

***Torymus ventralis* (Fonscolombe) and *Torymus maculatus* sp. n. from Finland, and *Torymus maculosus* sp. n. from Corfu, Greece (Hymenoptera: Chalcidoidea: Torymidae)**

Veli Vikberg

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Two new species of *Torymus* with maculated forewings are described: *T. maculatus* sp. n. from southern Finland and *T. maculosus* sp. n. from Corfu, Greece. Both species are related to *Torymus ventralis* (Fonscolombe). Findings of *T. ventralis* in Finland are presented. The species is known as a parasitoid of *Planetella* (Diptera: Cecidomyiidae), although no *Torymus* was reared from subterranean galls of *Planetella* sp. on *Carex lasiocarpa* Ehrh. (Cyperaceae) in Finland. The only parasitoids to emerge from these galls were *Eurytoma truncata* (Boheman) and *Eupelmus vesicularis* (Retzius).

V. Vikberg, Liinalammintie 11 as. 6, FI-14200 Turenki, Finland; E-mail: veli.vikberg@aina.net

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1. Introduction

The European species of *Torymus* Dalman were revised by Graham and Gijswijt (1998). In autumn 2009 Martti Koponen showed me two species of *Torymus*, the females of which had maculated forewings and the maculae were clearly attached to the stigmal vein anteriorly. Such species are rather few in the genus and Koponen's females did not fit any described species. Using the key to females in Graham and Gijswijt (1998), the females run, if the forewing maculae are ignored, to couplet 57 and to *Torymus ventralis* (Fonscolombe). Specimens of that species were then compared with the maculated females. They were found to be undescribed and are described as new species in this article.

2. Material and methods

Specimens were studied under a Leitz stereomicroscope at magnifications of 50× and 100×; the light source was a halogen lamp of 12V 20W with a light beam width of 10 degrees. The light was diffused by placing a piece of thick (0.2 mm) tracing acetate near the specimen. Measurements and drawings were made by using a grid of squares (50x50, side 0.20 mm) in one eyepiece. Body part terminology and their abbreviations are according to Graham and Gijswijt (1998). Ocellar diameter (OD) was measured as breadth of median ocellus. Lengths of metatibia and ovipositor sheath were measured as maximum lengths in lateral view. Length of hind basitarsus was measured as mediodorsal length. Abbreviations of the museums from where the reference specimens were borrowed for this study: MZH = Zoological Museum, University of Helsinki (cu-

rator of Hymenoptera Pekka Malinen), ZMT = Zoological Museum, University of Turku (curator Veikko Rinne).

3. Taxonomy

3.1. *Torymus ventralis* (Fonscolombe, 1832)

The species was described originally as *Cinips ventralis* by Fonscolombe (1832). A neotype female from France was designated by Graham (1992); (not examined by me). Nine synonyms by F. Walker, A. Förster and C.G. Thomson are listed in Graham and Gijswijt (1998). Of these *Callimomus discolor* Thomson was described in both sexes from southern and central Sweden (Thomson 1876). Its lectotype (not examined by me), a female from Skåne, not a male as cited in Graham and Gijswijt (1998), was designated by Hansson (1991). The species has been reared from galls of *Proshormomyia fischeri* Frauenfeld (Diptera: Cecidomyiidae) (now *Planetella fischeri*) on *Carex* (Hoffmeyer 1930). *Torymus ventralis* is widely distributed in Europe. It has been reported from Austria (Mayr 1874), Croatia (Bouček 1977), Czech Republic (Kalina 1989), France, Germany (Förster 1841, Mayr 1874), Hungary (Erdős 1946), Italy (near Trieste; Mayr 1874), Moldova (Bouček 1965), Serbia and Montenegro (Mayr 1874, Bouček 1977), Slovakia (Kalina 1989), Sweden, United Kingdom (Eady 1959, Bouček & Graham 1978), and South European part of the former U.S.S.R (Nikolskaya 1952). In Sweden it is found in southern parts of the country from Skåne to Närke and Södermanland (Hedqvist 2003).

From Finland *T. ventralis* was recorded under two names: *Callimome ventrale* and *Callimomus discolor* by Hellén (1934); this was based mostly on identifications of Erik B. Hoffmeyer in 1931. Five females which were identified by Hoffmeyer as *Callimome ventrale* are identified *Torymus chrysocephalus* Boheman (from Nystad and Karislojo, leg. Hellén) and *Torymus angelicae* (Walker) (from Nystad, leg. Hellén).

3.1.1. Specimens examined (12 females)

Denmark. 1 ♀, without locality (coll. R.W.

Schlick; *Callimome fulgens* F., det. Hoffmeyer [19]29; MZH).

Finland. A (= Åland), Föglö, 4.8.1925 1♀, leg. R. Forsius (ZMT). Jomala, [before 1934] 1♀, leg. R. Forsius (MZH). Jomala, Ytternäs, 16.7.1919 1♀, leg. W. Hellén (301; *Callimomus ventrale* Fonsc., det. Hoffmeyer 1931; MZH). Jomala, Möckelö, 25.8.1926 1♀, leg. W. Hellén (640; *Callimomus ventrale* Fonsc., det. Hoffmeyer 1931; MZH). Jomala, Sviby, 29.8.1926 1♀, leg. W. Hellén (767; *fulgens* F. Hellén det.; MZH). Hammarland, [before 1934] 1♀, leg. R. Forsius (MZH). Mariehamn, [before 1900] 2♀♀, leg. Reuter (*Callimome ventrale* Fonsc., det. Hoffmeyer 1931; MZH).

V (= Varsinais-Suomi), Karjalohja ("Karislojo"), 22.7.1911 1♀, leg. W. Hellén (909; *Callimomus discolor* Thoms., det. Hoffmeyer 1931; MZH). Länsi-Turunmaa, Nauvo ("Nagu"), 3.7.1925 1♀, leg. R. Forsius (21242; MZH).

France. Dordogne, Lalinde (3 km N), 1.9.2002 1♀, leg. R. R. Askew (*Torymus ventralis* (Fonsc.), det. R. R. Askew; coll. V. Vikberg, Turenki).

3.1.2. Morphology

Colouration of female. Described in some detail by Mayr (1874). Females examined by me fit his description rather well. The entire vertex is dark blue, the dorsum of mesosoma is green, the gaster has extensive reddish yellow colour basally, the legs are reddish yellow and the base of the hind coxa is dorsally green.

Female from Denmark. The largest female examined. Body 4.1 mm long. Head width 1.00 mm. Forewing 2.84 mm long. Ovipositor sheath is slightly shorter (0.95×) than gaster, ovipositor index 1.62.

Females from Finland. Body 2.35–3.3 mm long. Head width 0.66–0.97 mm. POL 1.55–1.86 times OOL. OOL 1.29–1.64 times OD. Pedicel plus flagellum 1.33–1.38 times as long as head width. Forewing clear, 1.95–2.77 mm long, 2.54–2.65 as long as wide. Ovipositor sheath 1.30–1.74 mm, metatibia 0.75–1.02 mm, ovipositor index 1.63–1.74. Ovipositor sheath slightly longer (1.07–1.25×) than gaster.

Female from France (Fig. 1). 3.1 mm long. Using the key of Graham and Gijswijt (1998) it

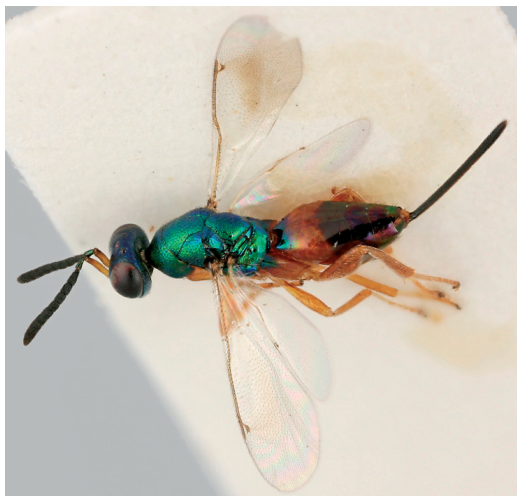


Fig. 1. *Torymus ventralis* (Fonscolombe), female from France. Photo by Pekka Malinen.

runs to couplet 57 and *Torymus ventralis*. Upper part of head dark blue, lower face green. Upper clypeus slightly violet, lower clypeus and lateral of it coppery. Mandible brown, teeth blackish. Palpi brown. POL/OOL 1.82, OOL/OD 1.21. Scape brownish yellow, radicle dark. Pedicel greenish black. Flagellum black. Funicular segments 2–7 with sensillae in two rows which overlap hardly at all. Mesosoma dorsally bright green. Forewing has on disk a faint yellowish infumation which does not touch stigmal vein. Basal third of gaster dorsally reddish yellow, extreme base green. Venter mostly reddish yellow. Terga 3–5 dark, metallic (with greenish-purplish-violet tint), tergum 6 greenish. Ovipositor sheath black, basal 0.7 beneath brown, apex brownish. Ovipositor index 1.76, sheath longer (1.14×) than gaster.

3.2. *Torymus maculatus* sp. n.

Holotype (Fig. 2). Female. Finland (“Suomi”), U (= Uusimaa), Nurmijärvi, [Grid 27°E] 6705:3381, 19.8.1989, M. Koponen leg. (MZH).

Colour. Head. Golden green, laterad of lateral ocelli purplish, purplish colour on sides of scrobal depression and malar space. Apical clypeus, and laterad of it, coppery. Base of mandible brown, apical part reddish brown, teeth infuscate. Palpi dark brown, apex of maxillary palpus brown.



Fig. 2. *Torymus maculatus* sp. n., holotype female from Finland. Photo by Pekka Malinen.

Scape reddish yellow, radical brownish black. Pedicel dark, greenish, flagellum black.

Mesosoma. Pronotum green, mediocaudally bluish green. Mesoscutum golden green, lateral lobes slightly purplish. Mesoscutellum purplish, axilla green. Metanotum and propodeum golden green, anterior callus purplish. Sides of mesothorax golden green, below tegula and mesepimeron purplish. Metapleuron emerald green. Legs reddish brown, base of mesocoxa slightly green, base of metacoxa dorsally green. Tegula pale yellow, apically brownish infuscate, humeral plate basally yellow, apically green. Wings hyaline, discal setae brown. Venation of forewing brown, parastigma and stigmal vein dark brown, on hind wing yellowish brown. Disk of forewing with large longitudinal brownish infumation, which is below stigmal vein accentuated and attached to stigmal vein.

Gaster. Basal third dorsally reddish yellow, extreme base greenish. Basal half of venter reddish yellow. Gastral terga 3–5 green, with broad apical zone purple-dark violet, tergum 6 green. Ovipositor sheath blackish, with basal 0.7 laterally brownish and apex slightly brownish.

Size. Length of body 3.7 mm, length of ovipositor sheath 1.9 mm.

Morphology. Head in dorsal view 2.13 times as broad as long; temples 0.11 apparent length of eyes, very strongly converging and slightly curved. POL 1.9 times OOL. OOL 1.3 times OD. Head in front view 1.2 times as broad as high; eyes separated by 0.9 times their height. Toruli with lower margins above lower ocular line but

much closer to anterior margin of clypeus than to median ocellus (29:53). Eye 1.39 times as high as wide, with very short setae. Mouth opening 1.9 times malar space, the latter 0.35 times height of eye. Scape 6 times as long as wide, 0.83 times as long as height of eye, reaching about to middle of median ocellus. Pedicel in dorsal view 2.3 times and in lateral view 2.6 times as long as wide, 1.17 times as long as F1. Anellus slightly transverse (0.83×). F1 1.45 times as long as broad, narrowing in its proximal half, its base hardly broader than the anellus, F2 1.2 times as long as broad, following segments decreasing gradually in length but increasing very slightly in breadth. Sensilla numerous, uniseriate, long, narrow base of segments without them. F7 slightly (0.92×) transverse. Clava almost twice as long as wide, slightly longer than F6 plus F7. Pedicel plus flagellum 1.27 times as long as breadth of head.

Mesosoma 1.9 times as long as mesoscutum broad. Pronotum 0.57 length of mesoscutum, in anterior two thirds its sculpture fine, slightly raised and forming transverse ripples, in posterior third similar to that on anterior mesoscutum. Mesoscutum with fine reticulation which in anterior part tends to form transverse ripples, posteriorly reticulation partly larger, with small and rather thick piliferous punctures. Scutellum moderately convex, its reticulate sculpture very finely reticulate, rather uniform, piliferous punctures small and rather remote, setae slightly raised, flange medially rather broad, with some trabeculae. Dorsellum with indication of a median longitudinal furrow. Propodeum shiny, with delicate alutaceous sculpture, anteriorly with a row of transverse foveae. Mesepimeron slightly higher than long, its height distinctly less than length of mesocoxa. Metacoxa 1.9× as long as broad, distinctly curved behind, its dorsal surface bare in basal half. Forefemur 2.9×, metafemur 3.7× as long as wide. Hind tibia 6.9× as long as apically wide, outer spur about 0.7 as long as inner spur, inner spur 0.51× as long as mediadorsal length of basitarsus. Forewing 2.7 as long as broad; costal cell 11.4× as long as broad, its upper surface apically with 7–8 setae, its lower surface with an almost complete row of setae. Relative lengths of costal cell, M, PM and ST = 114:86:20:12. Stigmal vein at a very oblique angle to PM, stigma small and shortly petiolate. Basal cell bare



Fig. 3. *Torymus maculosus* sp. n., holotype female from Corfu. Photo by Pekka Malinen.

except for 6–7 setae below SM, basal fold with 6–8 setae. Speculum large, extending almost to middle of M, closed below except in short basal corner.

Gaster rather strongly compressed, basal sternum about 1.2 times as long as hind coxa; hypopygium bare except for a few setae apically. Tip of hypopygium level 0.77× length of gaster. Ovipositor sheath about 1.09 as long as gaster, ovipositor index 1.58.

Male. Unknown.

Biology. Unknown. The holotype was captured in Nurmijärvi, Kaanaanmetsä, a mixed forest area near the river Vantaanjoki.

3.3. *Torymus maculosus* sp. n.

Holotype (Fig. 3). Female. Greece, Corfu, Acharavi, 28.4.1994. M. Koponen leg. (MZH). Paratype. A female from the same locality on 24.4.1994, M. Koponen leg. (MZH).

Holotype female.

Colour. Head. Dark blue-violet, punctures on vertex and upper frons shining green. Lower face bright green-blue, on medial line and malar space violet. Apical clypeus, and laterad of it, coppery. Mandible reddish brown, apically infuscate. Palpi dark brown, apex of maxillary palpus brown. Scape reddish yellow, dorsoapically green, radicle dark. Pedicel dark, greenish, flagellum black.

Mesosoma. Pronotum anteriorly green, in larger posterior area violet. Mesoscutum blue-violet. Mesoscutellum blue, axilla medially greenish. Metanotum green, propodeum violet, callus green. Sides of mesothorax bluish green, mes-

epimeron bronze. Metapleuron blue. Legs reddish yellow, base of mesocoxa slightly green, base of metacoxa dorsally green. Tegula brown, humeral plate brown, apically greenish. Wings hyaline, discal setae dark brown. Venation on forewing brown, parastigma and stigmal vein dark brown, on hind wing pale brown. Disk of forewing medially with large longitudinal brownish infumation, below stigmal vein it is broadened and attached to stigmal vein; anterior part of forewing slightly brownish from basal vein to stigmal vein.

Gaster. Basal third dorsally reddish yellow, extreme base blue-green-violet. Basal half of venter reddish yellow. Gastral terga 3–6 blackish, with faint metallic tint (green, violet). Ovipositor sheath blackish, with basal 0.7 beneath brownish and apex slightly brownish.

Size. Length of body 3.2 mm, length of ovipositor sheath 1.7 mm.

Morphology. Head in dorsal view 2.02 times as broad as long; temples 0.14 apparent length of eyes, very strongly converging and slightly curved. POL 1.6 times OOL. OOL 1.57 times OD. Head in front view 1.18 times as broad as high; eyes separated 0.96 times their height. Toruli with lower margins above lower ocular line but much closer to anterior margin of clypeus than to median ocellus (28:45). Eye 1.4 times as high as wide, with few very short setae. Mouth opening 2.1 times malar space, the latter 0.33 times height of eye. Scape 5.1 times as long as wide, 0.79 times as long as height of eye, reaching about to middle of median ocellus. Pedicel in dorsal view 2.2 times and in lateral view 2.3 times as long as wide, 1.03 times as long as F1. Anellus transverse (0.75×). F1 1.7 times as long as broad, narrowing in its proximal half, its base hardly broader than the anellus, F2 1.3 times as long as broad, following segments decreasing gradually in length but increasing very slightly in breadth. Sensilla numerous, in F2–F7 in two rows which hardly overlap, narrow base of segments without them. F7 slightly (0.91×) transverse. Clava almost twice as long as wide, slightly longer than F6 plus F7 together. Pedicel plus flagellum 1.35 times as long as breadth of head.

Mesosoma 2.1 times as long as mesoscutum broad. Pronotum medially 0.55 length of mesoscutum, in anterior two thirds its sculpture fine,

slightly raised and forming transverse ripples, in posterior third similar to that on anterior mesoscutum. Mesoscutum with fine reticulation which in anterior part tends to form transverse ripples, posteriorly reticulation regular, finer, with small and rather remote piliferous punctures. Scutellum slightly convex, its reticulate sculpture very fine, rather uniform, piliferous punctures small and rather remote, setae slightly raised, flange of equal breadth throughout, with regular trabeculae. Dorsellum with indication of a weak median longitudinal keel. Propodeum shiny, with delicate alutaceous sculpture, anteriorly with a row of transverse foveae. Mesepimeron slightly higher than long, its height distinctly less than length of midcoxa. Metacoxa 2.0× as long as broad, distinctly curved behind, its dorsal surface bare in basal half. Forefemur 2.7×, metafemur 3.7× as long as wide. Metatibia 6.0× as long as apically wide, outer spur about 0.8 as long as inner spur, inner spur 0.54× as long as basitarsus. Forewing 2.66 as long as broad; costal cell 9.5–11.3× as long as broad, its upper surface apically with 1–3 setae, its lower surface in the middle with broad glabrous zone. Relative lengths of costal cell, M, PM and ST = 95:67:16:10. Stigmal vein at a very oblique angle to PM, stigma rather large and shortly petiolate; in right forewing stigmal vein different, abnormal (petiole longer and at a much broader angle to PM). Basal cell bare except for 3–4 setae below SM, basal fold with 4 setae. Speculum large, extending basal 0.25 of M, closed below except broadly in basal corner.

Gaster rather strongly compressed; hypopygium bare except for a few setae apically. Tip of hypopygium level 0.79× length of gaster. Ovipositor sheath about 1.09 as long as gaster, Ovipositor index 1.89.

Paratype female (Fig. 4).

Smaller than holotype; length of body 2.4 mm, ovipositor sheath 1.33 mm. It is rather similarly coloured as the holotype, but there are many differences in proportions of body parts. The forewing macula is paler than in the holotype but it is attached to the stigmal vein in the same way.

Morphology. Head in dorsal view 1.88 times as broad as long; temples 0.19 apparent length of eyes. POL 1.42 times OOL. OOL 1.73 times OD. Head in front view 1.19 times as broad as high; eyes separated 1.09 times their height. Mouth



Fig. 4. *Torymus maculosus* sp. n., paratype female from Corfu. Photo by Pekka Malinen.

opening 1.9 times malar space, the latter 0.42 times height of eye. Scape 0.83 times as long as height of eye. Pedicel plus flagellum 1.42 times as long as breadth of head.

Mesosoma 2.04 times as long as mesoscutum broad. Forewing 2.47 as long as broad; costal cell on its upper surface apically without setae. Relative lengths of costal cell, M, PM and ST = 73:50:15:6. Stigmal vein at a very oblique angle to PM, stigma medium sized.

Gaster with sternum 1 1.26× as long as hind coxa. Tip of hypopygium level 0.83× length of gaster. Ovipositor sheath about 1.15 as long as gaster, Ovipositor index 1.90.

Male. Unknown.

Biology. Unknown. The females were swept in the northern part of Corfu, along a path rising to a hill that went through deciduous woodland with rich undergrowth.

4. Discussion

The infumation of the forewing in both new species much resembles that of *Torymus pulcher* Bouček and *T. josefi* Bouček (Bouček 1996; figs 3 and 9). *T. maculatus* and *T. maculosus* are not closely related to these species but apparently they are related to the species of the *Torymus laetus* group and to *Torymus ventralis* (Fonscolombe). If the forewing macula is neglected, both will run in the key to females (Graham and

Gijswijt 1998) to couplet 57 and *T. ventralis*. The mandibles of all females of the new species are closed and therefore it was not possible to study if they have two teeth, as is more probable, or three teeth. If they are added to this key, this could be done about couplets 26–28 which include other species with hind coxa bare in basal half of dorsal surface, and with forewing infumation attached to the stigmal vein, namely *Torymus favardi* Steffan, *T. spilopterus* Boheman and *T. flavovariegatus* Gijswijt. The new species are easily separated from these species by several characters mentioned in the descriptions. The shape of the macula is different from those of earlier described species.

Two species of *Torymus laetus* group: *Torymus fischeri* (Ruschka) and *T. ventralis* have been reared from galls of *Hormomyia fischeri* Frauenfeld or *Proshormomyia fischeri* (Frauenfeld) on *Carex* sp. (Ruschka 1921, Hoffmeyer 1930). This species is now placed in the genus *Planetella* Westwood (Diptera, Cecidomyiidae). *T. laetus* (Walker) has been reared from a species of *Planetella* (?*Planetella arenariae*; as *Torymus hormomyiae* Kieffer, 1899). 27 nominal species of *Planetella* are listed from Europe (Skuhrová 1986) and 14 of these form galls in leaves or stems of known species of *Carex*; in 13 species the host is unknown. The host of *Planetella fischeri* is *Carex pilosa* L., which does not occur in Denmark, Sweden or Finland (Hultén 1971; map. 382 *Carex pilosa* Scop.: isolated finds in Lithuania and Kaliningrad district, Russia). *Planetella arenariae* (Rübsaamen) induces galls on the leaves and stems of *Carex arenaria* L. and it is known in Denmark (Skuhrová *et al.* 2006) and Sweden: Skåne and Öland (Coulianos & Holmåsen 1991). *Planetella gibba* (Zetterstedt) has been described from Sweden, and *Planetella grandis* (Meigen) has been recorded from Denmark (Skuhrová *et al.* 2006) and Finland; the host plants of these species are unknown. Frey (1923) reported *Hormomyia grandis* from “several localities” in Åland and from North Häme: Keuruu, but Hackman (1980) listed *Planetella grandis* with a question mark as belonging to the Finnish fauna.

In May 1995 and 1996 I collected in Finland, EH (= South Häme), Janakkala, Suurisuo many galls of an unidentified species of *Planetella* in

underground stems of *Carex lasiocarpa* Ehrh. The galls were often more than 10 cm long and contained one larva of a cecidomyiid. No species of *Torymus laetus*-group emerged from the rearings. Four species of Chalcidoidea emerged: *Eurytoma truncata* (Boheman) (Eurytomidae), *Trichomalopsis* sp. (Pteromalidae), *Eupelmus vesicularis* (Retzius) (Eupelmidae) and *Aprostocetus* sp. (Eulophidae) and in addition *Isocybus* sp. (Platygastroidea, Platygastridae). These rearings were presented by the author at the monthly meeting of the Finnish Entomological Society in November 2001.

The specimens of *Torymus ventralis* from Finland were collected long ago from the south-western part of the country. The last ones were taken in the 1920's; all females were captured in July or August. Why has the species not been found later? One reason could be collecting activity, as the few collectors of small Hymenoptera have not visited the area in late summer. There is also a slight chance in changes in the insect community. A steep decline has been observed in *Planetella* species in Czech Republic, where a single species, *P. caricis* (Rübsaamen), is still persisting, while 12 other species have gone extinct (Skuhravá 1994). Further studies are needed to understand the real status *Planetella* species in Finland.

Acknowledgements. Most specimens of *Torymus ventralis* were loaned several years ago from MZH (also specimens from coll. W. Hellén) with the help of Pekka Malinen. One female was studied from coll. R. Forsius which was at that time in Åbo Akademi, Turku and Jukka Vauras helped in finding the specimens of *Torymus* and arranged the loan. Now the collection of Runar Forsius is located in Zoological Museum, University of Turku. One well prepared female of *Torymus ventralis* from France was sent to me for comparison as a gift by Richard R. Askew, Beeston, Tarporley, Cheshire, U.K. Martti Koponen, Mikkeli collected the females of the new species of *Torymus* and let me to work on them. He also studied Wolter Hellén's notes on collecting and found data (dates and more exact localities) behind the number codes of Hellén. Richard Askew carefully read the first draft of the manuscript, made many useful comments and improved my English. Pekka Malinen (MZH) took the photographs. Finally an anonymous referee suggested several improvements to the manuscript.

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