

On *Torymus chloromerus* (Walker) and some related species (Hymenoptera: Chalcidoidea: Torymidae)

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Torymus euphorbiae (Walker, 1833), *T. micropterus* (Walker, 1833), *T. abbreviatus* Boheman, 1834 (= *T. hieracii* Mayr 1874, syn. nov.), *T. campanulae* Cameron, 1880, and *T. tilicola* Ruschka, 1921, which were earlier considered as synonyms of *Torymus chloromerus* (Walker, 1833), are regarded as distinct species. Their lectotypes were examined and described. A new taxonomic character for separating species of *Torymus* is the colour of the transepisternal line on the lower mesepisternum; it is purple in *T. chloromerus*, *T. abbreviatus*, *T. campanulae*, and *T. tilicola*, but the purple colour is absent in *T. euphorbiae* and *T. micropterus*. A key is presented for the females of the species. *Torymus tilicola* is a new species to the fauna of Finland.

Loistokiihukaisten (Torymidae) heimossa suurin suku Suomessa on *Torymus* Dalman. Tämän suvun Euroopan lajien revisiossa *Torymus chloromerus* (Walker) kuvataan yleiseksi polyfagiseksi lajiksi. Sen isänniksi mainitaan *Urophora*-suvun kärpästen lisäksi monta äkämäsääskeä ja monta äkämäpistiäistä, ja nämä isännät aiheuttavat äkämiä sekä ruohoissa että puissa. Revision tekijät (Graham & Gijswijt 1998) itsekin hieman epäilevät näin laajaa isäntävalikoimaa ja pitävät lisätutkimuksia tarpeellisena. Lajin synonyymeinä mainitaan kymmenen muuta lajia. Näiden tyyppejä tutkittiin nyt tarkemmin uudestaan ja tällöin löytyikin yksi uusi tuntomerkki, joka jakaa lajit kahteen ryhmään. Keskirinnan sivulla voi olla pitkittäinen purppuranpunainen juova tai punainen väri puuttuu. Viisi aiemmin synonyymina pidettyä lajia nostetaan nyt omiksi lajeiksi. Vikberg (2005) kirjoitti tässä lehdessä orakärpäsen loisista, jolloin hän totesi että orakärpäsestä kasvatettu *Torymus chloromerus* eroaa sarjakeltanon varren *Aulacidea hieracii* -äkämäpistiäisestä kasvatetusta saman suvun lajista. Tästä jälkimmäisestä lajista on useasti käytetty nimeä *Torymus hieracii* Mayr, mutta tyyppien tutkimus osoitti, että lajin vanhin nimi on *Torymus abbreviatus* Boheman. *Torymus tilicola* Ruschka on kasvatettu maalle uutena lajina Turengissa äkämäsääsken *Contarinia tiliarum* (Kieffer) äkämistä puistolehmukselta.

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1. Introduction

The European species of the large genus *Torymus* Dalman, 1820 (Hymenoptera: Chalcidoidea: Torymidae) were revised recently (Graham & Gijswijt 1998). *Torymus chloromerus* (Walker, 1833) was regarded as a common pol-

yphagous species which is parasitic on many Diptera: Cecidomyiidae, Tephritidae, and Hymenoptera: Cynipidae on herbaceous plants as well as on trees. Eleven other described species, one with a query and one with a replacement name, were mentioned as its synonyms. However, the authors of the revision state before the

key to the species groups that the status of several species, e.g. *T. chloromerus*, is still problematic. In the key to females (couplet 135) it is written that *T. chloromerus* is “apparently a polyphagous species” and further study would be welcome. Over several years I have reared insects from the galls of *Aulacidea hieracii* (Bouché) (Hymenoptera: Cynipidae) in stems of *Hieracium umbellatum* L. (Cichoriaceae), and from galls of *Urophora cardui* (Linnaeus) (Diptera: Tephritidae) in stems of *Cirsium arvense* (L.) Scop. (Asteraceae) in S. Finland. From both galls specimens of *Torymus* emerged which, according to the revision, are identified as *T. chloromerus*. The reared specimens show small differences, as recorded already by Mayr (1874) under the names *T. hieracii* Mayr, 1874 and *T. cyanimus* (Boheman, 1834). This led to further study the specimens, comparing them with the type specimens of *T. chloromerus* and the other species mentioned as its synonyms. As a result of this comparison a new distinguishing character was found: the lower mesepisternum has a purple transepisternal line in some species but in others the purple colour is missing. From this and other characters it is evident that several distinct species are involved.

2. Material and methods

Lectotypes of *Torymus cyanimus* Boheman, 1834 and *T. abbreviatus* Boheman, 1834 were borrowed from Naturhistoriska Riksmuseet, Stockholm, Sweden (= NHRS; in 1999 curator Lars-Åke Janson), lectotypes of *Callimome chloromerus* Walker, 1833, *C. abdominalis* Walker, 1833, *C. micropterus* Walker, 1833, and *C. euphorbiae* Walker, 1833 were loaned from the Natural History Museum, London (= NHML; in 2004 curator Suzanne Ryder), and lectotypes of *Torymus hieracii* Mayr, 1874, *T. campanulae* Cameron, 1880, *T. tilicola* Ruschka, 1921, and *T. euphorbiae* Ruschka, 1921 were issued on loan from Naturhistorisches Museum, Wien (= NHMW; in 2012 cura-

tor Manuela Vizek). Fresh specimens of some *Torymus* were reared in S. Finland from their hosts' galls.

The specimens were examined and measurements were made as explained in Vikberg (2011). The abbreviations used are the same as in Graham & Gijswijt (1998). In Measurements the length of a body part is given in mm, if not stated otherwise. The length of the hind basitarsus was measured as its maximum length in lateral view. The distance of the tip of the hypopygium from the base of the gaster was measured and compared with the length of the gaster. Strong, soft light is needed to observe the purple colour of the transepisternal line.

3. Results

3.1. *Torymus chloromerus* (Walker, 1833) Fig. 1.

Callimome chloromerus Walker, 1833: 128, ♀ ♂. Lectotype ♀ no. 1580 (NHML; examined) designated by Eady (1959). Type locality: England; either Isle of Wight (in September) or the banks of Windermere, Westmoreland. The species was considered as a synonym of *T. cyanimus* by Eady (1959). Bouček & Graham (1978a) selected *Torymus chloromerus* as the valid name for the species called *T. cyanimus* by Eady.

Callimome abdominalis Walker, 1833: 126-127, ♀. Lectotype ♀ no. 1577 (NHML; examined) designated by Eady (1959). Type locality: Isle of Wight, England (in September). Considered as a synonym of *T. cyanimus* by Eady (1959).

Torymus cyanimus Boheman, 1834: 367-369, ♀ ♂. Lectotype ♀ (NHRS; examined) designated by Graham and Gijswijt (1998). Type locality: Kinnekulle, Västergötland, Sweden.

Female (lectotype of *Callimome chloromerus*): Head in dorsal view 2.17x as wide as long; temples narrowing strongly, slightly rounded,

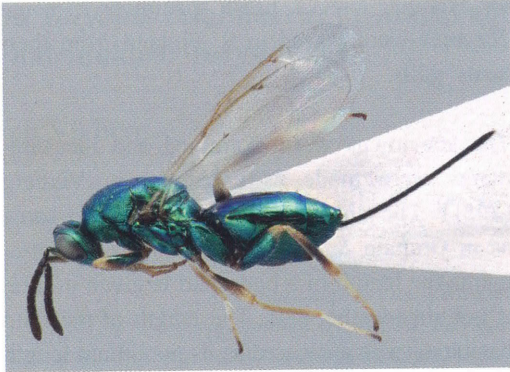


Fig. 1. Female of *Torymus chloromerus* Walker in lateral view. Female swept on 19.7.2012 on *Carduus crispus* in Finland, Janakkala, Kalpalinna. Body length 3.8 mm.

Kuva 1. *Torymus chloromerus* Walker –loistokiillukainen sivulta kuvattuna. Naaras haavittiin kyläkarhaisen mykeröistä 19.7.2012 Janakkalan Kalpalinnassa. Ruumiin pituus ilman munanasetinta 3,8 mm.

0.21x apparent length of eye. POL 2.0x OOL; OOL 1.24x OD. In frontal view head trapeziform with straight genae. Mouth 1.7x as wide as malar space; the latter 0.43x height of eye. Antennal toruli well above lower eye line, slightly nearer to clypeal margin than to median ocellus. Scape 3.9 times as long as broad, reaching anterior edge of median ocellus. Pedicel plus flagellum 1.35x as long as head width; flagellum proximally stouter than pedicel; pedicel 1.5x as long as broad in dorsal view; anellus transverse; F1-F5 elongate, F6-F7 quadrate, sensilla numerous, uniseriate. Clava 1.7x as long as broad.

Mesosoma 1.73x as long as wide, 1.19x as high as wide. Mesoscutum 1.2x as wide as long; scutellum 1.2x as long as wide, its punctures anteriorly rather weak, rather isolated. Dorsellum smooth, with fine median keel; propodeum densely alutaceous, medially with weaker sculpture. Mesepimeron 1.4x as high as broad, shorter (0.78x) than mid-coxa. Hind coxa 2.2x as long as broad; hind femur 4.5x as long as broad. Inner hind tibial spur 0.40x as long as basitarsus. Fore wing 2.43x as long as broad.

Costal cell 8.7 times as long as broad; upper surface with 5 setae apically, lower surface with scattered setae basally and apically, medially a broad glabrous zone. Basal cell with 6 setae in basal half, open below; basal fold with 3 setae. Speculum broadly open, large, extending to middle of marginal vein. Stigma oblique, broader than its length.

Gaster 2.65x as long as wide, distinctly compressed, 1.8 times as high as wide. Basal sternum projecting beyond coxa; tip of hypopygium at 0.8x length of gaster, hypopygium bare except near apex. Ovipositor index 3.2, ovipositor sheath about as long as metasoma plus mesosoma.

Colour: body bright green to blue-green or greenish blue. Scape testaceous, infusate above and apically. Pedicel green, flagellum dark brownish black. Tegula and humeral plate brownish yellow, former infusate on hind margin and latter greenish in the middle. Lower mesepisternum with purple transepisternal line from anterior margin almost to posterior margin. Coxae green, trochanters brownish yellow, infusate below, trochantelli brownish yellow. Fore femur on posterior surface with broad green colour which extends basally also to anterior surface; mid femur on basal 0.6 with green colour throughout; hind femur green, testaceous only on basal 0.06-0.11 and apical 0.17. Tibiae brownish yellow, hind tibia medially brownish infusate. Tarsi yellowish, with apical 1-2 tarsomeres infusate. Wings hyaline, veins brownish yellow. Gastral sternum 1 pale cupreous. Ovipositor sheath dark.

Measurements. Body 3.4. Head 0.36, width 0.78, height 0.65. Mouth 0.29, malar space 0.17. Eye 0.40 x 0.30; distance between eyes 0.45. Scape 0.28; pedicel plus flagellum 1.05. POL 0.19. Mesosoma 1.30. Fore wing 2.8; costal cell 1.13, marginal vein 0.81, postmarginal vein 0.15, stigmal vein 0.07. Hind coxa 0.75;

hind femur 0.90; hind tibia 0.93, width 0.13, inner spur 0.17, outer spur 0.12; hind tarsus 0.87, basitarsus 0.43. Gaster 1.83. Ovipositor sheath 3.0.

Female (lectotype of *Torymus cyanimus*):

Head in dorsal view 2.2x as wide as long; temples narrowing strongly, slightly rounded, 0.2x apparent length of eye. POL 2.0x OOL; OOL 1.26x OD. In frontal view head trapeziform with straight genae. Mouth 1.85x as wide as malar space; the latter 0.42x height of eye. Antennal toruli well above lower eye line, slightly nearer to clypeal margin than to median ocellus. Scape 3.4 times as long as broad, not reaching anterior edge of median ocellus. Pedicel plus flagellum 1.28x as long as head width; flagellum proximally stouter than pedicel; pedicel 1.4x as long as broad in dorsal view; anellus transverse, broadening apically; flagellum broadening (1.25 x) apicad, F1-F4 elongate, F5-F7 quadrate, sensilla numerous, uniseriate – partly biseriate. Clava 1.7x as long as broad.

Mesosoma 1.67x as long as wide, 1.06x as high as wide. Mesoscutum 1.56x as wide as long; scutellum 1.26x as long as wide, its punctures anteriorly weak, isolated. Dorsellum smooth; propodeum weakly alutaceous, medially almost without sculpture. Mesepimeron 1.3x as high as broad, shorter (0.7x) than mid-coxa. Hind coxa 2.1x as long as broad; hind femur 4.8x as long as broad. Inner hind tibial spur 0.45x as long as basitarsus. Fore wing 2.39x as long as broad. Costal cell 8.1 times as long as broad; upper surface with 3 setae near base, distal 0.6 with one row of ca. 20 setae, apically with 2 setae behind the row and 3 setae quite near apical submarginal vein; lower surface with one complete row of setae near anterior margin and, behind it, scattered setae in 1-3 rows basally and particularly apically, with fewer setae medially. Basal cell with 6 setae near submarginal vein, closed below; basal fold with 7 setae. Speculum basally open, large, extending 0.3 of marginal vein. Stigma oblique, about as broad as long.



Fig. 2. Female of *Torymus tilicola* Ruschka in lateral view. Female was reared from galls of *Contarinia tiliarum* on *Tilia* sp. in 2002 in Finland, Janakkala, Turenki. Body length 2.2 mm.

Kuva 2. *Torymus tilicola* Ruschka –loistokiilukainen sivulta kuvattuna. Naaras kasvatettiin äkämäsääsken *Contarinia tiliarum* äkämästä puistolehmukselta kesällä 2002 Janakkalan Turengissa. Ruumiin pituus 2,2 mm.

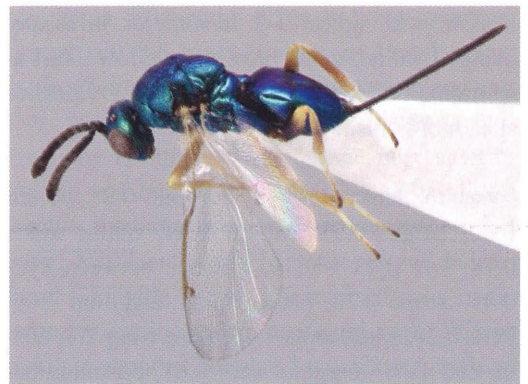


Fig. 3. Female of *Torymus abbreviatus* Boheman in lateral view. Female was reared from galls of *Aulacidea hieracii* on *Hieracium umbellatum* in 2003 in Finland, Janakkala. Body length 2.3 mm.

Kuva 3. *Torymus abbreviatus* Boheman –loistokiilukainen sivulta kuvattuna. Naaras kasvatettiin äkämäpistiäisen *Aulacidea hieracii* äkämästä sarjakeltanolta vuonna 2003 Janakkalassa. Ruumiin pituus 2,3 mm.

Gaster 2.35x as long as wide, compressed, 1.37 times as high as wide. Basal sternum projecting beyond hind coxa; hypopygium extending to 0.92x length of gaster, bare except near apex, on one side 3 setae near median line and 3 setae more laterally and basad. Ovipositor index 2.17, about as long as metasoma plus 0.4 of mesosoma.

Colour: body blue-green to greenish blue or violet-blue (on scutellum and terga of gaster). Scape testaceous, infusate above, especially apically. Pedicel green, flagellum dark, brownish black. Tegula and humeral plate brownish yellow, former infusate on hind margin and latter greenish in the middle. Lower mesepisternum with purple transepisternal line from anterior margin almost to posterior margin. Coxae green, trochanters brownish yellow, infusate below, trochantelli brownish yellow. Fore femur on posterior surface broadly green, this colour extending basally onto the anterior surface; mid femur on basal 0.6 with green to blackish colour throughout; anterior surface of hind femur green, with basal 0.09 and apical 0.18 testaceous. Tibiae brownish yellow, hind tibia medially brownish infusate. Tarsi yellowish, with apical 1-2 tarsomeres infusate. Wings hyaline, veins brownish yellow. Gastral sternum 1 medially pale cupreous. Ovipositor sheath brownish.

Measurements. Body 3.1. Head 0.37, width 0.82, height 0.70. Mouth 0.34, malar space 0.18. Eye 0.43 x 0.30; distance between eyes 0.45. Scape 0.28; pedicel plus flagellum 1.05. POL 0.20. Mesosoma 1.35. Fore wing 2.8; costal cell 1.16, marginal vein 0.81, postmarginal vein 0.20, stigmal vein 0.07. Hind coxa 0.68; hind femur 0.91; hind tibia 0.90, width 0.13, inner spur 0.19, outer spur 0.12; hind tarsus 0.91, basitarsus 0.42. Gaster 1.41. Ovipositor sheath 1.95.

Female (reared from *Urophora cardui* in Vantaa, Finland):

Head in dorsal view 2.28x as wide as long; temples narrowing strongly, slightly rounded, 0.24x apparent length of eye. POL 1.83x OOL; OOL 1.2x OD. In frontal view head trapeziform with straight genae. Mouth 2.0x as wide as malar space; the latter 0.40x height of eye. Antennal toruli well above lower eye line, slightly nearer to clypeal margin than to median ocellus.

Scape 3.7 times as long as broad, not reaching anterior edge of median ocellus. Pedicel plus flagellum 1.32x as long as head wide; flagellum proximally stouter than pedicel; pedicel 1.6x as long as broad in dorsal view; anellus transverse (0.61x); F1-F5 elongate, F6 quadrate, F7 transverse, sensilla numerous, biseriate, series largely overlapping. Clava 2.2x as long as broad, on inner side with areas of micropilosity at base ventrally of C2 and C3 and on apex of C3.

Mesosoma 1.66x as long as wide, 1.10x as high as wide. Mesoscutum 1.22x as wide as long; scutellum 1.15x as long as wide, hairs rather few, medially glabrous, its punctures anteriorly rather weak, rather isolated. Dorsellum smooth, with fine median keel; propodeum densely alutaceous, sculpture raised laterad of foramen, medially weak. Mesepimeron 1.35x as high as broad, shorter (0.68x) than mid-coxa. Hind coxa 2.0x as long as broad; hind femur 4.4x as long as broad. Inner hind tibial spur 0.44x as long as basitarsus. Fore wing 2.47x as long as broad. Costal cell 10 times as long as broad; upper surface with 2 setae near base and a row of 12 setae apically, lower surface with scattered setae and 3 rows in basal 0.27, and apical 0.5, a broad glabrous zone before the middle. Basal cell glabrous in one wing, with 2 setae in the other, open below; basal fold with 3 setae. Speculum basally broadly open, large, extending almost to mid-point of marginal vein. Stigma oblique, broader than its length.

Gaster 2.17x as long as wide, compressed, 1.2 times as high as wide. Basal sternum projecting beyond hind coxa; hypopygium extending 0.92x length of gaster, bare except near apex; apically on one side with row of 8 submedian setae and laterally 1 plus 3 setae. Ovipositor index 2.65, about as long as metasoma plus half of mesosoma.

Colour: body bright green to blue-green or greenish blue or violet-blue. Mandible yellow-

ish brown, palpi brownish yellow. Scape testaceous, a little infuscate above apically. Pedicel green, flagellum dark, brownish. Tegula and humeral plate brownish yellow, former infuscate on hind margin and latter greenish in the middle. Lower mesepisternum with purple transepisternal line from anterior margin almost to posterior margin. Coxae green, trochanters brownish yellow, infuscate below, trochantelli brownish yellow. Fore femur on posterior surface broadly green, this colour extending basally onto the anterior surface; mid femur on basal 0.6 with green colour throughout; anterior surface of hind femur green, with basal 0.13 and apical 0.19-0.25 testaceous. Tibiae brownish yellow. Tarsi yellowish, with apical 1-2 tarsomeres infuscate. Wings hyaline, veins brownish yellow. Gastral sternum 1 medially pale cupreous. Ovipositor sheath dorsally dark, ventrally pale brown.

Measurements. Body 4.0. Head 0.43, width 0.98, height 0.82. Mouth 0.43, malar space 0.21. Eye 0.52 x 0.37; distance between eyes 0.55. Scape 0.35; pedicel plus flagellum 1.29. POL 0.22. Mesosoma 1.74. Fore wing 3.6; costal cell 1.50, marginal vein 1.08, postmarginal vein 0.26, stigmal vein 0.08. Hind coxa 0.90; hind femur 1.18; hind tibia 1.17, width 0.20, inner spur 0.24, outer spur 0.16; hind tarsus 1.15, basitarsus 0.55. Gaster 1.95. Ovipositor sheath 3.1.

Male (reared from *Urophora cardui*, Vantaa, Finland):

Head in dorsal view 2.26x as wide as long; temples narrowing strongly, slightly rounded, 0.28x apparent length of eye. POL 1.53x OOL; OOL 1.42x OD. In frontal view head trapeziform with slightly curved genae. Mouth 2.06x as wide as malar space; the latter 0.39x height of eye. Antennal toruli well above lower eye line, slightly nearer to clypeal margin than to median ocellus. Scape 2.8 times as long as broad, not reaching anterior edge of median

ocellus. Pedicel plus flagellum 1.46x as long as head wide; flagellum proximally stouter than pedicel; pedicel 1.2x as long as broad in dorsal view; anellus short, transverse; flagellum densely hairy, equally wide, F1-F6 elongate, F7 quadrate, sensilla numerous, uniseriate, on apical 0.6 of segments. Clava 1.8-2.2x as long as broad.

Mesosoma 1.83x as long as wide, 1.14x as high as wide. Mesoscutum 1.2x as wide as long; scutellum 1.36x as long as wide, its punctures anteriorly weak, isolated. Dorsellum smooth; propodeum alutaceous, medially almost smooth. Mesepimeron 1.36x as high as broad, shorter (0.65x) than mid-coxa. Hind coxa 2.2x as long as broad; hind femur 4.0x as long as broad. Inner hind tibial spur 0.49x as long as basitarsus. Fore wing 2.26x as long as broad. Costal cell 8.6 times as long as broad; upper surface with one complete row of setae and apically with 1 seta behind the row; lower surface with one complete row of setae near anterior margin and behind it scattered setae basally in 2 rows, medially in one row and apically in 2-3 rows. Basal cell with 10 setae, closed below; basal fold with 6 setae. Speculum basally open, large, extending 0.3 of marginal vein. Stigma oblique, about as broad as long. Gaster 2.19x as long as wide, 0.91 times as high as wide.

Colour: body blue-green to greenish blue. Scape dark, green. Pedicel green, flagellum dark brownish. Tegula and humeral plate brownish yellow, former infuscate on hind margin and latter greenish in the middle. Lower mesepisternum with purple transepisternal line from anterior margin almost to posterior margin. Coxae green, trochanters brownish yellow, infuscate below, trochantelli brownish yellow. Fore femur on posterior surface broadly green, this colour extending basally onto the anterior surface; mid femur on basal 0.6 with green to blackish colour throughout; anterior surface of hind femur green, with basal 0.08 and apical

0.15 testaceous. Tibiae brownish yellow, hind tibia medially brownish infusate. Tarsi yellowish, with apical 1-2 tarsomeres infusate. Wings hyaline, veins brownish yellow. Tergum 1 of gaster violet-blue, following terga green, with violet-blue hind margins.

Measurements. Body 2.8. Head 0.35, width 0.79, height 0.67. Mouth 0.33, malar space 0.16. Eye 0.41 x 0.27; distance between eyes 0.47. Scape 0.27; pedicel plus flagellum 1.15. POL 0.18. Mesosoma 1.41. Fore wing 2.55; costal cell 1.12, marginal vein 0.73, postmarginal vein 0.21, stigmal vein 0.075. Hind coxa 0.67; hind femur 0.84; hind tibia 0.87, width 0.13, inner spur 0.18, outer spur 0.12; hind tarsus 0.85, basitarsus 0.37. Gaster 1.25.

Variation. Body length of females (n = 42) reared from *Urophora cardui* in S. Finland (Vikberg 2005) is 2.0-4.2 mm, of males (n = 9) reared from the same host 1.7-3.3 mm. Ovipositor index of females (n = 46) reared from *Urophora cardui* varies from 2.16-3.02, one female with index 1.95.

Comments. The lectotypes of *T. chloromerus* and *T. abdominalis* are similar to some females reared from the galls of *Urophora cardui* (Linnaeus) in the stem of *Cirsium arvense* (L.) Scop. in southern Finland, and the lectotype of *T. cyanimus* is similar to some females reared from the flower heads of *Carduus crispus* L., *Cirsium vulgare* (Savi) Ten., *Centaurea jacea* L. or *C. scabiosa* L. containing galls of other species of *Urophora*. All represent the same species of *Torymus*.

N.B. The figure 56 in Graham & Gijswijt (1998) does not show the correct antenna of *Torymus chloromerus* and instead is very similar to the clavate antenna of the female of *T. tilicola*. Fig. 59 is labelled as showing the fore wing of the lectotype of "*T. tiliarum* Ruschka" but obviously *T. tilicola* Ruschka is intended.

3.2. *Torymus tilicola* Ruschka, 1921. Species revocata. Fig. 2.

Torymus tilicola Ruschka, 1921: 337-338, ♀ ♂. Lectotype ♀ (NHMW) designated by Graham and Gijswijt (1998); examined. Type locality: Raabs, Niederösterreich, Austria (reared from *Contarinia tiliarum* (Kieffer) by Wachtl).

Female (lectotype of *Torymus tilicola*): Head in dorsal view 2.0x as wide as long; temples narrowing strongly, rounded, 0.25x apparent length of eye. POL 1.66x OOL; OOL 1.45x OD. In frontal view head triangular with curved genae. Mouth 1.8x as wide as malar space; the latter 0.39x height of eye. Anterior margin of antennal torulus well above lower eye line, distinctly nearer to clypeal margin than to median ocellus. Scape 3.7 times as long as broad, not reaching anterior edge of median ocellus. Pedicel plus flagellum 1.33x as long as head wide; pedicel 1.7x as long as broad in dorsal view; anellus distinctly transverse; flagellum clavate, clava 2.1 times as broad as F1; F1 1.4 times as long as broad, shorter than pedicel and slightly narrower than pedicel in lateral view, and slightly shorter than F2; F2-F5 slightly elongate, F6 subquadrate and F7 transverse, sensilla numerous, uniseriate. Clava 1.6x as long as broad.

Mesosoma 2.05x as long as wide, 1.34x as high as wide. Mesoscutum 1.46x as wide as long; scutellum 1.18x as long as wide, its punctures anteriorly rather weak, rather isolated. Dorsellum smooth; propodeum finely alutaceous, medially with weaker sculpture. Mesepimeron 1.4x as high as broad, shorter than mid-coxa. Hind coxa 2.9x as long as broad; hind femur 5.7x as long as broad. Inner hind tibial spur 0.51x as long as basitarsus. Fore wing 2.5x as long as broad. Costal cell 10.3 times as long as broad; upper surface with 10 setae in apical half, lower surface with one complete row of setae and with scattered setae basally and

apically. Basal cell with 5 setae in basal half, closed apically; basal fold with 6 setae. Speculum broadly open, rather large, extending to anterior third of marginal vein. Stigma oblique, longer than its height.

Gaster 1.96x as long as wide, compressed, 1.14 times as high as wide. Hypopygium extending to 0.8x length of gaster, bare except near apex with short setae. Ovipositor index 3.04, sheath about as long as metasoma plus most of mesosoma.

Colour: Head blue-green to blue, upper frons and vertex near ocelli with violet or purple areas. Scape basally and anteriorly brownish yellow, apically and dorsally metallic green. Pedicel green, flagellum dark, brownish. Mesosoma, including coxae blue-green. Tegula and humeral plate brownish yellow, latter greenish in the middle. Lower mesepisternum with purple transepisternal line. Fore femur on posterior surface with broad green colour which extends basally also onto anterior surface; mid femur on basal 0.6 with green colour throughout; anterior surface of hind femur green, with apical 0.15 testaceous. Tibiae brownish yellow, hind tibia medially brownish infuscate. Tarsi yellowish, with apical 1-2 tarsomeres infuscate. Wings hyaline, veins brownish yellow. Gaster largely violet-blue, with sternum 1 pale cupreous. Ovipositor sheath dark, lower margin largely paler, apex narrowly brownish.

Measurements. Body 2.0. Head 0.27, width 0.54, height 0.49. Mouth 0.22, malar space 0.12. Eye 0.31 x 0.21; distance between eyes 0.32. Scape 0.20; pedicel plus flagellum 0.72. POL 0.12. Mesosoma 0.84. Fore wing 1.9; costal cell 0.72, marginal vein 0.58, postmarginal vein 0.12, stigmal vein 0.05. Hind coxa 0.46; hind femur 0.69; hind tibia 0.56, width 0.08, inner spur 0.12, outer spur 0.08; hind tarsus 0.55, basitarsus 0.23. Gaster 1.00. Ovipositor sheath 1.70.

Comments. Ruschka (1921) described the species based on two females and two males which were reared from galls of *Contarinia tiliarum* Kieffer in Lower Austria by F. A. Wachtl. Graham & Gijswijt (1998) selected the lectotype and synonymized the species with *Torymus chloromerus*; they shortly stated that the specimen is an extreme dwarf of that species. The lectotype female has several characters which do not fit *T. chloromerus*. Interestingly *T. tiliicola* has a purple transepisternal line and differs in this character from *Torymus euphorbiae*. Both of these species were reared from cecidomyiid hosts.

Other reared specimens. On 27 June 2002 galls of *Contarinia tiliarum* on *Tilia* sp. were taken in Janakkala, Turenki (6760:3372) for rearing of parasitoids and on 8.7.-16.7.2002 16 males and 10 females emerged from the galls. The body length of males was 1.2-1.6 mm, one male 1.0, one male 1.9, and one male 2.3 mm long. The body length of females was 1.4-2.3 mm. Ovipositor index was 2.9-3.1, in one female 3.3.

Fresh specimens: 8 females and 11 males were reared in Janakkala, Turenki (6758:3372), Finland in 2012 from galls of *Contarinia tiliarum* on lower branches of *Tilia* sp. The galls were taken on 18 July and on 26 July and wasps emerged in early August. The body length of males was 1.1-2.0 mm and of females 1.5-2.0 mm. The ovipositor index varied from 2.9 to 3.2, in two females it was 2.6.

3.3. *Torymus campanulae* Cameron, 1880. Species revocata.

Torymus campanulae Cameron, 1880: 40, ♀ ♂. Lectotype ♀ (NHMW), designated by Graham and Gijswijt (1998); examined. Type locality: Scotland, Clydesdale (reared from galls of *Cecidomyia campanulae* Müller).

Female (lectotype of *Torymus campanulae*):

Head, which is slightly collapsed anteromedially, in dorsal view 2.2x as wide as long; temples narrowing strongly, slightly rounded, 0.22x apparent length of eye. POL 1.76x OOL; OOL 1.55x OD. In frontal view head trapezoidal with straight genae. Mouth 1.8x as wide as malar space; the latter 0.36x height of eye. Anterior margin of antennal torulus well above lower eye line, distinctly nearer to clypeal margin than to median ocellus. Scape 3.8 times as long as broad, does not reach anterior edge of median ocellus. Pedicel plus flagellum 1.5x as long as head wide; pedicel 1.6x as long as broad in dorsal view; anellus distinctly transverse; flagellum hardly clavate, F7 1.3 times as broad as F1; F1 1.4 times as long as broad, as long as pedicel and slightly broader than pedicel in lateral view, and as long as F2; F2-F5 slightly elongate, F6 subquadrate and F7 slightly transverse, sensilla numerous, uniseriate. Clava 1.9x as long as broad.

Mesosoma 1.5x as long as wide, 1.17x as high as wide. Mesoscutum 1.4x as wide as long; scutellum 1.2x as long as wide, its punctures anteriorly weak, rather isolated. Dorsellum smooth; propodeum laterally finely alutaceous, medially smooth. Mesepimeron 1.5x as high as broad, shorter than mid-coxa. Hind coxa 2.5x as long as broad; hind femur 4.7x as long as broad. Inner hind tibial spur 0.36x as long as basitarsus. Fore wing 2.5x as long as broad. Costal cell 10 times as long as broad; upper surface with one complete or almost complete row of setae, lower surface with one complete row of setae and with scattered setae basally and apically. Basal cell with 4 setae in basal half, closed apically; basal fold with 4-5 setae. Speculum broadly open, rather large, extending to anterior third of marginal vein. Stigma oblique, longer than its height.

Gaster 2.55x as long as wide, strongly compressed, 2.1 times as high as wide. Hypopyg-

ium extending to 0.83x length of gaster, bare except near apex which has short setae. Ovipositor index 2.93, sheath slightly longer than metasoma plus mesosoma.

Colour: Head blue-green. Scape brownish yellow, apically and dorsally metallic green. Pedicel green, flagellum dark, brownish. Mandible brownish yellow, apically reddish. Palpi brownish yellow. Mesosoma, including coxae, green. Tegula and humeral plate brownish yellow, latter greenish in the middle. Lower mesepisternum with purple transepisternal line. Fore femur brownish yellow, on posterior surface slightly greenish; mid femur brownish yellow, ventrally brownish infuscate; anterior surface of hind femur green, with apical 0.15 testaceous. Tibiae brownish yellow, hind tibia medially broadly brownish infuscate. Tarsi yellowish, with apical 1-2 tarsomeres infuscate. Wings hyaline, veins brownish yellow. Gaster green, with tergum 1 with violet tint and sternum 1 pale cupreous. Ovipositor sheath dark, with lower margin largely paler.

Measurements. Body 2.2. Head 0.29, width 0.63, height 0.57. Mouth 0.24, malar space 0.13. Eye 0.36 x 0.25; distance between eyes 0.34. Scape 0.25; pedicel plus flagellum 0.96. POL 0.15. Mesosoma 0.96. Fore wing 2.3; costal cell 0.90, marginal vein 0.65, postmarginal vein 0.15, stigmal vein 0.06. Hind coxa 0.54; hind femur 0.70; hind tibia 0.70, width 0.10, inner spur 0.10, outer spur 0.08; hind tarsus 0.68, basitarsus 0.28. Gaster 1.02. Ovipositor sheath 2.05.

Comments. Cameron (1880) described the species based on females and males which were reared in July and August from galls of *Cecidomyia campanulae* Müller in different parts of Clydesdale, Scotland. This cecidomyiid is not mentioned in the catalogue of Palaearctic species (Skuhrava 1986). However, according to Redfern & Shirley (2011) *Geocrypta campanu-*

lae (Müller, 1871) is valid name for the species earlier called *Geocrypta trachelii* (Wachtl).

Graham & Gijswijt (1998) designated the lectotype of the species and wrote that the female is in BMNH. However, the lectotype was sent from NHMW. It is mounted on 6 x 9 mm card and labelled: Cec. gall on Camp. Cameron 1880; collect. G. Mayr; *Torymus campanulae* Cam. det Ruschka 1919; *Torymus campanulae* Cam. M. de V. Graham det. 1993. Lectotype ♀ (white label with red margins). Two male paralectotypes (labelled by M. Gijswijt in 1996) mounted on one card, which is similar to that on which the female lectotype is mounted, were sent from NHMW for study. The body length of the males is 1.6-1.7 mm.

Additional material. One reared female and one reared male (body length 1.8 mm) were sent from NHMW. They were labelled "Das. trachelii Wchtl. Camp. rotundifolia. Liebenau – 2687. Boh., Baudys; *Torymus campanulae* Cam. det. Ruschka (mit Type vergl.). These specimens were labelled as paralectotypes by M. Gijswijt in 1996, but this they cannot be because they do not belong to the syntypes of Cameron's species. These specimens were reared from the cecidomyiid *Geocrypta trachelii* Wachtl on *Campanula rotundifolia* L. in Liebenau, Bohemia (now Czech Republic) by Baudys and the rearing was reported by Ruschka (1921). Some characters of the reared female are given below (both antennae are broken, in the right antenna F1-F4 are present):

Head in dorsal view 2.2x as wide as long; temples narrowing strongly, slightly rounded, 0.35x apparent length of eye. POL 2.0x OOL; OOL 1.45x OD. In frontal view head trapezoidal with almost straight genae. Mouth 1.9x as wide as malar space; the latter 0.30x height of eye. Pedicel 1.6x as long as broad in dorsal view; anellus distinctly transverse; F1 1.4 times as long as broad, almost as long as pedicel and

slightly broader than pedicel in lateral view, and almost as long as F2; F2-F4 slightly elongate, in F1-F4 sensilla numerous, uniseriate.

Mesosoma 1.6x as long as wide, 1.1x as high as wide. Mesoscutum 1.4x as wide as long; scutellum 1.13x as long as wide, its punctures anteriorly weak, rather isolated. Dorsellum smooth; propodeum laterally finely alutaceous, medially smooth. Lower mesepisternum with purple transepisternal line. Mesepimeron 1.4x as high as broad, shorter than mid-coxa. Hind coxa 2.9x as long as broad. Inner hind tibial spur 0.45x as long as basitarsus. Fore wing 2.45x as long as broad. Costal cell 10 times as long as broad; upper surface with one complete or almost complete row of setae, lower surface with one complete row of setae and with scattered setae basally and apically. Basal cell with 4 setae in basal half, closed apically; basal fold with 5 setae. Speculum broadly open, rather large, extending to anterior third of marginal vein. Stigma oblique, longer than its height.

Gaster 2.18x as long as wide, compressed, 1.3 times as high as wide. Hypopygium extending to 0.92x length of gaster, bare except near apex which has short setae. Ovipositor index 2.97, sheath slightly longer than metasoma plus mesosoma.

Colour: Head blue-green. Scape brownish yellow, apically and dorsally metallic green. Pedicel green, flagellum dark, brownish. Mandible brownish yellow, apically reddish. Palpi brownish yellow. Mesosoma blue-green. Tegula and humeral plate brownish yellow, latter greenish in the middle. Lower mesepisternum with purple transepisternal line. Fore coxa and mid-coxa brownish yellow, on outer side near base greenish, hind coxa mostly greenish. Fore femur brownish yellow, on posterior surface slightly greenish; mid femur brownish yellow, ventrally slightly brownish infuscate; anterior surface of hind femur green, with apical 0.2

testaceous. Tibiae brownish yellow, hind tibia medially broadly brownish infusate. Tarsi yellowish, with apical 1-2 tarsomeres infusate. Wings hyaline, veins brownish yellow. Gaster blue-green, with tergum 1 with violet tint and sternum 1 pale cupreous. Ovipositor sheath dark, with lower margin largely paler.

Measurements. Body 2.45. Head 0.31, width 0.68, height 0.59. Mouth 0.25, malar space 0.13. Eye 0.37 x 0.26. POL 0.16. Mesosoma 1.05. Fore wing 2.43; costal cell 0.95, marginal vein 0.69, postmarginal vein 0.16, stigmal vein 0.07. Hind coxa 0.64; hind femur 0.78; hind tibia 0.75, width 0.11, inner spur 0.15, outer spur 0.10, hind tarsus 0.70, basitarsus 0.33. Gaster 1.20. Ovipositor sheath 2.23.

It seems possible that the lectotype from Scotland and the reared female from Bohemia represent the same species which has pale legs. It differs distinctly from *T. tilicola* which has darker legs and flagellum of different form. It also differs from *T. euphorbiae* which has rather pale legs but no purple transepisternal line. In many colour characters this species is close to *T. abbreviatus* which has been reared from cynipid hosts.

3.4. *Torymus abbreviatus* Boheman, 1834. Species revocata. Fig. 3.

Torymus abbreviatus Boheman, 1834: 357-358, ♀. Lectotype ♀ (NHRS; examined) designated by Graham and Gijswijt (1998). Type locality: Norway, "Norvegia alpina".

Torymus Hieracii Mayr, 1874: 112-113, ♀ ♂. Lectotype ♀ (NHMW; examined) designated by Graham and Gijswijt (1998). Type locality: Germany, Freiberg in Sachsen (reared by Schlecht. (= Schlechtendal) from gall of *Aylax Hieracii* [= *Aulacidea hieracii*] in stem of *Hieracium*) Syn. nov.

Female (lectotype of *Torymus abbreviatus*):

Head missing, except one flagellum. Anellus transverse, 0.75 as long as broad; funicle broader than anellus, hardly broadening distally, F1-F5 slightly elongate, 1.3-1.15x as long as broad, F6-F7 quadrate, clava slightly broader than distal funiculus, 2.2x as long as broad; sensilla numerous, uniseriate.

Mesosoma 1.79x as long as wide, 1.18x as high as wide. Mesoscutum 1.23x as wide as long; scutellum 1.27x as long as wide, its punctures hardly visible, isolated. Dorsellum smooth; propodeum densely alutaceous, rippled, medially with weaker sculpture. Mesepimeron 1.28x as high as broad, shorter (0.72x) than mid-coxa. Hind coxa 2.29x as long as broad, hind margin rounded, on upper half pilose; hind femur 4.35x as long as broad. Inner hind tibial spur 0.53x as long as basitarsus. Fore wing 2.26x as long as broad. Costal cell 9.1 times as long as broad; upper surface in apical half with one row of setae (ca 20), near base with 2 setae; lower surface with one complete row of setae near anterior margin and scattered setae in basal 0.4 and apical 0.5. Basal cell with 2-3 setae in basal half, closed below; basal fold with 7-8 setae. Speculum almost closed, extending to basal marginal vein. Stigma oblique, broader than its length.

Gaster 2.7x as long as wide, compressed, 1.4x times as high as wide. Basal sternum projecting beyond hind coxa; hypopygium extending to 0.81x length of gaster, bare except near apex. Ovipositor index 2.3, sheath about as long as metasoma plus almost half of mesosoma.

Colour: body bright green to blue-green or greenish blue. Flagellum dark, brownish black. Tegula and humeral plate brownish yellow, latter greenish in the middle. Lower mesepisternum with long purple transepisternal line. Mesepimeron cupreous. Coxae green, fore coxa yellow apically and on inner surface; trochanters brownish yellow, infusate below, trochan-

telli brownish yellow. Fore femur on posterior surface with faint greenish colour and basally infuscate, anterior side yellow; mid femur ventrally with green colour; anterior side of hind femur green, with basal 0.15 and apical 0.2 testaceous. Tibiae brownish yellow, hind tibia medially brownish infuscate. Tarsi brownish yellow to whitish, with apical 1-2 tarsomeres infuscate. Wings hyaline, veins brownish yellow. Gastral tergum 1 violet-blue apically and on sides, following 3 terga with violet hind margins; sternum 1 pale cupreous. Ovipositor sheath dark.

Measurements. [Body ca. 3.4.] Flagellum 1.07. Mesosoma 1.52. Fore wing 3.1; costal cell 1.26, marginal vein 0.89, postmarginal vein 0.23, stigmal vein 0.09. Hind coxa 0.80; hind femur 1.00; hind tibia 1.00, width 0.15, inner spur 0.23, outer spur 0.14; hind tarsus 1.02, basitarsus 0.43. Gaster 1.6. Ovipositor sheath 2.3.

Female (lectotype of *Torymus hieracii* Mayr): Head in dorsal view 2.08x as wide as long; temples narrowing strongly, slightly rounded, 0.25x apparent length of eye. POL 2.12x OOL; OOL 1.21x OD. In frontal view head with curved genae. Mouth 2.2x as wide as malar space; the latter 0.35x height of eye. Antennal toruli well above lower eye line, slightly nearer to clypeal margin than to median ocellus. Scape 3.9 times as long as broad, not reaching anterior edge of median ocellus. Pedicel plus flagellum 1.36x as long as head width; flagellum proximally stouter than pedicel; pedicel 1.6x as long as broad in dorsal view; anellus transverse (0.67x); F1 1.3 times as long as wide, F2-F5 elongate, F6 subquadrate, F7 transverse, sensilla numerous, biseriate, the series largely overlapping. Clava 1.9x as long as broad, on inner side with minute areas of micropilosity ventrally on C2 and at base of C3 and on apex of C3.

Mesosoma 1.65x as long as wide, 1.07x as high as wide. Mesoscutum 1.4x as wide as long;

scutellum 1.22x as long as wide, rather densely and evenly haired, its punctures hardly visible, isolated. Dorsellum smooth; propodeum alutaceous, medially almost smooth. Mesepimeron 1.4x as high as broad, shorter than mid-coxa. Hind coxa 2.56x as long as broad, hind margin rounded, on upper half pilose; hind femur 4.6x as long as broad. Inner hind tibial spur 0.52x as long as basitarsus. Fore wing 2.4x as long as broad. Costal cell 9.2 times as long as broad; upper surface basally with some setae, in apical half with one row of ca. 17 setae; lower surface with one almost complete row of setae near anterior margin and scattered setae in basal 0.4 in 2 rows and apical 0.5 in 2-3 rows. Basal cell with 6 setae, closed below apically; basal fold with 7 setae. Speculum almost closed, extending to base of marginal vein. Stigma oblique, about as long as high.

Gaster 2.25x as long as wide, compressed, 1.22 times as high as wide. Hypopygium extending to 0.80x length of gaster, bare except near apex with some setae. Ovipositor index 2.41, sheath about as long as metasoma plus half of mesosoma.

Colour: body bright green to blue-green or greenish blue. Scape testaceous, above wholly green. Pedicel green, flagellum dark, brownish. Tegula and humeral plate brownish yellow, latter greenish in the middle. Lower mesepisternum with purple transepisternal line. Mesepimeron cupreous-green. Coxae green, fore coxa yellow apically and on inner surface; trochanters brownish yellow, infuscate below, trochantelli brownish yellow. Fore femur on posterior surface with faint greenish stripe in apical half, otherwise brownish yellow; mid femur ventrally near base green; anterior side of hind femur green, with basal 0.14-0.24 and apical 0.3 testaceous. Tibiae brownish yellow, hind tibia medially slightly brownish. Tarsi brownish yellow to whitish, with apical 1-2 tarsomeres infuscate. Wings hyaline, veins brownish yellow.

low. Propodeum blue. Gaster green, partly blue and violet. Ovipositor sheath dark, ventrally paler.

Measurements. Body 2.5. Head 0.36, width 0.75, height 0.63. Mouth 0.31, malar space 0.14. Eye 0.40 x 0.29; distance between eyes 0.42. Scape 0.27; pedicel plus flagellum 1.02. POL 0.18. Mesosoma 1.16. Fore wing 2.4; costal cell 0.97, marginal vein 0.73, postmarginal vein 0.19, stigmal vein 0.07. Hind coxa 0.64; hind femur 0.83; hind tibia 0.79, width 0.12, inner spur 0.16, outer spur 0.12; hind tarsus 0.70, basitarsus 0.31. Gaster 1.15. Ovipositor sheath 1.9.

Female (reared from *Aulacidea hieracii* in Hatula, Finland):

Head in dorsal view 2.18x as wide as long; temples narrowing strongly, slightly rounded, 0.25x apparent length of eye. POL 1.82x OOL; OOL 1.18x OD. In frontal view head trapeziform with straight genae. Mouth 2.1x as wide as malar space; the latter 0.36x height of eye. Antennal toruli well above lower eye line, slightly nearer to clypeal margin than to median ocellus. Scape 3.75 times as long as broad, not reaching anterior edge of median ocellus. Pedicel plus flagellum 1.29x as long as head wide; flagellum proximally stouter than pedicel; pedicel 1.7x as long as broad in dorsal view; anellus transverse (0.55x); F1-F6 elongate, F7 transverse, sensilla numerous, biseriate, series largely overlapping. Clava 2.2x as long as broad, on inner side with areas of micropilosity at base ventrally of C2 and ventrally on C3 and on apex of C3.

Mesosoma 1.67x as long as wide, 1.19x as high as wide. Mesoscutum 1.34x as wide as long; scutellum 1.22x as long as wide, rather densely and evenly haired, its punctures hardly visible, isolated. Dorsellum smooth; propodeum alutaceous, medially almost smooth. Mesepimeron 1.67x as high as broad, shorter (0.81x) than

mid-coxa. Hind coxa 2.4x as long as broad, hind margin rounded, on upper half pilose; hind femur 4.36x as long as broad. Inner hind tibial spur 0.45x as long as basitarsus. Fore wing 2.37x as long as broad. Costal cell 8.5 times as long as broad; upper surface in basal 0.4 with 7 setae, in apical half with one row of ca. 17 setae; lower surface with one almost complete row of setae near anterior margin and scattered setae in basal 0.4 in 2 rows and apical 0.5 in 2-3 rows. Basal cell with 3 setae, closed below; basal fold with 5-8 setae. Speculum almost closed, extending to base of marginal vein. Stigma oblique, broader than its length.

Gaster 1.99x as long as wide, compressed, 1.08 times as high as wide. Basal sternum projecting beyond hind coxa; hypopygium extending to 0.85x length of gaster, bare except near apex, apically with 8 submedian setae and laterad 2 setae in one side. Ovipositor index 2.69, sheath about as long as metasoma plus half of mesosoma.

Colour: body bright green to blue-green or greenish blue. Scape testaceous, above wholly green. Pedicel green, flagellum dark, brownish black. Tegula and humeral plate brownish yellow, latter greenish in the middle. Lower mesepisternum with long purple transepisternal line. Mesepimeron cupreous-green. Coxae green, fore coxa yellow apically and on inner surface; trochanters brownish yellow, infusate below, trochantelli brownish yellow. Fore femur on posterior surface with faint greenish stripe in apical half, otherwise brownish yellow; mid femur ventrally with green colour; anterior surface of hind femur green, with basal 0.16 and apical 0.26-0.31 testaceous. Tibiae brownish yellow, hind tibia medially slightly brownish. Tarsi brownish yellow to whitish, with apical 1-2 tarsomeres infusate. Wings hyaline, veins brownish yellow. Gaster green, tergum 1 with violet tint; sternum 1 medially hardly cupreous. Ovipositor sheath dark.

Measurements. Body 3.1. Head 0.38, width 0.83, height 0.68. Mouth 0.34, malar space 0.16. Eye 0.45 x 0.31; distance between eyes 0.46. Scape 0.30; pedicel plus flagellum 1.07. POL 0.18. Mesosoma 1.30. Fore wing 2.8; costal cell 1.11, marginal vein 0.82, postmarginal vein 0.21, stigmal vein 0.075. Hind coxa 0.72; hind femur 0.96; hind tibia 0.93, width 0.14, inner spur 0.18, outer spur 0.13; hind tarsus 0.85, basitarsus 0.40. Gaster 1.45. Ovipositor sheath 2.5.

Male (reared from *Aulacidea hieracii* in Hatula, Finland):

Head in dorsal view 2.16x as wide as long; temples narrowing strongly, slightly rounded, 0.23x apparent length of eye. POL 2.12x OOL; OOL 1.14x OD. In frontal view head trapeziform with slightly curved genae. Mouth 2.14x as wide as malar space; the latter 0.38x height of eye. Antennal toruli well above lower eye line, slightly nearer to clypeal margin than to median ocellus. Scape 3.0 times as long as broad, not reaching anterior edge of median ocellus. Pedicel plus flagellum 1.58x as long as head wide; flagellum proximally stouter than pedicel; pedicel 1.5x as long as broad in dorsal view; anellus short, transverse (0.45x); flagellum densely hairy, almost uniformly wide, F1-F4 elongate, F5-F6 quadrate, F7 slightly transverse, sensilla numerous, uniseriate, on apical 0.6 of segments. Clava 2.0 as long as broad.

Mesosoma 1.80x as long as wide, 1.16x as high as wide. Mesoscutum 1.14x as wide as long; scutellum 1.26x as long as wide, its punctures anteriorly weak, isolated. Dorsellum smooth; propodeum densely alutaceous, medially almost smooth. Mesepimeron 1.36x as high as broad, shorter (0.65x) than mid-coxa. Hind coxa 2.2x as long as broad; hind femur 4.0x as long as broad. Inner hind tibial spur 0.54x as long as basitarsus. Fore wing 2.2x as long as broad. Costal cell 9.4 times as long as broad; upper surface near anterior margin with one

complete row of setae, setae scarce before middle and dense apically, near apex with 1-3 setae behind the row; lower surface with one complete row of setae near anterior margin, and behind it scattered setae basally and apically in 1-2 rows. Basal cell with 3-4 setae in basal half, closed below; basal fold with 6 setae. Speculum almost closed, large, extending to base of marginal vein. Stigma oblique, slightly broader than long.

Gaster 2.38x as long as wide, 1.19 times as high as wide.

Colour: body blue-green to greenish blue. Scape dark, green. Pedicel green, flagellum dark brownish. Tegula and humeral plate brownish yellow, former infuscate on hind margin and latter greenish in the middle. Lower mesepisternum with purple transepisternal line extending from anterior margin almost to posterior margin. Mesepimeron cupreous. Coxae green, trochanters brownish yellow, infuscate below, trochantelli brownish yellow. Fore femur on posterior surface with broad green stripe, anterior side brownish yellow; mid femur ventrally green; anterior surface of hind femur green, with basal 0.07 and apical 0.22 testaceous. Tibiae brownish yellow, hind tibia medially brownish infuscate. Tarsi yellowish, with apical 1-2 tarsomeres infuscate. Wings hyaline, veins brownish yellow. Tergum 1 of gaster violet-blue, following terga cupreous-green, with violet-blue hind margins.

Measurements. Body 2.4. Head 0.32, width 0.69, height 0.60. Mouth 0.30, malar space 0.14. Eye 0.37 x 0.23; distance between eyes 0.42. Scape 0.24; pedicel plus flagellum 1.09. POL 0.18.

Mesosoma 1.15. Fore wing 2.13; costal cell 0.94, marginal vein 0.58, postmarginal vein 0.165, stigmal vein 0.075. Hind coxa 0.54; hind femur 0.68; hind tibia 0.70, width 0.12, inner

spur 0.15, outer spur 0.10; hind tarsus 0.65, basitarsus 0.28. Gaster 1.00.

Variation. Body length of females (n = 34) reared from *Aulacidea hieracii* in S. Finland (Vikberg 2005) is 1.2-3.1 mm, of males (n = 40) reared from the same host 1.0-2.4 mm. Ovipositor index of females (n = 40) reared from *Aulacidea hieracii* varies between 2.27 and 3.05.

Comments. Mayr (1874) studied the female type of *T. abbreviatus* from the collection of C.H. Boheman but regarded it as the same species which was reared from the folded leaflets of *Rosa* caused by the gall midge *Cecidomyia "rosae"*, now called *Wachtliella rosarum* (Hardy). Four different species of *Torymus* have been reared from *W. rosarum* according to Graham and Gijswijt (1998). Mayr (1874) described the species reared from galls of *Aulacidea hieracii* as new under the name *T. hieracii*. Eady (1959) synonymised it with *T. cyanimus* (= *T. chloromerus*), and this decision has been followed by later authors (Bouček & Graham 1978b, Graham & Gijswijt 1998). Some authors recorded *T. hieracii* as a distinct species (eg. Nikolskaya & Zerova 1978, Sellenschlo & Wall 1984). The specimens reared from *Aulacidea hieracii* have constantly much paler legs than specimens reared from *Urophora* spp., therefore I agree with Mayr that the species are distinct from each other, although very closely related.

Note. Mayr (1874) described *Torymus hieracii* based on specimens from at least four localities and reared by four different collectors: Halle a/S. (Taschenberg), Freiberg in Sachsen (Schlechtendal), Bohemia (Mayr himself) and Austria (Franz Löw). The lectotype was labelled by Graham in 1993. It was designated by Graham & Gijswijt (1998) and they cite one original label as "Aylax hierac. Schluss." I have interpreted the last word as Schlecht. and sup-

pose that it means the collector Schlechtendal. The type locality above is given according to this assumption. Besides the lectotype of *Torymus hieracii* I examined 5 females and one male in Mayr's collection labelled as types of *Torymus hieracii*. Only two of the females represented the same species as the lectotype.

3.5. *Torymus euphorbiae* (Walker, 1833). Species revocata.

Callimome Euphorbiae Walker, 1833: 132, ♀. Lectotype ♀ no. 1591 (NHML; examined) designated by Eady (1959). Type locality: near Paris, France (taken on a spurge [= *Euphorbia* sp.] by Mr. de Laporte).

Torymus euphorbiae Ruschka, 1921: 338, ♀ ♂. Lectotype ♀ (NHMW; examined) designated by Graham and Gijswijt (1998). Type locality: Weidling, Niederösterreich, Austria (reared from *Perrisia capitigena* (Bremi) [= *Bayeriola capitigena*] on *Euphorbia cyparissias* L. by Wachtl). The valid name of the cecidomyiid host species is now *Spurgia euphorbiae* (Vallot) (Redfern & Shirley 2011).

Female (lectotype of *Callimome euphorbiae*): Head in dorsal view 2.21x as wide as long; temples narrowing strongly, slightly rounded, 0.22x apparent length of eye. POL 2.1x OOL; OOL 1.26x OD. In frontal view head trapeziform with straight genae. Clypeus slightly produced, margin very slightly convex. Mouth 1.75x as wide as malar space; the latter 0.39x height of eye. Antennal toruli well above lower eye line, slightly nearer to clypeal margin than to median ocellus. Scape 4.8 times as long as broad, not reaching anterior edge of median ocellus. Pedicel plus flagellum 1.33x as long as head wide; flagellum proximally stouter than pedicel; pedicel 1.6x as long as broad in dorsal view; anellus transverse (0.67x); F1-F5 slightly elongate, F6-F7 slightly transverse, sensilla numerous, uniseriate. Clava 1.92x as long as broad.

Mesosoma 1.64x as long as wide, 1.11x as high as wide. Mesoscutum 1.5x as wide as long; scutellum 1.25x as long as wide, its punctures anteriorly inconspicuous, isolated. Dorsellum smooth; propodeum alutaceous, medially with very weak sculpture. Mesepimeron 1.4x as high as broad, shorter (0.72x) than mid-coxa. Hind coxa 1.94x as long as broad, hind margin rounded, on upper half pilose; hind femur 4.15x as long as broad. Inner hind tibial spur 0.46x as long as basitarsus. Fore wing 2.45x as long as broad. Costal cell 9.6 times as long as broad; upper surface with one row of setae, lower surface with one row of setae and scattered setae in basal 0.3 and apical 0.5. Basal cell with 4 setae in basal half, closed below; basal fold with 5 setae. Speculum almost closed, extending to basal marginal vein. Stigma oblique, broader than its length.

Gaster 2.5x as long as wide, compressed, 1.44 times as high as wide. Basal sternum projecting beyond coxa; hypopygium extending to 0.84x length of gaster, bare except near apex with 10 setae on one side. Ovipositor index 2.47, sheath about as long as metasoma plus half of mesosoma.

Colour: body bright green to blue-green or greenish blue. Scape testaceous, infuscate above, more apically. Pedicel green, flagellum dark, brownish black. Tegula and humeral plate brownish yellow, former infuscate on hind margin and latter greenish in the middle. Lower mesepisternum without any purple transepisternal line. Mesepimeron with cupreous tint. Coxae green, fore coxa yellow on inner surface; trochanters brownish yellow, infuscate below, trochantelli brownish yellow. Fore femur on posterior surface with faint greenish stripe, anterior surface yellow; mid femur ventrally with green colour; anterior surface of hind femur green, with basal 0.18 and apical 0.18-0.24 testaceous. Tibiae brownish yellow, hind tibia medially brownish infuscate. Tarsi brownish

yellow, with apical 1-2 tarsomeres infuscate. Wings hyaline, veins brownish yellow. Gastral tergum 1 violet-blue apically and on sides, sternum 1 pale cupreous. Ovipositor sheath dark.

Measurements. Body 2.8. Head 0.34, width 0.75, height 0.64. Mouth 0.28, malar space 0.16. Eye 0.41 x 0.29; distance between eyes 0.42. Scape 0.28; pedicel plus flagellum 1.0. POL 0.18. Mesosoma 1.23. Fore wing 2.5; costal cell 0.96, marginal vein 0.71, postmarginal vein 0.16, stigmal vein 0.06. Hind coxa 0.62; hind femur 0.83; hind tibia 0.83, width 0.13, inner spur 0.16, outer spur 0.12; hind tarsus 0.78, basitarsus 0.35. Gaster 1.25. Ovipositor sheath 2.05.

Female (lectotype and paralectotype of *Torymus euphorbiae* Ruschka):

Head in dorsal view 2.27x as wide as long; temples narrowing strongly, slightly rounded, 0.25x apparent length of eye. POL 2.05x OOL; OOL 1.38x OD. In frontal view head trapeziform with straight genae. Clypeus slightly produced, margin slightly convex. Mouth 1.78x as wide as malar space; the latter 0.40x height of eye. Anterior margin of antennal torulus well above lower eye line, distinctly nearer to clypeal margin than to median ocellus. Scape 3.8 times as long as broad, hardly or not reaching anterior edge of median ocellus. Pedicel plus flagellum 1.35x as long as head width; flagellum proximally stouter than pedicel; pedicel 1.9x as long as broad in dorsal view; anellus transverse (0.75x); F1-F5 slightly elongate, F6-F7 slightly transverse, sensilla numerous, uniseriate. Clava 2.09x as long as broad.

Mesosoma 1.70x as long as wide, 1.12x as high as wide. Mesoscutum 1.3x as wide as long; scutellum 1.25x as long as wide, its punctures anteriorly inconspicuous, isolated. Dorsellum smooth; propodeum alutaceous, medially with very weak sculpture. Mesepimeron 1.4x as high as broad, shorter than mid-coxa. Hind coxa 2.3x

as long as broad, hind margin rounded, on upper half pilose; hind femur 4.6 as long as broad. Inner hind tibial spur 0.43 as long as basitarsus. Fore wing 2.4-2.5x as long as broad. Costal cell 10.5 times as long as broad; upper surface with 9 setae in apical half, lower surface with one row of setae and scattered setae in basal 0.3 and apical 0.5. Basal cell with 6 setae in basal half, closed apically; basal fold with 6 setae. Speculum almost closed, extending to basal marginal vein. Stigma oblique, slightly longer than high.

Gaster 2.4x as long as wide, compressed, 1.27 times as high as wide. Hypopygium extending to 0.8x length of gaster, bare except near apex with short setae. Ovipositor index 2.47-2.55, sheath about as long as metasoma plus half of mesosoma.

Colour: Head green-blue, above blue with tiny violet areas. Scape testaceous, infusate above, more apically. Pedicel green, flagellum dark, brownish. Mesosoma bright green to blue-green or greenish blue. Tegula and humeral plate brownish yellow, latter greenish in the middle. Lower mesepisternum without any purple transepisternal line. Mesepimeron with cupreous tint. Coxae green; trochanters brownish yellow, infusate below, trochantelli brownish yellow. Fore femur on posterior surface with faint greenish stripe, anterior surface yellow; mid femur on ventrally with green colour; anterior side of hind femur green, with basal 0.12 and apical 0.26 testaceous. Tibiae brownish yellow, hind tibia medially slightly brownish infusate. Tarsi brownish yellow, with apical 1-2 tarsomeres infusate. Wings hyaline, veins brownish yellow. Gaster green, terga largely blue to violet, sternum 1 pale cupreous. Ovipositor sheath dark, with lower margin paler.

Measurements. Body 3.1. Head 0.37, width 0.84, height 0.71. Mouth 0.32, malar space 0.18. Eye 0.45 x 0.31; distance between eyes 0.47. Scape 0.32; pedicel plus flagellum 1.13.

POL 0.20. Mesosoma 1.41. Fore wing 2.8; costal cell 1.15, marginal vein 0.84, postmarginal vein 0.19, stigmal vein 0.06. Hind coxa 0.74; hind femur 0.96; hind tibia 0.95, width 0.15, inner spur 0.18, outer spur 0.12; hind tarsus 0.98, basitarsus 0.42. Gaster 1.51. Ovipositor sheath 2.45.

Comments. Eady (1959) synonymised the species with *T. cyanimus* (= *T. chloromerus*). Graham and Gijswijt (1998) treated the species as a synonym of *T. chloromerus*, though at first Graham hesitated to regard them as conspecific. However, the two species differ clearly by the presence or absence of the purple transepisternal line on the lower mesepisternum. Therefore I regard the species associated with *Euphorbia* sp. as distinct. Their hosts (Tephritidae >> Cecidomyiidae) are clearly different.

3.6. *Torymus micropterus* Walker, 1833. Species revocata.

Callimome micropterus Walker, 1833: 130, ♀. Lectotype ♀ no. 1585 (NHML; examined) designated by Eady (1959). Type locality: near London, England (in July). Eady regarded it as a distinct species but it was considered a synonym of *T. chloromerus* by Bouček & Graham (1978a).

Female (lectotype of *Callimome micropterus*): Head collapsed, distorted. POL 1.9x OOL; OOL 1.4x OD. Mouth 1.5x as wide as malar space; the latter 0.4x height of eye. Antennal toruli well above lower eye line, slightly nearer to clypeal margin than to median ocellus. Scape 3.9 times as long as broad, not reaching anterior edge of median ocellus. Pedicel plus flagellum 1.3x as long as head wide; pedicel 2.0x as long as broad in dorsal view; anellus transverse; flagellum proximally slightly stouter than pedicel; F1-F4 slightly (1.15-1.08 x) elongate, F5 quadrate, F6-F7 transverse, sensilla numerous, uniseriate. Clava 1.8x as long as broad.

Mesosoma 1.85x as long as wide, 1.15x as high as wide. Mesoscutum 1.37x as wide as long; scutellum 1.25x as long as wide, its punctures anteriorly weak, inconspicuous. Dorsellum smooth; propodeum with very delicate alutaceous sculpture. Mesepimeron 1.6x as high as broad, shorter (0.76x than mid-coxa. Hind coxa 2.2x as long as broad, hind margin rounded, on upper half now glabrous (originally pilose?); hind femur 4.1x as long as broad. Inner hind tibial spur 0.42x as long as basitarsus. Fore wing 2.6x as long as broad. Costal cell 10.7 times as long as broad. Speculum large, extending beyond middle of marginal vein. Stigma oblique, broader than its length.

Gaster 2.16x as long as wide, compressed, 1.24 times as high as wide. Basal sternum projecting beyond coxa; hypopygium extending to 0.86x length of gaster, bare except near apex with 6 setae on one side. Ovipositor index 2.3, sheath about as long as metasoma plus half of mesosoma.

Colour: body bronze green to blue-green. Scape testaceous, infusate above, more apically. Pedicel green, flagellum dark, brownish black. Tegula and humeral plate brownish yellow, former slightly infusate on hind margin and latter greenish in the middle. Lower mesepisternum without any purple transepisternal line. Mesepimeron with cupreous tint, green. Coxae green, fore coxa yellow apically; trochanters brownish yellow, infusate below, trochantelli brownish yellow. Fore femur on posterior surface with faint greenish colour and basally infusate, anterior surface yellow; mid-femur ventrally with green colour; anterior side of hind femur green, with basal 0.13 and apical 0.27 testaceous. Tibiae brownish yellow, hind tibia medially brownish infusate. Tarsi yellowish, with apical 1-2 tarsomeres infusate. Wings hyaline, veins brown. Gastral tergum 1 basally green and violet-blue apically and on sides, following terga cupreous, sternum 1 pale cupre-

ous. Ovipositor sheath dark.

Measurements. Body 2.3. Head width ca. 0.6. Mouth 0.21, malar space 0.14. Eye 0.35 x 0.24; distance between eyes ?0.42. Scape 0.25; pedicel plus flagellum 0.76. POL 0.13. Mesosoma 0.96. Fore wing 1.96; costal cell 0.75, marginal vein 0.54, postmarginal vein 0.14, stigmal vein 0.08. Hind coxa 0.48; hind femur 0.63; hind tibia 0.67, width 0.10, inner spur 0.12, outer spur 0.08; hind tarsus 0.62, basitarsus 0.30. Gaster 0.97. Ovipositor sheath 1.55.

Comments. The colour of the legs and gaster is similar to that of *T. heyeri* Wachtl but the ovipositor is distinctly longer. Eady (1959) regarded *T. micropterus* as a distinct species, whereas Bouček and Graham (1978) synonymised it with *T. chloromerus*. The colour of the legs fits rather well to *T. abbreviatus* but not the colour of the transepisternal line and of the gaster. I regard it distinct and do not know any other specimens except the lectotype. Its biology is unknown.

3.7. Key to females of some species of *Torymus*.

- 1 Transepisternal line on lower mesepisternum purple. 2
 1* Transepisternal line not purple. 5
 2 Fore femur yellow except for a metallic greenish stripe on posterior surface. Fore coxa can be yellow apically and on inner surface. 3
 2* Fore femur basally broadly green, yellow only apically. Fore coxa wholly green. 4
 3 Outer surface of fore coxa and whole mid-coxa green. Host: cynipids on Asteraceae. ...
 *abbreviatus*
 3* Outer surface of fore coxa yellow, only basally greenish. Mid-coxa yellow, with greenish colour only on outer surface near basally. Host: cecidomyiid on *Campanula*. *campanulae*
 4 Body length 2.0-4.2 mm. Flagellum not clavate. Upper margin of hind coxa densely

hairy. *chloromerus*
 4* Body length 1.4-2.3 mm. Flagellum clavate.
 Upper margin of hind coxa with 5-7 setae. ...
 *tilicola*
 5 Gaster cupreous. *micropterus*
 5*Gaster green to blue or violet. ... *euphorbiae*

3.8. Notes on some species which have been considered as synonyms of *Torymus chloromerus*

Graham & Gijswijt (1998) designated a lectotype female for *Callimome centaureae* Hoffmeyer, 1930: 241, 251, and synonymized the species with *Torymus chloromerus*. Its lectotype female, on a slide, has not yet been examined.

Torymus centaureae was reared in May-June, 1907 from galls of *Phanacis centaureae* Förster (Hymenoptera, Cynipidae) from Ermelunden in Denmark by J. P. Kryger. Hoffmeyer (1930) studied four females and 18 males, but now only the lectotype can be found in the Natural History Museum of Denmark, University of Copenhagen according to the information by Dr. Lars Björn Vilhelmsen. The species is probably close to *T. abbreviatum* but it lacks the blue colour; the body is emerald green with coppery red shine. Hoffmeyer (1930) gives a shorter ovipositor index for the species (1.8) than for *Callimome hieracii* (2.5-2.8).

A further possible synonym of *Torymus chloromerus* mentioned by Graham & Gijswijt (1998) is *Torymus chlorinus* Förster, based only on the original description of the species. This species was described in Förster 1841: 32, not 1840 as they wrote. The original description is short; according to it the legs of the green female are yellow, all femora medially green, and hind tibia medially relatively narrowly brownish. This colouration could fit *Torymus euphorbiae* or *T. abbreviatus*. However, Förster's name is preoccupied in *Torymus* by *Callimome chlorinus*

Walker, 1833, which is mentioned as a synonym of *T. flavipes* (Walker, 1833) by Graham & Gijswijt (1998).

4. Discussion

Askew (1965: 228) showed that in *Torymus nigricornis* Boheman [= *T. auratus* (Müller)], which lives in cynipid galls on the oak, the ovipositor length is different on average in the first and second generations, with only a small overlap. Graham & Gijswijt (1998) measured the ovipositor index in the specimens of the same species: in females emerging in May, June and July the index varied from 3.0 to 4.0, and in females emerging in August and September the index was 3.9-4.3.

When dealing with *Torymus chloromerus* and its many synonyms, Graham & Gijswijt (1998: 74-75) stated that in the spring generation of *T. chloromerus* the ovipositor index is 2.05-2.4 and in the summer generation of the same species it is 2.8-3.2. *Torymus cyanimus* belongs to the spring generation and *T. hieracii* belongs to the summer generation of *T. chloromerus*.

Against the treatment of the species discussed here as different generations of the same species can be presented the following facts: in Finland adults of *Torymus abbreviatus* emerging after hibernation from galls of *Aulacidea hieracii* have an ovipositor index about the same as that of females reared from *Urophora cardui*. Sellenschlo & Wall (1984) give the flying season of *T. hieracii* in C. Europe as May-June. There exists no work which demonstrates that any species of the *Torymus chloromerus* complex is capable of moving from one host to another. Therefore it is more probable that in the complex several species are involved, and indeed some differences can be found in the structure and colour in the females reared from different hosts.

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