

**Revision of Palaearctic *Stiphrosoma*, including the *Anthomyza laeta*-group
(Diptera: Anthomyzidae)**

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Taxonomy, Anthomyzidae, *Stiphrosoma*, redefinition, new species, redescrptions, key, lectotype designations, relationships, biology, distribution

Abstract. The genus *Stiphrosoma* Czerny, 1928 is revised and redefined to include species of the *Anthomyza laeta*-group and its relationships are discussed. Four Palaearctic species are recognized: *Stiphrosoma sabulosum* (Haliday, 1837), *S. fissum* sp. n. (North Korea), *S. cingulatum* (Haliday, 1855) comb. n., and *S. laetum* (Meigen, 1830) comb. n. All available type material was revised and 4 lectotypes are designated; all species are (re)described, illustrated, keyed and their relationships, biology and distribution surveyed. Wing polymorphism of *S. sabulosum* is discussed and sexual dichroism in *S. fissum* sp. n. and *S. cingulatum* is described.

INTRODUCTION

Originally, *Stiphrosoma* Czerny, 1928 included only two species, viz. *S. oldenbergi* Czerny, 1928 and *S. sabulosum* (Haliday, 1837). These differed from other known Anthomyzidae in possessing incomplete venation and/or strongly reduced wings. Enderlein (1936) erected a new genus *Ptenotaenia* for the brachypterous species *S. sabulosum*, leaving *Stiphrosoma* as a monotypic genus. However, *S. oldenbergi* was later found to be a macropterous form of *S. sabulosum* (cf. Stackelberg, 1970) and, consequently, *Stiphrosoma* has recently been treated either as a monotypic genus (e.g., Soós, 1981; Roháček, 1984; Roháček & Freidberg, 1993) or, following Collin (1944), as a synonym of *Anthomyza* Fallén, 1810 (e.g., Stackelberg, 1970; Andersson, 1984; Vockeroth, 1987).

In the present revision, *Stiphrosoma* is considered a separate genus, and redefined to include species of the *Anthomyza laeta*-group which are shown to be closely related to *S. sabulosum*. The revised genus *Stiphrosoma* is widespread in the Holarctic Region. This study is restricted to Palaearctic species which are (re)described, keyed and illustrated, including the revision of the type material, lectotype designations, discussion of their relationships and survey of their biology and distribution.

MATERIAL AND METHODS

The material examined during this study is deposited in the following collections: DEIC – Deutsches Entomologisches Institut, Eberswalde (Germany); DZCP – Department of Zoology, Charles University, Praha (Czech Republic); ECB – Entomological Collection, Universität Bielefeld (Germany); GUE – Dept. of Environmental Biology, University of Guelph (Canada); JZP – Collection of J. Zuska, Praha (Czech Republic); KMVC – Muzeum východních Čech, Hradec Králové (Czech Republic); MBP – Collection of M. Barták, Praha (Czech Republic); MNHN – Muséum National d'Histoire Naturelle, Paris (France); MZLU – Museum of Zoology, University of Lund (Sweden); NMID – National Museum of Ireland, Dublin (Ireland); NMWC – National Museum of Wales, Cardiff (Wales, UK); OMS – Okresní

museum, Soběslav (Czech Republic); OXUM – University Museum, Oxford (England, UK); SMOC – Silesian Museum, Opava (Czech Republic); ZHMB – Zoologisches Museum an der Humboldt Universität, Berlin (Germany).

The presentation of label data is strictly verbatim in type specimens but standardized and/or abbreviated in other material examined. Abdomens of a number of specimens were detached and genitalia dissected. After examination, all dissected parts were put in plastic tubes in glycerine and pinned below the respective specimens; this is indicated by the abbreviation “genit. prep.” in the text. Wings for micrography were mounted on microslides.

Abbreviations of morphological terms used in text and figures:

A ₁	– anal vein	p	– perianthrium
ac	– acrostichal (seta)	pa	– postalar (seta)
afa	– aedeagal part of folding apparatus	pg	– postgonite
ag	– accessory gland	pp	– phallophore
ap	– aedeagal apodeme	ppl	– propleural (seta)
bm	– basal membrane	prg	– pregonite
C	– costa	prs	– presutural (seta)
ce	– cercus	pvt	– postvertical (seta)
Cs ₃ , Cs ₄	– 3rd, 4th costal section	R ₁	– 1st branch of radius
CuA ₁	– cubitus	R ₂₊₃	– 2nd branch of radius
dc	– dorsocentral (seta)	R ₄₊₅	– 3rd branch of radius
dm	– discal medial cell	r-m	– radial-medial cross-vein
dm-cu	– discal medial-cubital (posterior) cross-vein	r-m\dm-cu	– sector of M between r-m and dm-cu
ea	– ejaculatory apodeme	s	– saccus of distiphallus
f	– filum of distiphallus	S ₂ –S ₁₀	– abdominal sterna
f ₁ , f ₃	– fore, hind femur	sa	– supraalar (seta)
fc	– fulcrum of aedeagal apodeme	sc	– scutellar (seta)
gs	– gonostylus	stpl	– sternopleural (seta)
hu	– humeral (seta)	T1–T10	– abdominal terga
hy	– hypandrium	t ₁ , t ₂ , t ₃	– fore, mid, hind tibia
in	– internal sclerite(s)	vi	– vibrissa
ip	– intraperianthial sclerite	vr	– ventral receptacle
M	– media	vte	– outer vertical (seta)
npl	– notopleural (seta)	vti	– inner vertical (seta)
oc	– ocellar (seta)		
ors	– orbital (seta)		

Stiphrosoma Czerny, 1928

Stiphrosoma Czerny, 1928: 6; Frey, 1958: 31 (key); Trojan, 1962: 35; Soós, 1981: 114; Roháček & Freidberg, 1993: 63 (key).

Type species: *Stiphrosoma oldenbergi* Czerny, 1928: 6 (des. by Enderlein, 1936: 167, by elimination).

Ptenotaenia Enderlein, 1936: 167. Type species: *Opomyza (Geomyza) sabulosa* Haliday, 1837: 151 (by monotypy).

DIAGNOSIS. (1) Head about as long as high or slightly higher than long. (2) Eye large, suboval, with longest diameter oblique. (3) Frons wide, frontal triangle distinct. (4) Frontal lunule minute, very reduced. (5) Antenna geniculate between pedicel and 1st flagellomere, the latter laterally compressed. (6) Arista distinctly pectinate. (7) Palpus yellow, with 1 dark terminal seta. Cephalic chaetotaxy: (8) pvt short, convergent or crossed; (9) vte, vti (longest), and oc long; (10) 2 long ors, the anterior always distinctly shorter than posterior;

1–2 microsetulae in front of anterior ors; (11) a row of very short postocular setulae; (12) 1 long vi and 1 shorter but well developed subvibrissa; (13) peristomal setulae small.

(14) Thorax slightly to distinctly narrower than head. Thoracic chaetotaxy: (15) 1 short hu, 2 npl (anterior longer), (16) 1 small prs or reduced to microseta, (17) 1 short sa, 1 longer pa, (18) 2 long postsutural dc (posterior longer than apical sc; anterior considerably shorter), (19) ac microsetae very sparse between dc, (20) 2 sc (apical long, basal short and weak), (21) 1 minute ppl, 2 stpl (posterior always longer). (22) f_1 with or without ctenidial spine; (23) t_2 with distinct ventroapical seta; (24) male f_3 with posteroventral row of shortened and thickened setae. (25) Wing relatively short (usually shorter than body length), sometimes greatly reduced. (26) Wing membrane unicoloured. (27) C with distinct spinulae between apices of R_1 and R_{2+3} . (28) R_{2+3} long, parallel with C, apically straight or slightly upcurved to C. (29) R_{4+5} parallel or slightly divergent from apical part of M. (30) Cell dm short and narrow; cross-vein r-m situated more proximally than in species of *Anthomyza*. (31) CuA_1 not reaching wing margin, A_1 ending far from it. (32) Alula small and very narrow.

Abdomen. (33) T1 separate from T2, (34) T2–T5 large and wide. (35) Preabdominal sterna (S2–S5) much narrower and paler than associated terga. (36) Male postabdomen with reduced, shortly transverse T6, often partly (medially or one side) or completely unpigmented. (37) S6 and S7 strongly asymmetrical and situated laterally (Fig. 38), (38) S8 less asymmetrical and situated dorsally (Figs 28, 38).

Male genitalia. (39) Periandrium relatively wide, always wider than long. (40) Intraepiandrial sclerite (Fig. 3) simple but comparatively large, dorsally broad. (41) Cercus simple, lobate. (42) Gonostylus finely setose at anterior margin of inner side, densely micropubescent on outer. (43) Hypandrium (Fig. 27) without caudal process (= epiphallus of Andersson, 1976), fused with (44) small, inconspicuous pregonites (Fig. 10). (45) Postgonite simple, small, internally curved. (46) Aedeagal apodeme (Fig. 6) with widened apex having downwardly curved corners and its base forked deeply. (47) Aedeagus with small framed phallosophore connected by ventral strip-like sclerites with distiphallus. (48) Distiphallus composed of voluminous membranous saccus and slender sclerotized filum. (49) Saccus armed with spinulae, strong spines, thorns or tubercles. (50) Filum formed by 2 longitudinal band-like, partly fused sclerites and terminated in sharp processes or teeth. (51) Aedeagal part of folding apparatus (= inner lobe of postgonite of Vockeroth, 1987 and Roháček & Freidberg, 1993) attached to distiphallus by a slender twisted sclerite and its wall provided with distinctive sculpturing (dense excrescences of various form, Fig. 7). (52) Also basal membrane (Figs 25, 27) below posterior hypandrial bridge with at least some microsculpture. (53) Ejaculatory apodeme small, inconspicuous.

(54) Female postabdomen relatively wide, short but telescopically retractable from 7th segment. (55) T6 and S6 normal, particularly T6 large. (56) T7 and S7 fused to form distinctive tergosternum characterized by dark, medially divided, dorsal part (cf. Fig. 13) and by (usually paler) ventral part with a remnant of original S7 (Figs 15, 51). (57) T8 plate-shaped, more or less tapered anteriorly and wide posteriorly; (58) S8 short, transverse with a posteromedial cleft or medially membranous. (59) Internal sclerotization of female genital chamber (uterus) formed by 1 (originally) to 3 pairs of posterior sclerites and (60) 1 anterior very narrow and strongly transverse looped sclerite (Figs 67, 69). (61) Anterior part of uterus provided with a small, sclerotized, shortly subcylindrical ventral receptacle

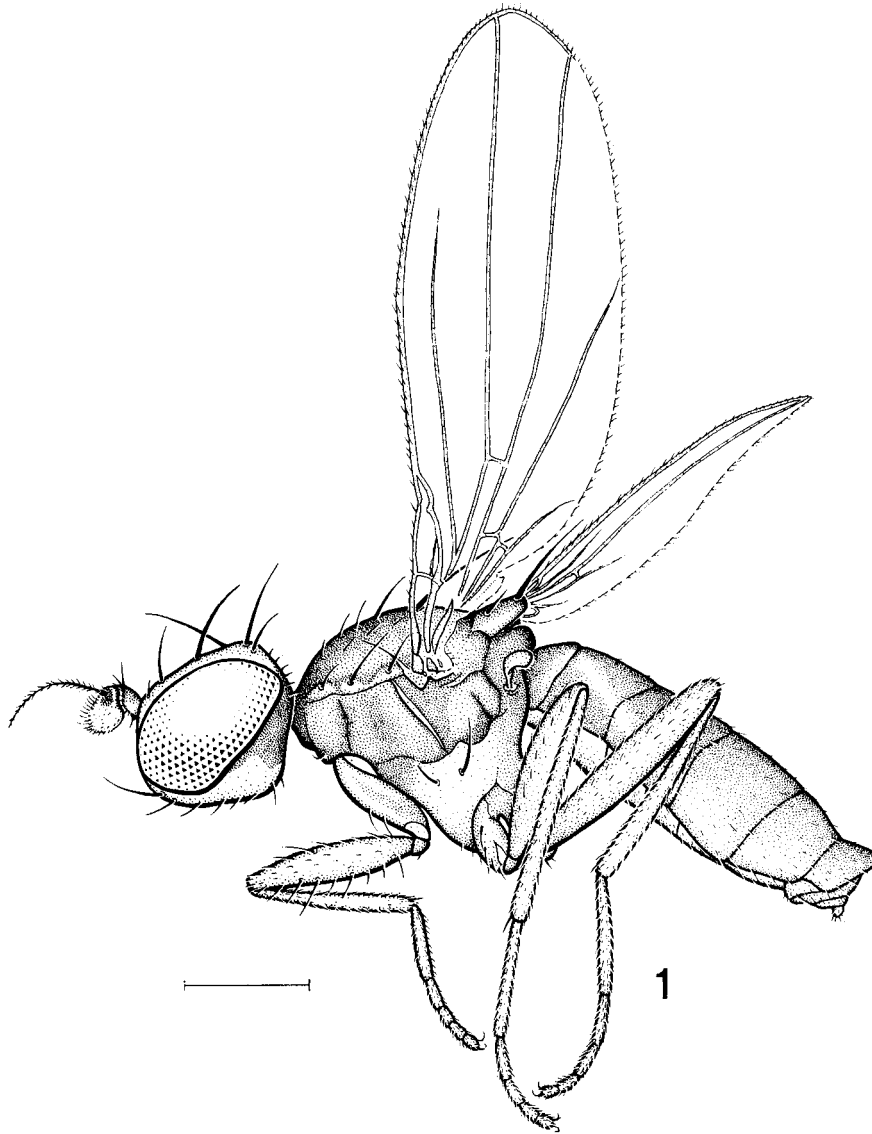
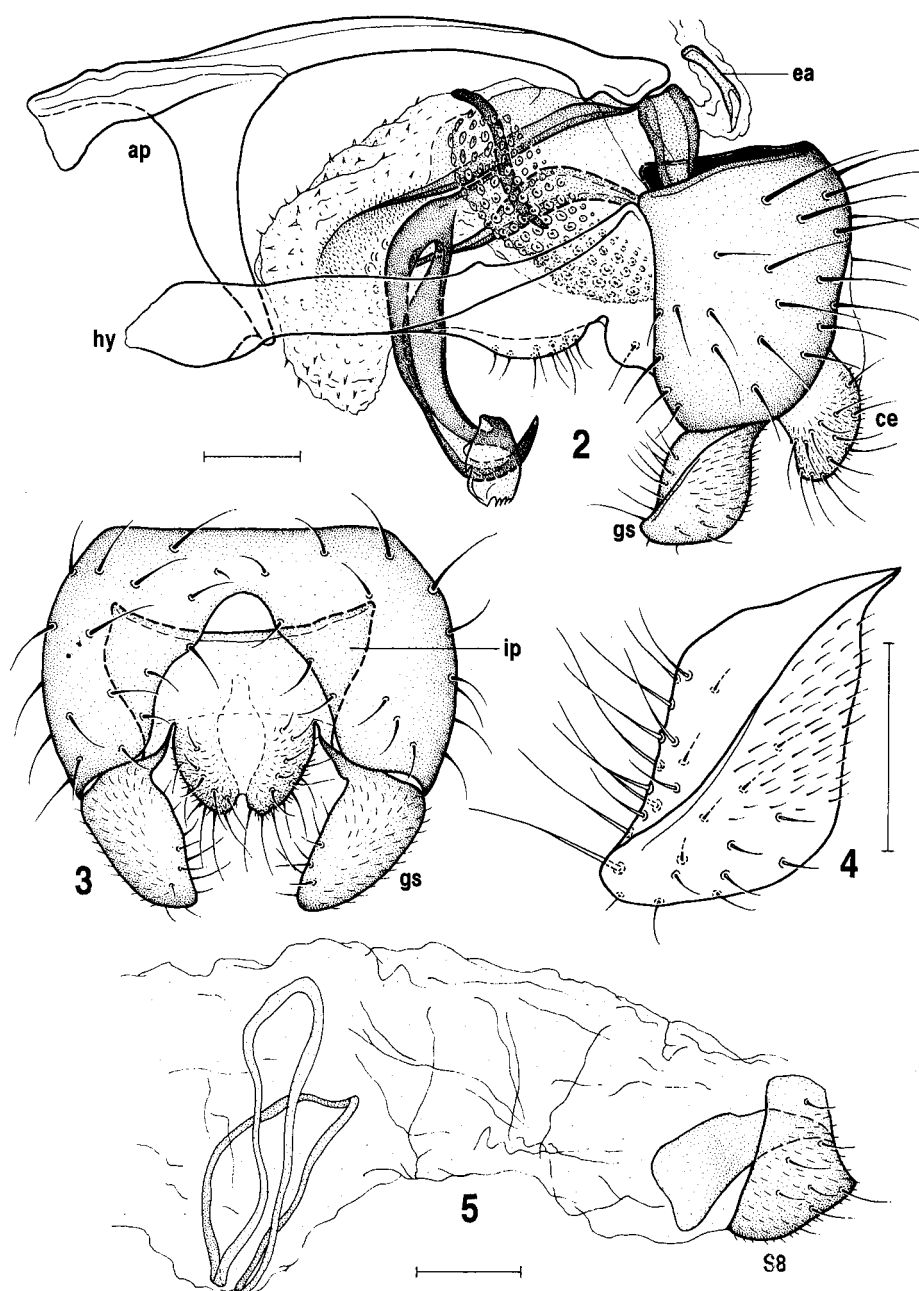


Fig. 1. *Stiphrosoma sabulosum* (Haliday), female from Slovakia having wings of both brachypterous and macropterous forms. Scale = 0.3 mm.

(Fig. 19). (62) Accessory glands of usual form, on slender ringed ducts. (63) Spermathecae (1+1) pyriform, with surface covered by dark spines or transverse ridges carrying minute pale globuli. (64) T10 small, short and strongly transverse, with 1 pair of dorsal setae; (65) S10 also short, considerably wider than T10. (66) Cerci short and with relatively short fine setae.



Figs 2–5. *Stiphrosoma sabulosum* (Haliday), male (2–4), female (5) (Slovakia). 2 – male genitalia laterally (aedeagal apodeme, hypandrium and associated structures not dotted); 3 – external genitalia caudally; 4 – gonostylus laterally; 5 – internal sclerites of female genital chamber and S8 laterally. Scales = 0.05 mm.

DISCUSSION. The following features (see above diagnosis) are considered to be most diagnostic of *Stiphrosoma*: 6, 12, 16, 19, 25, 30, 40, 43, 50, 54, 56–61, 63–65. All these characters distinguish *Stiphrosoma* from *Anthomyza* but only some of them (particularly of the female postabdomen) are autapomorphic of *Stiphrosoma* and prove its monophyly, e.g. (25) wing relatively short (usually shorter than body length), sometimes greatly reduced, (56) tergosternum T7+S7 characterized by medially divided dorsal part and by ventral part with a remnant of original S7, (57) T8 plate-shaped, more or less tapered anteriorly and wide posteriorly; (60) female genital chamber, besides posterior paired sclerites, with a narrow and strongly transverse anterior looped sclerite, (61) anterior part of uterus with a small, shortly subcylindrical ventral receptacle, (63) spermathecae pyriform, covered by dark spines or transverse ridges carrying minute pale globuli, (64) T10 small, short and strongly transverse. Several other features listed above (6, 19, 30, 40, 54, 66) are thought to be synapomorphies demonstrating the sister-group relationships of the genera *Stiphrosoma* and *Cercagnota* Roháček & Freidberg, 1993. The affinity of these genera has been suggested (Roháček & Freidberg, 1993: 84) but, despite of a number of similarities (e.g., in the chaetotaxy of head and thorax, wing venation, male genitalia), they differ considerably and deserve generic status. *Cercagnota* possesses some peculiar characters (e.g., the unique projecting male cercus, slender curved gonostylus, no sa seta, absence of internal sclerites in female genital chamber, etc. – cf. Roháček & Freidberg, 1993).

With the exception of the Nearctic genus *Ischnomyia* Loew, 1863, *Stiphrosoma* (as defined above) is the only known genus of Anthomyzidae comprising both species possessing and species lacking the ctenidial spine on f_1 . The ctenidial spine appears to be a ground-plan character of Anthomyzidae (Roháček, in prep.), but has been lost independently in a number of recent genera of the family, including some species of *Stiphrosoma*.

Four Palearctic species of *Stiphrosoma* have been recognized, viz. *S. sabulosum* (Haliday, 1837), *S. fissum* sp. n., *S. cingulatum* (Haliday, 1855) comb. n. and *S. laetum* (Meigen, 1830) comb. n. which are treated in detail below. Several other (mostly unnamed) species occur in the Nearctic Region, but their revision is beyond the scope of this work.

Key to Palearctic species of *Stiphrosoma*

- 1 f_1 without posteroventral ctenidial spine (Fig. 8); wing strongly abbreviated and narrowed (f. brach. Figs 72–75) or with incomplete venation lacking dm-cu (f. macropt. Figs 70–71); dorsal half of pleuron dark brown (Fig. 1); gonostylus short and broad and male cercus enlarged (Fig. 2); female T7+S7 ventrally with distinctive dark pattern (Fig. 15); female T8 almost triangular, anteriorly tapered (Fig. 13) *S. sabulosum* (Haliday)
- f_1 with distinct ctenidial spine (Fig. 35); wing not strongly reduced and with venation complete (Figs 76–78); pleuron with only narrow longitudinal brown stripe at notopleural suture; gonostylus elongate (Figs 24, 59) or apically tapered (Fig. 41), male cercus small; female T7+S7 ventrally pale pigmented; female T8 not triangular 2
- 2(1) Arista with dense and long pectination; ors much shifted anteriorly and anterior ors very short (Fig. 36); pvt convergent but not crossed; gonostylus slender and long (Fig. 24); saccus of distiphallus (Fig. 21) without spines and apex of filum with a preapical slender projection (Fig. 23); female T7+S7 with transverse remnant of S7 (Fig. 32); spermathecae shortly pyriform (Fig. 33) *S. fissum* sp. n.
- Arista with short pectination; ors in normal position and also anterior ors relatively long (Fig. 37); pvt crossed; gonostylus shorter (Figs 41, 59); saccus with sclerotized spines (Figs 42, 58) and apex

- of filum different; female T7+S7 with elongate remnant of S7 (Fig. 51); spermathecae elongately pyriform (Figs 49, 68) 3
- 3(2) Paler species; occiput yellow to ochraceous also laterally (Fig. 37); abdomen pale, with brown spotted or transversely striped terga (Figs 38, 46); gonostylus shorter, with more acute apex (Fig. 41); saccus with thorn-like spines (Fig. 42); apex of filum with 2 lanceolate processes (Fig. 42); female T6 and T8 pale (Fig. 47); spermathecae covered with dark spines (Fig. 49); internal sclerites smaller and pale (Fig. 50) *S. cingulatum* (Haliday)
- Darker species; occiput dark brown (see Fig. 36), only medially behind ocellar triangle pale; entire preabdominal terga brown to black-brown, in female with seemingly darker posterior margins because of overlapping sclerites; gonostylus longer, with blunt apex (Fig. 59); saccus with smaller spines (Fig. 58) and apex of filum (Fig. 62) with a tuft of setae; female T6 and T8 dark (Fig. 64); spermathecae transversely dark ribbed, with spines only at base (Fig. 68); internal sclerites large, dark and complex (Figs 67, 69) *S. laetum* (Meigen)

Stiphrosoma sabulosum (Haliday, 1837)

(Figs 1–19, 70–75)

Opomyza (*Geomyza*) *sabulosa* Haliday, 1837: 151.

Anthomyza sabulosa: Czerny, 1902: 251; Collin, 1944: 267, 268; Stackelberg, 1970: 326 (key); Andersson, 1984: 52 (catalogue).

Stiphrosoma sabulosum: Czerny 1928: 6; Séguy, 1934: 304 (key); Trojan, 1962: 36; Soós, 1981: 115 (key).

Geomyza brevipennis Zetterstedt, 1852: 4335.

Anthomyza saliens Loew, 1866: 5.

Stiphrosoma oldenbergi Czerny, 1928: 6; Trojan, 1962: 36.

Anthomyza oldenbergi: Andersson, 1984: 52 (catalogue).

Opomyza apterina Ruthe, in litt.: Czerny, 1902: 251 (nom. nudum).

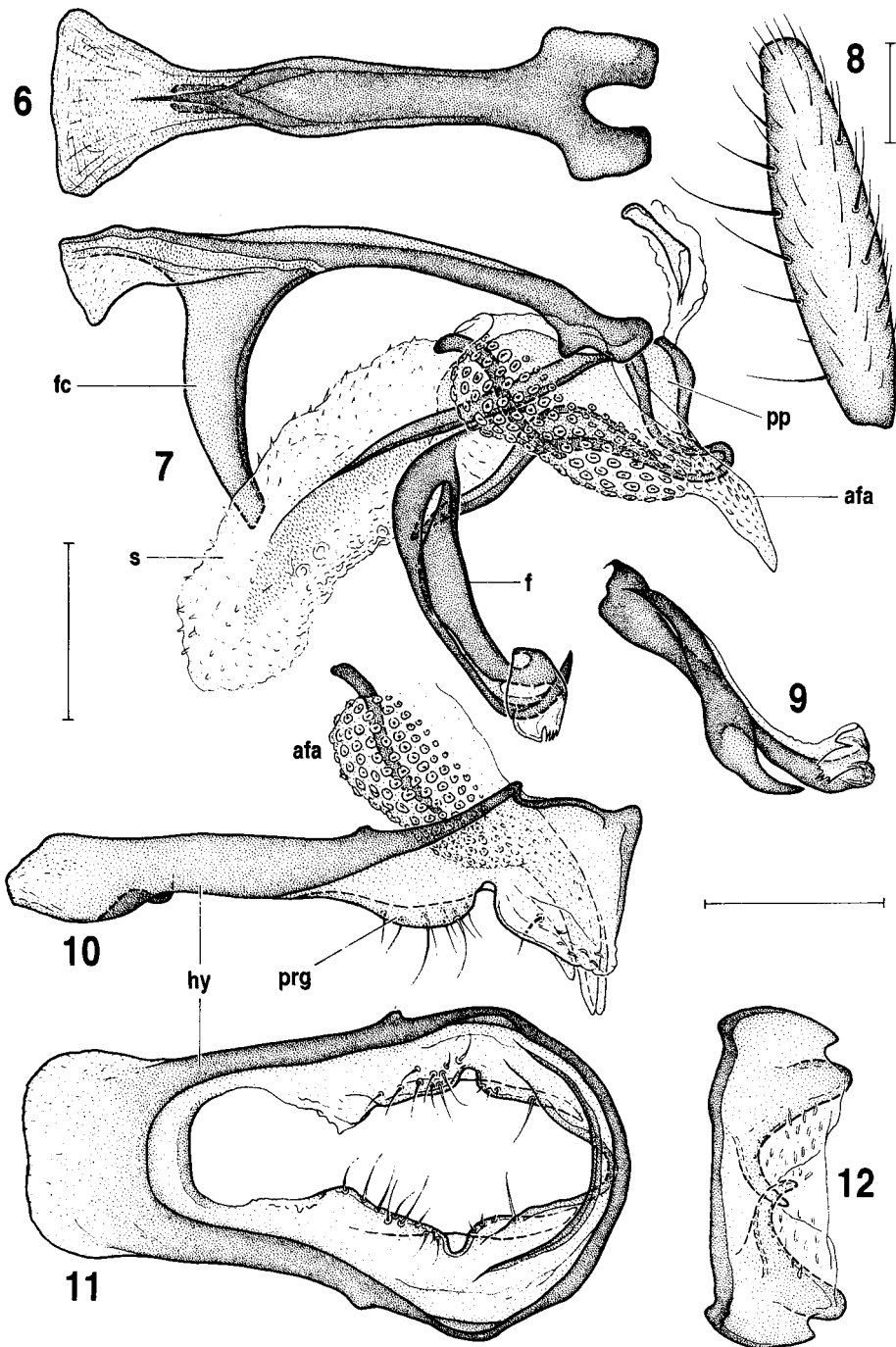
TYPE MATERIAL: *Opomyza* (*Geomyza*) *sabulosa* Haliday: Lectotype ♀ (herewith designated) labelled “Killina” (handwritten), “Haliday 20.2.’82” (registration label), “Type” (red printing), “sabulos” (handwritten), “Fide, Dale. seen, Collin” (handwritten), “Opomyza (G.) sabulosa Halid. ♀, J. Roháček des. 1994, Lectotypus” (red), “Stiphrosoma sabulosum (Hal.) ♀, J. Roháček det. 1994”. Paralectotypes: 1 ♀ without abdomen, “Killina”, “Ireland” (green); 1 ♀ “Dublin”, “Ireland” (green); 1 ♀ “Dublin”; all with “Haliday 20.2.’82” label (all type specimens in NMID, examined). Comments: specimens labelled “Killina” originate from the Bay of Killiney, those labelled “Dublin” probably from Port Marnock (cf. Haliday 1837: 151); both localities being in the Dublin vicinity.

Geomyza brevipennis Zetterstedt: Holotype ♀ labelled “Ekeby in Ln. Börshult den 24 Juli 24”, “Geomyza brevipennis ♀ ... Holmgr.”, “G. brevipennis Zett.”, “Holotypus Geomyza brevipennis Zetterstedt, 1852, des. H. And. 1987” (red), “Anthomyza sabulosa Hal., det. H. Andersson 1987”, “Stiphrosoma sabulosum (Hal.) ♀, J. Roháček det. 1994” (MZLU, examined).

Anthomyza saliens Loew: Lectotype ♀ (herewith designated) labelled “9/5 41”, “Typus” (red), “saliens”, “Anthomyza saliens Loew ♀, J. Roháček des. 1994, Lectotypus” (red), *Stiphrosoma sabulosum* (Hal.) ♀, J. Roháček det. 1994 (ZHMB). Comments: there are several other syntypes (not examined) in Loew’s collection in ZHMB (H. Schumann, letter commun., 1994) but because of their poor mounting on micropins only the above (best preserved) specimen was lent for study. All these specimens originate from “Posen” (= Poznań, Poland) and were collected by H. Loew himself in May 1841 (see Loew 1866: 4).

Stiphrosoma oldenbergi Czerny: Holotype ♀ labelled “Berlin 27.V. 26, Albrechts Tierofen”, “coll. Oldenberg”, “Stiphrosoma Oldenbergi Czerny”, “Holotypus” (red), “Coll. DEI Eberswalde”, “Stiphrosoma sabulosum (Hal.) ♀ f. macropt., J. Roháček det. 1994” (DEIC, examined). Comments: The specimen is in very poor condition, headless, without legs and wings; genit. prep.

OTHER SPECIMENS EXAMINED: Denmark (1 ♀ f. brach.; MZLU): Jyll. Saby (Bo Tjeder leg.). Sweden (1 ♂, 2 ♀ f. brach.; MZLU): Boh. Ljung-Lyckorna (Bo Tjeder leg.); Hall. Trönninge, Laxvik-Grusvik; Sk.



Falsterbo (Ardö leg.). Germany (7♂, 13♀ f. brach., 3♀ f. macropt.; DEIC, ECB, SMOC, ZHMB): Köln-Poll (Wehlitz leg.); Ottendorf bei Kiel; Kiel-Universität (Meyer leg.); Fürstenberg i.M. (Lichtwardt leg.); Berlin-Albr. Tierofen (Oldenberg leg.); Berlin-Müggelhm (Wendt leg.); Klostermusnitz/Thür. (Bährmann leg.). Czech Republic (50♂, 68♀ f. brach., 5♀ f. macropt.; JZP, KMVC, MBP, SMOC): Bohemia. Břilina-Chloumek; Břilina-Štěpánov; Roztoky-Tiché údolí; Praha-Bohnice; Kunice-Vrchy (all Barták leg.) and localities given by Roháček (1983); Moravia & Silesia. Hradec n. Moravicí-Včelí hrad; Chlebičov nr. Opava; Moravskoslezské Beskydy Mts-Horní Bečva env. (Roháček leg.); Hrušovany n. J. (Zuska leg.); Luhačovice (Barták leg.). Slovakia (22♂, 42♀ f. brach., 1♂, 4♀ f. macropt., 1♀ ambiguous; SMOC): localities given by Roháček (1983). Total: 80♂, 126♀ f. brach., 1♂, 12♀ f. macropt., 1♀ ambiguous; 12 with genit. prep.

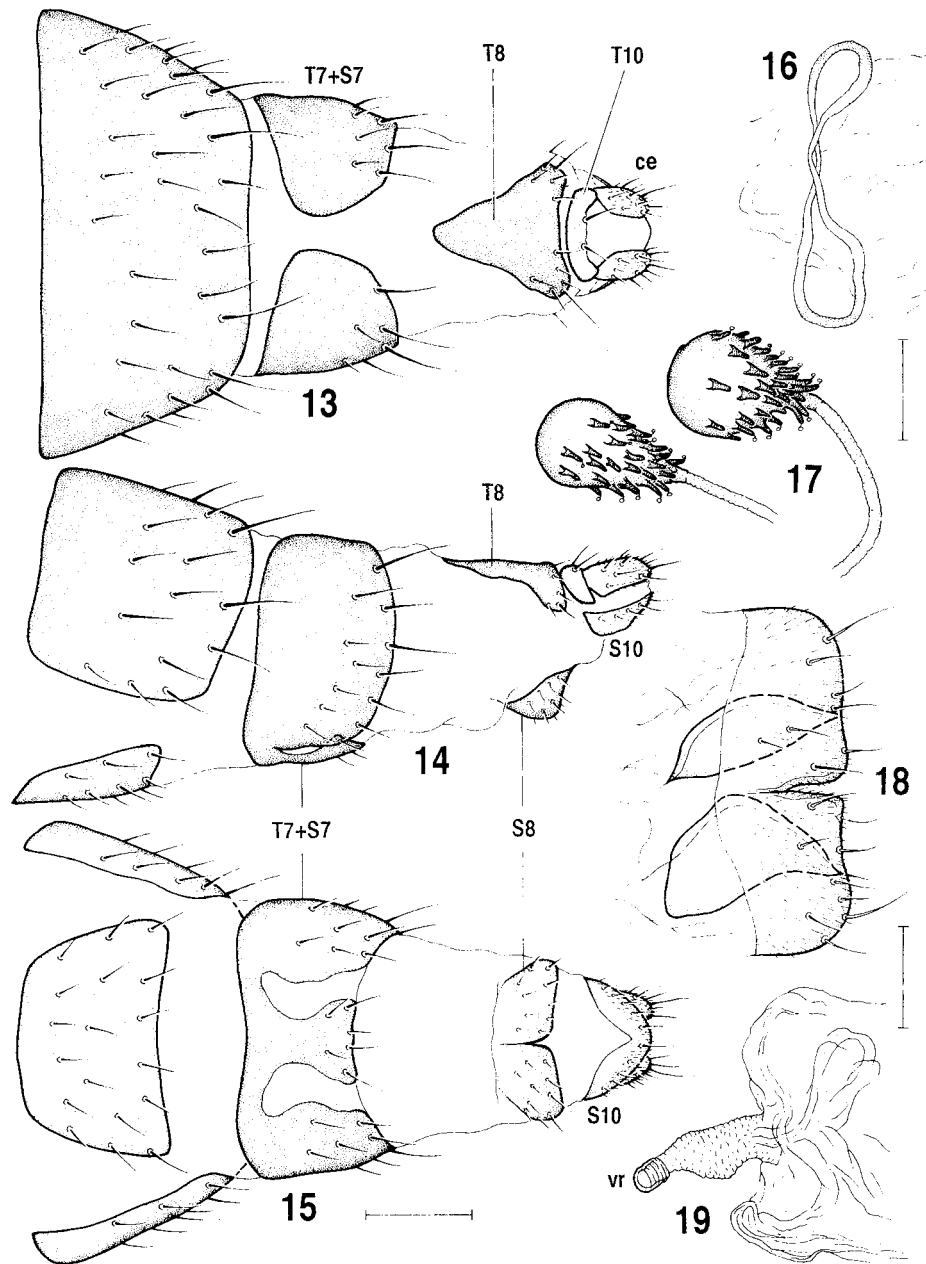
DESCRIPTION. Male. Total body length 1.66 mm (f. macropt.), 1.18–1.55 mm (f. brach.); general colour brown to dark brown. Head only slightly higher than long, bicoloured (Fig. 1). Posterior part (from posterior ors) of orbits, frontal (incl. ocellar) triangle, lateral parts of occiput and dorsal part of postgena brown to dark brown; rest of head yellow. Frontal triangle extending to anterior third of frons, somewhat lustrous despite sparse pale micropubescence. Pale anterior half of orbits whitish, anterior half of frons and stripes between frontal triangle and orbits yellowish micropubescent and dull. Face (prefrons) and gena whitish to pale yellow. Cephalic chaetotaxy: pvt minute, convergent, with tips meeting medially; 2 ors, posterior as long as oc, anterior about two-thirds of posterior ors; 2–4 microsetulae medially, in front of frontal triangle; subvibrissa one to two-thirds of vi length; 3–4 peristomal setulae. Eye with longest diameter about 1.5 times as long as that shortest; gena narrow, its smallest height 0.1 times as long as the shortest eye diameter. Antenna ochraceous yellow; 1st flagellomere with darkened dorsal area surrounding base of arista, otherwise yellow, with medium-long hairs on anterodorsal corner. Arista dark brown, about 1.9 times as long as antenna, with thickened basal segment and with short but distinct pectination (Fig. 1).

Thorax slightly (f. macropt.) to distinctly (f. brach.) narrower than head, brown to dark brown, sparsely greyish micropubescent and with a weak lustre; only pleuron (usually) ventrally (i.e. sternopleuron and hypopleuron) brown-ochraceous to yellow (Fig. 1). Thoracic chaetotaxy: prs reduced to microseta; only 2–3 dc microsetae in front anterior dc; ac sparse (only 2–4), in 2 rows between dc, not extending to posterior third of mesonotum; basal sc very small in contrast to related species; anterior stpl much smaller than posterior; posterior margin and ventral part of sternopleuron with a few additional, sometimes 1 microseta also in front of anterior stpl. Scutellum somewhat trapezoidal, dorsally convex and with rounded posterior corners.

Legs yellow, only terminal tarsal segments or their parts darkened. f_1 (Fig. 8) without ctenidial spine, only with usual posteroventral and posterodorsal rows of thin setae. f_3 with posteroventral row of rather sparse setae, 4–5 in distal half of f_3 shortened and somewhat thickened. Hind basitarsus with only short setulae ventrally.

Wing dimorphic but macropterous specimens are much rarer than those brachypterous in populations. Sometimes specimens with wings of unequal size can be found, even those having one wing reduced and the other macropterous (Fig. 1). Macropterous wing (Figs 70, 71) relatively short and narrow, with pale ochraceous membrane and veins. R_{2+3} apically slightly curved to C (Fig. 70) but more often incomplete, not reaching C (Fig. 71).

Figs 6–12. *Stiphrosoma sabulosum* (Haliday), male (Slovakia). 6 – aedeagal apodeme dorsally; 7 – aedeagal complex laterally; 8 – left f_1 posteriorly; 9 – filum of distiphallus ventrally; 10 – hypandrium and associated structures laterally; 11 – ditto ventrally; 12 – hypandrium caudally. Scales = 0.1 mm.



Figs 13–19. *Stiphrosoma sabulosum* (Haliday), female (Slovakia). 13 – postabdomen dorsally; 14 – ditto laterally; 15 – ditto ventrally; 16 – looped internal sclerite ventrally; 17 – spermathecae; 18 – S8 and internal sclerites ventrally; 19 – ventral receptacle. Scales: Figs 13–15 = 0.1 mm, 16–19 = 0.05 mm.

R_{4+5} not entirely straight, apically distinctly divergent from M. Cross-vein r-m situated proximally, slightly in front of junction of R_1 and C. M complete and reaching wing margin. Discal cell (dm) not closed, cross-vein dm-cu absent. CuA_1 almost straight or slightly sinuous in apical third and, like A_1 , not reaching wing margin. Wing measurements (f. macropt.): length 1.45 mm, width 0.58 mm, $Cs_3 : Cs_4$ not measurable because R_{2+3} incomplete. Wing of brachypterous form greatly shortened and narrowed (Figs 72–75). Only R_1 and R_{4+5} complete; R_{2+3} , M, CuA_1 and A_1 reduced to short remnants or entirely absent; r-m always preserved. Alula strongly reduced, often almost indistinct. Wing measurements (f. brach.): length 0.39–0.83 mm, width 0.10–0.13 mm. Haltere with dark yellow stem and whitish knob, in f. brach. greatly reduced.

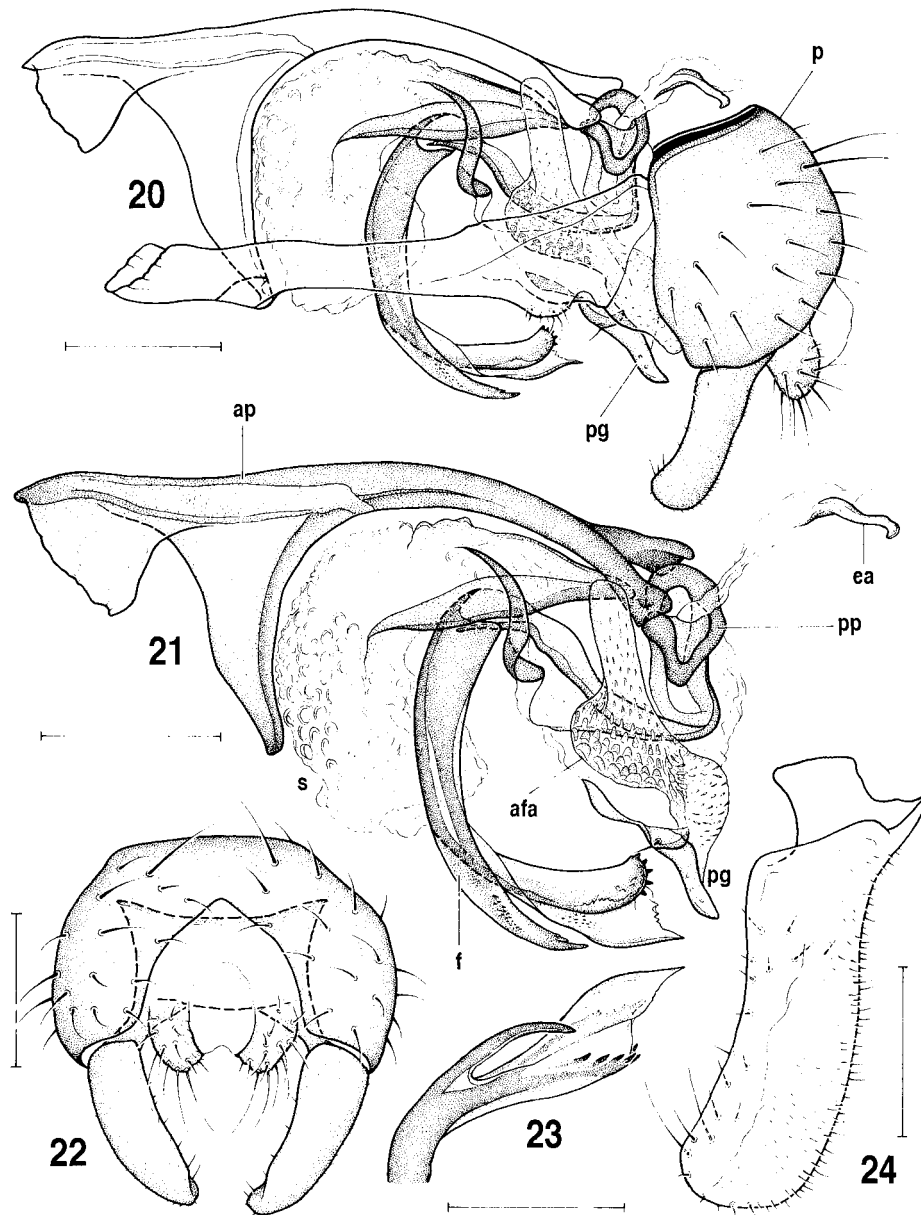
Abdomen. Preabdominal terga dark brown and sparsely greyish micropubescent, with a slight lustre; the associated sterna pale brown to ochraceous. T6 reduced to a short, medially unpigmented stripe, thus appearing like two small sclerites. S2–S5 narrow and becoming slightly wider posteriorly, more densely setulose than terga; S5 the widest but much shorter than S4. Postabdominal sterna dark brown, asymmetrical; S8 about as long as periandrium.

Genitalia. Periandrium (Figs 2, 3) higher and much broader than long, with sparse setae, 2 dorsolateral of which longer than others. Dorsal side of periandrium relatively straight; anal fissure subtriangular. Cercus (Figs 2, 3) large in comparison with the periandrium. Gonostylus (Fig. 4) relatively short, rhomboid in lateral view, with rounded anteroventral corner. Hypandrium (Figs 10–12) frame-like, pale, weakly sclerotized. Pregonite (Fig. 10, 11) small, pale pigmented, with some 10 setulae; postgonite also very weakly sclerotized and poorly differentiated from basal membrane, with 1 usual seta (Fig. 10). Aedeagal complex. Aedeagus (Fig. 7) with relatively small phallosophore; distiphallus composed of a voluminous, sparsely and finely spinulose saccus and a rather robust, heavily sclerotized filum. Distal end of filum split in a pointed dark process and a flattened, strongly bent, pale apex provided with fine teeth (Figs 7, 9). Aedeagal part of folding apparatus with slender strip-like sclerites and laterally sculptured by rounded flat excrescences; its ventral part connected with basal membrane of hypandrium (Fig. 10). Ejaculatory apodeme pale pigmented.

Female. Similar to male unless mentioned otherwise. Total body length 1.70–1.98 mm (f. macropt.), 1.35–1.87 mm (f. brach.). f_3 without shortened and thickened posteroventral setae. Wing of brachypterous form usually somewhat longer and narrower than in male. Wing measurements (f. macropt.): length 1.50–1.79 mm, width 0.56–0.66 mm, $Cs_3 : Cs_4 = 1.64–1.83$. Wing measurements (f. brach.): length 0.50–1.03 mm, width 0.09–0.17 mm.

Abdomen. Preabdominal terga somewhat wider, sterna narrower and paler than in male. S4 and S5 subequal in size.

Postabdomen (Figs 13–15). T6 dark brown, posteriorly narrowed. S6 much smaller than T6, posteriorly wider than anteriorly. Tergosternum T7+S7 divided dorsomedially (Fig. 13) and with characteristic pigmentation ventrally (Fig. 15); its dark ventromedial part (corresponding to original S7) separated by weakly pigmented tongue-shaped areas from those lateral. T8 (Fig. 13) also distinctive, of triangular shape, with angularly tapered anterior corner and with setae in posterior corners. S8 (Fig. 15) short, transverse and convex, with narrow posteromedial cleft and short setulae. Internal sclerotization of female genital chamber composed of only one pair of posterior flat sclerites connected to S8 (Fig. 18)



Figs 20–24. *Stiphrosoma fissum* sp. n., male paratype. 20 – genitalia laterally (aedeagal complex, hypandrium and associated structures not dotted); 21 – aedeagal complex laterally; 22 – external genitalia caudally; 23 – apex of filum ventrally; 24 – gonostylus laterally. Scales: Figs 20–23 = 0.1 mm, 24 = 0.05 mm.

and 1 anterior, transverse, looped sclerite (Figs 5, 16). Anterior part of uterus with small but subcylindrical ventral receptacle (Fig. 19) borne on a relatively wide duct. Spermathecae (Fig. 17) shortly pyriform, covered with dense dark spines. T10 unusually short and transverse (Fig. 13), with a pair of setae. S10 longer than T10, anteriorly emarginate (Fig. 15). Cerci short and short-haired.

Preimaginal stages. Only 3rd instar larva was described and illustrated by Nye (1958), see also Ferrar (1987), Smith (1989).

DISCUSSION. *S. sabulosum* is a distinctive wing polymorphic species with the brachypterous form strongly predominating in populations. The wing of its rare macropterous form resembles that of *Cercagnota collini* (Czerny, 1928) in the position of r-m and in the absence of dm-cu. *S. sabulosum* can be easily distinguished from all other Palaearctic congeners in lacking the ctenidial spine on f₁ and by other features mentioned in the key above. *S. fissum* sp. n. appears to be its closest Palaearctic relative based upon the similar saccus (without large spines) and filum (apex with preapical projection – cf. Figs 9, 23), intraperiandrial sclerite (projecting dorsal corners), female internal sclerites (cf. Figs 18, 29), spermathecae and S10.

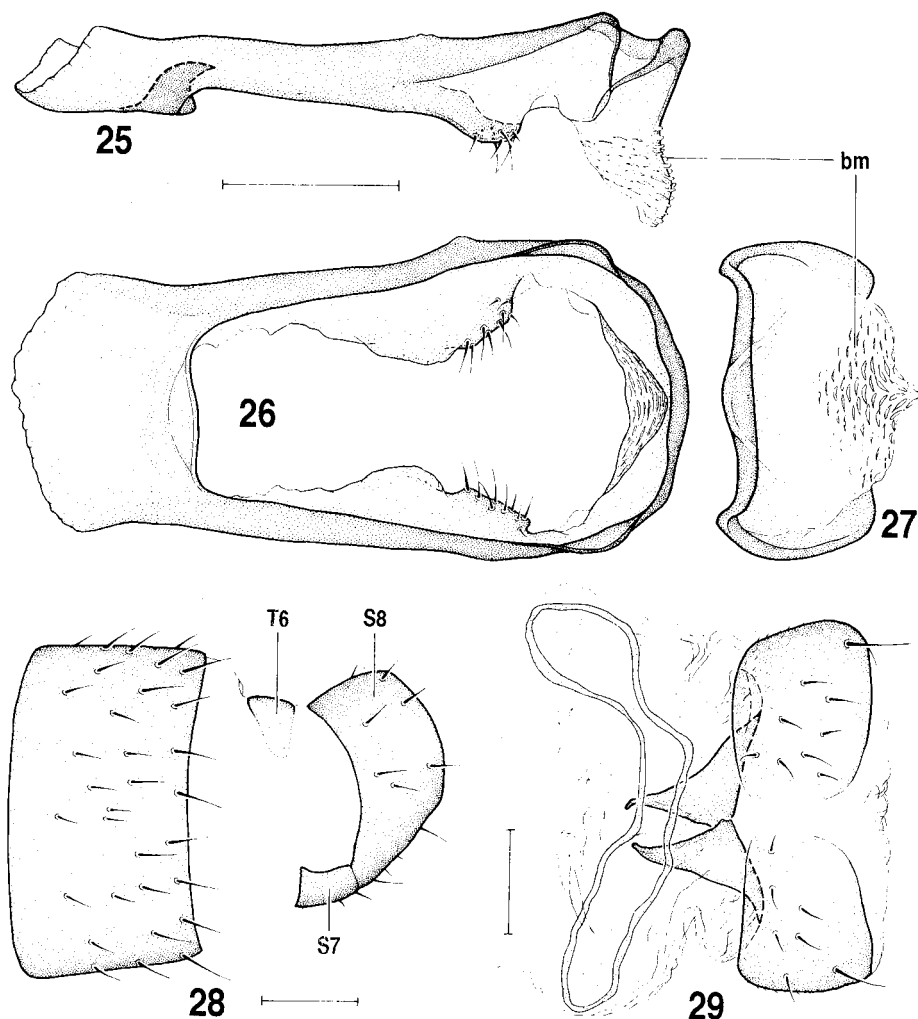
There is a morphological curiosity in *S. sabulosum* – specimens with wings of uneven size and venation (one fully developed and the other narrow and abbreviated, see Fig. 1). This form was first recorded by Collin (1944: 268) from England, later by Stackelberg (1970: 326) from Russia; I found it (1♀) together with numerous f. brach. and a few f. macropt. on a saltmarsh in southern Slovakia (Roháček 1983). As far as I am aware, this peculiar phenomenon is otherwise unknown in wing polymorphic species of acalyptrate Diptera.

BIOLOGY. *S. sabulosum* is associated with grassland habitats, mainly in lowlands. Its larvae develop in leaf-sheaths of grasses (Poaceae) near the ground (breeding records from *Arrhenatherum elatius*, *Lolium perenne* – Nye, 1958; also reared from tufts of *Dactylis glomerata*, *Holcus lanatus* and *Poa nemoralis* – material examined) and are probably (micro)phytosaprophagous; 3rd instar larvae overwinter and pupate in April, but because mature larvae were also found in June, it is probable that the species has 2 or more generations (Nye, 1958). There is a breeding record (Richards, 1932) also from nest of *Microtus agrestis* (Cricetidae), apparently from grass brought into the nest by the rodent. Adults were mostly recorded in May–June but they also occur in July–August (cf. Soós, 1981; Roháček, 1983). They live (often in numbers) in grass tufts near the roots and were also collected using pitfall traps (Bährmann, 1987, material examined). Interestingly, macropterous specimens may sometimes occur in sweep samples although they are otherwise rare in populations.

DISTRIBUTION. Widespread in Europe. Andersson (1984) summarized older records: Ireland, Great Britain, France, Germany, Austria, Denmark, Poland, Sweden, Finland, Estonia, European part of Russia. Additional records: Czech Republic, Slovakia (Kratochvíl, 1936; Roháček, 1983, 1986, 1987a), Hungary (Soós, 1946, 1981, 1983; Papp, 1985). Also known from the Nearctic Region (cf. Vockeroth, 1987), ?introduced from Europe.

Stiphrosoma fissum sp. n.
(Figs 20–36, 76)

TYPE MATERIAL: Holotype ♂ labelled “N. Korea: Myangsan Myomyanssan, 4.viii.89, Kozánek leg.” (SMOC). Allotype ♀ (SMOC) and 1♀ paratype (MBP) with the same data as for holotype. Other



Figs 25–29. *Stiphrosoma fissum* sp. n., male (25–28) and female (29) paratypes. 25 – hypandrium with associated structures (without postgonites); 26 – ditto ventrally; 27 – ditto caudally; 28 – postabdominal sclerites and T5 dorsally; 29 – female S8 and internal sclerites ventrally. Scales: Figs 25–28 = 0.1 mm, 29 = 0.05 mm.

paratypes: 1 ♂, 4 ♀ “N. Korea: Čchong-Ryong-San, 1.viii.89, Kozánek leg.” (1 ♀ SMOC, others MBP); 3 paratypes with genit. prep.

DESCRIPTION. Male. Total body length 1.70–1.79 mm; body bicoloured, yellow and brown. Head (Fig. 36) about as long as high. Posterior part of orbits (from posterior ors), ocellar triangle, lateral parts of occiput and upper half of postgena brown to dark brown and glossy; frontal triangle lustrous and ochraceous, rest of head yellow to white-yellow. Frons anteriorly and stripes between orbits and ocellar triangle yellow-white

micropubescent, dull. Frontal triangle large, almost extending to anterior margin of frons. Face pale brown striped (2 marginal and 2 medial stripes). Gena pale yellow with whitish micropubescence. Cephalic chaetotaxy: pvt small, convergent; posterior ors almost as long as vti and inserted unusually anteriorly (Fig. 36), anterior ors reduced (at most one-third of posterior ors); only 1 additional microsetula in front of anterior ors and 2–4 near anterior corner of frontal triangle; subvibrissa about half length of vi; only 2–3 small peristomal setulae. Eye with longest diameter about 1.4 times as long as that shortest. Smallest height of gena only 0.06 times as long as shortest eye diameter. Antenna bicoloured, with dark brown scape, pedicel (pale brown on inner side) and dorsal area of 1st flagellomere surrounding base of arista; rest of 1st flagellomere white-yellow, with rather long white pilosity on anteroventral corner; arista black-brown, about 1.9 times as long as antenna, with thickened basal segment, unusually densely and long (particularly proximally) pectinate (Fig. 36).

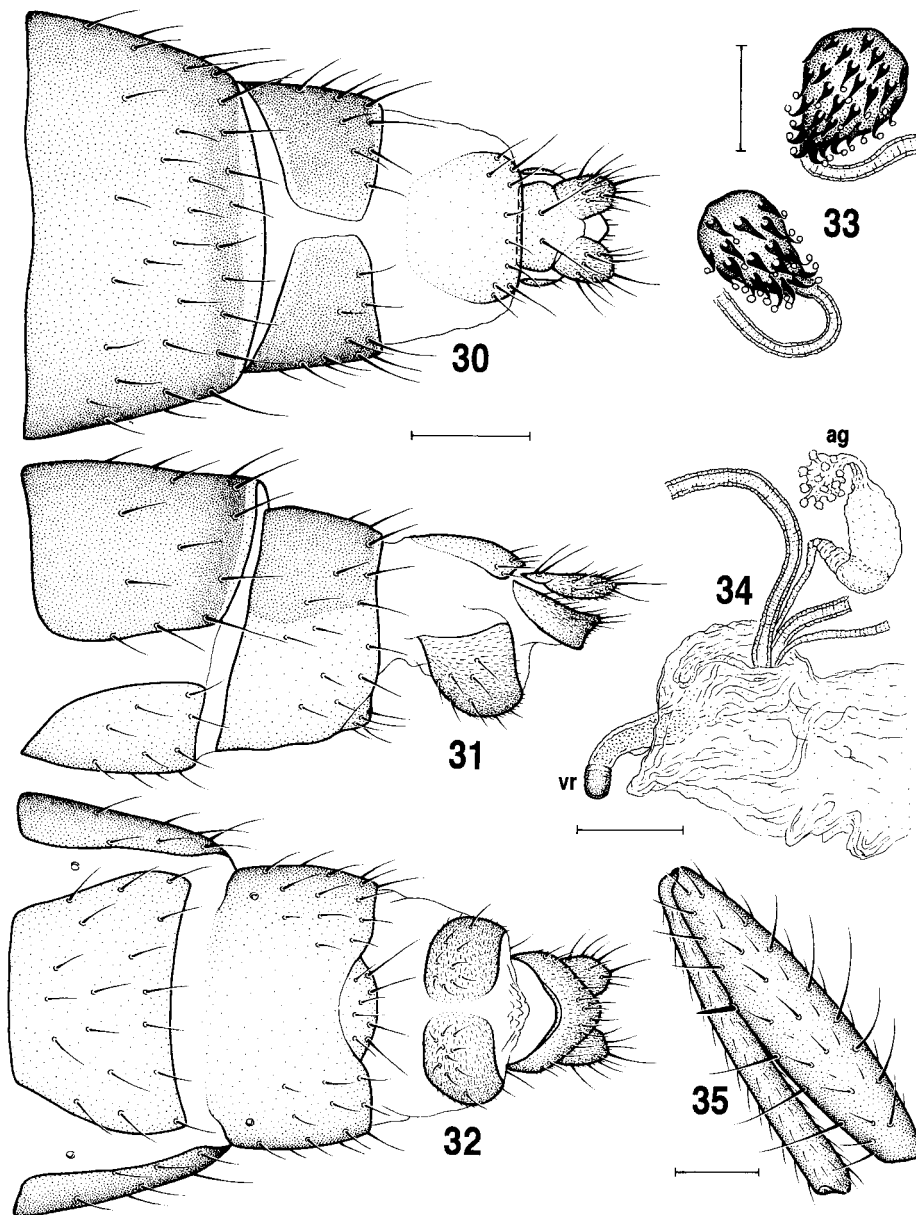
Thorax only slightly narrower than head, bicoloured. Mesonotum (including scutellum) ochraceous, with narrow brown medial stripe often extending from anterior part of mesonotum to scutellum and with broad lateral spots covering most of scutum out of dc setae and basal corners of scutellum. Pleuron dorsally with brown stripe extending from anterior margin of propleuron to haltere; rest of pleuron yellow. Mesonotum sparsely pale micropubescent and lustrous. Thoracic chaetotaxy: 1 small prs; anterior dc about half length of posterior long dc, with several dc microsetae in front; only 2 rows of ac microsetae, posterior third of scutum without ac; basal sc short and weak; anterior stpl only slightly shorter than posterior and with 2 small microsetae near it; ventral part of sternopleuron with fine long setulae. Scutellum subtriangular, dorsally rather convex and with rounded apex.

Legs slender, pale yellowish ochraceous, only distal half of terminal tarsal segments brownish. f_1 (Fig. 35) with 1 relatively short posteroventral ctenidial spine and 2 rows of thin setae; f_3 with posteroventral row of setae, 5–6 in distal half of f_3 being distinctly shortened and thickened. Ventral setulae on hind basitarsus short.

Wing (Fig. 76) with pale ochraceous membrane and yellow-brown veins. R_{2+3} with apex curved to C; R_{4+5} and M subparallel, only apically very slightly divergent. Cross-vein r-m situated rather proximally, a little behind junction of R_1 and C and in proximal two-fifths of dm cell. Apical section of CuA_1 almost twice as long as cross-vein dm-cu, indistinctly bent and almost reaching wing margin. Wing measurements: length 1.67–1.79 mm, width 0.53–0.58 mm, $Cs_3 : Cs_4 = 2.00\text{--}2.14$, $r\text{-m} \backslash dm\text{-cu} : dm\text{-cu} = 3.08\text{--}3.50$. Haltere with darker yellow stem and yellow-white knob.

Abdomen with dark terga and postabdominal sclerites (only S6 and S7 paler) but T6 reduced to small pale sclerite on right side of postabdomen (Fig. 28). Sterna narrow, pale ochraceous, with denser and longer setae than terga. S8 darker than S7 and somewhat shorter than periandrium.

Genitalia. Periandrium (Figs 20, 22) higher and broader than long, with sparse and rather short setae, only 1 (posterodorsal) pair of them longer. Dorsal margin of periandrium more rounded and anal fissure larger than in *S. sabulosum*. Cercus (Fig. 20) medium-sized, relatively long-haired. Intra-epiandrial sclerite with projecting dorsal corners. Gonostylus (Fig. 24) long and slender (longer than those of its Palaearctic congeners), with slightly dilated apex. Hypandrium (Figs 24–27) relatively slender, weakly



Figs 30–35. *Stiphrosoma fissum* sp. n., female paratype. 30 – postabdomen dorsally; 31 – ditto laterally; 32 – ditto ventrally; 33 – spermathecae; 34 – anterior part of female genital chamber laterally; 35 – left f₁ and t₁ posteriorly. Scales: Figs 30–32, 35 = 0.1 mm, 33, 34 = 0.05 mm.

pigmented. Pregonite (Fig. 26) pale, with short setae-bearing part (about 9 setulae); postgonite (Figs 20, 21) apically pointed, basally with 1 seta. Aedeagal complex (Fig. 21). Apex of aedeagal apodeme yet more widened than that of *S. sabulosum*. Distiphallus with saccus covered anterodorsally with rounded disc-shaped tubercles and with slender, dark filum. Distal third of filum (Fig. 23) with deep fissure separating a slender pointed projection and complex main part being provided with a series of short spines and a flattened, acutely pointed tip. Aedeagal part of folding apparatus with twisted slender sclerite; its lateral wall sculpted by small, flat semicircular to spinose excrescences (Fig. 21). Basal membrane (Figs 27) with fine rasp-like surface sculpture. Ejaculatory apodeme slender.

Female. Similar to male unless mentioned otherwise. Total body length 1.58–1.87 mm. Head with whitish face, without dark stripes. f_1 usually with slightly longer ctenidial spine; f_3 uniformly haired. Wing measurements: length 1.74–1.91 mm, width 0.55–0.62 mm, $Cs_3 : Cs_4 = 1.74\text{--}2.11$, $r\text{-m} : dm\text{-cu} : dm\text{-cu} = 2.85\text{--}3.31$.

Abdomen. Preabdominal terga ochraceous dorsally, dark brown laterally and each with narrow brown stripe at posterior margin; T3–T5 with more or less distinct pale brown anteromedial spot in addition. T2–T5 somewhat shorter than in male; S2–S6 yellowish, becoming slightly wider posteriorly.

Postabdomen (Figs 30–32). T6 long, with darker pigmented stripe at posterior margin; S6 relatively large, much paler than T6. Tergosternum T7+S7 dorsomedially shortest and divided; its dorsal half darker pigmented, the ventral pale. Posteromedial part of ventral side of tergosternum (= remnant of original S7) distinctly delimited but unusually short and with several longer setae. T8 very weakly sclerotized and pale; its anterior margin poorly defined; setae only situated at its posterior margin. S8 short, considerably wider than T8, ventromedially non-sclerotized and appearing divided into 2 sclerites (cf. Fig. 29). Internal sclerotization of female genital chamber comparatively simple (Fig. 29) consisting of 2 posterior subtriangular bent sclerites and 1 transverse looped sclerite. Ventral receptacle (Fig. 34) small but distinct, borne on a wide duct; terminal part of accessory gland duct dilated. Spermathecae (Fig. 33) shortly pyriform and densely covered with dark spines with minute globulae on tips, most similar to those of *S. sabulosum*. T10 (Fig. 30) poorly defined as a consequence of weak sclerotization, longer than in all other Palaearctic congeners. S10 anteriorly deeply emarginate (Fig. 32). Cerci short but relatively robust and dorsoventrally flattened, shortly setose.

ETYMOLOGY. The species is named according to its apical fission of filum of distiphallus.

DISCUSSION. *S. fissum* sp. n. appears to be intermediate between *S. sabulosum*, *S. cingulatum* and *S. laetum* and may be easily distinguished from each of them by its long pectinate arista, anteriorly positioned ors and other features given in the key. It resembles *S. sabulosum* in the structure of the male genitalia and spermathecae, *S. laetum* in the colouring of head and thorax and *S. cingulatum* in striped female preabdominal terga. *S. fissum* also is distinctive in its sexual dichroism of the face and preabdominal terga being yet more conspicuous than are found in *S. cingulatum*.

BIOLOGY. Unknown. The type series was collected in August.

DISTRIBUTION. North Korea.

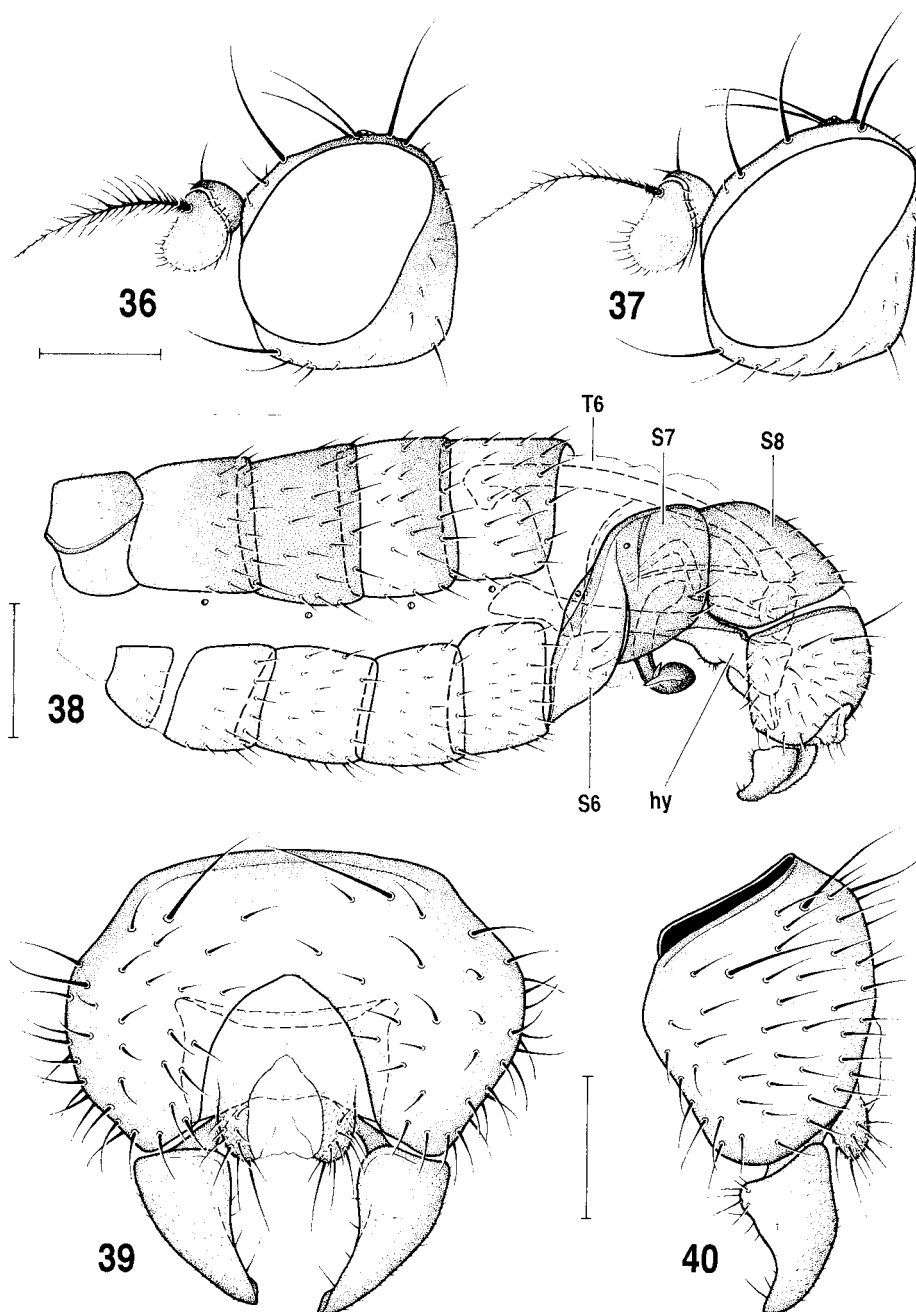


Fig. 36. *Stiphrosoma fissum* sp. n., female paratype, head laterally. Figs 37–40. *S. cingulatum* (Haliday), male (Slovakia, only Fig. 38 based on paralectotype). 37 – head laterally; 38 – abdomen laterally; 39 – external genitalia caudally; 40 – ditto laterally. Scales: Figs 36–38 = 0.2 mm, 39–40 = 0.1 mm.

Stiphrosoma cingulatum (Haliday, 1855) comb. n.
(Figs 37–52, 77)

Geomyza cingulata Haliday, 1855: 64.

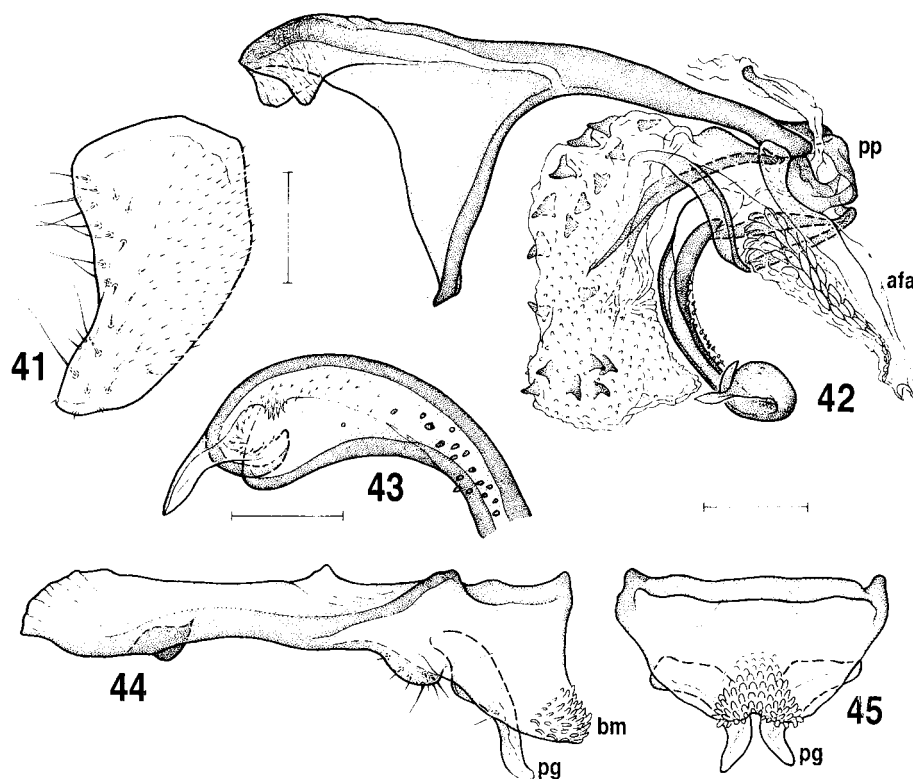
Anthomyza cingulata: Czerny, 1902: 253, 1928: 3 (?part); Collin, 1944: 272 (part.); Andersson, 1984: 51 (?part., catalogue).

TYPE MATERIAL: Lectotype ♂ (herewith designated) labelled “Castlemaine” (green), “Haliday 20.2.'82”, “Named by J.E. Collin”, “*Geomyza cingulata* Haliday ♂, J. Roháček des. 1994, Lectotypus” (red), “*Stiphrosoma cingulatum* (Hal.) ♂, J. Roháček det. 1994”. Paralectotypes: 1 ♀ with the same original labels; 1 ♂ differing only in green label “Castlemaine R.” and in having two additional labels “*Achalcus flavicollis*” (pencil handwriting; apparently a misplaced label) and “*Anthomyza cingulata* Hal., det. P.J. Chandler 1973” (all NMID, examined; paralectotype ♂ with genit. prep.).

OTHER MATERIAL EXAMINED: Great Britain: England. Berkshire: Temple, 1 ♀ 10.vi.1931, nest of rook, bred, E.B. Basden leg. (OXUM). Czech Republic: Bohemia. Karlštejn env., 49.57N/14.11E, 1 ♀ 28.vii.1985, 350 m, deciduous forest, M. Barták leg. (MBP); Silesia. Vidnava (distr. Šumperk), 1 ♀ 6.viii.–10.ix.1984, 1 ♂, 1 ♀ 10.ix.–10.x.1984, 1 ♂, 1 ♀ 10.x.–13.xi.1984, 2 ♂ 21.viii.–24.ix.1985, 1 ♂, 2 ♀ 24.ix.–24.x.1985, soil traps in *Carex* boggy meadow, J. Roháček leg. (SMOC). Slovakia: Búč (distr. Komárno), 1 ♂, 1 ♀ 19.vii.1983, sweeping growth of *Typha* sp.; Kamenín nr. Štúrovo, 1 ♂, 1 ♀ 16.vii.1983, sifting grass in salty meadow, J. Roháček leg. (SMOC). Russia: Moscow-Izmailovo, 55.49N/37.45E, 1 ♂ 1.ix.1988, park vegetation, M. Barták leg. (MBP); Siberia. Chany lake, Biol. Stn., 1 ♂ 1.–5.vii.1991, pan traps in marsh, S.A. Marshall leg. (GUE). Total: 9 ♂, 9 ♀, most of them with genit. prep.

DESCRIPTION. Male. Total body length 1.62–1.98 mm; general colour yellowish ochraceous, with some faint brownish markings. Head (Fig. 37) as long as high or slightly higher than long, yellow to ochraceous. Frons yellow, only ocellar triangle brown. Frontal triangle extending to anterior fourth of frons but rather narrow, darker yellow than rest of frons, weakly lustrous. Orbits dull due to white-yellow and dense micropubescence. Face medially darker (ochraceous to brown), laterally pale and with white-silver micropubescence. Gena white-yellow, with white micropubescent stripe surrounding anterior and ventral eye margin. Postgena yellow; occiput yellow to ochraceous, medially usually paler. Cephalic chaetotaxy: pvt short but crossed; posterior ors as long as oc, anterior three-fifths to two-thirds of posterior ors; 1–2 microsetulae medially in front of frontal triangle; subvibrissa about half length of vi; 6–8 short peristomal setulae. Eye with longest diameter about 1.4–1.5 times as long as that shortest. Genal smallest height about 0.09 times as long as shortest eye diameter. Antenna ochraceous yellow (darker than frons); first flagellomere with small darkened spot at base of arista and with relatively long whitish hairs on anteroventral margin. Arista dark brown, about 1.9 times as long as antenna, with slightly thickened basal segment, shortly but distinctly (particularly dorsally) pectinate (cf. Fig. 37).

Thorax very slightly narrower than head, yellow to yellow-ochraceous, with longitudinal, more or less distinct, ochraceous-brown stripe, running between dc and sa from posthumeral area to scutellum, and with another, usually darker, stripe covering dorsal margin of pleuron from propleuron to haltere. Basal corners of scutellum and postscutellum also somewhat darkened, ochraceous-brown. Thoracic chaetotaxy: 1 prs only slightly longer than ac microsetae; 3–4 dc microsetae in front of anterior dc; usually 4 rows of ac microsetae anteriorly but only 2 between dc macrosetae never extending beyond posterior dc; basal sc about half length of apical sc; anterior stpl much smaller than posterior; 1 additional setula also in front of anterior stpl, 4–5 along posterior margin and 2–3 longer



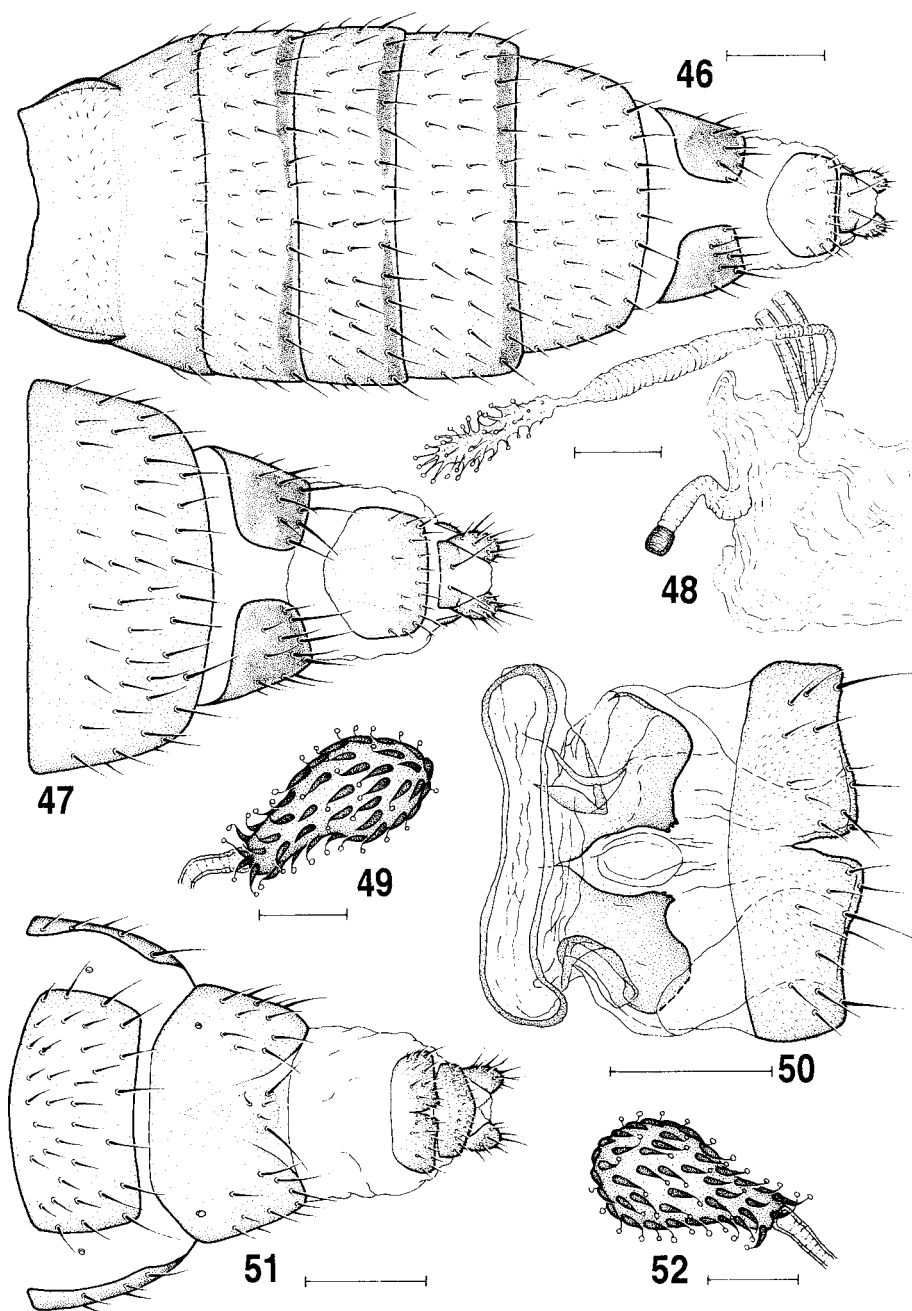
Figs 41–45. *Stiphrosoma cingulatum* (Haliday), male (Slovakia). 41 – gonostylus laterally; 42 – aedeagal complex laterally; 43 – apex of filum ventrally; 44 – hypandrium and associated structures laterally; 45 – ditto caudally. Scales: Fig. 41, 43 = 0.05 mm, 42, 44–45 = 0.1 mm.

setulae on ventral side of sternopleuron. Scutellum rounded triangular, relatively long and dorsally convex.

Legs yellowish, only terminal tarsal segment of all legs at least partly brownish. f_1 with ctenidial spine about 1.5 times as long as tibial width in addition to usual 2 rows of thin setae. t_3 with a shorter but distinct ventroapical seta. f_3 with a long posteroventral row of setae, 6–8 in distal half of f_3 thickened and shortened. Hind basitarsus with 2 enlarged proximoventral setulae.

Wing (Fig. 77) with pale white-yellow membrane and veins. R_{2+3} with almost straight distal fifth. R_{4+5} very slightly bent and parallel to M. Cross-vein r-m situated in proximal third to two-fifths of dm cell. Apical section of CuA_1 about 2.1 times as long as cross-vein dm-cu, slightly bent and like A_1 not extending to wing margin. Wing measurements: length 1.50–1.87 mm, width 0.49–0.62 mm, $Cs_3 : Cs_4 = 1.20–1.47$, $r-m \backslash dm-cu : dm-cu = 3.23–3.84$. Haltere yellow, with darker, ochraceous knob.

Abdomen (Fig. 38). Preabdominal terga yellow-ochraceous with brown markings only laterally (T1), both laterally and at posterior margin (T2, T3 – darkest) or with dark stripe



Figs 46–52. *Stiphrosoma cingulatum* (Haliday), female (Slovakia). 46 – abdomen dorsally; 47 – postabdomen dorsally; 48 – anterior part of female genital chamber laterally; 49 – spermatheca; 50 – S8 and internal sclerites ventrally; 51 – postabdomen ventrally; 52 – spermatheca. Scales: Figs 46, 51 = 0.2 mm, 47–49, 52 = 0.05 mm, 50 = 0.1 mm.

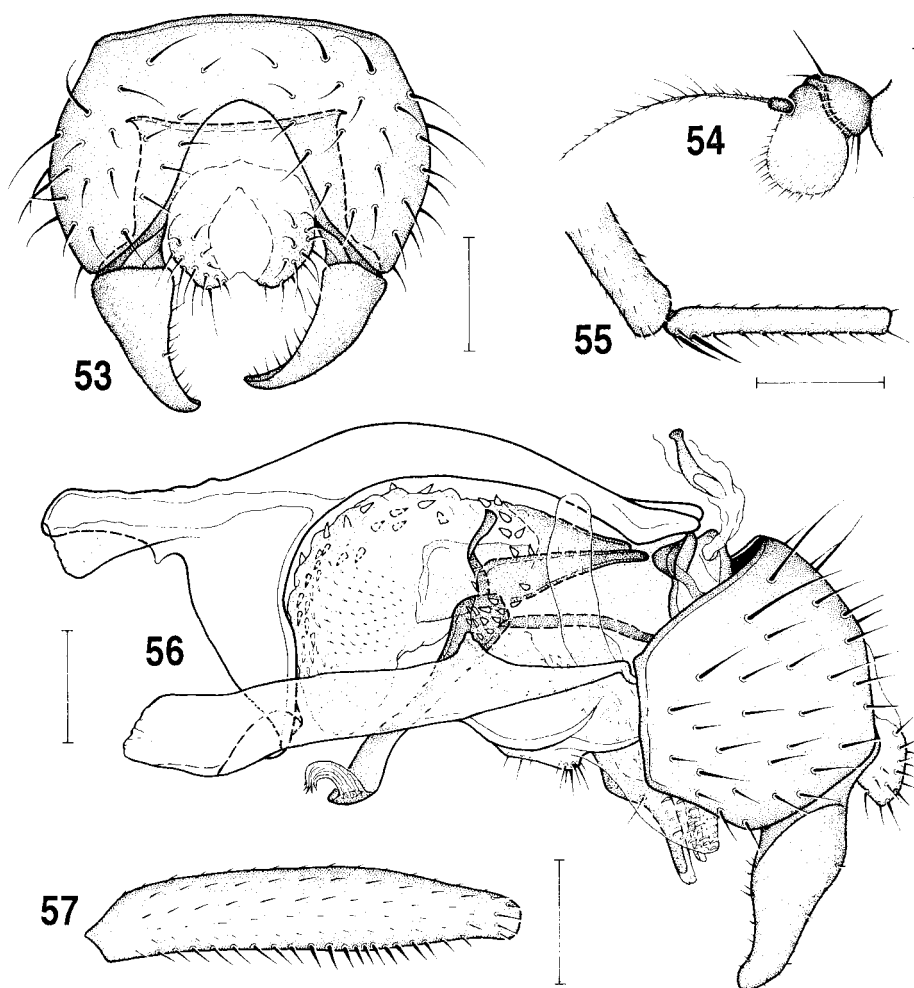
at only posterior margin (T4, T5); the posterior dark stripe(s) sometimes medially interrupted. T3 is largest tergum; T6 reduced to a short, transverse, unpigmented, poorly defined sclerite. S2–S5 yellow, becoming larger posteriorly, with denser setae than associated terga. S6 with dark pigmented anterior margin (Fig. 38); S8 darker brown than S7 and about as long as ochraceous periandrium.

Genitalia. Periandrium (Figs 39, 40) higher and particularly broader than long, with relatively dense short setae, two pairs of them considerably longer. Dorsal margin of periandrium more rounded than in *S. laetum*. Intraperiandrial sclerite simple, similar to that of *S. laetum*. Cercus rather small, with medium-long hairs. Gonostylus (Fig. 41) comparatively short and (proximally) wide, with tapered and somewhat anteriorly bent apex. Hypandrium (Fig. 44) medium-sized, pale pigmented. Pregonite (Fig. 44), darker than adjacent hypandrial frame, relatively short and carrying some 7–8 setulae. Postgonite (Fig. 44) curved (cf. Fig. 45) in caudal view, with flattened and rounded apex. Aedeagal complex (Fig. 42). Distiphallus with large saccus armed with sclerotized thorn-like spines and with slender filum carrying a row of small, spiniform tubercles. Apex of filum (Fig. 43) ending in 2 sharp, lanceolate projections. Aedeagal part of folding apparatus with lateral wall sculptured by elongate lenticular excrescences. Basal membrane (Fig. 45) provided with pale, densely arranged tubercles grouped at its posterior ventromedial part. Ejaculatory apodeme relatively small.

Female. Similar to male unless mentioned otherwise. Total body length 1.98–2.34 mm. Face not darker medially, uniformly white-yellow. Darker stripes on scutum sometimes very faint, poorly visible. f_3 without posteroventral row of short thickened setae. Wing usually wider than in male. Wing measurements: length 2.04–2.38 mm, width 0.63–0.85 mm, $Cs_3 : Cs_4 = 1.13\text{--}1.44$, $r\text{-m} : dm\text{-cu} : dm\text{-cu} = 3.00\text{--}3.47$.

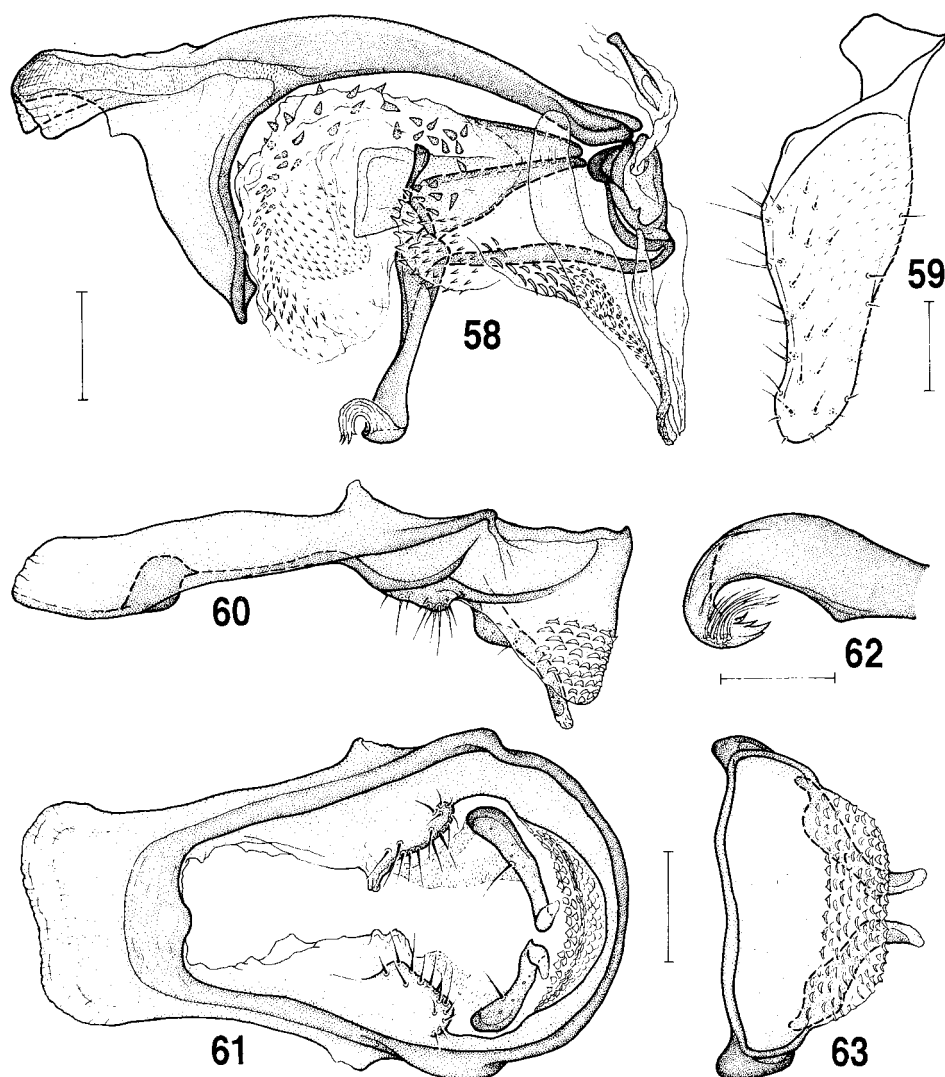
Abdomen (Fig. 45). Preabdominal terga distinctly dark striped at posterior margin, but generally much paler than in male. T1 and T2 not dark laterally and brown stripes at posterior margins of T2–T5 much narrower and usually medially interrupted. All preabdominal terga wider than in male, more so lateroventrally. S2–S5 somewhat narrower than in male, becoming gradually wider posteriorly.

Postabdomen (Figs 47, 51). T6 longer than T5, entirely weakly pigmented; S6 much narrower than T6, relatively densely setose. Tergosternum T7+S7 dorsomedially divided; its dorsal parts shortened and dark pigmented; its ventral part long, pale and bearing a small, subtriangular posteromedial area (probably homologous with original S7) similar to that of *S. laetum* but narrower and less setose (Fig. 51). T8 plate-shaped, setulose at posterior margin and with darker pigmented spot being widened posteriorly. S8 short, transverse, with deep posteromedial cleft and shortly setulose (Fig. 50). Internal sclerotization of female genital chamber (Fig. 50) complex, composed of 2 larger, darker posterior sclerites each having a posteromedial finely dentate process, 2 poorly defined smaller structures anterolaterally to the former and of 1 transverse, looped sclerite. Ventral receptacle (Fig. 48) small and very similar to that of *S. laetum*. Duct of accessory gland relatively narrow, with ringed surface. Spermathecae (Figs 49, 52) elongately pyriform, thus similar to those of *S. laetum* but covered with dark spines as in *S. sabulosum* or *S. fissum* sp. n. T10 (Fig. 47) shortly transverse, with a pair of dorsal setae; S10 short, simple, wider than T10 and distinctly shorter than that of *S. laetum*. Cerci small, short, widely separated from each other, with rather short setae.



Figs 53–57. *Stiphrosoma laetum* (Meigen), male (Czech Republic). 53 – external genitalia caudally; 54 – antenna laterally; 55 – apex of t_3 and left hind basitarsus anteriorly; 56 – genitalia laterally (aedeagal apodeme, hypandrium and associated structures not dotted); 57 – right f_3 posteriorly. Scales: Figs 53, 56 = 0.1 mm, 54–55, 57 = 0.2 mm.

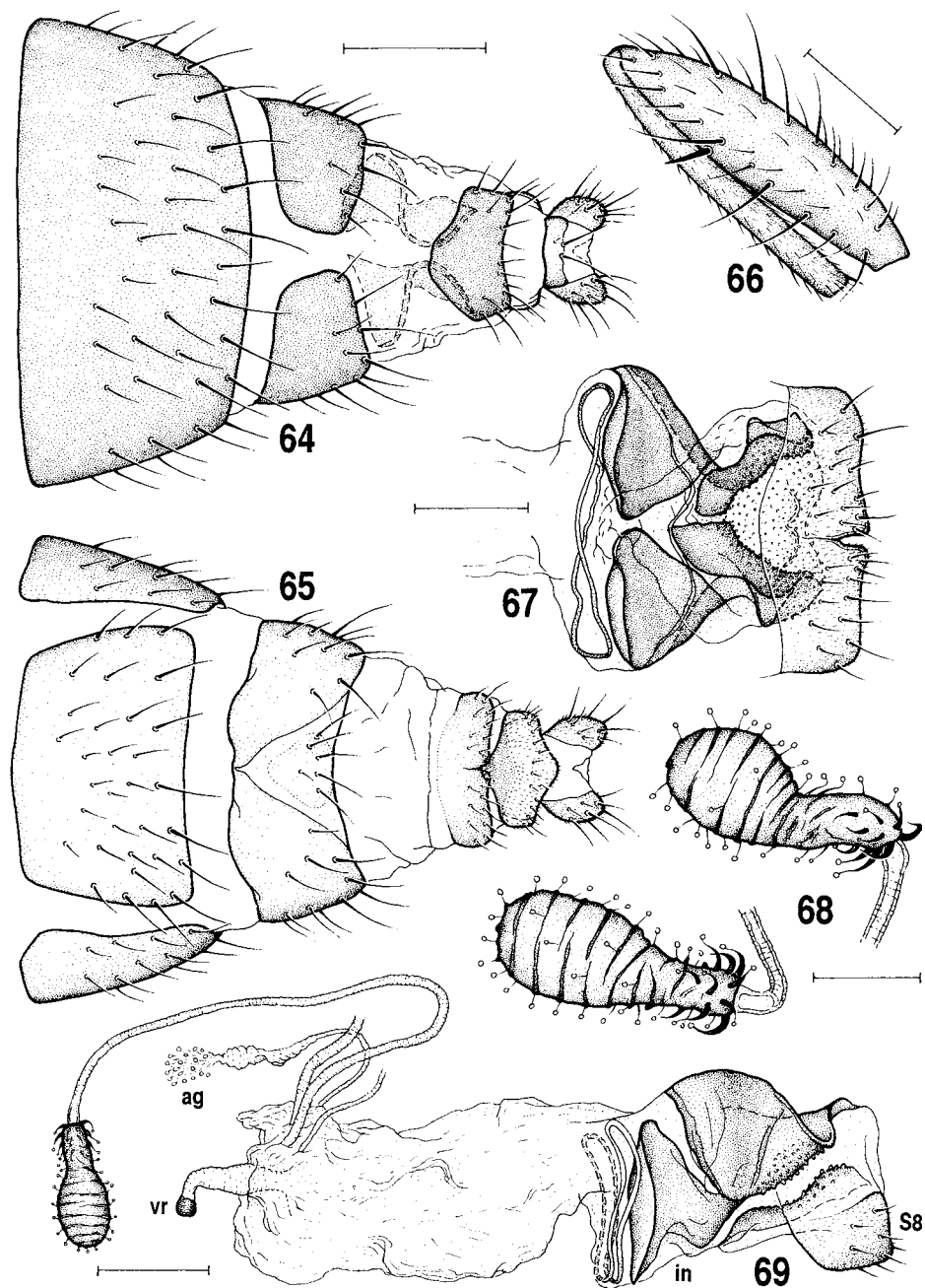
DISCUSSION. *S. cingulatum* has been misinterpreted because Collin (1944) confused this species with *S. laetum*. Indeed, the majority of records published under “*Anthomyza cingulata*” (see below) belong to *S. laetum*, the commoner of the two. *S. cingulatum* is a pale species, with transversely striped dorsum of abdomen, differing from *S. laetum* by numerous features in the male and female postabdomen (see key) but also in having entire occiput yellow, distinct ventroapical seta on t_3 , longer frontal triangle, etc. Its slight sexual dichroism is also distinctive (colouring of face, pattern of preabdominal terga) and resembles that of *S. fissum* sp. n. (see under that species). *S. cingulatum* and *S. laetum* are



Figs 58–63. *Stiphrosoma laetum* (Meigen), male (Czech Republic). 58 – aedeagal complex laterally; 59 – gonostylus laterally; 60 – hypandrium and associated structures laterally; 61 – ditto ventrally; 62 – apex of filum ventrally; 63 – hypandrium caudally. Scales: Figs 58, 60–61, 63 = 0.1 mm, 59, 62 = 0.05 mm.

undoubtedly closely related, with several shared characters (e.g. crossed pvt, enlarged ventroproximal setulae on hind basitarsus – Fig. 55, saccus of distiphallus with spines, similar construction of female tergosternum T7+S7, elongate spermathecae).

BIOLOGY. Poorly known. Haliday (1855) found a series of specimens among reeds in the silt of the Castlemaine River, in June. Collin (1944) noted an interesting breeding record



Figs 64–69. *Stiphrosoma laetum* (Meigen), female (Czech Republic). 64 – postabdomen dorsally; 65 – ditto ventrally; 66 – left f_1 and t_1 posteriorly; 67 – internal sclerites and S8 ventrally; 68 – spermathecae; 69 – female internal genitalia laterally. Scales: Figs 64–66 = 0.2 mm, 67, 69 = 0.1 mm, 68 = 0.05 mm.

of 1 ♀ (examined!) from the nest of a rook. According to my experience and specimens examined, *S. cingulatum* is a rare species associated with lowland marshes (in contrast to *S. laetum*). Adults were mainly obtained from among *Carex* (Cyperaceae), *Typha* (Typhaceae) reeds and grasses (Poaceae) in June–November.

DISTRIBUTION. Ireland (Haliday, 1855), England (Collin, 1944, part.). The only specimen from Sweden (Czerny 1902; Andersson, 1984) has not been revised but, according to description of its head (Czerny, 1902: 254), it obviously belonged to a misidentified *S. laetum*. However, *S. cingulatum* is probably widespread in the Palaearctic Region, new records being from Czech Republic, Slovakia and Russia (Moscow region, Siberia-Ob region).

Stiphrosoma laetum (Meigen, 1830) comb. n.
(Figs 53–69, 78)

Opomyza laeta Meigen, 1830: 111.

Anthophilina laeta: Zetterstedt, 1848: 2703.

Anthomyza laeta: Becker, 1902: 308; Czerny, 1902: 253, 1928: 4; Trojan, 1962: 38 (?part.); Andersson, 1984: 52 (catalogue).

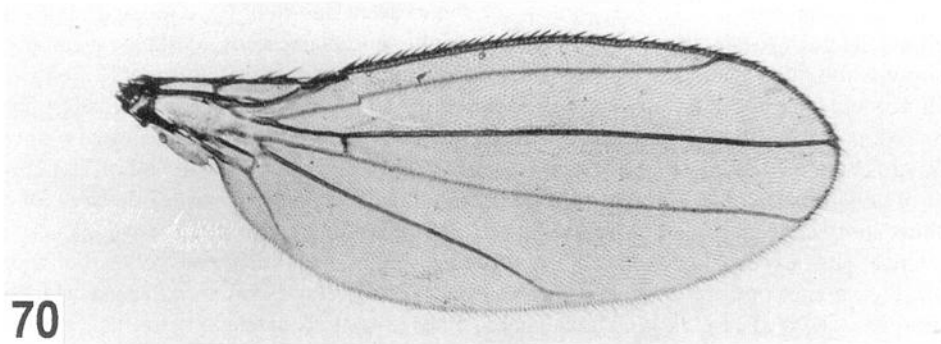
Anthomyza cingulata: Collin, 1944: 268, 272 (part.); Stackelberg, 1970: 329 (key).

TYPE MATERIAL: Lectotype ♀ (designated herewith) labelled “2689/40” (?registration number; reverse of circular label), “Meigen” (obverse of the same label), “Opomyza laeta” (Meigen’s handwriting), “Lectotypus Opomyza laeta Meig. 1830, design. H. Andersson 1985”, “Anthomyza laeta Meig., det. H. Andersson 85” (examined, MNHN, No. 2492). Specimen is in fairly good condition (genit. prep.).

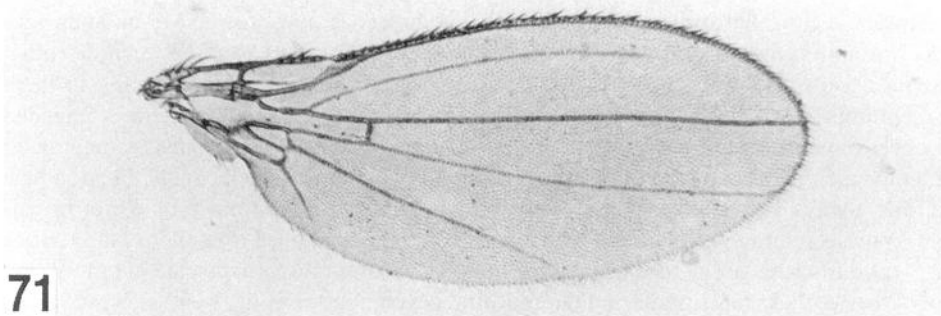
OTHER MATERIAL EXAMINED: Great Britain (5 ♂, 4 ♀; NMWC, OXUM): England. Felixstowe; Frinton-on-Sea, Barton Mills (Collin leg.); Gr. Moulton (Deeming leg.); Scotland. Dumfriesshire (Murray leg.). Sweden (3 ♂, 2 ♀; MZLU): Ög. Aby (Tulgren leg.); Dlr. Folkärna-Tilljället (Waldén leg.); Dlr. Leksand-Sångår (T. Tjeder leg.); Sm. Torsås-Gettnabo (Danielsson leg.). Germany (407 ♂, 494 ♀; DEIC, ECB, NMWC, ZHMB): Groß-Königsfärde bei Kiel; Ottendorf bei Kiel; Kiel-Universität; Waakenitz bei Lübeck (Meyer leg.); Laacherhof; Höfchen (?leg.); Aller (river) nr. Alden (Deeming leg.); Berlin-Finkenkrug (Oldenberg leg.). Poland (1 ♀; ZHMB): Wustung bei Habelschwerdt (= Bystrzyca Kłodzka) (Duda leg.). Czech Republic (84 ♂, 121 ♀; DZCP, JZP, KMVC, MBP, OMS, SMOC): Bohemia. Duchcov; Horní Vltavice-Volary (Barták leg.); Šumava Mts-Horská Kvilda (Barták, Roháček leg.); Šumava Mts-Zhůřské slatě; Šumava Mts-Dolní Antygl; Šumava Mts-Luzenské údolí; Lipno n. Vltavou (Roháček leg.); Těmice (Máca leg.); Praha-Bohnice; Kunice; Velké Popovice; Sázava; Uhlířské Janovice; Krkonoše-důl Bílého Labe; Předhrádí-Hadinec pond; Orlické hory Mts-Jelenka (all Barták leg.); Moravia & Silesia. Vidnava; Karlova Pláň-Karlovec; Karlova Pláň-Volárenský potok; Hradec n. Moravicí-Včelí hrad; Žimrovice; Albertovec nr. Bolatice; Moravskoslezské Beskydy Mts-Tanečnická Mt. (all Roháček leg.); M.S. Beskydy Mts-Ostrý Mt.; M.S. Beskydy Mts-Muřinkový Mt.; Horní Lomná (Barták leg.) and localities given by Roháček (1983). Slovakia (12 ♂, 15 ♀; MBP, SMOC): Košecké Podhradie; Pstruša nr. Zvolen (Barták leg.); Snina-Cirocha river; Zboj (distr. Humenné); Nová Sedlica-Novosedlické bahno res.; Nová Sedlica-Stužica res. (Roháček leg.) and localities given by Roháček (1983). North Korea (3 ♂, 3 ♀; MBP, SMOC): S slope of Paekdu Mt.; Paekdusan-Onsupjong; Paekdusan-Samjion (Kozánek leg.). Total: 514 ♂, 639 ♀ (about 80 with genit. prep.).

DESCRIPTION. Male. Total body length 1.55–2.20 mm; body bicoloured, yellow to ochraceous and brown. Head very slightly higher than long, yellow and brown. Frons yellow except for ocellar triangle (brown) and (usually) frontal triangle (yellow-brown); also orbits sometimes darker than the rest of the frons. Frontal triangle relatively short, reaching at most anterior third of frons, somewhat lustrous; also orbits and ocellar triangle

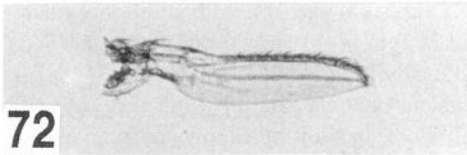
Figs 70–75. *Stiphrosoma sabulosum* (Haliday), wings. 70 – f. macropt., female; 71 – f. macropt., male (both Slovakia); 72 – f. brach., male (Germany); 73 – f. brach., female (Slovakia); 74, 75 – same as in Figs 72, 73, higher magnification. Scales: Figs 70–73 = 0.5 mm, 74–75 = 0.1 mm.



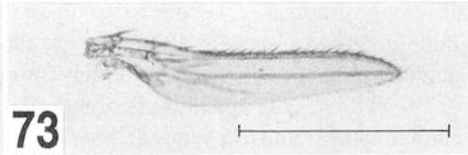
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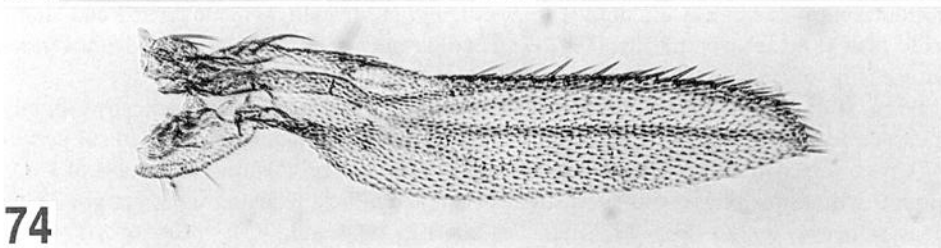
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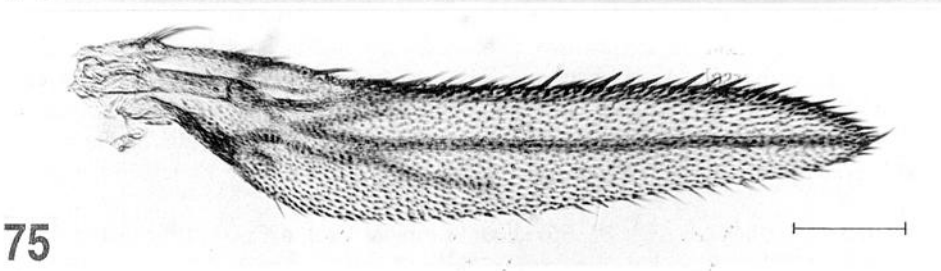
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partly lustrous; rest of frons pale yellow micropubescent and dull. Face medially golden yellow; laterally (similarly as gena) silvery white micropubescent. Postgena ventrally yellow-white, dorsally dark brown. Occiput medially behind ocellar triangle yellow-ochraceous, laterally dark brown (as in *S. sabulosum*). Cephalic chaetotaxy: pvt short but crossed; posterior ors as long as oc, anterior about two-thirds of the posterior; usually only 1 microsetula medially in front of frontal triangle; subvibrissa shorter than half of vi; number of peristomal setulae variable (4–8). Eye with longest diameter about 1.7 times as long as that shortest. Genal smallest height only 0.08 times as long as the shortest eye diameter. Antenna with scape and pedicel ochraceous orange; first flagellomere pale yellow but with dark brown spot dorsally at base of arista and its anteroventral corner with long whitish hairs (Fig. 54). Arista dark brown, about 1.7 times as long as antenna, with thicker basal segment and shortly, sparsely but distinctly pectinate (Fig. 54).

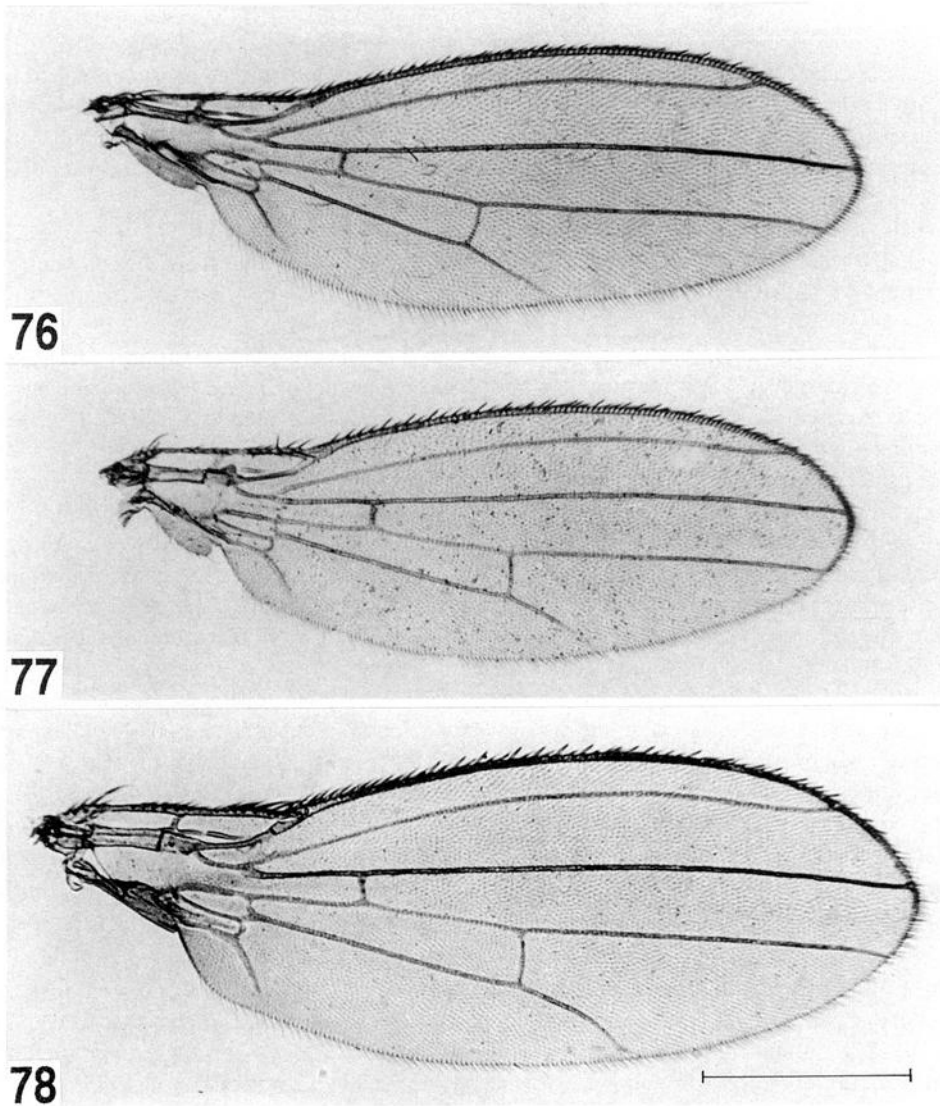
Thorax a little narrower than head, yellow-ochraceous and brown. Mesonotum with very variable brown pattern, usually with wide, pale ochraceous band between dc (often having a very narrow brownish stripe medially) and brown both sides laterally to them (except humeral callus and notopleural area) but sometimes the brown pattern is extended to cover most of scutum and scutellum (only humeral and notopleural areas remain pale) or, conversely, very reduced to form several small, pale brown, lateral spots. Pleuron pale yellow, always with distinct longitudinal brown band dorsally (from propleuron to haltere); postscutellum also brown. Thoracic chaetotaxy: prs reduced to a microseta; a series of 5–6 dc microsetae in front of anterior long dc; 4 rows of ac microsetae anteriorly but only 2 between dc macrosetae and not reaching beyond posterior dc; basal sc weak, about half length of apical sc; anterior stpl relatively long; sternopleuron with additional microsetulae in front of anterior stpl (1), at posterior margin (4–6) and ventrally (longer, 2–3). Scutellum rounded triangular, relatively long, dorsally little convex.

Legs yellow, only apical parts of terminal tarsal segments pale brown. f_1 (Fig. 66) with ctenidial spine about 1.5 times as long as tibial width, in addition to rows of long setae. t_3 without ventroapical seta in contrast to *S. cingulatum*. f_3 with 7–12 thickened and shortened setae in posteroventral row (Fig. 57). Hind basitarsus with 2 enlarged proximoventral setulae (Fig. 55).

Wing (Fig. 78) with pale ochraceous membrane and veins. R_{2+3} apically slightly upcurved to C. R_{4+5} almost straight, parallel or very slightly divergent from apical part of M. Cross-vein r-m situated in proximal two-fifths of dm cell. Terminal section of CuA_1 about 2.2 times as long as dm-cu, distinctly bent and almost reaching wing margin. Wing measurements: length 1.35–1.87 mm, width 0.45–0.64 mm, $Cs_3 : Cs_4 = 1.37–1.84$, $r-m \backslash dm-cu : dm-cu = 2.80–3.50$. Haltere pale yellow, with whitish knob.

Abdomen. Preabdominal terga brown to black-brown, lustrous despite some greyish micropubescent, sparsely shortly setulose. T5 is the largest tergum. T6 short, transverse, medially divided to form 2 small, hairless sclerites. S2–S5 yellow, densely setulose and becoming wider posteriorly. S6 and S7 brown, with darker anterior margin; S8 darker than S7 or periandrium. Postabdominal part of abdomen usually more or less downwardly curved.

Genitalia. Periandrium (Figs 53, 56) about as long as high, narrower than that of *S. cingulatum*, with rather dense but short setae, 2 pairs of them longer. Dorsal margin (Fig. 53) of periandrium relatively straight. Intraperiandrial sclerite and cercus similar as in *S.*



Figs 76–78. *Stiphrosoma* species, wings. 76 – *S. fissum* sp. n., female paratype; 77 – *S. cingulatum* (Haliday), male (Slovakia); 78 – *S. laetum* (Meigen), male (Germany). Scale = 0.5 mm.

cingulatum. Gonostylus (Fig. 59) considerably longer and narrower than in *S. cingulatum*, with tapered but rounded and internally bent apex. Hypandrium medium-sized, darker and more sclerotized than that of *S. cingulatum*. Pregonite (Fig. 60, 61) forming a low lobe with some 12–15 setae. Postgonite distinct, bent internally (Fig. 63), with blunt pale apex.

Aedeagal complex (Fig. 58). Aedeagal apodeme as in *S. cingulatum* but with more or less distinct tooth in dorsal part of fulcrum. Distiphallus with voluminous saccus provided with numerous dark spines and fine spinulae. Its slender filum with curved apex terminated in sharp teeth and a cluster of curved setae (Fig. 62). Aedeagal part of folding apparatus with rather short twisted sclerite and its wall provided with spinulae (distally) and small bent excrescences (proximally). Basal membrane (Fig. 60, 63) with sickle-shaped to thorn-like microsculptures. Ejaculatory apodeme similar to that of *S. cingulatum*.

Female. Similar to male but differs as follows. Total body length 1.62–2.74 mm. Face medially paler yellow than in male. f_3 with uniform short setosity. Wing measurements: length 1.43–2.38 mm, width 0.45–0.79 mm, $Cs_3 : Cs_4 = 1.30\text{--}1.73$, $r\text{-m} : m\text{-cu} : dm\text{-cu} = 2.59\text{--}3.73$.

Abdomen. Preabdominal terga brown but paler than in male. Dark transverse stripes at posterior margin of terga (particularly noticeable in specimens preserved in alcohol) are due to overlapping sclerites. Terga wider, sterna narrower than in male. S2–S6 yellow, becoming gradually wider posteriorly.

Postabdomen (Figs 64, 65). T6 longer than T5, dark pigmented; S6 relatively large, wider than S5, pale yellow. Tergosternum T7+S7 shorter than that of *S. cingulatum*, particularly ventrally; its dorsal part dark but medially divided, its ventral part pale, with delimited medial subtriangular area (original S7) bearing some 6 setae at posterior margin. T8 forming a dark brown, anteriorly somewhat tapered plate, with setulae at posterior and side margins. S8 shortly transverse, wider than T8, with a narrow posteromedial cleft and short setulae. Internal sclerites of female genital chamber (Figs 67, 69) very complex, in 3, partly fused pairs; 2 more posterior sclerites carrying minute tubercles; anterior looped transverse sclerite very slender and strongly bent. Ventral receptacle (Fig. 69) small, short and subcylindrical. Spermathecae (Fig. 68) elongately pyriform, yet longer than those of *S. cingulatum* and, in contrast to that species, with transverse surface ridges on dilated part, curved spines being only on a tapered part near duct insertion. T10 (Fig. 64) very short, transverse, with a dorsal pair of setae and 0–2 additional microsetulae. S10 (Fig. 65) much wider than T10, anteromedially somewhat projecting and darker pigmented. Cerci short, small, inserted relatively far from each other, shortly setulose.

DISCUSSION. This common species has been identified as “*Anthomyza cingulata*” following Collin’s (1944) interpretation. However, it seems probable that not only Collin (l.c.) but also Czerny (1902, 1928) confused under the latter name both *S. laetum* and *S. cingulatum*. The darker, more frequent species proved to be *S. laetum* after the examination of the only preserved type specimen. It was also examined by H. Andersson in 1985, but his lectotype designation was not published and is therefore validated herewith.

S. laetum is closely allied to *S. cingulatum* (see under the latter species) but may be easily recognized from it using the above key. The thoracic colouring varies considerably in *S. laetum* and, hence, this feature is of little diagnostic value. The eastern Palaearctic specimens (N. Korea) are distinctly darker and differ from those European in having the mesonotum and frontal triangle completely brown and wings longer.

BIOLOGY. *S. laetum* differs from *S. cingulatum* also in habitat preference. In contrast to the latter, *S. laetum* is mainly associated with wet grassland habitats in higher altitudes, such as peat bogs, upland marshes, damp woodland meadows etc. Its association with mires was recognized by Roháček & Máca (1982, sub “*A. cingulata*”) who classified it as

a tyrophilous species. Adults occur (often in numbers) among tufts of grasses (Poaceae), *Carex*, *Scirpus* (Cyperaceae), *Juncus* (Juncaceae) etc. in April (only 2 specimens seen) to November, but most abundantly in July–September. In Germany, *S. laetum* was reared from tufts of *Deschampsia caespitosa*, *Agrostis* sp., *Dactylis glomerata*, *Holcus lanatus* and *Poa nemoralis* (Poaceae) (Meyer leg., examined).

DISTRIBUTION. Probably widespread in the Palaearctic Region but, hitherto, only recorded from northern and central Europe, viz. Great Britain (Collin, 1944; Cogan, 1976), Germany (Bährmann, 1987), Czech Republic (Doskočil, 1962; Roháček & Máca, 1982; Roháček, 1983, 1987a), Slovakia (Roháček, 1983, 1986, 1987a,b), Poland (Czerny, 1902), Sweden (Czerny, 1902), Finland (Hackman, 1980), northeastern areas of European Russia (Stackelberg, 1970), mostly under the name "*Anthomyza cingulata*". There are new records from North Korea (see material examined).

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