed. Obviously, the seed is sometimes so small that the head cannot develop properly. Milliron (1949) gave the value 1.6 and similar values were found in normal Finnish females. Many Finnish females had a deformed head and as extreme case one female had head width/head length value 1.1. Also some Finnish females of *M. amelanchieris* had more or less deformed head form.

The description of the male of *M. brevicaudis* in Zerova & Seryogina (1994) is short and Finnish males cannot be recog-

nized using it. Also using the key to males in Jensen and Ochsner (1999) Finnish males of *M. brevicaudis* (with black mesonotum) do not key properly.

The males of the two species of *Megastigmus* are rare. Our Finnish material of *M. brevicaudis* contains 732 females, but only four males. Two males and 483 females of them were collected in one locality in western Finland. 86 females of *M. amelanchieris* have been found in Finland, but only one male. No males of *Torymus aucupariae* are known from Finland yet, but in *Torymus aea* males are frequent and comprise 43 percent of specimens.

Hellén (1934) recorded *M. brevicaudis* only from the southern coast of Finland, but now its distribution covers almost all of the country and only the three northernmost biogeographical provinces in Lapland still lack finds.

In Sweden, Hedqvist (2003) reported *M. brevicaudis* from seven biogeographical provinces from Scania (Skåne) to Lycksele Lapland, but *Torymus aucupariae* only from Uppsala and Pitime Lapland.

In Norway, rowan berries were collected in 1971–1984 and *M. brevicaudis* was reared from them in South Norway and up to ca. 69° N in North Norway, but *T. aucupariae* only in South Norway up to 63°N. (Trandem et al. 2023, Fig. 3).

In Finland, *Torymus aea*, *T. aucupariae* and *T. druparum* are now known only from South Häme, but their distribution in the country is obviously wider and awaits for more study.

It is difficult to guess when *Megastigmus amelanchieris* and *Torymus aea* have arrived to Europe from North America. *Amelanchier spicata* is known in Europe already at the end of 18th century. In South Finland it became widely naturalized in the first half of 20th century. First specimens of *M. amelanchieris* were found in two different localities in 1976. It will be interesting to see, when they are found in Sweden and Norway, where the food plant is also naturalized.

Acknowledgements

Pekka Malinen took photographs of the specimens of *Megastigmus* and *Torymus*.

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