ACTA ENTOMOLOGICA
MUSEI NATIONALIS PRAGAE
ISSN 1804-6487 (online) – 0374-1036 (print)

2021
61(1): 261–288
doi: 10.37520/aemnp.2021.016
www.aemnp.eu

RESEARCH PAPER

New species and records of Anthomyzidae (Diptera) from the East Palaearctic, with a checklist of taxa occurring in the area

Jindřich ROHÁČEK

Department of Entomology, Silesian Museum, Nádražní okruh 31, CZ-746 01 Opava, Czech Republic; e-mail: rohacek@szm.cz

Accepted:
28th June 2021

Published online:
26th July 2021

Abstract. The knowledge of Anthomyzidae (Diptera: Acalyptratae) in the East Palaearctic area is extended by new taxonomic, biological and distributional information. Two new species of the genus *Anthomyza* Fallén, 1810, viz. *A. aspina* sp. nov. (Russia: Far East) and *A. breviclavus* sp. nov. (North Korea), and a species tentatively affiliated with the genus *Zealantha* Roháček, 2007, viz. *Z. fasciolata* sp. nov. (Japan) are described. Although all are based only on females, they are distinctive species unmistakably recognized by external characters and structures of the female postabdomen. Relationships of all new species are discussed. Records of 24 species are presented; 3 species are recorded from the E. Palaearctic, 1 species from continental Asia, 3 species from North Korea and a number of species from particular parts of E. Palaearctic Russia for the first time. An updated checklist of East Palaearctic Anthomyzidae is presented, now comprising 13 genera and 44 species. Taxonomic notes for *Anthomyza clara* Roháček, 2006, *Fungomyza cercata* Roháček, 2009 and some other species, and new biological information for *Anthomyza trifurca* Sueyoshi & Roháček, 2003 are given. Longitudinal dark patterning of the wing found in *A. breviclavus* sp. nov., represents the fifth lineage of Anthomyzidae in which this type of pattern has evolved independently. Species richness of Anthomyzidae in the E. Palaearctic is discussed with an estimate of about 60 species occurring in the area.

Key words. Diptera, Anthomyzidae, *Anthomyza*, *Zealantha*, 3 new species, taxonomy, relationships, biology, distribution, biodiversity, new records, wing pattern, Palaearctic Region

Zoobank: http://zoobank.org/urn:lsid:zoobank.org:pub:92EA52D1-7C37-4D87-B588-84FEE89A2809

Introduction

The family Anthomyzidae is a small group of acalyptrate Diptera usually classified within the superfamily Opomyzoidea (sensu McAlpine 1989) as a sister group of the Opomyzidae (Roháček 1998, 2006, 2013a; Roháček et al. 2019). Although recent molecular studies have suggested markedly different relationships of Anthomyzidae, their hypotheses cannot be accepted because the suggested sister-group affinities of this family are not only poorly supported but also extremely different from each other, cf. Winkler et al. (2010: Carnidae, Milichiidae + Chloropidae, or Muscidae), Wiegmann et al. (2011: Heleomyzidae), Wiegmann & Yeates (2017: Heleomyzidae/Teratomyzidae), Bayless et al. (2021: Asteiidae).

A total of 147 extant (cf. Roháček 2018, 2020; Barber & Roháček 2020; Roháček & Tóthová 2021) and 14 fossil (all Tertiary, for their review see Roháček 2013a and Roháček & Hoffeins 2020) named species of Anthomyzidae are currently known in the world. Adult Anthomyzidae are small-bodied (length 1.3–4.5 mm) and usually slender flies (Figs 3, 19, 46, 51, 53, 55). Their larvae can be characterized as microsaprophagous grazers because they feed on rotting or damaged plant (rarely fungal) tissues. The majority of species are associated with graminoid plants where larvae usually live between the stem and leaf base. Some species are known to develop in soft (mainly decaying) tissues of dicotyledonous plants, and *Fungomyza albimana* (Meigen, 1830) in rotting sporocarps of fungi, probably as do two other species of

this genus (cf. Roháček 2006, 2009; Roháček & Barber 2011, 2016; Barber & Roháček 2020). However, biological information is only available for (some) species living in Europe and North America, while for other regions such data are almost lacking. This is also true for species living in the East Palaearctic area (cf. Roháček 2009, 2018; Roháček & Przhiboro 2016).

Although all taxa of Anthomyzidae of the Palaearctic Region were monographed by Roháček (2006, 2009), the knowledge of this group in the E. Palaearctic area remains limited, even after subsequent faunal additions by Roháček & Przhiboro (2016), Roháček (2018) and Wang et al. (2021). In particular, the study on the Chinese fauna of Anthomyzidae (Roháček 2018) clearly demonstrated that the currently known local diversity (despite discovery of a series of new, largely E. Palaearctic taxa) represents only a fragment of the real species richness of the family in this vast area of Asia. Therefore, new taxa, as well as new records of species hitherto known only from Europe, have been expected to occur in this (larger) part of the Palaearctic Region.

The main aim of the present study is to advance the knowledge of the Anthomyzidae in the whole of the E. Palaearctic area. Based on the examination of material from several collections comprising specimens of Anthomyzidae from Asian Russia, North Korea and Japan, three species new to science have been found and a total of 24 species (13 *Anthomyza*, 2 *Arganthomyza*, 2 *Epischnomyia*, 2 *Fungomyza*, 1 *Paranthomyza* and 4 *Stiphrosoma*) have been recorded from the area. All three new species described here (see below) are based only on females. Normally, I would avoid their naming and description because of insufficient material. However, all these species proved to be so distinctive and markedly different from all other known members of the family, both externally and in structures of the female terminalia, that they can be described without hesitation. Moreover, I believe that their distinctive external appearance will readily allow their association with males as and when the latter are found. Apart from new distributional data, the material examined also provided new biological information (phenological, habitat and host-plant association) for some species. Finally, a checklist of E. Palaearctic Anthomyzidae is presented along with the currently known distribution of each species in the area.

Material and methods

Material. The material examined is deposited in collections as follows:

NMPC	National Museum, Praha (Czech Republic);
SIINH	Saigusa Institute of Insect Natural History, Fukuoka (Japan);
SMOC	Silesian Museum, Opava (Czech Republic);
ZMUM	Zoological Museum of the Moscow State University, Moscow (Russia);
ZSMC	Zoologische Staatssammlung München, München (Germany).

Methods. Specimens were examined, drawn and measured using two types of binocular stereoscopic microscopes (Reichert, Olympus SZX10). Male genitalia and female terminalia were examined after their detachment, maceration in hot 10% KOH, neutralization with 10% acetic acid, washing in water and dissection of the whole abdomen in a drop of glycerine under a binocular microscope. More detailed examination was performed with a compound microscope (Zeiss Jenaval). After examination, all parts were transferred to a small plastic tube in glycerine and pinned below the respective specimens.

Drawing techniques and photography. Legs were drawn on squared paper using a Reichert binocular microscope with an ocular screen. Details of the male and female terminalia were drawn using Abbe's drawing apparatus on a compound microscope (Zeiss Jenaval). Whole adult (dry-mounted) specimens and wings were photographed by means of a digital camera Canon EOS 5D Mark III with a Nikon CFI Plan 10x/0.25NA 10.5mm WD objective attached to a Canon EF 70–200mm f/4L USM zoom lens. The specimen photographed by means of the latter equipment was repositioned upwards between each exposure using a Cognisys StackShot Macro Rail and the final photograph was compiled from multiple layers (20–40) using Helicon Focus Pro 7.0.2. The final images were edited in Adobe Photoshop CS6.

Measurements. Five main characteristics of adults were measured: body length (measured from anterior margin of head to end of cercus, thus excluding the antenna), wing length (from wing base to wing tip), wing width (maximum width), index Cs_3 : Cs_4 (= ratio of length of 3rd costal sector : length of 4th costal sector) and index r-m\dm-cu : dm-cu (= ratio of length of section between r-m and dm-cu on discal medial cell : length of dm-cu). All type specimens were measured.

Presentation of faunistic data. Label data of designated type specimens are presented strictly verbatim, including information on colour of all associated labels. Locality data of other recorded specimens are standardized and, when originally in Russian Cyrillic, transliterated. New phenological and other biological information obtained from the material examined and literature are given in the Biology paragraph; data on occurrence are summarized in the Distribution paragraph.

Morphological terminology follows that used in monographs of Anthomyzidae by Roháček (2006) and/or Roháček & Barber (2016) including terms of the male hypopygium and female terminalia except that "orbit" is replaced here with "orbital plate". For male genitalia terminology, the "hinge" hypothesis of the origin of the eremoneuran hypopygium (see Zatwarnicki 1996) has been adopted. The following synonymous terms of the male genitalia emanating from other hypotheses and used in recent manuals of Diptera (Cumming & Wood 2010, 2017) and/or the monograph of Griffiths (1972) need to be listed (terms used here first): aedeagus = phallus; ejacapodeme = ejaculatory apodeme; epandrium = periandrium; gonostylus = surstylus, telomere; medandrium = bacilliform sclerite, intraepandrial or intraperiandrial sclerite; phallapodeme = aedeagal apodeme; postgonite = gonite, paramere. Morphological terms of the male terminalia are depicted in Figs 36, 37, 39–41, 45, those of the female postabdomen in Figs 6–8, 10, 13, 15, 16 and/or 63–65, 68, 69.

Abbreviations of morphological terms used in text and/or figures:

A_1	anal vein
ac	acrostichal (seta)
afa	aedeagal part of folding apparatus
ag	accessory gland
ans	secondary sclerite anterior to postgonite
bm	basal membrane
C	costa
ce	cercus
cp	caudal process of transandrium
cs	connecting sclerite
Cs_3, Cs_4	3rd, 4th costal sector
ct	ctenidial spine
CuA_1	cubitus
dc	dorsocentral (seta)
dm	discal medial cell
dm-cu	discal medial-cubital (= posterior, tp) cross-vein
ea	ejacapodeme
ep	epandrium
f	filum of distiphallus
f_1, f_2, f_3	fore, mid, hind femur
fc	fulcrum of phallapodeme
gs	gonostylus
hl	hypandrial lobe
hu	humeral (= postpronotal) (seta)
hy	hypandrium
is	internal sclerites of female genital chamber
M	media
ma	medandrium
npl	notopleural (seta)
oc	ocellar (seta)
ors	orbital (seta)
pa	postalar (seta)
pg	postgonite
pha	phallapodeme
pp	phallophore
ppl	propleural (= proepisternal) (seta)
prg	pregonite
prs	presutural intra-alar (seta)
pvt	postvertical (seta)
R_1	1st branch of radius
R_{2+3}	2nd branch of radius
R_{4+5}	3rd branch of radius
r-m	radial-medial (= anterior, ta) cross-vein
s	saccus of distiphallus
S1–S8, S10	abdominal sterna
sa	supraalar (seta)
sc	scutellar (seta)
sp	spermatheca
stpl	sternopleural (= katepisternal) (seta)
T1–T8, T10	abdominal terga
t_1, t_2, t_3	fore, mid, hind tibia
ta	transandrium
vi	vibrissa
vr	ventral receptacle
vte	outer vertical (seta)
vti	inner vertical (seta)

Results

Genus *Anthomyza* Fallén, 1810

A total of 21 species of this genus (including 2 new, described below) are currently known from the E. Palaearctic area. Fifteen of them are treated here (presented in alphabetical order) on the basis of the material examined, while the other 6 have been recorded previously (see Roháček 2006, 2009).

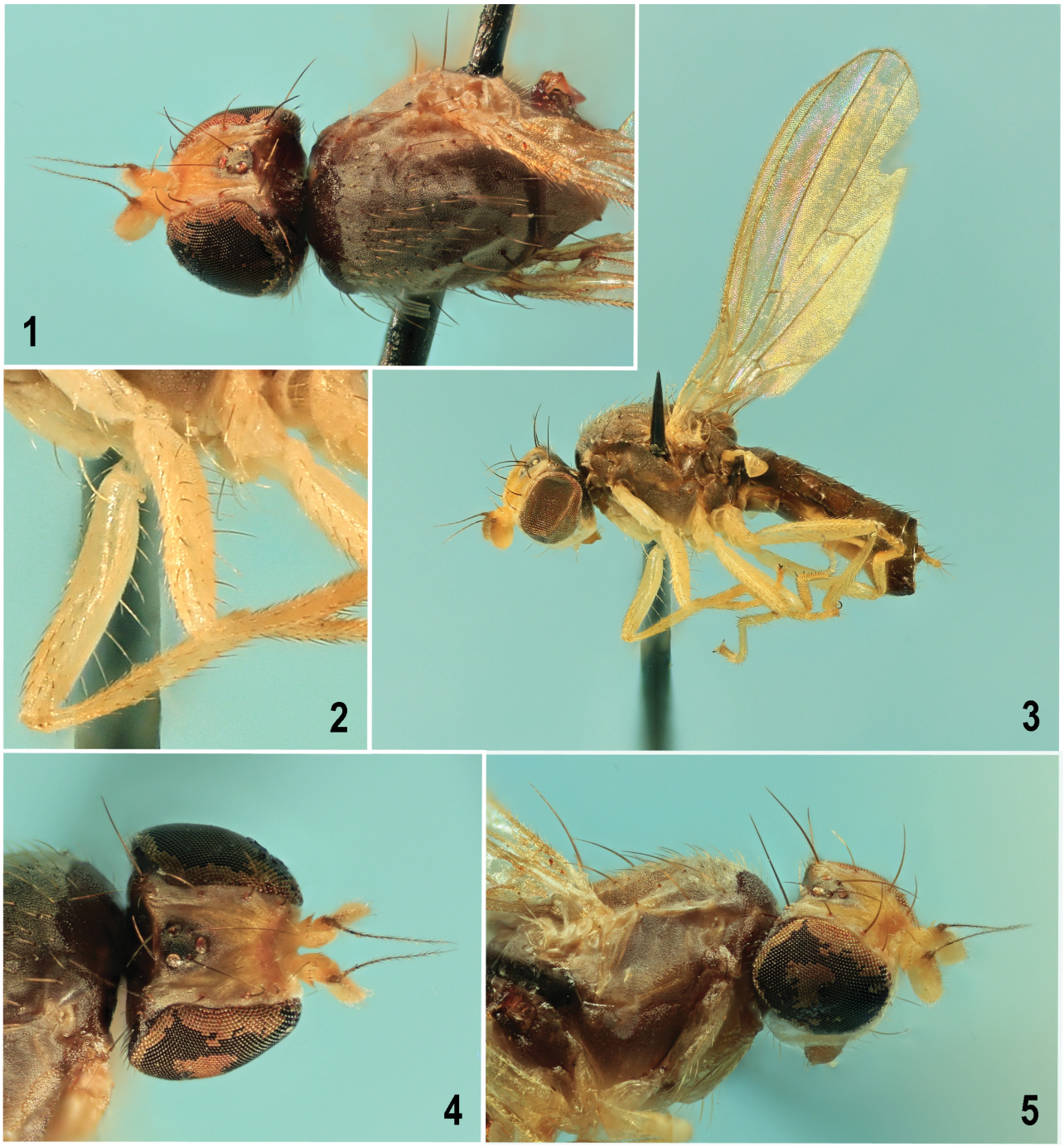
Anthomyza aspina sp. nov.

(Figs 1–16)

Type material. Holotype: ♀, labelled: 'Юж. Приморье' (printed), 'Каменушка 23. VI 1984' [= Yuzh. Primor'e, Kamenushka] (Indian ink handwriting), 'А. Шаталкин' [= A. Shatalkin] (printed), 'Anthomyza sp., det. D. Gavryushin, 2008' and 'Holotypus ♀, Anthomyza aspina sp. n., J. Roháček det. 2020' (red label) (ZMUM, genit. prep.). Paratype: ♀, with same data but with 'Каменушка 25. VI 1984' (Indian ink handwriting) on locality label and with 'Anthomyza bellatrix Roháček, det. D. Gavryushin, 2008' and 'Paratypus ♀, Anthomyza aspina sp. n., J. Roháček det. 2020' (yellow label) (SMOC, genit. prep.). ***Note.*** The type locality actually lies close to selo (= village) Kaimanovka (which was formerly a part of Kamenushka), 43°37′52″N 132°13′46″ E, near the Barsukovka river (A. Shatalkin, personal communication, 2021).

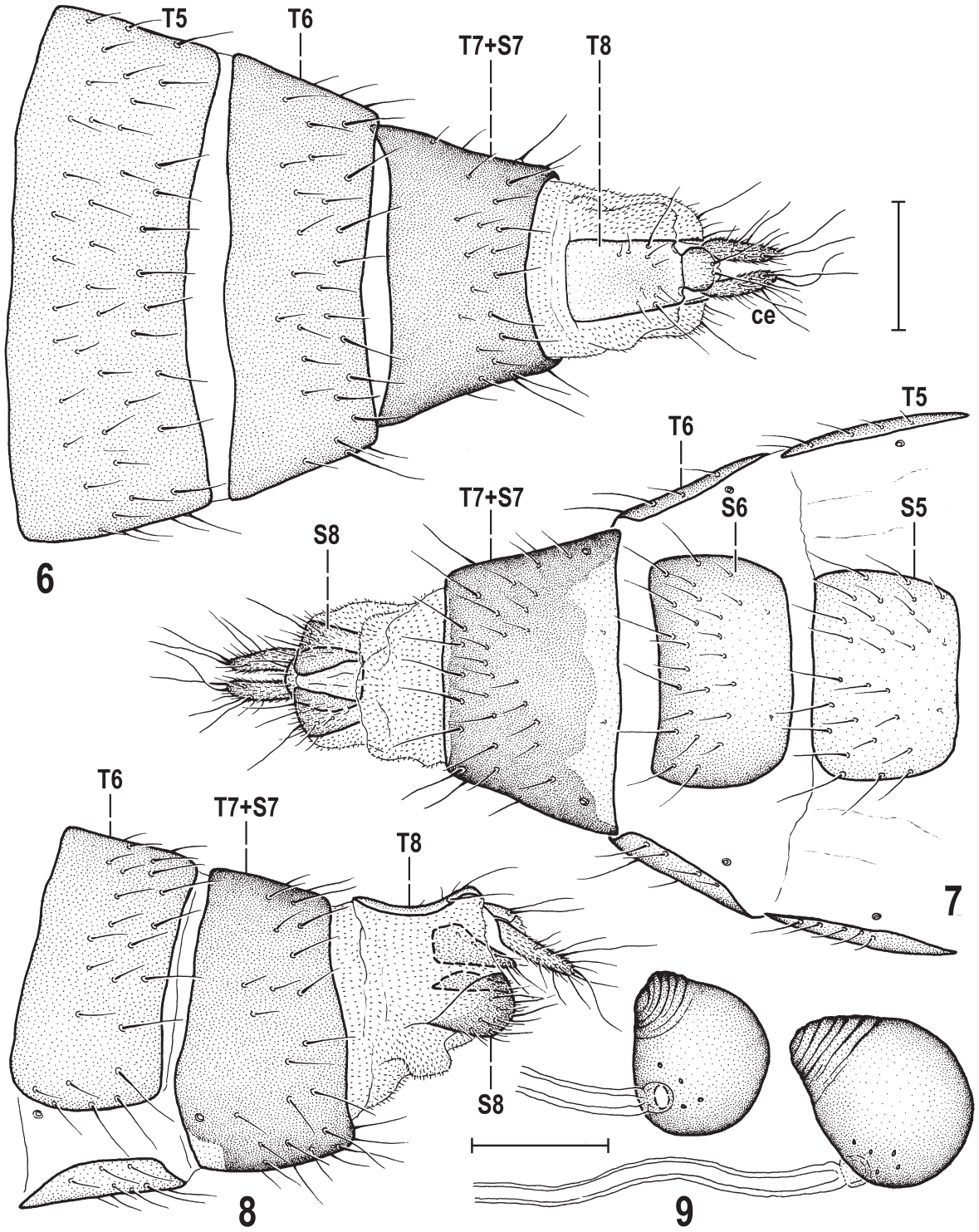
Description. ***Male*** unknown.

Female. Total body length 2.78 mm (holotype) to 2.94 mm (paratype); generally brown to dark brown (Fig. 3), with head largely yellow, thorax dull and densely light-grey microtomentose but abdomen subshining, with sparse microtomentum. Head yellow to (anteroventrally) whitish yellow (Figs 1, 4, 5), except for occiput and ocellar triangle (both brown to dark brown), very slightly higher than long, in profile almost rounded anteriorly (frons not projecting in front of eye). Occiput dorsomedially concave, brown to (laterally) dark brown, only small dorsal area behind ocellar triangle dark yellow to ochreous and ventralmost parts pale brown, all subshining due to sparse greyish microtomentum. Frons (Figs 1, 4) bright yellow, orange at anterior margin, with only frontal triangle brown (ocellar triangle dark brown), the latter pale grey microtomentose and dull. Orbital plate yellow or somewhat darkened posteriorly, entirely (up to vte) silvery-whitish microtomentose and dull. Frontal triangle relatively small, equilateral, reaching only a little into front half of frons, pale brown with anterior corner ochreous; ocellar triangle convex, dark and covering most of frontal triangle; ocelli relatively large (Fig. 4). Frontal lunule small, transverse, yellow and whitish microtomentose. Face relatively narrow, less sclerotized and somewhat concave, white to dirty yellow ventrally and whitish microtomentose; parafacialia and gena whitish, with dense silvery-white microtomentum, both bordered by very narrow, yellowish-white to pale ochreous marginal stripe; postgena whitish yellow to dirty yellow, also densely whitish microtomentose and hence sharply delimited from adjacent shiny ochreous to brown ventrolateral part of occiput. Mouthparts dirty yellow to orange ochreous (darkest distally), with pale yellow clypeus and yellowish-white palpus. Cephalic chaetotaxy: all macrosetae relatively long (see Fig. 5) but fine, hence not as strong as those of *Anthomyza ornata* Roháček, 2018; pvt relatively long and very strongly crossed (Fig. 4); vti longest of cephalic setae; oc slightly divergent, almost as long as vti and slightly longer than vte; 3 ors of distinctive size combination with middle ors longest (Fig. 5), markedly longer than both posterior and anterior ors, the latter two subequal, thus anterior ors also unusually long (see Figs 1, 5); 1 microsetula (about as long as medial microsetulae) in front of anterior ors; 2 or 3 pairs of medial microsetulae between apex of frontal triangle and anterior margin of frons; 1 small and pale inclinate setula



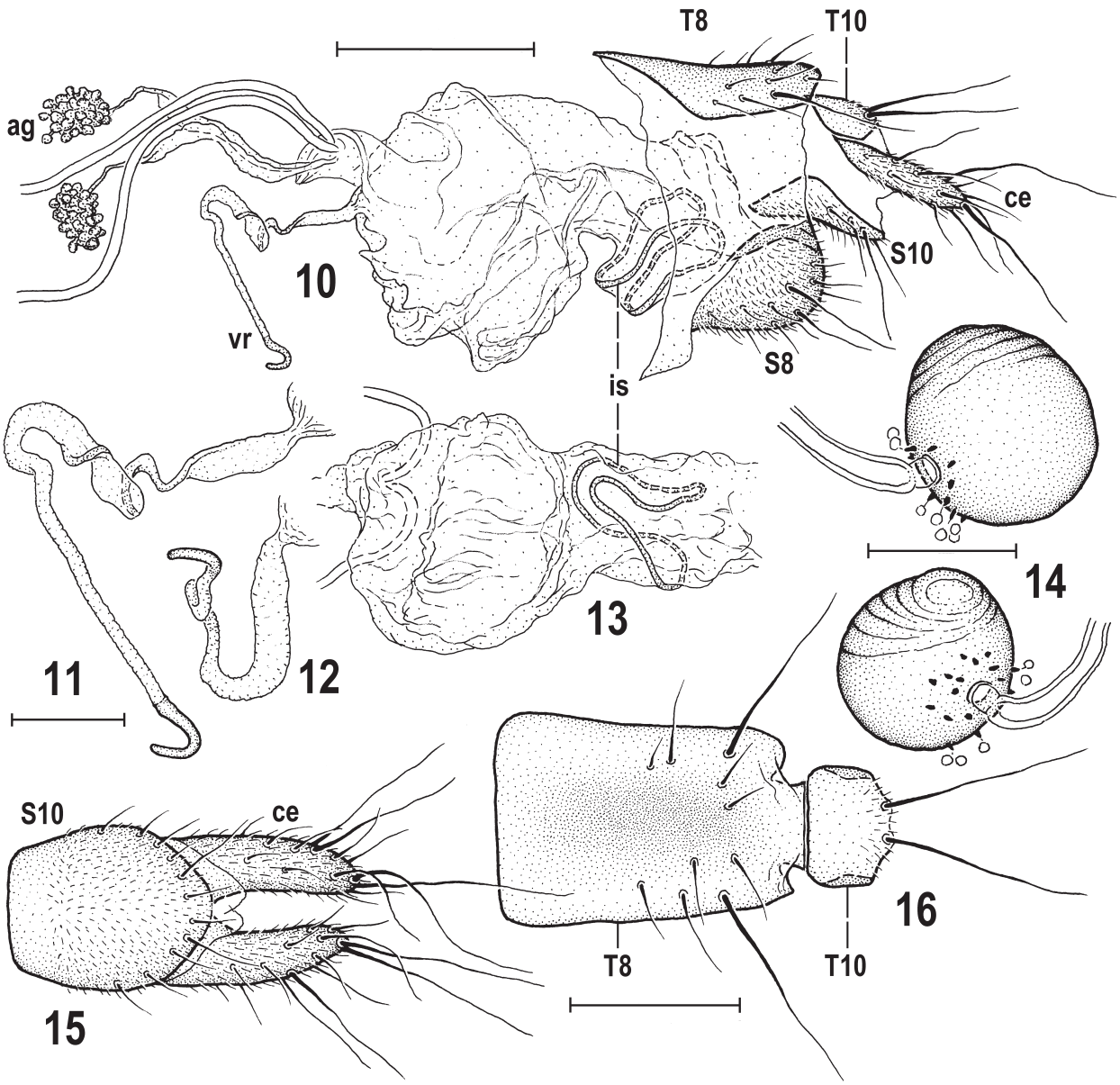
Figs 1–5. *Anthomyza aspina* sp. nov., female. 1 – head and thorax, subdorsally, holotype (body length 2.78 mm); 2 – fore legs, anteriorly and posteriorly, paratype; 3 – female before dissection, paratype (body length 2.94 mm); 4 – head, dorsally, holotype; 5 – head and thorax, laterally, holotype. Photos by J. Roháček.

behind vte; postocular setulae (7 or 8) also small and pale, in single row; lateroventral part of occiput and postgena with several pale setulae, with 1 longer but fine seta in posteroventral corner; 1 weak vi (as long as but finer than anterior ors); subvibrissa not developed (indistinguishable from peristomals); peristomal setulae (5 or 6) also small, fine and sparse. Palpus small and slender, with 1 longer and blackish preapical seta and about 5 pale ventral and lateral microsetulae; labella fleshy, orange, broad and very finely long setulose. Eye not very large, somewhat smaller than that of *A. ornata*, broadly subreniform (Fig. 3), with longest diameter oblique and about 1.3 times as long as the shortest. Gena distinctly higher than in *A. ornata* (see Fig. 5), with shortest height 0.20 times shortest eye diameter. Postgena also relatively large (Fig. 3). Antenna yellow, only 1st flagellomere more or less orange ochreous, darkened around insertion of arista; pedicel with dorsal seta small and weak; 1st flagellomere suboval, laterally strongly flattened and with relatively short white cilia on anteroventral margin. Arista dark brown including thickened basal segment, only 1.7 times as long as antenna, with brownish cilia hardly longer than those on 1st flagellomere.



Figs 6–9. *Anthomyza aspina* sp. nov., female holotype. 6 – postabdomen + 5th abdominal segment, dorsally; 7 – the same, ventrally; 8 – postabdomen, laterally; 9 – spermathecae, largest extension view. Scales = 0.2 mm (Figs 6–8) and 0.05 mm (Fig. 9). For abbreviations see p. 263.

Thorax as wide as head, brown to dark brown in ground colour but very densely pale grey microtomentose (often with some bluish tinge) and dull (Figs 1, 5); microtomentum on pleural part of thorax less dense but also distinct. Mesonotum dark brown to brown except area between supraalar seta and wing base pale brown; small spot at base of posterior notopleural seta ochreous to yellow, as is also apical margin of scutellum with areas surrounding bases of apical scutellar setae lightest. Pleuron (Fig. 5) lighter brown than mesonotum, sutures between sclerites ochreous and ventral corner of sternopleuron becoming yellow on apex. Prosternum and mesosternum ochreous to yellow. Postscutellum bulging and blackish brown (Fig. 3). Thoracic chaetotaxy rich, with macrosetae long but relatively fine: 1 hu (distinctly shorter and finer than anterior npl); 2 npl (posterior short, slightly shorter than hu); 1 long prs and



Figs 10–16. *Anthomyza aspina* sp. nov., female. 10 – genital chamber with 8th and 10th abdominal segments, laterally; 11 – ventral receptacle, laterally; 12 – the same, ventrally; 13 – genital chamber (without appendages), ventrally; 14 – spermathecae (all based on paratype); 15 – S10 and cerci, ventrally; 16 – T8 and T10, dorsally (both based on holotype). Scales = 0.1 mm (Figs 10, 13, 15, 16) and 0.05 mm (Figs 11, 12, 14). For abbreviations see see p. 263.

1 subequally long sa; 1 pa (distinctly shorter and thinner than sa); 2 postsutural dc but 1 of microsetae in front of them may also be enlarged (more distinctly in holotype), posterior dc very long (longest thoracic seta), anterior dc fine and only about half length of posterior dc; 6 or 7 dc microsetae in front of them (1 dc microseta can also be present between anterior and posterior dc); 4 rows of ac microsetae on suture, 2 rows more posteriorly; hindmost ac pair (situated slightly in front of posterior dc) distinctly enlarged, in holotype almost forming ac macroseta (as long as hu); 2 sc, laterobasal fine and as long as anterior dc, apical strong and very long, almost as long as posterior dc; 1 distinct but fine and pale upcurved ppl (reaching to about half of propleuron); 2 stpl, both thin, anterior only half length of posterior; 1 pale setula in front of anterior stpl and 2 or 3 setulae below it; ventral corner of sternopleuron with only 2 or 3 longer but pale and fine setae. Scutellum rounded triangular (Fig. 1), relatively long (ca 1.4 times as wide as long), convex dorsally.

Legs uniformly yellow to yellowish white (Figs 2, 3), tibiae and tarsi darker than femora, trochanters and coxae (these palest), only apices of last tarsal segments somewhat darkened, ochreous. f_1 (Fig. 2) with posterodorsal and posteroventral rows of unusually pale and long setae but ctenidial spine entirely absent; f_2 and f_3 simply uniformly setulose, as are also all tibiae, except for t_2 having a distinct, dark but very short (as long as tibial width) ventroapical seta and 3 small dark anteroventral setulae on apex; only fore basitarsus with proximoventral fine and pale setulae slightly longer than others.

Wing (Fig. 3) long and relatively narrow, with ochreous to pale yellow veins and pale ochreous hyaline membrane.

C with very distinct spine-like setae between apices of R_1 and R_{2+3}. R_{2+3} long, bent parallel to C but apically shortly and slightly upcurved to it, running closely to C and producing cell r_1 very narrow, only half width of cell r_{2+3} (thus markedly different from that of *A. ornata*, *A. sulphurea* Roháček, 2018 or *A. breviclavus* sp. nov.); R_{4+5} slightly bent along almost entire length, running nearly parallel to R_{2+3} but with distal part almost straight. M (beyond dm-cu) very slightly bent to almost straight basally, subparallel to R_{4+5} distally. Cell dm relatively large and long, with r-m situated at basal two-fifths (holotype) to half (paratype) of cell. Apical portion of CuA_1 short, 1.1–1.4 times as long as dm-cu and not reaching wing margin; A_1 short, ending far from wing margin. Alula relatively large but narrowed and with apex rounded; anal lobe well developed. Wing measurements: length 3.02 (holotype) to 3.08 (paratype) mm, width 1.07 (holotype) to 1.15 (paratype) mm, Cs_3 : Cs_4 = 1.06 (holotype) to 1.18 (paratype), rm\dm-cu : dm-cu = 2.03 (paratype) to 2.41 (holotype). Haltere (Fig. 3) yellow to pale ochreous, with darker orange-ochreous base of stem.

Abdomen dorsally dark brown, ventrally brown to ochreous-yellow, sparsely microtomentose and subshining to almost shining (Fig. 3). Preabdominal terga brown, all with very sparse microtomentum and relatively short and sparse setae. T1 and T2 only laterally fused, dorsally distinctly separate; T1 shorter and narrower than T2; T2–T5 subequal in length or T5 slightly longer, transverse and bent far onto lateral sides of abdomen, T2–T4 subequal in width but T5 (Fig. 6) narrower than T4. Preabdominal sterna ochreous-yellow to brown, all shortly, finely and sparsely setose. S1 short (about half length of S2), transverse, somewhat wider than S2, pale ochreous brown; S2–S5 subequal in length but becoming somewhat wider posteriorly (S5 widest); S2 longer than broad, brown, with basal dark stripe separated from rest of sclerite by yellowish-white area; S3–S5 pale ochreous or S3 and S5 anteriorly darkened, S3 as long as broad, S4 slightly and S5 distinctly wider than long (Fig. 7).

Postabdomen (Figs 6–8) medium long, tapered from 7th segment. T6 broad but somewhat narrower, shorter and darker than T5, with setae in posterior two-thirds, those at posterior margin longest. S6 (Fig. 7) wider, more transverse and darker brown (mainly laterally and posteriorly) than S5, finely setose in posterior half. T7+S7 fused to form compact, conical, strongly sclerotized ring-shaped synsclerite (tergosternum) that is dorsally and laterally uniformly blackish brown (Figs 6, 8) but ventrally with pale-pigmented anterior marginal stripe (Fig. 7); tergosternum T7+S7 setose mainly in posterior half and 7th spiracle embedded lateroventrally, near anterior margin of synsclerite (Figs 7, 8). T8 narrow, elongate, flat (Figs 6, 16), slightly tapered posteriorly, pale pigmented, bare except for some short and fine setae and 1 long seta in posterolateral corner. S8 shorter and much wider than T8, medially divided into 2 dark-pigmented sclerites (Fig. 7), each posterodorsally somewhat invaginated (cf. Figs 8, 10); external side of S8 finely setose (with 1 seta long) and micropubescent (as is usual in *Anthomyza*). Genital chamber relatively short and broad (Figs 10, 13) without paired internal sclerites (or these membranous), only annular sclerite distinctly developed and (for *Anthomyza*) unusually compressed (Figs 10, 13) and bent onto lateral surfaces of genital chamber (as in *A. sulphurea* or *A. ornata*). Ventral receptacle (Figs 10–12) relatively subtle, membranous, elongately tubiform, with basal part wider and twisted several times, distal part slender and straight, ending in a hook-like, slightly sclerotized apex. Remnant of accessory gland small, grape-like, on very slender duct that is somewhat dilated but plain in the middle (Fig. 10). Spermathecae (1+1) subovoid (Fig. 9) to broadly oval (Fig. 14), each with sparsely (often asymmetrically) ringed distal part, simple apex without terminal invagination, eccentrically inserted duct (without sclerotized cervix or collar), and several short spinulae proximally near duct insertion; spermathecal duct very long (about as long as abdomen) and all membranous. T10 very small, transversely hexagonal to oval, pale pigmented (Figs 6, 16), with single medial pair of long setae (as long as those on cercus) in middle of posterior margin, and some sparse micropubescence near them. S10 (Fig. 15) much larger than T10 but largely hidden under S8 in ventral view (Fig. 7), longer than wide, rounded pentagonal, finely setulose (marginally in posterior half) and densely micropubescent. Cercus of moderate size, relatively slender, with rich setosity, apical and dorsopreapical setae sinuate and much longer than other long setae of cercus (Figs 10, 15).

Discussion. *Anthomyza aspina* sp. nov. is the first species of the genus *Anthomyza* found to be lacking a ctenidial spine on the fore femur. Apart from this atypical feature, it is also characterized by the middle ors markedly longer than both anterior and posterior ors (also very unusual), the almost entirely yellow head combined with dark brown but densely pale grey microtomentose thorax and dark, relatively shining abdominal terga. The female postabdominal sclerites (particularly the large and dark annular tergosternum T7+S7, see Fig. 3) and structures of the female genital chamber are also very characteristic. The reduced internal sclerotization (paired sclerites membranous or absent) and the compressed annular sclerite bent onto the lateral walls of the genital chamber (and also the elongate S10) indicate a relationship of *A. aspina* with the two Chinese species, *A. ornata* and *A. sulphurea* (see Roháček 2018: figs 93, 95, 114, 116), and also with *A. breviclavus* sp. nov. (Figs 26, 28) from North Korea described below. However, *A. aspina* differs distinctly from all these species by the detailed construction of the annular sclerite (most strongly compressed among all known *Anthomyza* spp.), shape and surface of the spermathecae and form of the ventral receptacle not to mention the dark and completely fused T7+S7 and wing with unusually narrow cell r_1. It should be noted that both above Chinese species have the ctenidial spine strongly reduced (extremely short in *A. sulphurea*, see Roháček 2018: fig. 111) so that its entire disappearance in *A. aspina* may not be so surprising.

Etymology. The name '*aspina*' refers to the absence of a ctenidial spine on the fore femur. It is a Latin noun, in the nominative singular in apposition, meaning without spine.

Biology. Unknown. The holotype and paratype females were collected in June. Both specimens were netted by A. Shatalkin (personal communication, 2021) from rich low vegetation in open damp places in taiga forest close to the Barsukovka river. Several other species of Anthomyzidae were also collected in this locality, including *Epischnomyia triarmigera* (Sueyoshi & Roháček, 2003), *Stiphrosoma fissum* Roháček, 1996 (see records below), *Anthomyza elbergi* Andersson, 1976 and even the extremely rare *Ischnomyia barbarista* (Roháček, 2009) (for their records see Roháček 2009).

Distribution. Russia: Far East (Primor'e).

Anthomyza breviclavus sp. nov.

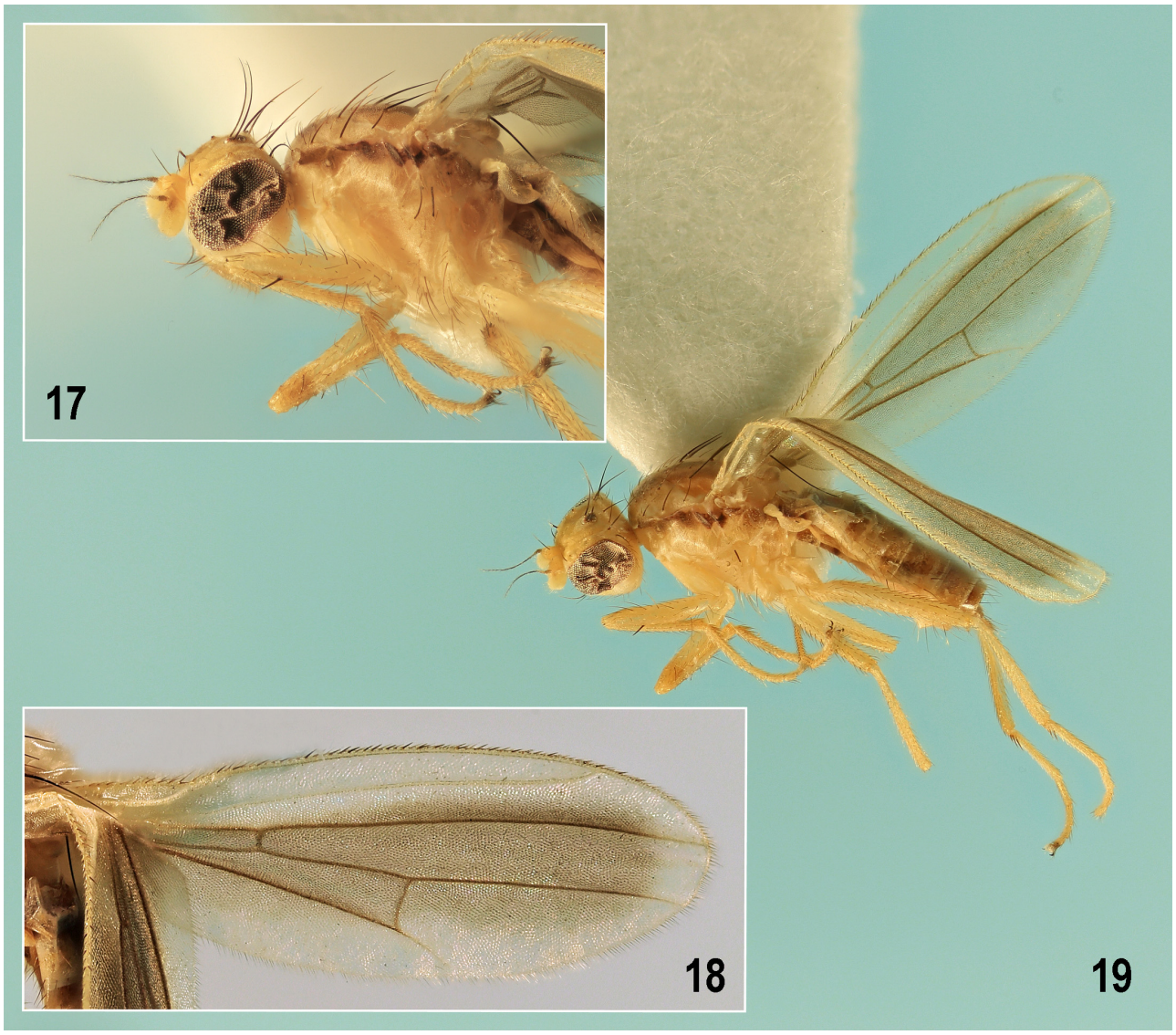
(Figs 17–31)

Type material. Holotype: ♀, labelled: 'D. P. R. KOREA, PAEKDUSAN Mts., SANJIYON, lgt. M. KOZÁNEK' (obverse, printed), '18. 8. 89' (reverse, pencil handwriting) and 'Holotypus ♀, Anthomyza breviclavus sp. n., J. Roháček det. 2020' (red label) (SMOC, genit. prep.).

Description. ***Male*** unknown.

Female. Total body length 2.54 mm; bicolourous but largely yellow (pale yellow to pale ochreous) with only longitudinal vittae on thorax brown (Figs 17, 19), rather sparsely whitish microtomentose, subshining, with wings distinctively variegated. Head pale yellow except for a small brown spot on ocellar triangle (Fig. 19), somewhat higher than long, in profile almost rounded anteriorly (frons not projecting in front of eye). Occiput dorsomedially concave, entirely yellow (lighter medially) and subshining, but with a patch of silvery-white microtomentum at dorsal margin of foramen. Frons bright to pale yellow, with only central spot on ocellar triangle brown, largely dull, only margins of frontal triangle and orbital plate somewhat glittering. Entire orbital plate light yellow, sparsely silvery-whitish microtomentose and slightly glittering. Frontal triangle relatively narrow, somewhat longer than broad, reaching anterior two-fifths of frons, concolourous with adjacent frons but delimited by narrowly golden glittering margins and whitish microtomentose posterior corners; ocellar triangle somewhat elevated, having marginal parts yellow and central area between (medium-sized) ocelli brown. Frontal lunule very small, yellow, with whitish microtomentum. Face narrow, concavely depressed, white and whitish microtomentose; parafacialia and gena also white, with silvery-white microtomentum, both bordered by a very narrow marginal stripe that is darker (yellow) on ventral margin of gena; postgena white to whitish yellow posteriorly, sparsely whitish microtomentose, confluent with similarly coloured ventrolateral part of occiput; mouthparts yellow including clypeus and palpus. Cephalic chaetotaxy: all macrosetae (see Fig. 17) dark, long but relatively thin and most similar to those of *A. ornata* (see below); pvt unusually long (right pvt seta two-thirds of vti!) and strongly crossed; vti very long, longest of cephalic setae; oc subparallel (unnaturally erect in holotype, see Fig. 17) and almost as long as vti; 3 ors, posterior and middle obviously long and strong (both broken in holotype), anterior markedly shorter and fine, only about a quarter length of vti; 1 microsetula (as long as medial microsetulae) in front of anterior ors; 3 or 4 pairs of medial microsetulae between apex of frontal triangle and anterior margin of frons; 1 inclinate setula (as long as uppermost postocular) behind vte; 7 or 8 postocular setulae, all relatively short but dark, in single row; lateroventral part of occiput and postgena with a few dark setulae, 1 longer but fine seta in posteroventral corner; 1 vi (undoubtedly shorter and weaker than both long ors); subvibrissa apparently absent; 5 or 6 small peristomal setulae becoming longer anteriorly. Palpus slender and rather long, with 1 relatively long and dark preapical seta and a few (3–5, all dark) setulae; labella fleshy, dirty yellowish white, finely long setulose. Eye relatively small (as in *A. sulphurea*), elongately reniform (Fig. 17), with longest diameter oblique and about 1.4 times as long as the shortest. Gena higher than in *A. ornata*, resembling more that of *A. sulphurea*, with shortest height 0.30 times shortest eye diameter. Antenna yellow (scape, pedicel) to whitish yellow (1st flagellomere); pedicel with dorsal seta normal; 1st flagellomere elongately suboval, laterally flattened and with relatively long white cilia on anteroventral margin (as in *A. ornata*). Arista brown including thickened basal segment, about 1.8 times as long as antenna, with pale cilia slightly shorter than those on 1st flagellomere.

Thorax distinctly wider than head, largely yellow but brown striped (thoracic pattern most resembling that of *A. ornata* and *Epischnomyia* spp.), finely whitish microtomentose, almost dull. Mesonotum yellow, with broad brown vittae between dc and prs-sa lines that are not fused anteriorly (thus, in contrast to *A. ornata*, medial yellow area reaching anterior margin of mesonotum) and posteriorly continuing narrowly on sides of otherwise yellow scutellum. Humeral and notopleural areas whitish yellow. Pleuron whitish yellow but dorsally with brown band reaching from propleuron to base of abdomen (see Figs 17, 19); ventral part of pleuron yellowish white. Postscutellum bulging (Fig. 17) and dark ochreous. Thoracic chaetotaxy rich, with most macrosetae very long (as in *A. ornata*) and dark: 1 hu (slightly shorter and finer than anterior npl); 2 npl (posterior shorter); 1 exceptionally long prs (Fig. 17) and 1 subequally long or slightly longer and thicker sa; 1 pa (somewhat shorter and thinner than sa); 2 postsutural dc: posterior extremely long and robust (longest thoracic seta), anterior also long but only about half length of posterior dc; only 4 or 5 dc microsetae in front of them (no dc microseta between anterior and posterior dc); ac microsetae sparse but relatively long, in only 2 rows on suture; hindmost ac pair (situated between posterior dc) only slightly longer than others; 2 sc (all are broken off); judging from basal remnants apical sc must be strong and very long and laterobasal sc small (situated unsually laterally in middle of scutellar side); 1 relatively long but very fine upcurved ppl; 2 stpl, posterior long, anterior distinctly shorter (Fig. 17); 1 setula in front of anterior stpl and 1 other between both stpl, and 5 or 6 setulae below it; ventral corner of sternopleuron with 5 or 6 fine setae, 3 or 4 of them longer. Scutellum rounded triangular, very slightly convex to flat dorsally, about 1.6 times as wide as long.

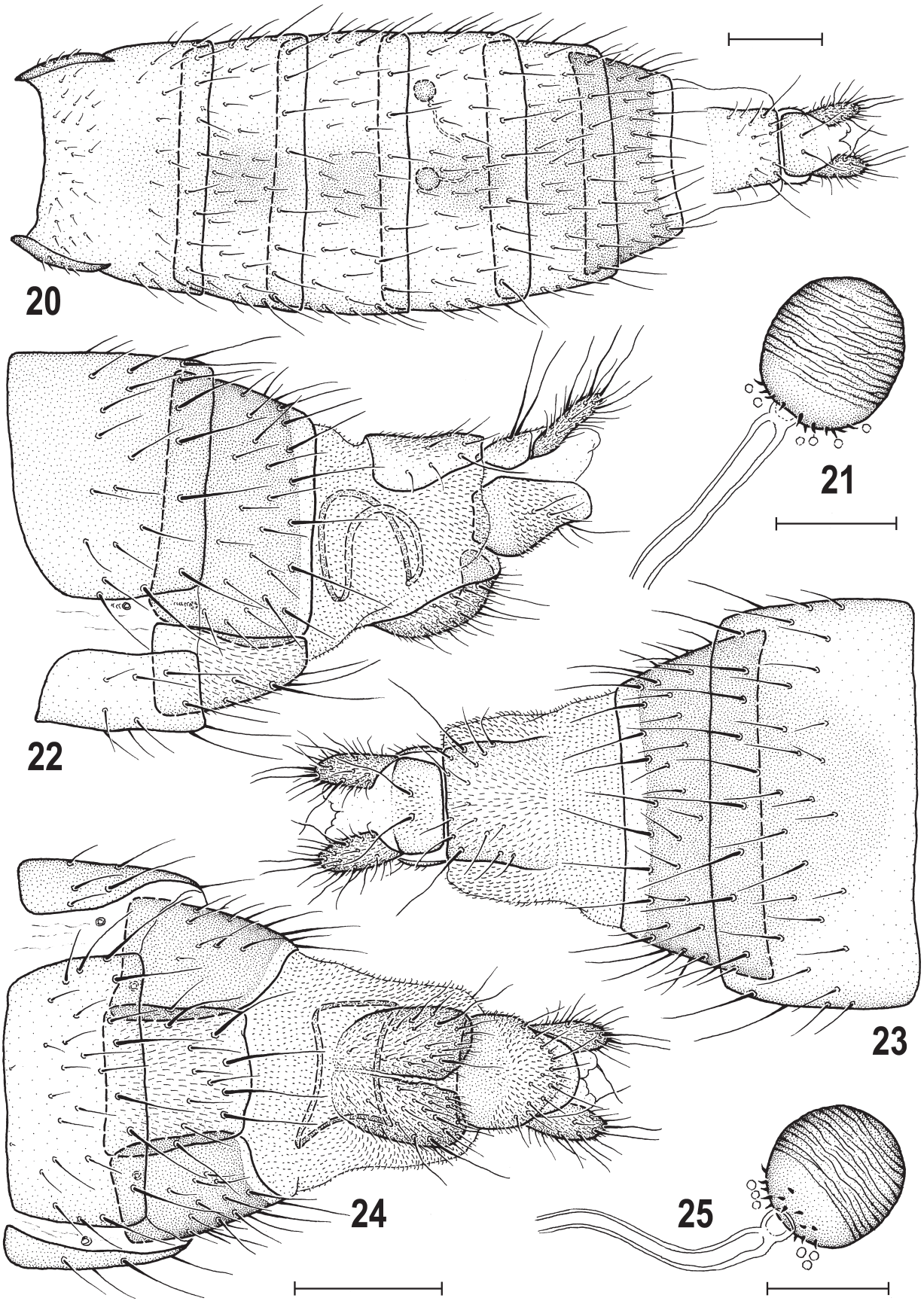


Figs 17–19. *Anthomyza breviclavus* sp. nov., female holotype. 17 – head and thorax, laterally; 18 – right wing (length 2.70 mm); 19 – female before dissection, sublaterally (body length 2.54 mm). Photos by J. Roháček.

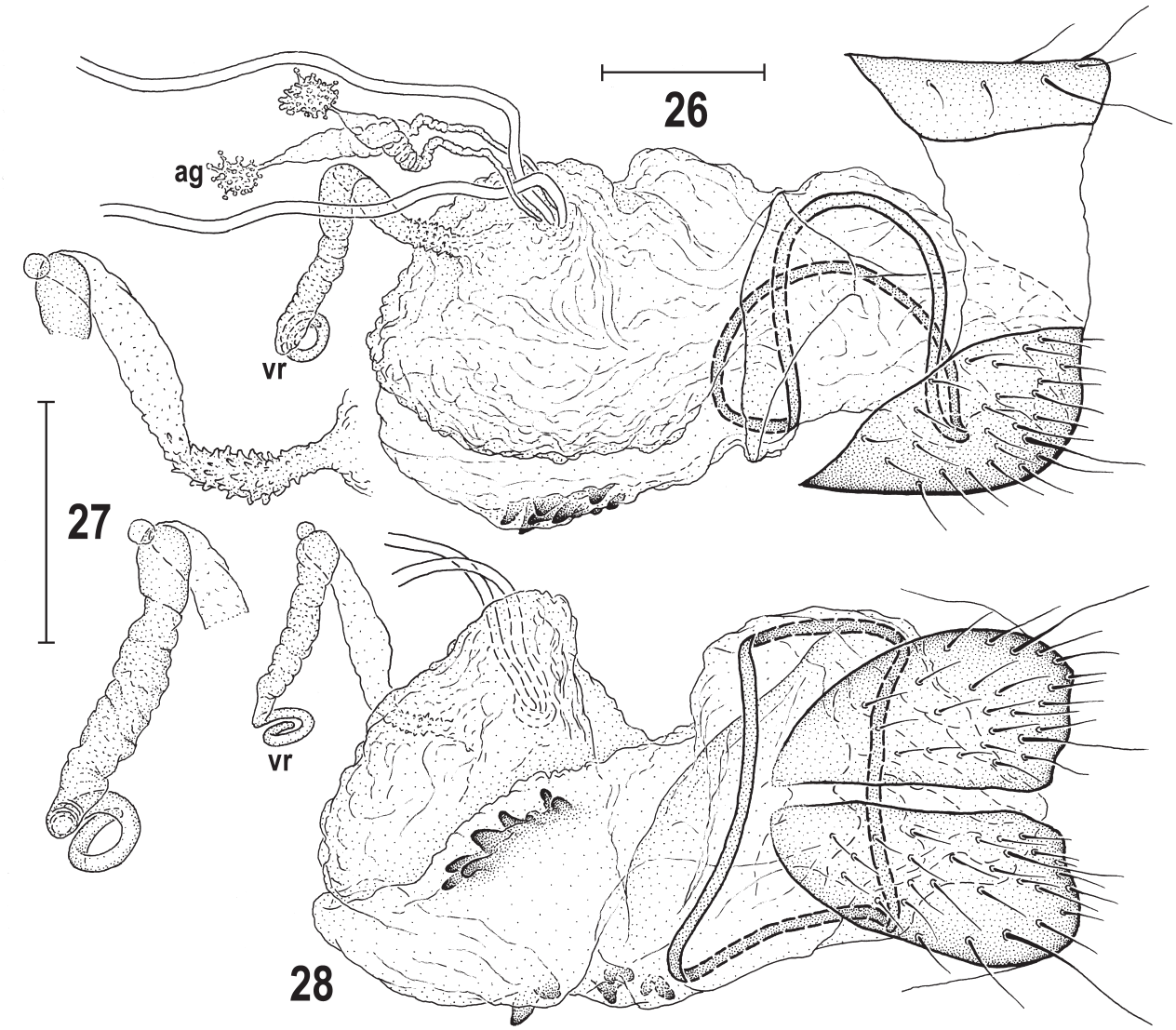
Legs yellow to yellowish white (coxae lightest), only apical half of last tarsal segment of all legs darkened, brown (Fig. 19). f_1 (Fig. 29) with usual posterodorsal and posteroventral rows of dark long setae and robust ctenidial spine (in contrast to *A. ornata*) that is slightly longer than maximum width of t_1. f_2 and f_3 simply uniformly setulose, as are all tibiae, except for t_2 having a distinct but short (only as long as width of t_2) ventroapical seta and a pair of anteroventral setulae on apex (Fig. 30); fore basitarsus with 2 enlarged but pale proximoventral setulae (Fig. 29), mid basitarsus with single dark enlarged proximoventral setula (Fig. 30) and hind basitarsus with 2 or 3 dark and robust proximoventral setulae (Fig. 31).

Wing (Fig. 18) relatively long and narrow, with whitish yellow (C, R_1, R_{2+3}) to brown veins (most parts of others). With distinctive pattern, composed of white hyaline marginal areas (on anterior, apical and posterior margin) and broad brown stripe in the middle covering area primarily between R_{4+5} and CuA_1 but (in contrast to all known Anthomyzidae with similar wing patterning) not reaching to apex of wing. C with very distinct spine-like setae between apices of R_1 and R_{2+3}. R_{2+3} not very long (ending far from wing apex), very slightly sinuous, subparallel to C but apically upcurved to it; R_{4+5} slightly downcurved, basally running nearly parallel to C and distally to M. M (beyond dm-cu) basally almost straight and distally slightly downcurved. Cell dm long but relatively narrow, with r-m situated at basal two-fifths of cell. Apical portion of CuA_1 short, 1.15 times as long as dm-cu and not reaching wing margin; A_1 short, ending far from wing margin. Alula moderate, relatively narrow and with apex rounded; anal lobe well developed. Wing measurements: length 2.70 mm, width 0.95 mm, $Cs_3 : Cs_4 = 2.13$, rm\dm-cu : dm-cu = 2.92. Haltere whitish yellow, with knob dirty yellow.

Abdomen generally yellow to pale brown (Fig. 19). Preabdominal terga (Fig. 20) largely yellow but T2–T5 with pale brown spot medially, all sparsely greyish microtomentose and subshining. T1 and T2 not distinctly separated, apparently fused dorsally; T1 slightly shorter and narrower



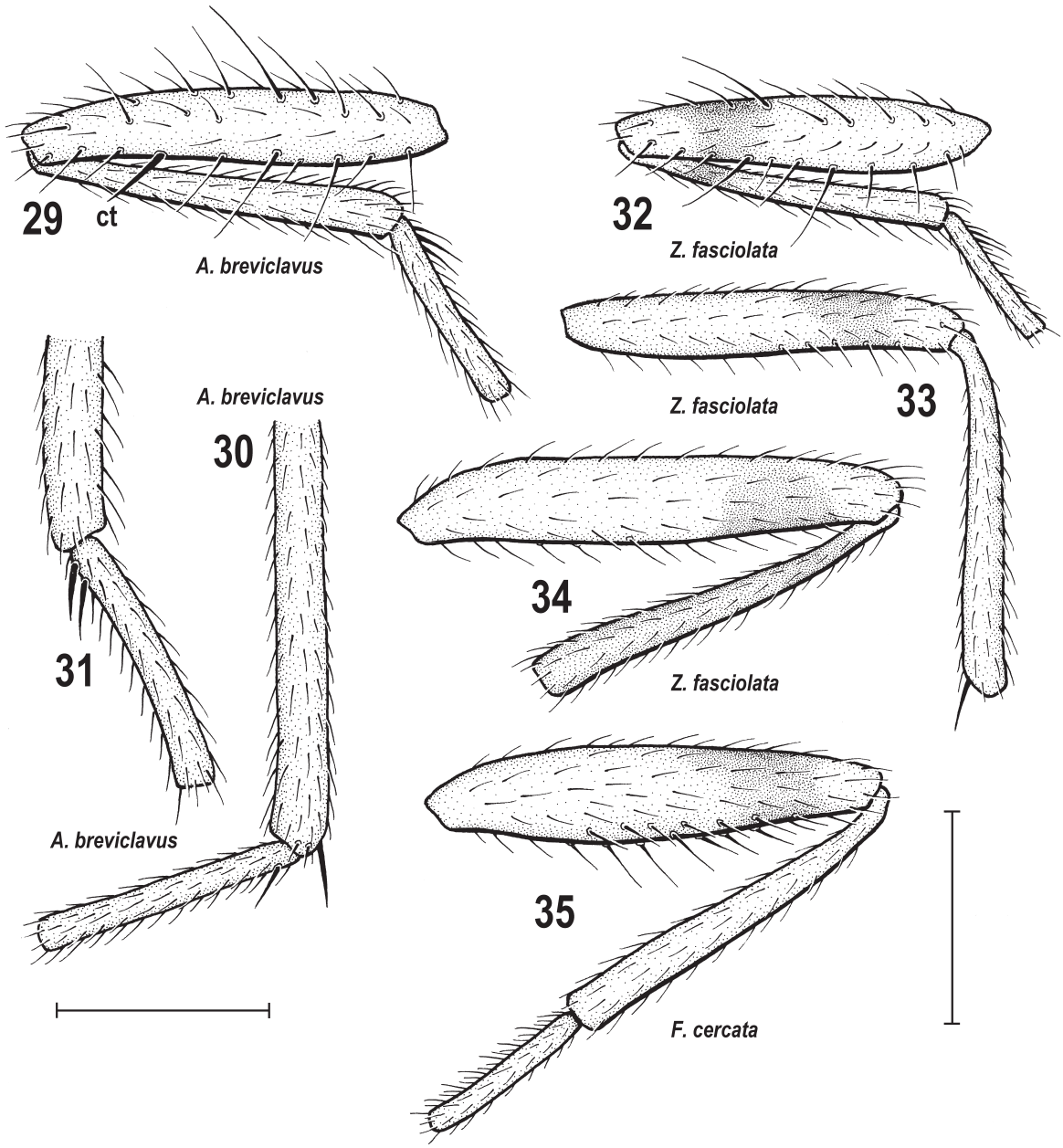
Figs 20–25. *Anthomyza breviclavus* sp. nov., female holotype. 20 – entire abdomen, dorsally; 21 – spermatheca; 22 – postabdomen, laterally; 23 – the same, dorsally; 24 – the same, ventrally; 25 – spermatheca. Scales = 0.2 mm (Figs 20, 22–24) and 0.05 mm (Figs 21, 25).



Figs 26–28. *Anthomyza breviclavus* sp. nov., female holotype. 26 – genital chamber with 8th abdominal segment, laterally; 27 – ventral receptacle, proximal (above) and distal (bottom) part, largest extension view; 28 – genital chamber with S8, ventrally. All scales = 0.1 mm. For abbreviations see see p. 263.

than T2 and with small short setulae on disc; T2 slightly shorter than T3, sparsely setose in posterior half. T3–T5 subequal in length, transverse and bent far onto lateral sides of abdomen, all with relatively short and fine setae on disc and longer setae at posterior margin. Preabdominal sterna whitish yellow, relatively large and broad (pleural membranous part of preabdomen rather narrow). S2–S5 becoming very slightly wider posteriorly (S5 widest), all wider than long, S5 most transverse. S1 not observed; S2–S5 with fine and relatively sparse setae, those at posterior margin longest.

Postabdomen (Figs 22–24) medium long, tapered from 7th segment. T6 large, only slightly narrower than T5, posteromedially pale brown to brown, anterolaterally yellow (Figs 20, 23), bent onto lateral sides of segment as in preabdominal terga (see Fig. 22), setose in posterior two-thirds, and with setae at posterior margin long but fine. S6 (Fig. 24) slightly wider than S5, transverse and similarly whitish yellow, with long setae posteriorly besides shorter setosity on disc. T7 and S7 separate. T7 brown (much darker than T6) in the middle (Fig. 23), with unpigmented stripe at posterior margin and its anterior part pale brown. T7 tapered posteriorly (Figs 20, 23), with sides extended far onto ventral aspect of 7th segment and embedding 7th spiracles (Figs 22, 24), with more numerous setae than T6, including long ones at posterior margin. S7 (Fig. 24) markedly narrower than S6, as long as broad, very slightly tapered posteriorly, yellowish white, with sides overlapping ventrolateral margins of T7, with distinct micropubescence and relatively long setosity, with 4 (2 pairs of) setae at posterior margin particularly long (see Fig. 24). T8 relatively small and flat, roughly square-shaped (Fig. 23), pale pigmented, entirely micropubescent, and with fine setae in posterior half, only 1 of them (in posterolateral corner) long. S8 (Figs 24, 26, 28) about as long as or slightly longer than T8, medially very narrowly divided longitudinally into 2 distinctly pigmented sclerites that are somewhat bent dorsally and invaginated posteriorly (cf. Fig. 22); external surface of each side of S8 finely setose (with 3 longer setae) and micropubescent (as is usual in



Figs 29–35. Legs and their parts of Anthomyzidae. 29–31 – *Anthomyza breviclavus* sp. nov., female holotype: 29 – left f_1, t_1 and fore basitarsus posteriorly (chaetotaxy partly reconstructed); 30 – distal end of right t_2 and mid basitarsus, anteriorly; 31 – apex of left t_3 and hind basitarsus, anteriorly; 32–34 – *Zealantha fasciolata* sp. nov., female holotype: 32 – left f_1, t_1 and fore basitarsus, posteriorly; 33 – left f_2 and t_2, anteriorly; 34 – right f_3 and t_3 posteriorly; 35 – *Fungomyza cercata* Roháček, left f_3, t_3 and hind basitarsus, anteriorly. All scales = 0.5 mm. For abbreviations see see p. 263.

Anthomyza). Genital chamber of medium length but relatively broad and somewhat asymmetrical (Figs 26, 28), with reduced internal sclerotizations: only annular sclerite well developed, large, broad, transverse and bent onto lateral surfaces of genital chamber (as in *A. ornata*); no posterior pair(s) of sclerites, only an asymmetrical submembranous structure lateroventral to annular sclerite; anterior part of genital chamber asymmetrical, with a pair of dark-pigmented groups of short blunt spine-like excrescences (Figs 26, 28) ventrolaterally. Ventral receptacle (Figs 26–28) medium long but tube-like and twisted, membranous, composed of larger and wider part having surface proximally toothed (Fig. 27), medially plain and more distally somewhat bumpy, and of slender vermicularly twisted terminal part (Fig. 27) with blunt apex. Remnant of accessory gland small, on somewhat dilated duct that is distally plain and gradually narrowed and ringed in the middle (Fig. 26). Spermathecae (1+1) broadly oval to spherical (Figs 21, 25), with simple apex without invagination, surface finely densely transversely ringed except for basal fourth or third and with a number of small spinulae proximally near duct insertion; no sclerotized cervix developed; spermathecal duct entirely membranous, simple and very long. T10 small, short, transversely suboblong, pale pigmented (Fig. 23), with single medial pair of long setae (somewhat longer than those on cercus) in centre and some sparse and fine micropubescence. S10 (Fig. 24) much

larger and particularly longer than T10, somewhat longer than wide, finely setulose and densely micropubescent in posterior half but its posterior marginal area bare and rounded. Cercus of moderate size, rather wide but somewhat dorsoventrally flattened (cf. Figs 22, 23), with rich but not very long setosity, apical, subapical and dorsopreapical setae longest and more or less sinuate.

Discussion. *Anthomyza breviclavus* sp. nov. is easily recognized by its patterned wing which is broadly white margined, thus having its middle longitudinal dark stripe abbreviated, not reaching the apex of the wing (Fig. 18). A similar longitudinal pattern is very rare in the genus *Anthomyza*, otherwise known only in *A. caesarea* Roháček, 2020 from Taiwan (cf. Roháček 2020: fig. 24). However, it also occurs in all three E. Asian species of the genus *Epischnomyia* (see Fig. 51) and the Nearctic *Ischnomyia albicosta* (Walker, 1849) and *Arganthomyza vittipennis* (Walker, 1857) (Roháček & Barber 2016: fig. 49 and fig. 85 respectively). However, in all these taxa the middle dark band is extended to the wing tip where it is dilated. *Anthomyza breviclavus* also differs from all these species by the largely yellow body. Judging from the long macrosetae of the head and thorax, the postabdominal structures and female internal genitalia, *A. ornata* and *A. sulphurea* (both from China, see Roháček 2018) are undoubtedly the closest relatives of this new species. The shape of the annular sclerite, the reduced internal sclerotization of the female genital chamber and the densely ringed spermathecae with a spinose basal part support this relationship. However, *A. breviclavus* differs from both these species (besides the strong ctenidial spine on f_1, and the colouration of head, thorax and wing) by the formation, pigmentation and setosity of T7, S7, T8, T10, S10, the subspherical spermathecae without a terminal invagination, the shape of the ventral receptacle as well as by the two groups of ventrolateral dark-pigmented blunt spine-like excrescences in the distal part of the female genital chamber (see Fig. 28). A similar armature is also known in some other (distantly related) species of *Anthomyza*, e.g. *A. pengellyi* Roháček & Barber, 2016, *A. concolor* (Thomson, 1869), *A. variegata* (Loew, 1864) (cf. Roháček & Barber 2016: figs 273, 335, 397) and *A. orineglecta* Roháček, 2006 (cf. Roháček 2009: fig. 42) so that this secondary sclerotization apparently evolved independently several times in various lineages of the genus. As mentioned above, *A. aspina* sp. nov. could also be related to *A. breviclavus* but certainly less distinctly than are *A. ornata* and *A. sulphurea*.

Etymology. The species is named for its distinctive wing pattern using a Latin noun in the nominative singular in apposition composed of *brevis* (= short) and *clavus* (meaning a coloured stripe on toga of ancient Roman senators).

Biology. Unknown. The holotype was swept in the Paekdusan Mts from low vegetation in August (M. Kozánek, personal communication, 2018).

Distribution. North Korea.

Anthomyza clara Roháček, 2006

(Figs 36–45, 49, 50)

Material examined. JAPAN: Hokkaido: Kiyokawa, Ashoro, 23.vii.1967, 2 ♂♂ 1 ♀, T. Saigusa leg. (SIINH, 1 ♂ 1 ♀ genit. prep.).

Remarks. This little known species belongs to the *Anthomyza umbrosa* group (see Roháček 2006, Roháček & Barber 2016). The recent molecular study by Roháček et al. (2019) revealed that the E. Palaearctic *A. drachma* Sueyoshi & Roháček, 2003 could also belong to this group. Consequently, the finding of *A. clara* in Japan is considered important inasmuch as it is the second species of the *A. umbrosa* group in the area. Because of its long-ciliate 1st flagellomere and arista, and pale body colouration (Figs 49, 50), *A. clara* resembles some species of the *A. neglecta* group. It can be distinguished from them by the more elongate head and long subvibrissa (Fig. 50), the shining frontal triangle and the male f_3 with short thickened posteroventral setae and, particularly, by its entirely dissimilar genitalia. The structures of the male and female terminalia of the Japanese specimens were studied in detail to test differences against paratypes from Switzerland. In the male genitalia (first illustrated in situ, see Fig. 36), only a minute difference in the distal end of the gonostylus was found (subapically with more excavated posteromedial margin, see Fig. 38). Structures of both the hypandrial (see them now also in ventral view, Fig. 39) and aedeagal complexes (Figs 39–45) resemble those of paratypes in much detail (cf. Roháček 2006: figs 216, 218–220). Their description can be supplemented as follows: secondary sclerite anterior to postgonite (Figs 39, 41, ans) always well developed and V-shaped in ventral view (Fig. 39). Small posterior bulge of pregonite (with 2 setae) more or less distinctly separate, at least posteriorly (cf. Fig. 41). Phallapodeme with both apex (Fig. 43) and base (Fig. 42) symmetrical.

Biology. No new information can be added to the poor knowledge from Europe (see Roháček 2006). This rare species is probably associated with large sedges in wetland habitats by lakes and near the sea.

Distribution. *Anthomyza clara* was described from Switzerland, Lithuania and Estonia (Roháček 2006) and subsequently recorded by Roháček (2009) from the Central European Territory of Russia (Moscow vicinity). Its discovery in Japan (first record from E. Palaearctic) is, therefore, surprising.

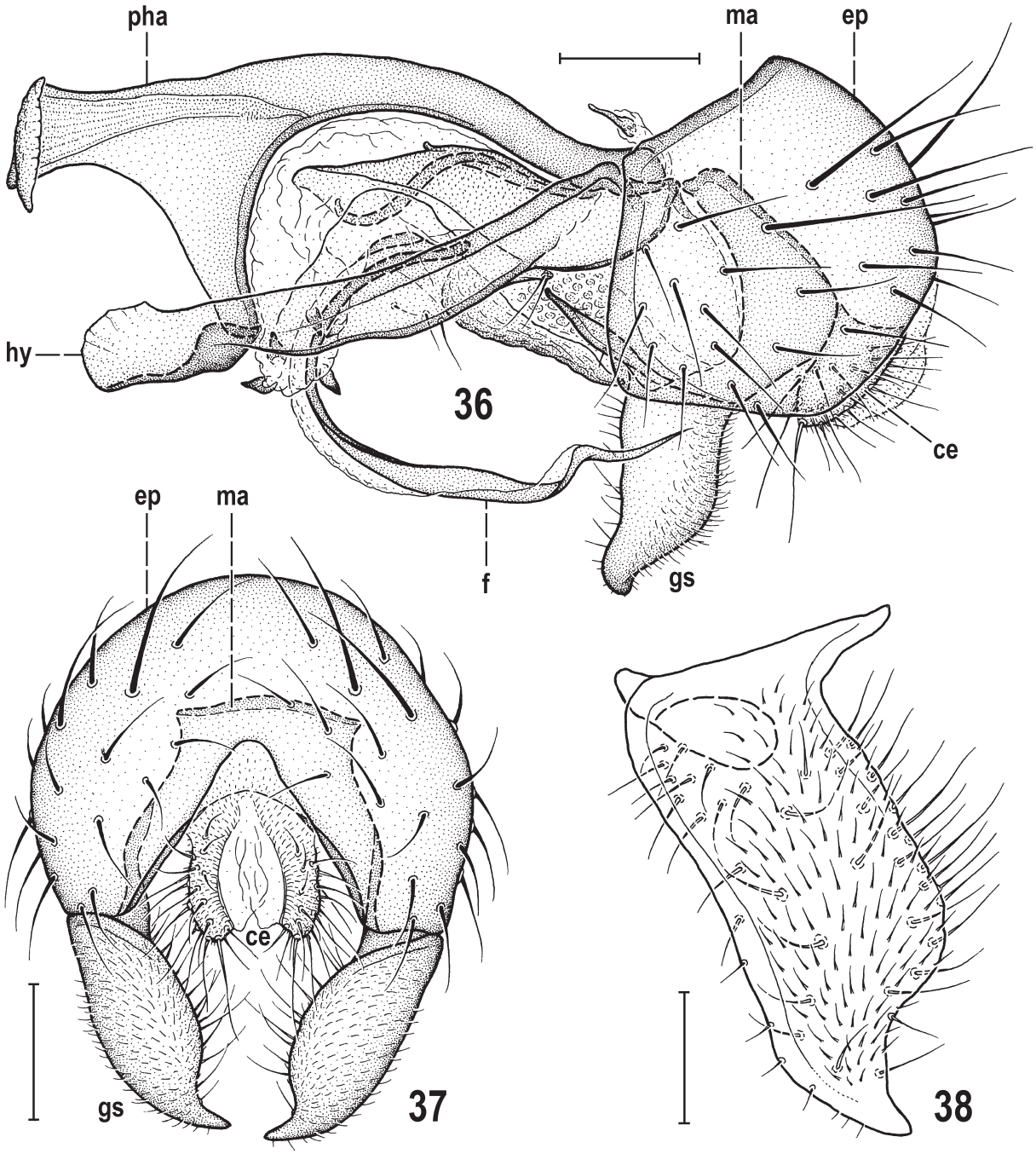
Anthomyza collini Andersson, 1976

Material examined. RUSSIA: West Siberia: Altaiskiy krai, Zmeinogorskiy rayon, Oz. Kalyvanovskoe, 8.ix.2007, 1 ♀; Novosibirsk, mikr-n Shlyuz, staritsa-boloto, 54°50′43–44″N 83°02′88″E, 21.vi.2008, 2 ♀♀; Omsk, Park 30-letia Pobedy, vegetation near water, 27.viii.2007, 1 ♀, all O. E. Kosterin leg. (all ZMUM, all but one genit. prep.).

Distribution. This is a widespread and frequently encountered species in Europe. There were only single records from W. Siberia (see Roháček 2006, 2009) but recently it has also been found in Iturup I. of the Kuril archipelago (Roháček & Przhiboro 2016). First records from the southeasternmost part of W. Siberia demonstrate its occurrence also in other intervening areas.

Anthomyza decolorata Roháček, 2009

Material examined. RUSSIA: Far East: o. Kunashir, okr. vlk. Mendeleeva, 4.vii.1985, 1 ♂, 8.vii.1985, 1 ♀, 23.vii.1985, 1 ♀, 29.vii.1985,



Figs 36–38. *Anthomyza clara* Roháček, male (Japan). 36 – male genitalia in situ, laterally; 37 – external genitalia, caudally; 38 – gonostylus, ventrolaterocaudally (widest extension view). Scales = 0.1 mm (Figs 36, 37) and 0.05 mm (Fig. 38). For abbreviations see see p. 263.

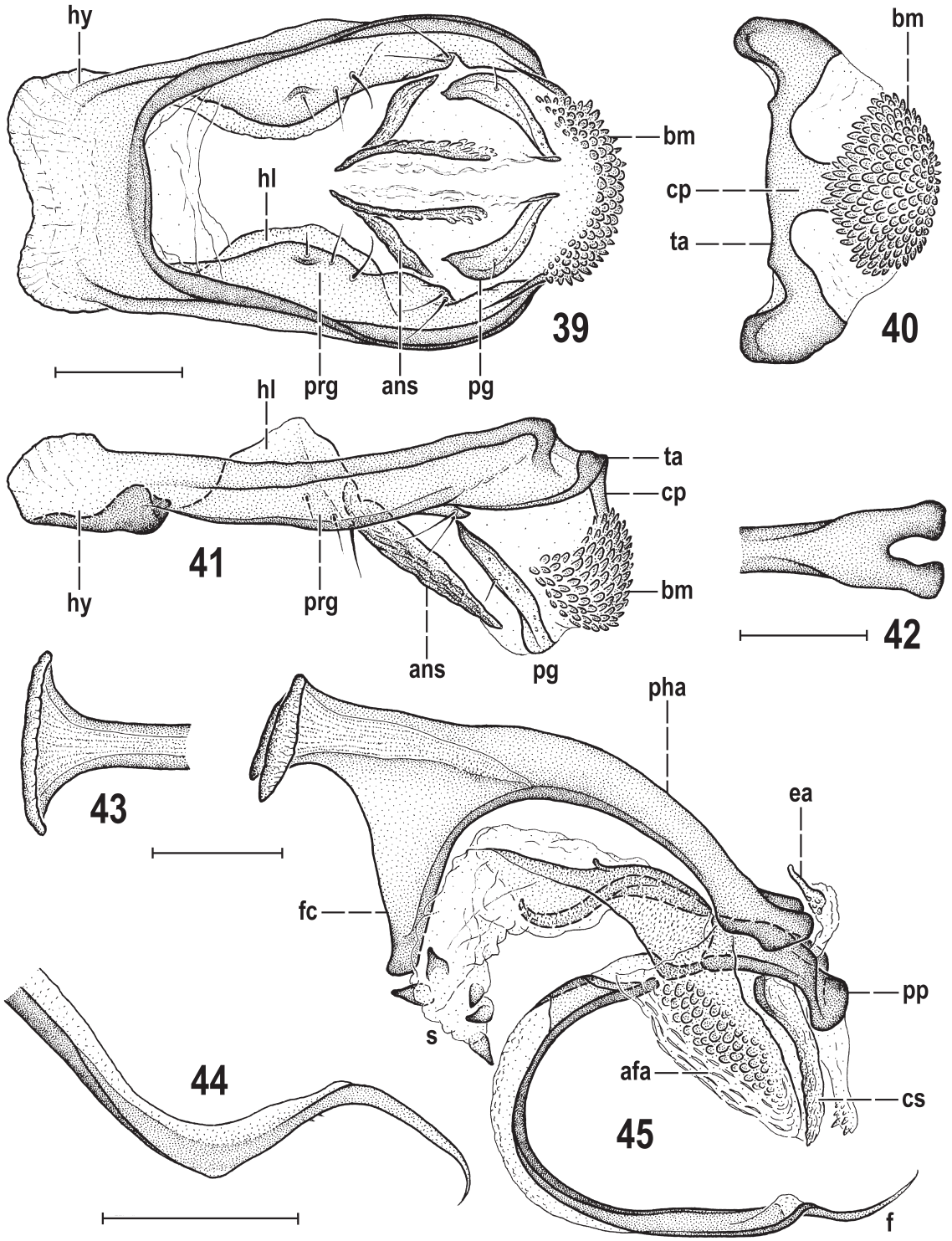
1 ♀; Tret'yakovo, 21.vii.1985, 1 ♀, all S. Churkin leg. (all ZMUM, 1 ♂ 1 ♀ genit. prep.).

Remarks. *Anthomyza decolorata* belongs to the *A. macra* group (Roháček 2009) and was found to be the closest relative of the Nearctic *A. oblonga* Roháček & Barber, 2016 by Roháček & Barber (2016: 377–379). It is distinguished by its bicolourous (largely yellow) head and thorax and strikingly dorsomedially depigmented preabdominal terga, apart from a distinctive gonostylus and unusually extensive sclerotization of the anterior part of the female genital chamber (Roháček 2009: figs 36, 38).

Distribution. The species is known only from the Far East of Russia. It was described from Kamchatka and Kunashir I. (Roháček 2009). Additional records from Kunashir I. indicate that it could be a relatively frequent species on this island.

Anthomyza dissors Collin, 1944

Material examined. RUSSIA: East Siberia: Irkutskaya oblast: Kultuk village, W end of Baikal lake, 51°43′36″N 103°43′08″E, 428 m, meadow, swamp and ruderal area, *Rhinanthus* present, swept and emptied in photoeclector, Ru2177, 22.vii.2016, 1 ♀, M. von Tschirnhaus leg. (SMOC, in pure ethanol).



Figs 39–45. *Anthomyza clara* Roháček, male (Japan). 39 – hypandrial complex, ventrally; 40 – transandrium, caudally; 41 – hypandrial complex, laterally; 42 – base of phallapodeme, dorsally; 43 – apex of phallapodeme, dorsally; 44 – apex of filum of distiphallus, ventrally; 45 – aedeagal complex, laterally. All scales = 0.1 mm. For abbreviations see see p. 263.

Distribution. The species is considered a Boreo-montane species, occurring in northern and central Europe including European Russia but it has also been recorded from FE: Kamchatka (Roháček 2006, 2009). The above first record from East Siberia demonstrates its occurrence also in the intervening area of the E. Palaearctic.

Anthomyza drachma Sueyoshi & Roháček, 2003

Material examined. RUSSIA: Far East: Yuzh. Primor'e: 40 km YU-V [= SE] Ussuriysk, 30.vi.1985, 1 ♂, A. Ozerov leg. (ZMUM). **JAPAN: Hokkaido:** Kiyokawa, Ashoro, 23.vii.1967, 1 ♀, T. Saigusa leg. (SIINH, genit. prep.).

Remarks. Because of the distinctive male and female

terminalia, *A. drachma* was formerly considered of unknown relationship (cf. Roháček 2009; Roháček & Barber 2016) but it has recently been recognized as a relative (or even a member) of the *A. umbrosa* group in the molecular phylogenetic hypothesis by Roháček et al. (2019). If so, *A. clara* is its closest relative in the E. Palaearctic area.

Biology. Poorly known. Roháček & Przhiboro (2016) reported its occurrence in graminoid vegetation in swampy mixed forest near a lake shore. Adults occur in May to September.

Distribution. The species has been known only from Japan (Hokkaido, Honshu) (Sueyoshi & Roháček 2003, Roháček 2009) and Iturup I. in the Kuril archipelago (Roháček 2006, Roháček & Przhiboro 2016). The above record from the Ussuriysk vicinity is the first from continental Asia and demonstrates its wider distribution in this easternmost part of the Palaearctic Region.

Anthomyza elbergi Andersson, 1976

Material examined. RUSSIA: West Siberia: S. Ural: Chelyabinsk Reg., Miass, SW Turgoyak Lake, 26.–31.vii.2008, 4 ♀♀; Khanty-Mansy AO: Shapsha env., 61.085°N 69.458°E, 42 m, forest, 1.–4.viii.2010, 1 ♂, all K. Tomkovich leg. (all ZMUM, all genit. prep.); Novosibirsk, Akademgorodok, 54.825°N 83.113°E, pond in botanic garden, 1.vii.2009, 1 ♂ (genit. prep.); North Altai: Shebalino distr., Kamlak vill. Env., Chistyi Lug terrain, meadow & pine forest, 10.vii.2007, 3 ♂♂; Altai: Shebalinskiy rayon, dol. r. Peschanaya, mezhdu sel. Il'inka i Bagarash, 51°57.202′N 86°22.881′E, 29.vii.2008, 1 ♂; Altai: Chojskiy rayon, dol. r. Isha, mezhdu sel. Paspaul i Levinka, 51°57.202′N 86°22.881′E, 322 m, 26.vii.2008, 1 ♀ (genit. prep.), all O. E. Kosterin leg. (all ZMUM); Krasnoyarsk, 70 km W st. Kryuchkovo, 14.–23.vii.2009, 1 ♂, K. Tomkovich leg. (ZMUM, genit. prep.). **East Siberia:** Irkutskaya oblast: Kultuk village, W end of Baikal lake, 51°43′36″N 103°43′08″E, 428 m, meadow, swamp and ruderal area, *Rhinanthus* present, swept and emptied in eclector, Ru2177, 22.vii.2016, 2 ♂♂ 4 ♀♀, M. von Tschirnhaus leg. (SMOC, in pure ethanol); same locality, below Trans-Siberian Railway line, meadow and swamp, ruderal area along path, 22.vii.2016, 2 ♂♂; Buryatskaya oblast: shore of Baikal lake, 1.5 km NNE Vydrino, E river Suezhnaya, walked eastwards until 51°28′13″N 104°40′32″E, 457 m, sandy shore, shore wall, adjoining lagoons and swamps, *Eleocharis* (dominant), *Comarum*, *Ranunculus*, *Phalaris*, *Triglochin palustre*, *Halerpesthes ruthenica*, *Butomus umbellatus*, *Sium suave*, *Phragmites*, *Scirpus* [=*Schoenoplectus*] *tabernaemontani*, swept and filled in eclector, Ru2178, 23.vii.2016, 2 ♂♂ 3 ♀♀; Buryatskaya oblast: Tunkinsky district, 149 km W Lake Baikal, western bank of river Khalagun, 0.4 km N road no. A164 (A333), 0.6 km W of its river mouth in river Irkut, 51°38′09″N 101°33′18″E, 909 m, very diverse vegetation (for list see diary), swept and filled in eclector, Ru2185, 6.viii.2016, 2 ♂♂ 3 ♀♀, all M. von Tschirnhaus leg. (all ZSMC). **Far East:** Amurskaya oblast: g. Zeya, 30.vi.1978, 1 ♂, 18.vii.1981, 2 ♀♀, A. Shatalkin leg.; same locality, 28.vii.1981, 1 ♂, 6.viii.1981, 1 ♂, O. Gorbunov leg.; o. Kunashir, okr. vlk. Mendeleeva, 25.vii.1985, 1 ♂, S. Churkin leg. (all ZMUM, all genit. prep.). **NORTH KOREA** (D.P.R. Korea): Paekdusan Mts, Samjiyon, 18.viii.1989, 1 ♀; Paekdusan Mts, Mupo, 30 km N of Samjiyon, 18.viii.1989, 1 ♀, both M. Kozánek leg. (SMOC, both genit. prep.).

Distribution. This transpalaearctic species (restricted to the northern belt of the region) seems to be common and widespread in the E. Palaearctic area, including all parts of Russia (also known from the Kuril archipelago and Sakhalin I.), China (Inner Mongolia), Japan and North Korea (Roháček 2006, 2009; Roháček & Przhiboro 2016; Wang et al. 2021). The above records confirm this distribution.

Anthomyza flavosterna Sueyoshi & Roháček, 2003

Material examined. RUSSIA: Far East: o. Kunashir, okr. vlk. Mendeleeva, [no day, month], 1985, 1 ♀, S. Churkin leg. (ZMUM, genit. prep.).

Remarks. This is another distinctive E. Palaearctic species of *Anthomyza*. Roháček (2020) has recently recognized its close relationship to some unnamed *Anthomyza* species found in Taiwan and established the *A. flavosterna* group to accommodate all these species. Currently, *A. flavosterna* is the only species of the group occurring outside Taiwan.

Distribution. The species is probably restricted to the easternmost areas of the Palaearctic but it has not been recorded from continental Asia up to the present. It remains known only from Japan (Hokkaido, Honshu) (Sueyoshi & Roháček 2003) and the Kuril archipelago (Kunashir I., Iturup I.), see Roháček (2009), Roháček & Przhiboro (2016) and the record above.

Anthomyza gracilis Fallén, 1823

Material examined. RUSSIA: West Siberia: Bashikiria: Beloretsk distr., Abzakovo env., Kulsugady river, 53.83795°N 58.5823°E, 531 m, 17.vii.2015, 6 ♂♂, D. Gavryushin leg. (ZMUM, 1 ♂ genit. prep.); Altai: Shebalinskiy rayon, s. Cheroga, 51°33.545′N 85°38.344′E, 575 m, lug na SV sklone [= meadow on NE slope], 25., 28.vii.2008, 3 ♀♀ (1 ♀ genit. prep.); Altai: Shebalinskiy rayon, dol. r. Peschanaya, mezhdu sel. Il'inka i Bagarash, 51°57.202′N 86°22.881′E, 29.vii.2008, 2 ♀♀; Altai: Chojskiy rayon, dol. r. Isha, mezhdu sel. Paspaul i Levinka, 51°57.202′N 86°22.881′E, 322 m, 26.vii.2008, 1 ♀ (genit. prep.), all O. E. Kosterin leg. (all ZMUM); Krasnoyarsk, 70 km W st. Kryuchkovo, 14.–23.vii.2009, 3 ♂♂ 1 ♀ (2♂♂ 1 ♀ genit. prep.); Krasnoyarsk, E bank, 'Stoby' Res. env., riv. Laletina, 55.963°N 92.738°E, 208 m, *Padus* & shrubs near stream, 24.–26.vii.2009, 1 ♂ (genit. prep.), all K. Tomkovich leg. (all ZMUM). **East Siberia:** Irkutskaya oblast: Kultuk village, W end of Baikal lake, 51°43′36″N 103°43′08″E, 428 m, meadow, swamp and ruderal area, *Rhinanthus* present, swept and emptied in eclector, Ru2177, 22.vii.2016, 2 ♀♀, M. von Tschirnhaus leg. (SMOC, in pure ethanol); Buryatskaya oblast: shore of Baikal lake, 1.5 km NNE Vydrino, E river Suezhnaya, walked eastwards until 51°28′13″N 104°40′32″E, 457 m, sandy shore, shore wall, adjoining lagoons and swamps, *Eleocharis* (dominant), *Comarum*, *Ranunculus*, *Phalaris*, *Triglochin palustre*, *Halerpesthes ruthenica*, *Butomus umbellatus*, *Sium suave*, *Phragmites*, *Scirpus* [=*Schoenoplectus*] *tabernaemontani*, swept and filled in eclector, Ru2178, 23.vii.2016, 3 ♂♂ 1 ♀; Buryatskaya oblast: Tunkinsky district, 149 km W Lake Baikal, western bank of river Khalagun, 0.4 km N road no. A164 (A333), 0.6 km W of its river mouth in river Irkut, 51°38′09″N 101°33′18″E, 909 m, very diverse vegetation (for list see diary), swept and filled in eclector, Ru2185, 6.viii.2016, 4 ♂♂ 4 ♀♀, all M. von Tschirnhaus leg. (all ZSMC).

Distribution. Another transpalaearctic species, widespread in the northern and temperate belts of the Palaearctic Region. It is also frequently encountered in the E. Palaearctic area, having been recorded from Russia (West and East Siberia, Far East) and North Korea (Roháček 2006, 2009). However, the records from easternmost Asia are rather scarce (two records from Amurskaya oblast, several from Kamchatka, and a single record from North Korea).

Anthomyza orineglecta Roháček, 2006

Material examined. RUSSIA: Far East: Primor'e: Khasansk. rayon, Tsukanevo, 17.vii.1989, 1 ♀, S. Churkin leg. (ZMUM).

Biology. Based on data from Iturup I. (Roháček & Przhiboro (2016), the species seems to be associated with grass-

es and sedges in wetland and marshy rivershore habitats. Adults have been captured only in July and August.

Remarks. This distinctive species is the only member of the *A. neglecta* group occurring in the Far East. It is closest to *A. paraneglecta* Elberg, 1968 (cf. Roháček 2009) and differs from all Palaearctic relatives by lateral brown markings on the occiput and 1st antennal flagellomere, vittae on mesonotum and brown preabdominal sterna apart from distinctive male and female terminalia (cf. Roháček 2006, 2009).

Distribution. Known only from scarce records from continental and insular Russian Far East. The majority of records (including the type locality) are from Iturup I. in the Kuril archipelago (Roháček 2006; Roháček & Przhiboro 2016). Otherwise, it is known only from Sakhalin I. (1 male) and southern Primor'e (1 male, 1 female), see Roháček (2009). One more record from Primor'e is given above.

Anthomyza pallida (Zetterstedt, 1838)

Material examined. RUSSIA: West Siberia: Bashikiria: Beloretsk distr., Makhmutovo env, Belaya river, 54.33012°N 58.80735°E, 550 m, 15.vii.2015, 1 ♀, D. Gavryushin leg. (ZMUM, genit. prep.); S. Ural: Chelyabinsk Reg., near Zlatoust, Taganay Mts, 16.–24.vii.2008, 2 ♂♂, K. Tomkovich leg. (ZMUM, 1 ♂ genit. prep.); Central Altai: Ust'-Koksa distr., Kuzuyak pass, ~50°06′N 86°26′E, 1000–1400 m, 26.vi.2007, 1 ♂, O. Kosterin leg. (ZMUM); Krasnoyarsk, 70 km W st. Kryuchkovo, 14.–23. vii.2009, 3 ♂♂ 3 ♀♀ (2 ♂♂ 1 ♀ genit. prep.); Krasnoyarsk, 70 km W, st. Kryuchkovo (4040 km), garden, yellow pan traps, 15.–24.vii.2009, 3 ♂♂ 3 ♀♀ (1 ♂ genit. prep.); Krasnoyarsk, Emelyanovo distr., Kryuchkovo station, 56.096°N 92.109°E, pond, 13.–15.vi.2011, 2 ♂♂; Krasnoyarsk, E bank, 'Stoby' Res. env., riv. Laletina, 55.963°N 92.738°E, 208 m, *Padus* & shrubs near stream, 30.–31.vii.2009, 1 ♂; Krasnoyarsk, W bank, Udachniy distr. env., *Betula* forest edge, 28.vii.2009, 1 ♀, all K. Tomkovich leg. (all ZMUM). **East Siberia:** Irkutskaya oblast: Kultuk village, W end of Baikal lake, 51°43′36″N 103°43′08″E, 428 m, meadow, swamp and ruderal area, *Rhinanthus* present, swept and emptied in photoeclector, Ru2177, 22.vii.2016, 1 ♂ 1 ♀, M. von Tschirnhaus leg. (SMOC, in pure ethanol); Buryatskaya oblast: shore of Baikal lake, 1.5 km NNE Vydrino, E river Suezhnaya, walked eastwards until 51°28′13″N 104°40′32″E, 457 m, sandy shore, shore wall, adjoining lagoons and swamps, *Eleocharis* (dominant), *Comarum*, *Ranunculus*, *Phalaris*, *Triglochin palustre*, *Halerpesthes ruthenica*, *Butomus umbellatus*, *Sium suave*, *Phragmites*, *Scirpus* [=*Schoenoplectus*] *tabernaemontani*, swept and filled in photoeclector, Ru2178, 23.vii.2016, 1 ♂; Buryatskaya oblast: western shore of river Selenga, 1.5 km stream up from village Kibolina, 12.4 km SSW Orongoy, 51°24′30″N 106°59′58″E, 536 m, dry and swampy areas along a small stream under the shade of trees, adjoining dry hills (list of 82 vascular plants available), swept and filled in photoeclector, Ru2181, 29.vii.2016, 1 ♂; Buryatskaya oblast: Barguzinsky district, between town Ust'-Barguzin and peninsula Svyatoy Nos ("holy nose"), 53°35′16″N 108°55′29″E, 450 m, large swamp and bog between coast of Lake Baikal (south) and Lake Arangatuy (north), north of sand strip with camp site "Mestro Stoyanki", *Betula*, *Pinus*, *Pedicularis*, *Comarum*, *Menyanthes*, *Equisetum*, *Carex*, *Epilobium*, *Ledum*, *Saxifraga hirculus*, *Triglochin*, *Cicuta*, *Vaccinium uliginosum*, *V. oxycoccus*, some *Eriophorum*, swept for one hour and filled in photoeclector, Ru2184, 2.viii.2016, 1 ♂; Buryatskaya oblast: Tunkinsky district, 149 km W Lake Baikal, western bank of river Khalagun, 0.4 km N road no. A164 (A333), 0.6 km W of its river mouth in river Irkut, 51°38′09″N 101°33′18″E, 909 m, very diverse vegetation (for list see diary), swept and filled in photoeclector, Ru2185, 6.viii.2016, 1 ♂, all M. von Tschirnhaus leg. (all ZSMC). **NORTH KOREA** (D.P.R. Korea): Paekdusan Mts, Mt. Pakdu, 16.viii.1989, 1 ♂, M. Kozánek leg. (SMOC, genit. prep.).

Distribution. *Anthomyza pallida* is widespread in the northern and temperate belts of the Palaearctic Region, ranging from Great Britain to the Far East of Russia (Roháček 2006, 2009). In the E. Palaearctic, there are records from Kirghizia and Russia (West and East Siberia, Far East) (Roháček 2006, 2009) and from China (Inner Mongolia, Wang et al. 2021). The above records confirmed its occurrence in further areas of Siberia. In southern areas (Italy, Kirghizia), the species seems to be restricted to montane ranges. This is also the case of the above first record from North Korea which is the southernmost in eastern Asia.

Anthomyza paraneglecta Elberg, 1968

Material examined. RUSSIA: West Siberia: Bashikiria: Beloretsk distr., Makhmutovo env, Belaya river, 54.33012°N 58.80735°E, 550 m, 15.vii.2015, 1 ♀, D. Gavryushin leg. (ZMUM, genit. prep.).

Distribution. This species has hitherto been known only from northern and central Europe, viz. Czech Republic, Denmark, Estonia, Finland, Germany, Great Britain, Latvia, Poland, Slovakia and Sweden (Roháček 2009). The above record is the first from Russia and it is also new to the E. Palaearctic area, although situated near the westernmost border of the latter.

Anthomyza pleuralis Czerny, 1928

Material examined. RUSSIA: West Siberia: Krasnoyarsk, 70 km W st. Kryuchkovo (4040 km), garden, yellow pan traps, 15.–24.vii.2009, 1 ♂ 3 ♀♀; same locality, pine forest, near pond, shady, yellow pan traps, 14.–23.vii.2009, 2 ♂♂, all K. Tomkovich leg. (all ZMUM).

Distribution. This Palaearctic species has a similar distribution to that of *A. pallida*, occurring in the northern and temperate belts of the region. In the E. Palaearctic, there are only single records from West and East Siberia (Roháček 2006) and the Far East of Russia (Amurskaya oblast, Roháček 2009). The above records from Krasnoyarsk confirm its occurrence in the southeastern part of West Siberia.

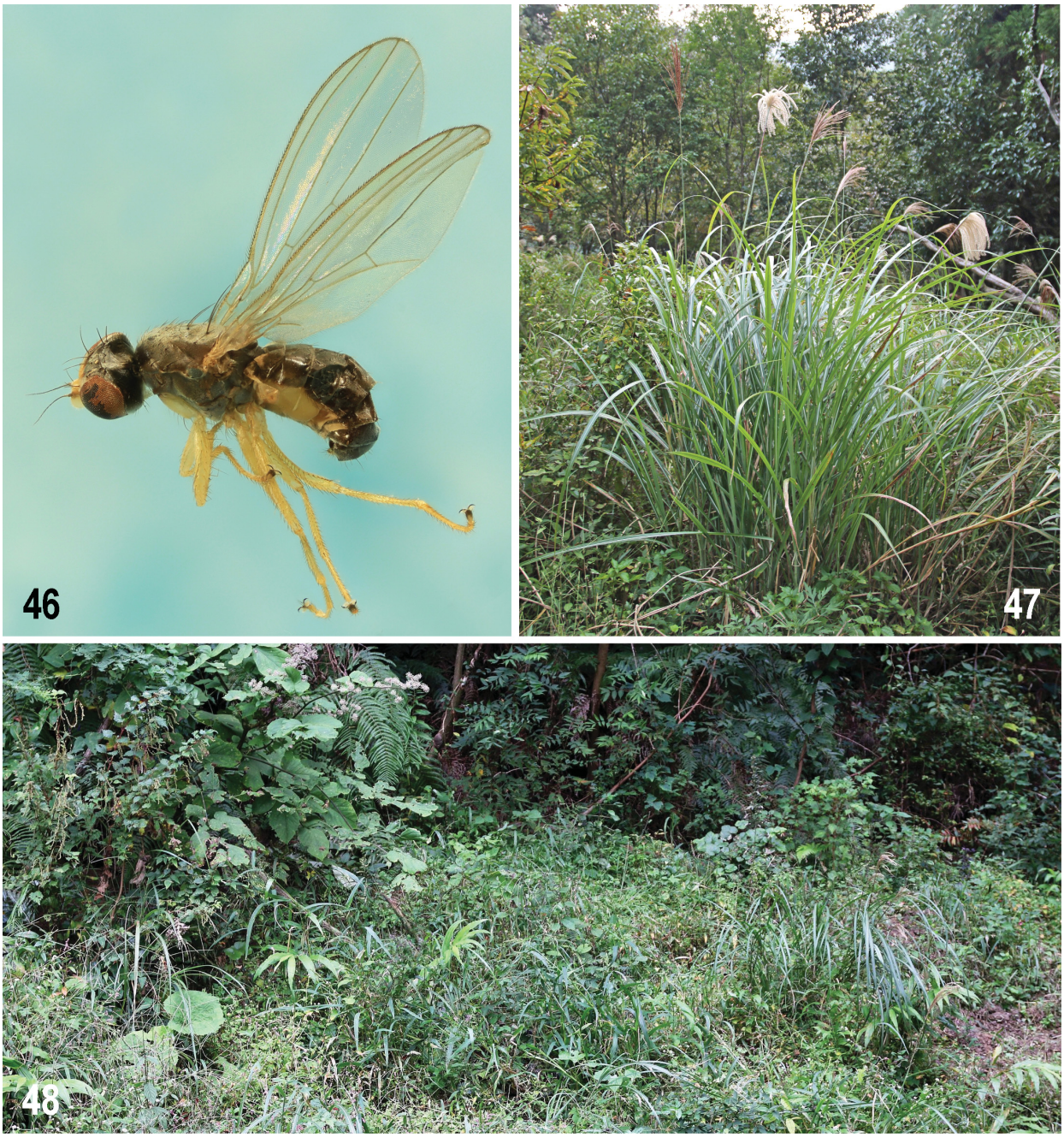
Anthomyza trifurca Sueyoshi & Roháček, 2003

(Fig. 46)

Material examined. JAPAN: Kyushu: Fukuoka Pref., Inunaki-yama, 23.x.2015, 1 ♂, T. Saigusa leg. (SIINH, genit. prep.); Fukuoka Pref., Fukuoka, Mitsuse, Mt. Sefuri, Kitayma (Hokuzan) Dam, 33°25′58.4″N 130°13′58.6″E, 355 m, sweeping forest edge, 10.x.2015, 10 ♂♂ 7 ♀♀, M. Tkoč leg. (8 ♂♂ 5 ♀♀ NMPC; 2 ♂♂ 2 ♀♀ SMOC, 1 ♂ 1 ♀ genit. prep.); Kumamoto Pref., Shimomashiki District, Misato, Midorikawa Dam, 32°37′N 130°54′E, 365 m, sweeping forest edge, 19.x.2015, 1 ♂ 4 ♀♀, M. Tkoč leg. (NMPC, 1 ♀ genit. prep.); same locality but 32°37′26.5″N 130°54′35″E, 190 m, sweeping forest edge, 21.x.2015, 1 ♂ 2 ♀♀, M. Tkoč leg. (NMPC, 1 ♂ genit. prep.).

Remarks. A species of the *Anthomyza bellatrix* group (characterized by a solid, whitish-grey microtomentose spot on occiput (above foramen) as visible on Fig. 46), distinguished from related species by having the shortest ctenidial spine on f_1. Its closest relative, *A. robusta* Roháček, 2020, has recently been described from Taiwan (Roháček 2020).

Biology. Based on above records from Japan and information provided by M. Tkoč (personal communication, 2016, 2020), the species seems to be associated with taller grasses growing at wet margins of forests (Fig. 48). A series of adults collected at Midorikawa Dam on October 21, 2015 was swept from tufts of the large grass *Miscanthus*



Figs 46–48. *Anthomyza trifurca* Sueyoshi & Roháček, male (South Korea) and its habitat in Japan. 46 – male, sublaterally, with a view of occiput; 47 – a tussock of grass, *Miscanthus sinensis*, probable host plant of the species in Kumamoto Pref. (Kyushu); 48 – various graminoids on forest margin, habitat of the species in Fukuoka Pref. (Kyushu). Photos by J. Roháček (46) and M. Tkoč (47, 48).

sinensis Andersson (Fig. 47) which could be its host plant. Interestingly, *A. robusta* was also caught from this grass in Taiwan (Roháček 2020: 278 and fig. 3).

Distribution. Hitherto recorded only from easternmost parts of the Palaearctic Region, viz., Japan, North Korea, South Korea and China (Sichuan) (Roháček 2006, 2009, 2018). Interestingly, this species (common in Japanese archipelago and Korean peninsula) has not been encountered in the Far East of Russia up to now.

Genus *Arganthomyza* Roháček, 2009

The genus is represented by only 3 species (2 of them recorded below) in the E. Palaearctic area. The third species, *A. hyperseta* Roháček, 2018, is known only from the holotype male from China (Shaanxi), see Roháček (2018).

Arganthomyza socculata (Zetterstedt, 1847)

Material examined. RUSSIA: West Siberia: Khanty-Mansy AO: Shapsha env., 61.085°N 69.458°E, 42 m, forest, 1.–4.viii.2010, 1 ♂, K. Tomkovich leg. (ZMUM, genit. prep.); Central Altai: Ust'-Koksa distr., Kuzuyak pass, ~50°06′N 86°26′E, 1000–1400 m, 26.vi.2007, 1 ♀, O. Kosterin leg. (ZMUM); Krasnoyarsk, 70 km W st. Kryuchkovo, 14.–23.vii.2009, 2 ♂♂ (1 ♂ genit. prep.); same locality, garden, yellow pan traps, 15.–24.vii.2009, 3 ♂♂, all K. Tomkovich leg. (all ZMUM). **East Siberia:** Irkutskaya oblast: Kultuk village, W end of Baikal lake, 51°43′36″N 103°43′08″E, 428 m, meadow, swamp and ruderal area, *Rhinanthus* present, swept and emptied in photoeclector, Ru2177, 22.vii.2016, 3 ♂♂ 2 ♀♀, M. von Tschirnhaus leg. (SMOC, in pure ethanol).

Distribution. A boreo-alpine species widespread in the northern belt of the Palaearctic Region, ranging from Iceland to Kamchatka (Roháček 2009) but also recorded from Alaska in the Nearctic Region (Roháček & Barber 2013, 2016). In the E. Palaearctic, already known from Kazakhstan, Kirghizia, Mongolia, Russia (West and East Siberia, Far East) and from a single specimen from North Korea (Roháček 2006). Additional records from further areas of West and East Siberia are presented above.

Arganthomyza versitheca Roháček, 2009

Material examined. NORTH KOREA (D.P.R. Korea): Paekdusan Mts, Mt. Sobaek, 17.viii.1989, 1 ♂, M. Kozánek leg. (SMOC, genit. prep.).

Distribution. An East Asian species originally described from South Korea (Roháček 2009) and subsequently recorded from China (Shaanxi and Sichuan) by Roháček (2018). The above (first) record from North Korea represents a new northernmost distribution limit of the species.

Genus *Epischnomyia* Roháček, 2006

This exclusively E. Palaearctic genus includes 3 named species, two of which are recorded below. The remaining species, *E. tkoci* Roháček, 2018, is known only from the male holotype collected in China (Sichuan) (Roháček 2018). *Epischnomyia* is a small E. Asian group of variegated (Figs 51, 52) and morphologically aberrant species which is closely allied to *Anthomyza*. A recent molecular phylogenetic hypothesis even suggests it could be a lineage within the latter genus (Roháček et al. 2019).

Epischnomyia merzi Roháček, 2009
(Figs 51, 52)

Material examined. NORTH KOREA (D.P.R. Korea): Paekdusan Mts, Onsupjong, 19.viii.1989, 1♀, M. Kozánek leg. (SMOC, genit. prep.).

Remarks. This species is very similar and closely related to *E. triarmigera* (for detail see Roháček 2009).
Biology. Information obtained from a recent record from Sichuan (Roháček 2018) indicates that this, and probably also other species of *Epischnomyia*, are associated with dicotyledonous plants in herbaceous undergrowth of humid leafy forests. Adults were encountered in May (Roháček 2018), June (Roháček 2009) and August (the present record).
Distribution. The species was described from South Korea (Roháček 2009) and later recorded from China (Sichuan). The first record from North Korea (see above) represents a new northernmost occurrence of the species.

Epischnomyia triarmigera (Sueyoshi & Roháček, 2003)

Material examined. RUSSIA: Far East: Yuzh. Primor'e: Kamenushka, 19.vii.1983, 1 ♂ (genit, prep.), A. Shatalkin leg.; same locality, 22.viii.1989, 1 ♀, S. Churkin leg.; Primorskyi reg.: Andreevka, ~42.64°N 131.13°E, 25.–30.vi.2014, 1 ♂, N. Vikhrev leg. (ZMUM).

Distribution. The species was described (as *Ischnomyia*) from Japan (Hokkaido, Honshu) and Russia (Primorski Territory: Ussuriysk env.), see Sueyoshi & Roháček (2003), and one more record from the latter area was added by Roháček (2009). The above records confirm its occurrence in the continental Far East of Russia.

Genus *Fungomyza* Roháček, 1999

This small genus is represented by 2 species in the Palaearctic Region (Roháček 2009), both of which are recorded below from the E. Palaearctic area.

Fungomyza albimana (Meigen, 1830)

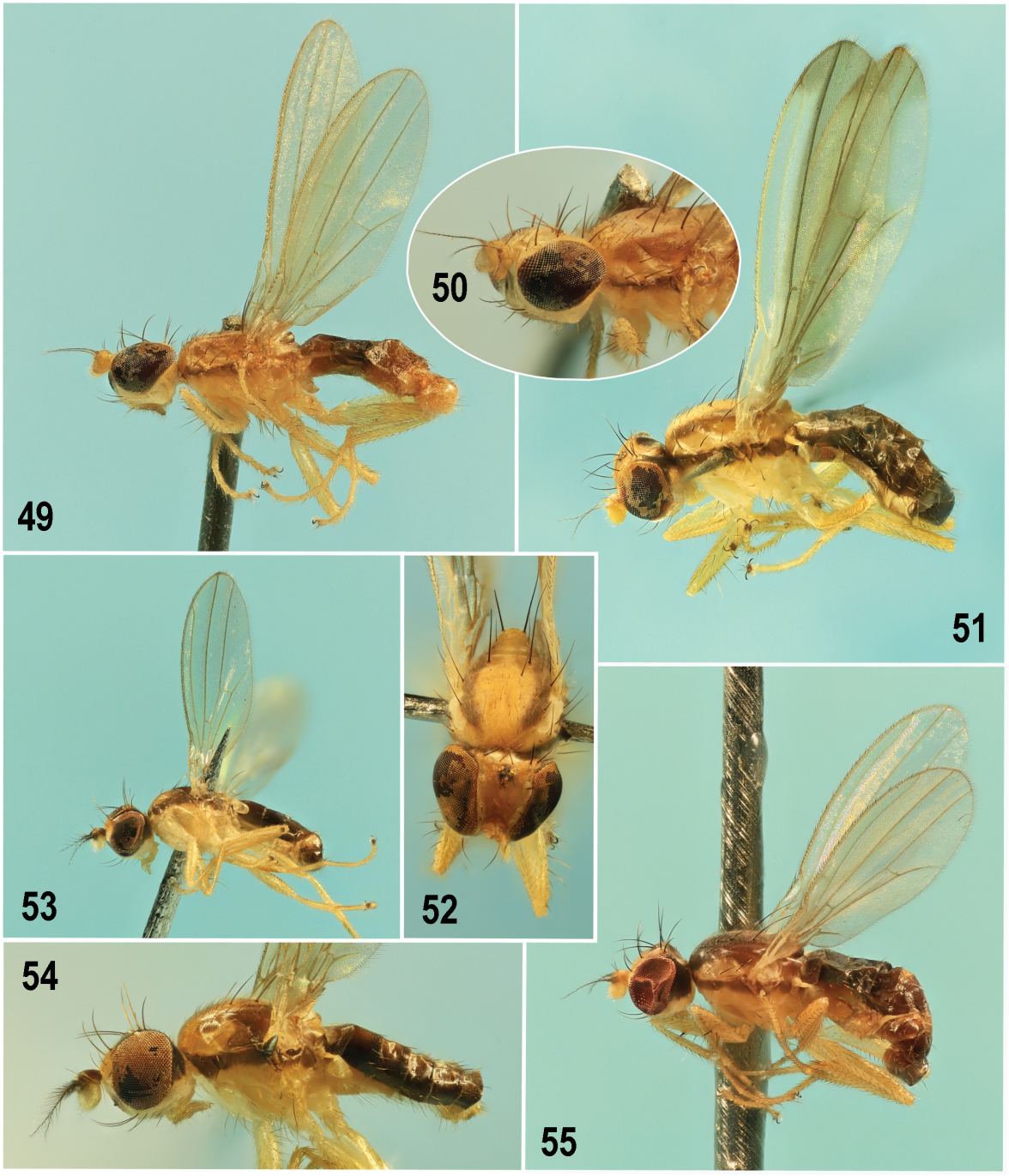
Material examined. RUSSIA: West Siberia: S. Ural, E. Bashkiria: Abzakovo-Murakaevo env., E. Kryktytau Mts, birch, steppe, 2.–8.viii.2008, 1 ♀; S. Ural: Chelyabinsk Reg., Miass, SW Turgoyak Lake, 26.–31.vii.2008, 3 ♂♂ 8 ♀♀, all K. Tomkovich leg. (all ZMUM); Novosibirsk Reg., Iskitimskiy Distr., 7–20 km S vill. Zavyalovo, Karakansky bor (pine forest), 12.vii.2007, 3 ♂♂ 1 ♀, O. Kosterin leg. (ZMUM, 1 ♂ genit. prep.).

Remarks. A distinctive species, easily recognizable by its stout blackish and relatively shining body and variegated fore leg: yellow with broad blackish-brown subapical annulus on femur, largely blackish-brown tibia (with only knee yellow) and fore basitarsus, rest of fore tarsus yellowish white, see Roháček (2009: fig. 147).
Biology. A species with mycosaprophagous larvae feeding in decayed tissues of various species of macrofungi (for detail see Roháček 2009). Adults can be observed hovering over suitable sporocarps of fungi in groves and sparse forests in May to September (Roháček 2006).
Distribution. The species is widespread in virtually the whole of Europe and was also recorded from Turkey (Roháček 2006, 2009). The above records from West Siberia are the first from the E. Palaearctic area, that from Iskitimskiy district representing a new easternmost locality for the species.

Fungomyza cercata Roháček, 2009
(Fig. 35)

Material examined. RUSSIA: Far East: khr. Mal. Khingan [= ridge Lesser Khingan], r [= river] Dichun, 13.vii.1979, 1 ♂, A. Shatalkin leg. (SMOC, whole specimen in pinned plastic tube in glycerine, genit. prep.). ***Note.*** the locality lies in the Jewish Autonomous Region, ca 13 km SE Radde selo (= larger village), near the confluence of the Dichun and Amur rivers, coordinates 48°31′15″N 130°44′10″E (A. Shatalkin, personal communication, 2021).

Remarks. In contrast to congeners (*F. albimana* and *F. buccata* Roháček & Barber, 2004), this species has the fore leg uniformly yellow, with only the apical tarsal segment (partly) darkened brown but the hind femur (Fig. 35) with pale brown to brown subapical annulus (knee yellow). Setae in posteroventral row on male f_3 longer than other setosity, only 3 or 4 in distal half somewhat shortened and slightly (in contrast to those of *F. albimana*) thickened.
Biology. Unknown owing to its rarity. The holotype male was collected in August (Roháček 2009), the specimen recorded here in July.
Distribution. The species was known only from southern Primor'e (40 km SE Ussuriysk) in the Far East of Russia. The above male (second known specimen) originates from a locality in the Jewish Autonomous Region, lying some 560 km further north.



Figs 49–55. Some E. Palaearctic Anthomyzidae. 49 – *Anthomyza clara* Roháček, 2006, male, laterally (Japan), body length 2.22 mm; 50 – same specimen, head and thorax, dorsolaterally; 51 – *Epischnomyia merzi* Roháček, 2009, male, laterally (South Korea), body length 2.58 mm; 52 – same specimen, head and thorax, dorsally; 53 – *Stiphrosoma fissum* Roháček, 1996, male, laterally (South Korea), body length 1.79 mm; 54 – same species, female, laterally (South Korea), body length 1.85 mm; 55 – *Stiphrosoma humerale* Roháček & Barber, 2005, male, laterally (Far East of Russia), body length 1.90 mm. Photos by J. Roháček.

Genus *Paranthomyza* Czerny, 1902

A monotypic genus of Anthomyzidae (see Roháček 2009). Its only species occurs rarely in the E. Palaearctic area (hitherto known only from West Siberia).

Paranthomyza nitida (Meigen, 1838)

Material examined. RUSSIA: West Siberia: Krasnoyarsk, 70 km W st. Kryuchkovo, 14.–23.vii.2009, 2 ♂♂ 2 ♀♀; same locality, garden, yellow pan traps, 15.–24.vii.2009, 1 ♂, all K. Tomkovich leg. (all ZMUM).

Distribution. This is generally a European species (for its distribution see Roháček 2009) with a single previous record from West Siberia (Altai: Teletskoye Lake, Roháček 2006). The locality recorded above extends its known distribution more than 500 km easterly.

Genus *Stiphrosoma* Czerny, 1928

A genus of only 6 species in the Palaearctic Region (cf. Roháček 2009) but many more in the New World (Roháček & Barber 2005). Five species are known from the E. Palaearctic area, 4 of them recorded below. The fifth species, *S. grande* Roháček, 2006, is known only from the type locality in Iturup I. (Kuril archipelago) in the Far East of Russia.

Stiphrosoma cingulatum (Haliday, 1855)

Material examined. RUSSIA: East Siberia: Buryatskaya oblast: western shore of river Selenga, 1.5 km stream up from village Kibolina, 12.4 km SSW Orongoy, 51°24′30″N 106°59′58″E, 536 m, dry and swampy areas along a small stream under the shade of trees, adjoining dry hills (list of 82 vascular plants available), swept and filled in photoeclector, Ru2181, 29.vii.2016, 1 ♂ 1 ♀, M. von Tschirnhaus leg. (ZSMC).

Distribution. The species is distributed in the northern and temperate belts, mainly in the W. Palaearctic, ranging from Ireland to West Siberia in Russia (Novosibirsk Region, Chany lake), see Roháček (2006). This first record from East Siberia markedly extends its known distribution.

Stiphrosoma fissum Roháček, 1996

(Figs 53, 54)

Material examined. RUSSIA: Far East: Yuzh. Primor'e: Kamenushka, 17.vi.1983, 1 ♀, 19.vii.1983, 2 ♂♂ 5 ♀♀, 21.vii.1983, 1 ♀, 26.vii.1983, 1 ♀, 27.vii.1983, 1 ♂, 29.vii.1983, 2 ♀♀, A. Shatalkin leg. (ZMUM, 1♂ genit. prep.). **NORTH KOREA** (D.P.R. Korea): 10 km NW of Pyongsong, 1.viii.1989, 2 ♀♀, M. Kozánek leg. (SMOC).

Remarks. This species differs markedly from its relatives by its densely and long-haired arista (Fig. 54) and somewhat resembles in this character the rare E. Palaearctic *Ischnomyia barbarista*, which is also known (paratype female) from Kamenushka in the Far East of Russia (see Roháček 2009: 63). However, the latter species can be separated by its shorter and yet denser pilosity of the arista and its longer and wider wing with the dm-cu situated near the middle of cell dm (Roháček 2009: 88). *Stiphrosoma fissum* proved to be an aberrant species of *Stiphrosoma*, having no close relative among other known species of the genus (see Roháček et al. 2019).

Distribution. Known only from easternmost areas of the Palaearctic: Japan (Hokkaido, Honshu), North Korea, South Korea and Russia (Far East: Primor'e), see Roháček (1996), Sueyoshi & Roháček (2003), Roháček (2006, 2009). The above records confirm its occurrence in the Russian Far East where it can be encountered relatively frequently.

Stiphrosoma humerale Roháček & Barber, 2005

(Fig. 55)

Material examined. RUSSIA: West Siberia: Krasnoyarsk, 70 km W st. Kryuchkovo, 14.–23.vii.2009, 1 ♀; same locality, garden, yellow pan traps, 15.–24.vii.2009, 3 ♂♂ 1 ♀ (1 ♂ genit. prep.); Krasnoyarsk, E bank, 'Stoby' Res. env., riv. Laletina, 55.963°N 92.738°E, 208 m, *Padus* & shrubs near stream, 30.–31.vii.2009, 1 ♂ 2 ♀♀, all K. Tomkovich leg. (all ZMUM). **East Siberia:** Irkutskaya oblast: Kultuk village, W end of Baikal lake, 51°43′36″N 103°43′08″E, 428 m, below Trans-Siberian Railway line, meadow and swamp, ruderal area along path, swept and emptied in photoeclector, Ru2177, 22.vii.2016, 1 ♂ 1 ♀; Buryatskaya oblast: Tunkinsky district, 149 km W Lake Baikal, western bank of river Khalagun, 0.4 km N road no. A164 (A333), 0.6 km W of its river mouth in river Irkut, 51°38′09″N 101°33′18″E, 909 m, very diverse vegetation (for list see diary), swept and filled in photoeclector, Ru2185, 6.viii.2016, 2 ♂♂ 2 ♂♂, all M. von Tschirnhaus leg. (all ZSMC). **Far East:** Amurskaya oblast: g. Zeya, 1.viii.1981, 1 ♀, 22.vii.1982, 1 ♂, 2.viii.1982, 1 ♀, A. Ozerov leg. (ZMUM, 1 ♀ genit. prep.). **NORTH KOREA** (D.P.R. Korea): Paekdusan Mts, Mt. Pakdu, 16.viii.1989, 1 ♂ 5 ♀♀; Paekdusan Mts, Mt. Sobaek, 17.viii.1989, 1 ♂, all M. Kozánek leg. (all SMOC).

Remarks. This Holarctic species (see Roháček & Barber 2005) has slightly differently coloured adults in the Palaearctic and Nearctic Regions. The Palaearctic specimens have the lateral yellow part of the thorax larger, covering (besides the humeral callus) the entire notopleural area (see Fig. 55).

Distribution. A widespread Holarctic species (Roháček & Barber 2005); it is frequently recorded from the eastern parts of the Palaearctic Region but disappears westerly, with only scarce records from Europe (Czech Republic, Latvia, Slovakia, see Roháček et al. 2017). In the E. Palaearctic, it is known from Russia (West and East Siberia, Far East), China (Inner Mongolia) and North Korea (see Roháček & Barber 2005; Roháček 2006, 2009; Roháček et al. 2017; Wang et al. 2021; and new records above).

Stiphrosoma sabulosum (Haliday, 1837)

Material examined. RUSSIA: West Siberia: Krasnoyarsk, 70 km W st. Kryuchkovo (4040 km), garden, yellow pan traps, 15.–24.vii.2009, 1 ♂ f. brach., K. Tomkovich leg. (ZMUM).

Distribution. This wing-polymorphic (largely brachypterous) species is Holarctic in distribution (Roháček & Barber 2005; Roháček 2006, 2009), common in northern and temperate Europe, Canada and USA but only once recorded from Asia (West Siberia: Novosibirsk region, Chany Lake), see Roháček (2006). The above record is the second from Asia and extends its Palaearctic distribution about 350 km easterly.

Genus *Zealantha* Roháček, 2007

A monotypic genus hitherto known only from New Zealand (Roháček 2007). The peculiar species described below proved to be most closely related to this genus but, because it lacks some of the autapomorphic features, it is only tentatively included in this genus.

Zealantha fasciolata sp. nov.

(Figs 56–69)

Type material. Holotype: ♀, labelled: 'Toyotomi, HOKKAIDO, 29. VI. 1967, T. SAIGUSA' (Indian ink handwriting) and 'Holotypus ♀, Zealantha fasciolata sp. n., J. Roháček det. 2020' (red label) (SIINH, genit. prep.).

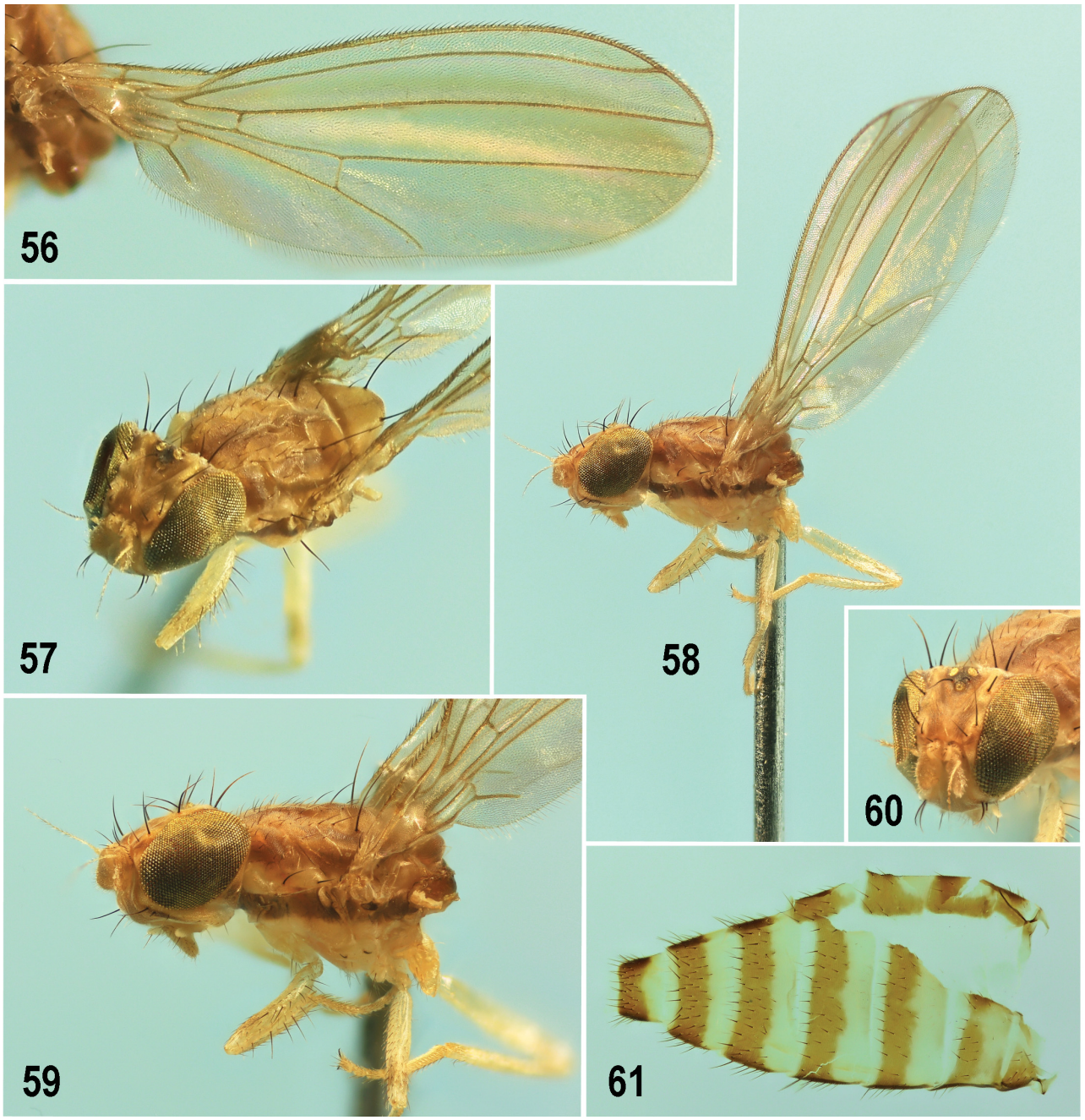
Description. ***Male*** unknown.

Female. Total body length 2.94 mm. Body distinctly bicolourous (Figs 57–61), head and thorax dorsally pale brown and ventrally yellow, with light-grey microtomentum, while abdomen and extremities are yellow-and-brown (or pale brown) variegated. Head (Figs 57, 59, 60) about as long as high, anteriorly (in profile) almost rectangular, with frons somewhat projecting in front of eye, pale brown and yellow. Occiput dorsomedially strongly concave (as in *Zealantha thorpei* Roháček, 2007), brown medially and ochreous yellow laterally, with a distinctive crescent-shaped patch of silvery-white microtomentum above foramen (a pair of stripe-like patches in *Z. thorpei*). Frons relatively narrow (as in *Amygdalops* species), largely pale brown (Fig. 60) but orbital plates and anterior part of frons dirty yellow to orange yellow, and ocellar triangle dark brown, all dull due to dense greyish microtomentum. Orbital plate mostly yellow, brownish only at base of vte, all sparsely whitish microtomentose. Frontal triangle narrow, somewhat longer

than broad, distinctly delimited because depressed (see Fig. 57) and reaching to anterior two-fifths of frons; band-like areas between orbital plates and frontal triangle brown striated (as in *Z. thorpei*) and reaching anterior margin of frons (Fig. 57). Ocellar triangle flat, dark brown but with silvery bluish-grey microtomentum; ocelli relatively large (Fig. 60). Frontal lunule very small and narrow, depressed but visible, light yellow. Face relatively narrow, medially weakly sclerotized and somewhat depressed, pale brown but whitish microtomentose; parafacialia and gena yellowish-white and silvery-white microtomentose, both narrowly ochreous margined but on gena this stripe anteroventrally widened to form a distinctive brown elongate spot below vi and subvibrissa (see Fig. 59); postgena pale yellow ventrally to pale brown dorsally, silvery-white microtomentose. Mouthparts small, yellow, with clypeus and palpi yellowish white. Cephalic chaetotaxy (Figs 57, 59, 60): pvt relatively small but with apices crossed; vti slightly shorter than vte, the latter and posterior ors longest of cephalic setae; oc as long as vti and arising outside of ocellar triangle (as in *Z. thorpei*); 3 ors, posterior as long as vte, middle somewhat shorter, anterior short and thin (about half length of, and arising close to middle ors) and somewhat inclinate; no microsetula in front of anterior ors; only 1 pair of minute medial microsetulae just at anterior margin of frons; 1 inclinate setula behind vte; postocular setulae (9–11) short, in single dense row; postgena with a few setulae and 1 relatively short posteroventral seta; 1 vi (slightly shorter than middle ors); subvibrissa well developed, as long as vi but thinner; 5 or 6 short and fine peristomal setulae. Palpus slender, yellow, with 1 ventral preapical seta and 3 or 4 small ventral setulae in proximal half. Eye convex, relatively large, elongately elliptical (Fig. 59), with longest diameter oblique and about 1.5 times as long as the shortest. Eye lacking pilosity (Figs 57, 59) in contrast to that of *Z. thorpei*. Gena short, shortest height about 0.11 times shortest eye diameter. Postgena with posteroventral corner almost right angled (Fig. 59). Antenna strongly geniculate, entirely ochreous yellow; scape minute; pedicel short, simple, not cap-like overlapping base of 1st flagellomere, with a number of short dark setulae at distal margin and 1 anterodorsal seta as long as anterior ors; 1st flagellomere strongly flattened laterally, with white pilosity on anteroventral margin longer than dark cilia on arista. Arista brown with pale brown basal segment, about 1.8 times as long as antenna, relatively shortly ciliate.

Thorax slightly narrower than head, ochreous to pale yellow with brownish longitudinal vittae, light-grey microtomentose, subshining to dull. Mesonotum ochreous yellow, with 3 brownish longitudinal vittae: 1 narrow unpaired medial (running from anterior margin to scutellum where widened) and 2 broad (from dc line to sa line) laterals (cf. Figs 57, 58); humeral and notopleural areas yellow; scutellum largely brownish on disc but ochreous yellow laterally. Pleuron yellow to (ventrally) whitish yellow but dorsally with distinctive brown band extending from cervix to base of abdomen and posteriorly also widened on postscutellum and metanotum. Thoracic chaetotaxy: 1 hu (longer than posterior npl); 2 npl (anterior distinctly longer than hu); 0 prs and 0 sa (both reduced to microsetae); 1 pa (as long as hu); 2 postsutural dc, anterior short and weak (less than half length of posterior), posterior long and strong (almost as long as apical sc); 6 or 7 dc microsetae, 1 in front of anterior dc enlarged (on left side of holotype twice as long as others); 4 rows of ac microsetae on suture but only 2 rows behind anterior dc, the latter reaching behind level of posterior dc; 2 sc, laterobasal very weak and only as long as hindmost ac microseta, apical sc long (longest thoracic seta) and robust, slightly longer than posterior dc; 1 minute ppl, reduced to microseta in contrast to that of *Z. thorpei*; 2 relatively long and strong stpl (anterior shorter and thinner) and 2 pale microsetae in dorsal half of sternopleuron; its ventral part with 4 longer pale setae. Scutellum rounded triangular, about 1.5 times as wide as long, flat dorsally; postscutellum well developed, distinctly bulging. Legs dirty yellow; all femora with darker (pale brown) subapical annulus and whitish knee (see Figs 32–34); tibiae variably variously coloured, t_1 with some darkening proximally but with base whitish (Fig. 32), t_2 uniformly yellow, t_3 almost entirely darkened (except for whitish base); tarsi entirely yellow or pale yellow, including last tarsal segment. f_1 (Fig. 32) with ctenidial spine entirely absent, thus with only long thin setae in posteroventral (1 seta longer) and posterodorsal (2 setae longer) rows; f_2 and f_3 uniformly setulose (Figs 33, 34); t_2 with short (about as long as maximum width of tibia) ventroapical seta (Fig. 33); t_1, t_3 (Figs 32, 34) and all tarsi simply setulose, only fore basitarsus with 2 proximoventral setulae somewhat prolonged but fine (Fig. 32). Wing (Fig. 56) moderately long, not very narrow, with pale ochreous-brown veins and membrane, the latter hyaline. C with very small and sparse spinulae between apices of R_1 and R_{2+3} (not visible in Fig. 56 because situated on other side of wing), as in *Z. thorpei*. Sc well developed basally and fused with R_1 apically to form a small preapical kink at level of subcostal break. R_{2+3} long, distinctly sinuous distally, running parallel to C but subapically somewhat diverging and with apex upcurved; the cell r_1 narrow, only half the width of cell r_{2+3}; R_{4+5} slightly bent along its entire length, subparallel to M distally. M (beyond dm-cu) almost straight. Cell dm relatively small and distally narrow (Fig. 56), with r-m situated at about basal third. Apical portion of CuA_1 long, about 3.3 times as long as dm-cu, slightly downcurved, not reaching wing margin; A_1 short, ending far from it. Alula small, narrow. Wing measurements: length 2.82 mm, width 0.93 mm, $Cs_3 : Cs_4 = 1.42$, r-m\dm-cu : dm-cu = 3.63. Haltere pale ochreous-yellow.

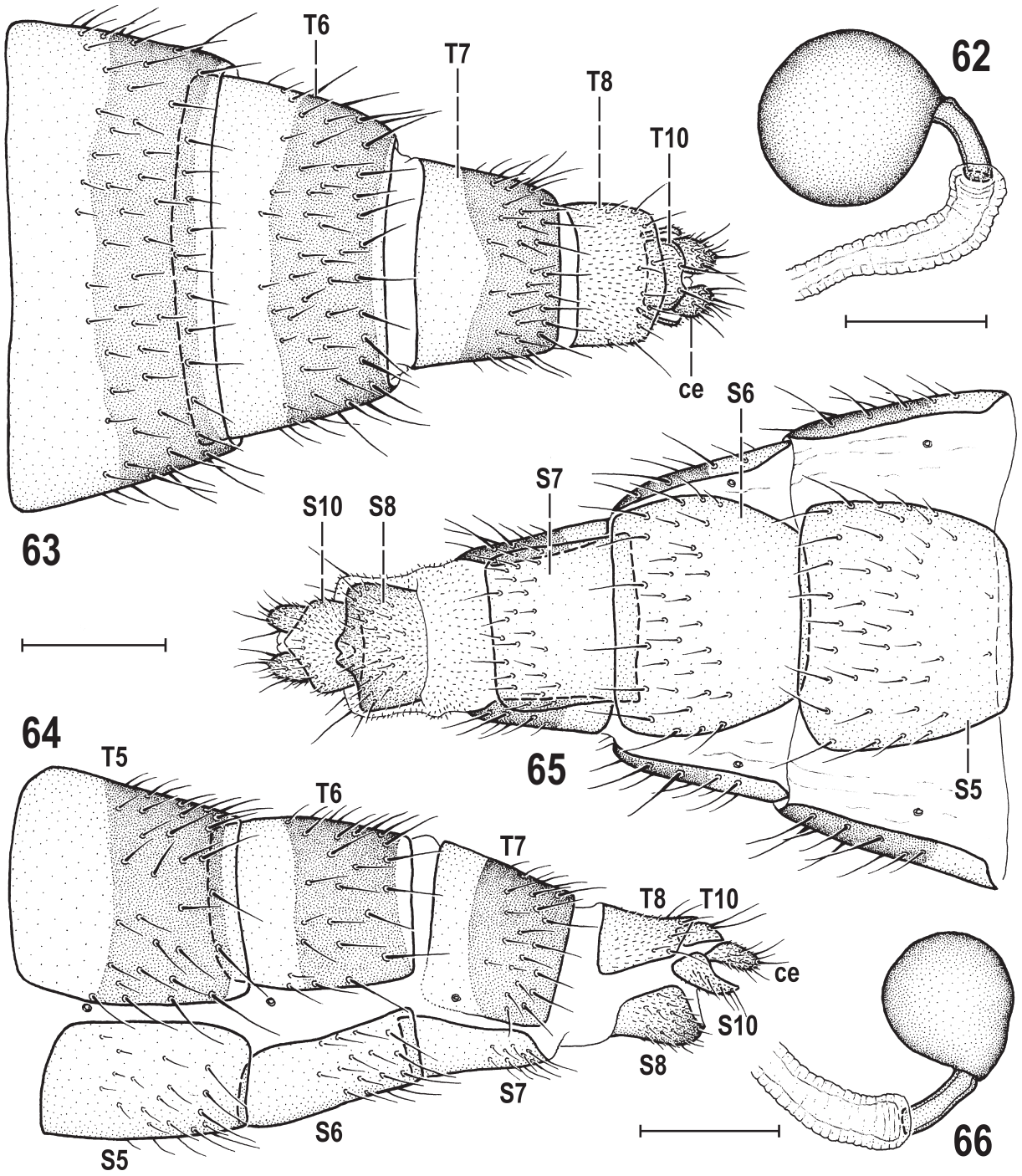
Abdomen relatively slender, elongate, largely pale ochreous-yellow but with terga (T2–T6) with distinctive transverse brown bands covering posterior half of each sclerite (see Fig. 61) but very posteriorly yellowish-white margined (in *Z. thorpei* these terga only posterolaterally dark spotted). T1 with brown subtriangular spot in posterolateral corner (as in *Z. thorpei*). T1 and T2 dorsally separate, the former with very short and sparse setulae, mainly laterally. T2 slightly shorter than T3; T3–T5 subequal in length, broad, bent onto lateral sides of abdomen, all with sparse, short but relatively robust setae (longest



Figs 56–61. *Zealantha fasciolata* sp. nov., female holotype. 56 – left wing, length 2.82 mm; 57 – head and thorax, anterodorsally; 58 – female after dissection, laterally (wing length 2.82 mm); 59 – head and thorax, laterally; 60 – head, frontally; 61 – abdomen, dorsally (photographed relaxed in glycerine). Photos by J. Roháček.

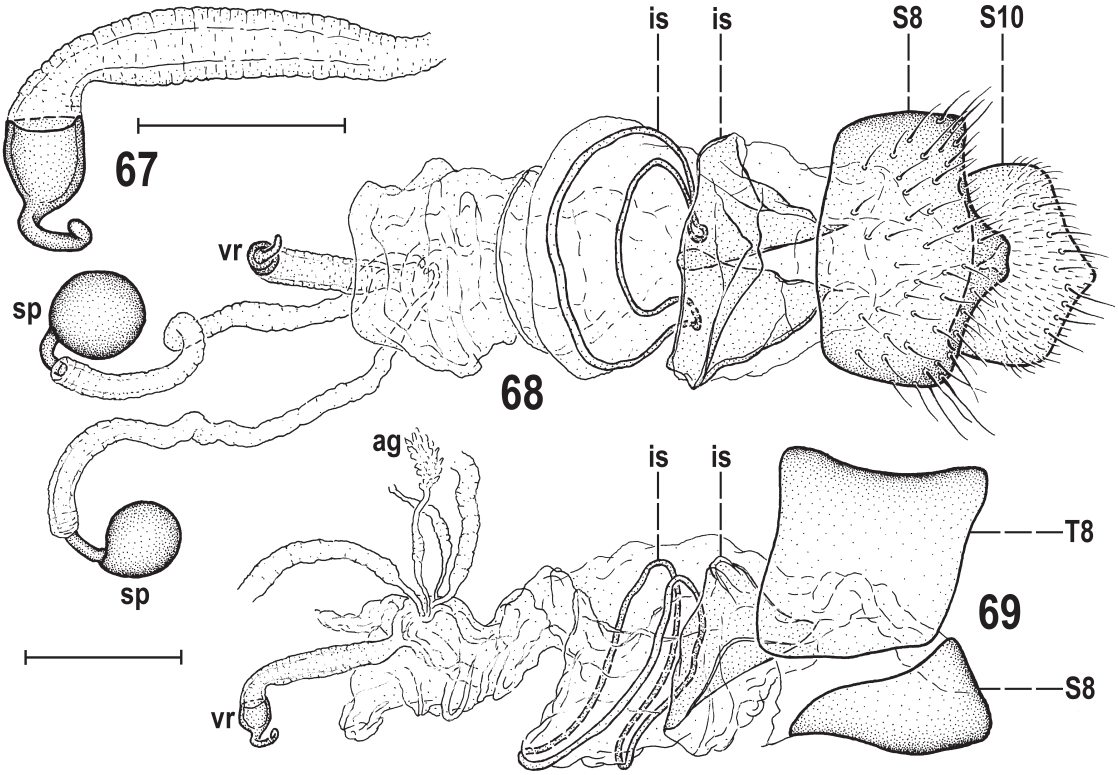
at posterior margin); T5 (Fig. 63) narrower than T4 and distinctly tapered posteriorly. Preabdominal sterna paler than terga, yellowish white, relatively large and all, except for S1, finely setose. S1 short, much shorter than wide, and bare. S2–S4 of similar size and each somewhat wider than long, with corners rounded; S2 and S3 wider anteriorly than posteriorly; S4 slightly transversely suboblong; S5 (on the contrary) wider posteriorly than anteriorly (Fig. 65). Spiracles situated in pleural membrane near ventral margin of terga.

Postabdomen (Figs 63–65) relatively short, tapered posteriorly. T6 large and broad (but much narrower than T5, see Fig. 63), transversely subtrapezoid, thus tapered posteriorly, pale yellow, with brown transverse band covering posterior half except for pale posterior margin (thus similarly coloured as preceding terga), short-setose on dark part of tergum, with setae at posterior margin longer. S6 relatively large, of similar size and shape to that of S5 (see Fig. 65), thus slightly wider than long, subtrapezoidal (wider posteriorly) but with sides rounded (convex), shortly setose in posterior half, with longer setae at posterior margin only. T7 and S7 separate (in contrast to those of *Z. thorpei*). T7 much narrower than T6 but bent farther onto lateroventral sides of postabdomen (Fig. 64), slightly tapered posteriorly, dark brown in posterior two-thirds, whitish yellow anteriorly (Fig. 63), with short



Figs 62–66. *Zealantha fasciolata* sp. nov., female holotype. 62 – spermatheca; 63 – postabdomen + 5th abdominal segment, dorsally; 64 – the same, laterally; 65 – the same, ventrally; 66 – spermatheca. Scales = 0.05 mm (Figs 62, 66) and 0.2 mm (Figs 63–65). For abbreviations see p. 263.

thicker setae on dark part, and with 7th spiracle embedded in pale anterolateral corner (cf. Fig. 64). S7 comparatively large and broad (Fig. 65), almost square-shaped, pale pigmented, finely short-setose in posterior two-fifths. T8 relatively broad (slightly narrower than T7) plate-shaped, transversely suboblong with rounded corners (Fig. 63), flat, pale pigmented and microtomentose, with a few fine setae at posterior margin, including 1 or 2 longer in posterolateral corner. S8 (Fig. 65) only slightly shorter but narrower than T8, transversely trapezoidal but posteromedially somewhat prominent (Fig. 68) and with narrow fissure (better visible in caudal view), densely micropubescent and finely setose. Genital chamber (uterus) relatively narrow, with internal sclerotization (Figs 68, 69) composed of a pair of posterior, flat, crooked, pale-pigmented sclerites and 1 anterior annular sclerite, the latter ribbon-shaped, strongly (fronto-caudally) compressed and bent onto lateral surfaces of genital chamber (somewhat resembling that of *A. aspina* sp. nov.). Ventral receptacle (Fig. 67) formed by broad, relatively short and membranous tube-like proximal duct and distinctly sclerotized, shortly subconical distal part gradually projecting into curved digitiform process.



Figs 67–69. *Zealantha fasciolata* sp. nov., female holotype. 67 – ventral receptacle, laterally; 68 – genital chamber with S8, S10 and spermathecae, ventrally; 69 – the same, without spermathecae, laterally (setosity on T8 and S8 omitted). Scales = 0.05 mm (Fig. 67) and 0.1 mm (Figs 68, 69). For abbreviations see p. 263.

Remnant of accessory gland (Fig. 69) hyaline, small, and connected to short, very slightly (in the middle) dilated and indistinctly ringed duct. Spermathecae (1+1) subovoid to shortly pyriform (Figs 62, 66, 68), each with plain surface and long slender slightly bent sclerotized cervix (half to two-thirds length of spermathecal body) (similar to that of *Z. thorpei*); spermathecal duct (Fig. 68) relatively short (only as long as genital chamber) and broad, terminally twice wider than cervix. T10 (Fig. 63) small, transversely suboblong, with rounder posterior corners, pale, with 1 pair of long setae at posterior margin surrounded by some micropubescence. S10 (Figs 65, 68) larger than T10, wider than long, transversely pentagonal, micropubescent in posterior two-thirds and with some fine setulae at posterior margin. Cercus (Figs 63–65) very short, broad, with relatively short setosity, including some thicker setae, dorsopreapical seta somewhat longer than others.

Discussion. This peculiar (even in the female sex) species differs distinctly from all described Anthomyzidae both in external appearance and internal structures. Although its head and body are somewhat reminiscent of an *Anthomyza* species, the structures of the female postabdomen and construction of the internal genitalia prevent its distinct affiliation with any of the described genera. Because some of its distinctly apomorphic characters are shared with *Zealantha thorpei* Roháček, 2007 (type and only species of the genus), the new species is tentatively placed in *Zealantha*. The relationship of *Z. thorpei* and *Z. fasciolata* sp. nov. is mainly supported by shared characters of the female postabdomen, viz. the broad and flat T8 (Fig. 63), compact S8 with only a small posteromedial incision (Fig. 68), ventral receptacle composed of a relatively short broad duct and short distal sclerotized part terminating in a curved digitiform apical process (Fig. 67) and, particularly, strikingly similar spermathecae with a plain surface and a very long sclerotized cervix (Fig. 62), the latter two features considered apomorphies of the genus *Zealantha* (see Roháček 2007). There are also some other shared external features treated as apomorphies of *Zealantha*, e.g. oc arising outside the ocellar triangle. A relationship between these two species can also be supported by a silvery microtomentose spot on the strongly concave occiput (solid in *Z. fasciolata* but divided into 2 stripes in *Z. thorpei*), a flat ocellar triangle with large ocelli, a similar cephalic chaetotaxy (but with pvt short in *Z. fasciolata*), reduced prs and sa (which have entirely vanished in *Z. fasciolata*), variegated abdominal terga (dark-banded in *Z. fasciolata*, dark spotted in posterior corners in *Z. thorpei*), the similarly shaped although differently micropubescent T10 and S10 and the short female cercus. However, it cannot be denied that there are also characters markedly different in both these taxa, which prevent unequivocal classification of *Z. fasciolata* within *Zealantha*. These particularly include the absence of autapomorphies considered unique for *Zealantha*, viz. eye densely long-pilose, head and thorax with peculiar velvety dark bluish-grey microtomentum, and also the following: pvt unusually long, ppl long, female T7 and S7 fused to form a tergosternal ring (but with S7 indicated by posterior

incisions, see Roháček 2007: fig. 18) and female S10 almost bare (Roháček 2007). Moreover, the annular sclerite in the female genital chamber is quite dissimilar being elongately ovoid in *Z. thorpei* while compressed in *Z. fasciolata*. For all the above reasons, the new species is only provisionally described as a *Zealantha* pending discovery of males (and knowledge of male genital characters) for clarification of its generic affiliation. Therefore, it is suggested that the generic diagnosis of *Zealantha* is not modified for the time being.

Zealantha fasciolata can be easily distinguished from all known Anthomyzidae by a combination of the following external characters: head with elongately ovoid eyes, long subvibrissa, thorax with darker longitudinal vittae, prs and sa setae absent, f_1 without ctenidial spine, wing with cell dm narrow and apical portion of CuA_1 long, and, particularly, abdomen with dark transversely banded terga. The latter colouration of the abdomen occurs infrequently in the Anthomyzidae, known e.g. in the Nearctic *Anthomyza dichroa* Roháček & Barber, 2016 and its relatives (see Roháček & Barber 2016) but hitherto not recorded in the Palaearctic species of Anthomyzidae. Of course, the female postabdominal characters (see above) of *Z. fasciolata* are also highly species-specific.

Etymology. The species is named using the Latin adjective *fasciolatus* (*-a*, *-um*) meaning belted, for its dark transverse bands on the abdominal terga.

Biology. Unknown. The holotype female was encountered in June.

Distribution. Japan: Hokkaido.

Checklist of Anthomyzidae encountered in the East Palaearctic

The East Palaearctic area is here treated in the broadest sense, i.e., with the boundary between West and East Palaearctic as defined in Snow & Perrins (1998). The East Palaearctic in this sense includes Russia east of the Ural Mts, Kazakhstan, Kirghizia, Uzbekistan, Tadzhikistan, Turkmenia, Iran, Afghanistan, NW part of Pakistan, Mongolia, China except for SE areas, North Korea, South Korea and Japan.

This species checklist is provided with a listing of countries where a species has been recorded, but more precision is applied to Russia where its regions are distingushed as follows: WS – West Siberia, ES – East Siberia, FE – Far East (the areas as defined in Soós & Papp 1992: 15–16). For China, the provinces and territories are given in parentheses after the country name. The country records are summarized from published sources (see Roháček 1984, 1992, 1996, 2006, 2009, 2018; Sueyoshi & Roháček 2003; Roháček & Przhiboro 2016; Roháček et al. 2017; Wang et al. 2021) and from data presented in this paper. With the new species and records presented above, a total of 44 species in 13 genera of Anthomyzidae are currently known from the E. Palaearctic area.

Amygdalops Lamb, 1914
- *femorinus* Roháček, 2009 – Japan
- *nigrinotum* Sueyoshi & Roháček, 2003 – Japan

Anagnota Becker, 1902
- *bicolor* (Meigen, 1838) – Russia (WS)
- *oriens* Roháček, 2006 – Russia (WS)

Anthomyza Fallén, 1810
- *aspina* **sp. nov.** – Russia (FE)
- *bellatrix* Roháček, 1984 – Japan, North Korea, Russia (FE)
- *breviclavus* **sp. nov.** – North Korea
- *clara* Roháček, 2006 – Japan
- *collini* Andersson, 1976 – Russia (WS, FE)
- *cuneata* Roháček, 1987 – China (Sichuan)
- *decolorata* Roháček, 2009 – Russia (FE)
- *dissors* Collin, 1944 – Russia (ES, FE)
- *drachma* Sueyoshi & Roháček, 2003 – Japan, Russia (FE)
- *elbergi* Andersson, 1976 – China (Inner Mongolia), Japan, North Korea, Russia (WS, ES, FE)
- *flavosterna* Sueyoshi & Roháček, 2003 – Japan, Russia (FE)
- *gracilis* Fallén, 1823 – North Korea, Russia (WS, ES, FE)
- *macra* Czerny, 1928 – Japan, Russia (FE)
- *orineglecta* Roháček, 2006 – Russia (FE)
- *ornata* Roháček, 2018 – China (Sichuan)
- *pallida* (Zetterstedt, 1838) – China (Inner Mongolia), Kirghizia, Mongolia, North Korea, Russia (WS, ES, FE)
- *paraneglecta* Elberg, 1968 – Russia (WS)
- *pleuralis* Czerny, 1928 – Russia (WS, ES, FE)
- *sulphurea* Roháček, 2018 – China (Yunnan)
- *tschirnhausi* Roháček, 2009 – Russia (FE)
- *trifurca* Sueyoshi & Roháček, 2003 – China (Sichuan), Japan, North Korea, South Korea

Arganthomyza Roháček, 2009
- *hyperseta* Roháček, 2018 – China (Shaanxi).
- *socculata* (Zetterstedt, 1847) – Kazakhstan, Kirghizia, Mongolia, North Korea, Russia (WS, ES, FE)
- *versitheca* Roháček, 2009 – China (Shaanxi, Sichuan), North Korea, South Korea

Cercagnota Roháček & Freidberg, 1993
- *collini* (Czerny, 1928) – Uzbekistan

Epischnomyia Roháček, 2006
- *merzi* Roháček, 2009 – China (Sichuan), North Korea, South Korea
- *tkoci* Roháček, 2018 – China (Sichuan)
- *triarmigera* (Sueyoshi & Roháček, 2003) – Japan, Russia (FE)

Fungomyza Roháček, 1999
- *albimana* (Meigen, 1830) – Russia (WS)
- *cercata* Roháček, 2009 – Russia (FE)

Ischnomyia Loew, 1863
- *barbarista* (Roháček, 2009) – South Korea, Russia (FE)

Marshallya Roháček, 2018
platythorax Roháček, 2018 – China (Sichuan)

Paranthomyza Czerny, 1902
nitida (Meigen, 1838) – Russia (WS)

Stiphrosoma Czerny, 1928
cingulatum (Haliday, 1855) – Russia (WS, ES)
fissum Roháček, 1996 – Japan, North Korea, South Korea, Russia (FE)
grande Roháček, 2006 – Russia (FE)
humerale Roháček & Barber, 2005 – China (Inner Mongolia), North Korea, Russia (WS, ES, FE)
sabulosum (Haliday, 1837) – Russia (WS)

Typhamyza Roháček, 1992
bifasciata (Wood, 1911) – Kazakhstan, Russia (WS)

Zealantha Roháček, 2007
fasciolata **sp. nov.** – Japan

General discussion and conclusions

Diversity of fauna. A total of 44 species and 13 genera of Anthomyzidae are reliably known from the E. Palaearctic area (see the checklist above). This is distinctly more than in the (smaller) W. Palaearctic area where only 33 species and 13 genera have been found (Roháček 2009, 2013b) even though Anthomyzidae in this area have been investigated in much more detail. Despite the species richness of Anthomyzidae in the E. Palaearctic seeming to be already high, the above number is obviously far from reality because large territories of this subregion remain unexplored for Diptera, and for these small Acalyptratae in particular. The recent estimate of diversity of the family (50–60 species) in China surely is not exaggerated because the first small probe into Chinese Anthomyzidae yielded 6 new species in the total 11 species recorded (Roháček 2018). Although the estimate of number of species living in China (50–60 species) also includes the Oriental part of the country, more than half of its estimated 20 unnamed species (Roháček 2018) could also be expected in the E. Palaearctic area. Consequently, in the whole of the E. Palaearctic, up to about 60 species of Anthomyzidae might be found.

New taxa of Anthomyzidae. The three new species described in this paper (all from easternmost areas of the Palaearctic), although known from only the female sex, demonstrate that the morphological diversity of Anthomyzidae is exceptionally high in this territory. With inclusion of the new species of *Anthomyza*, *A. aspina* sp. nov. and *A. breviclavus* sp. nov., the taxonomic limits of the genus must be widened again (for the previous concept of *Anthomyza* see Roháček 2006, 2009 and Roháček & Barber 2016), particularly to accommodate the unusual structures in the female genital chamber but also the chaetotaxy of the head (see ors in *A. aspina*) and legs (absence of ctenidial spine on f_1 in *A. aspina*) and patterning of the wing (in *A. breviclavus*). The third new species, *Zealantha fasciolata* sp. nov., remains a taxonomic enigma which cannot be solved without knowledge of the male terminalia; it could even be a representative of an unknown genus. Despite this, it undoubtedly has no close relative among Holarctic taxa of Anthomyzidae.

Distribution of E. Palaearctic Anthomyzidae. Based on new knowledge, the distributions of a number of species have become more precise with respect to their previous biogeographical characterization in Roháček (2009). The following species can now be attributed to a Sino-Japanese geoelement (type of distribution) with certainty: *Anthomyza bellatrix*, *A. drachma*, *A. flavosterna*, *A. orineglecta*, *A. trifurca*, *Arganthomyza versitheca*, *Epischnomyia merzi*, *E. triarmigera*, *Stiphrosoma fissum*. Also, *Anthomyza breviclavus*, *A. decolorata*, *Fungomyza cercata* and *Ischnomyia barbarista* may have this type of distribution. *Anthomyza clara* and *A. collini* can now be characterized as temperate Palaearctic, and *Anthomyza paraneglecta*, *Fungomyza albimana*, *Paranthomyza nitida* and *Stiphrosoma cingulatum* as Eurosiberian species.

Parallel evolution of wing pattern. The distinctive longitudinal patterning of the wing with a brown band in the middle and whitish-coloured anterior and posterior marginal areas (see Figs 18, 51) has also now been found in *Anthomyza breviclavus* sp. nov. This is the second lineage of the genus *Anthomyza* where this type of wing colouration occurs after recently being described in the Taiwanese *A. caesarea* Roháček, 2020, a member of the *A. flavosterna* group (see Roháček 2020). However, a highly similar type of wing patterning also developed independently in all three known species of *Epischnomyia* (cf. Roháček 2009, 2018), as well as in the Nearctic taxa *Ischnomyia albicosta* and *Arganthomyza vittipennis*, see Roháček & Barber (2016). Thus, we now know five lineages of Anthomyzidae where this wing pattern occurs.

Acknowledgements

It is an agreeable duty to express my sincere gratitude to all curators and donors who kindly provided specimens of Anthomyzidae for this study, viz. M. Kozánek (Bratislava, Slovakia), A. Ozerov and A. Shatalkin (ZMUM), T. Saigusa (SIINH), M. Tkoč (NMPC) and M. von Tschirnhaus (Bielefeld, Germany). I would like to specially thank M. Tkoč (NMPC) for photographs and information on the habitat and host grass of *A. trifurca* from his research in Japan and to D. Zelený (National Taiwan University, Taipei, Taiwan) for identification of this plant. A. Shatalkin kindly provided information on the exact position of localities and habitats in the Far East of Russia where he collected Anthomyzidae. My thanks are further extended to P. Chandler (Melksham, U. K.) for kind revision of the English of an early draft of the text and to both reviewers for all improvements and helpful comments on the manuscript. This research was financially supported by the Ministry of Culture of the Czech Republic through the institutional financing of long-term conceptual development of a research institution (the Silesian Museum, MK000100595).

References

BARBER K. N. & ROHÁČEK J. 2020: Revision of Carexomyza Roháček with descriptions of three new Nearctic species (Diptera:

Anthomyzidae). *Arthropod Systematics & Phylogeny* **78 (1)**: 69–109. doi: 10.26049/ASP78-1-2020-04

BAYLESS K. M., TRAUTWEIN M. D., MEUSEMANN K., SHIN S., PETERSEN M., DONATH A., PODSIADLOWSKI L., MAYER C., NIEHUIS O., PETERS R. S., MEIER R., KUTTY S. N., LIU S., ZHOU X., MISOF B., YEATES D. K. & WIEGMANN B. M. 2021: Beyond Drosophila: resolving the rapid radiation of schizophoran flies with phylotranscriptomics. *BMC Biology* **19 (23)**: 1–17. doi: 10.1186/s12915-020-00944-8

CUMMING J. M. & WOOD D. M. 2010: 2. Adult morphology and terminology. Pp. 9–50. In: BROWN B. V., BORKENT A., CUMMING J. M., WOOD D. M., WOODLEY N. E. & ZUMBADO M. A. (eds): *Manual of Central American Diptera*. Vol. 1. NRC Research Press, Ottawa, ix + 714 pp.

CUMMING J. M. & WOOD D. M. 2017: 3. Adult morphology and terminology. Pp. 89–133. In: KIRK-SPRIGGS A. H. & SINCLAIR B. J. (eds): *Manual of Afrotropical Diptera*. Vol. 1. Introductory chapters and keys to Diptera families. Suricata 4. South African National Biodiversity Institute, Pretoria, xiii + 425 pp.

GRIFFITHS G. C. D. 1972: *The phylogenetic classification of Diptera Cyclorrhapha with special reference to the structure of the male postabdomen*. Dr. W. Junk N.V., The Hague, 340 pp.

McALPINE J. F. 1989: 116. Phylogeny and classification of the Muscomorpha. Pp. 1397–1518. In: McALPINE J. F. & WOOD D. M. (eds): *Manual of Nearctic Diptera*. Vol. 3. Agriculture Canada Monograph No. 32, Minister of Supply and Services Canada, Ottawa, vi + 1333–1581 pp.

ROHÁČEK J. 1984: New species and records of Palaearctic species of the Anthomyza gracilis-group (Diptera, Anthomyzidae). *Acta Entomologica Bohemoslovaca* **81**: 384–394.

ROHÁČEK J. 1992: Typhamyza gen. n. for Anthomyza bifasciata Wood, with description of immature stages (Diptera, Anthomyzidae). *Bollettino del Museo Regionale di Scienze Naturali* (Torino) **10**: 187–207.

ROHÁČEK J. 1996: Revision of Palaearctic Stiphrosoma, including the Anthomyza laeta-group (Diptera: Anthomyzidae). *European Journal of Entomology* **93**: 89–120.

ROHÁČEK J. 1998: Taxonomic limits, phylogeny and higher classification of Anthomyzidae (Diptera), with special regard to fossil record. *European Journal of Entomology* **95**: 141–177.

ROHÁČEK J. 2006: A monograph of Palaearctic Anthomyzidae (Diptera) Part 1. *Časopis Slezského Zemského Muzea, Opava (A)* **55 (Supplement 1)**: 1–328.

ROHÁČEK J. 2007: Zealantha thorpei gen. et sp. nov. (Diptera: Anthomyzidae), first family representative from New Zealand. *Zootaxa* **1576**: 1–13.

ROHÁČEK J. 2009: A monograph of Palaearctic Anthomyzidae (Diptera) Part 2. *Časopis Slezského Zemského Muzea, Opava (A)* **58 (Supplement 1)**: 1–180.

ROHÁČEK J. 2013a: New amber fossil Anthomyzidae (Diptera): an unexpected Eocene diversity. *Journal of Systematic Palaeontology* **11**: 431–473.

ROHÁČEK J. 2013b: Reliquantha variipes gen. & sp. nov., a peculiar new taxon of Anthomyzidae (Diptera) from Great Britain with uncertain relationships. *Acta Entomologica Musei Nationalis Pragae* **53(2)**: 793-814.

ROHÁČEK J. 2018: First Anthomyzidae (Diptera) from China: a new genus, six new species and new records. *Acta Entomologica Musei Nationalis Pragae* **58**: 35–76.

ROHÁČEK J. 2020: Anthomyzidae (Diptera) of Taiwan: new species but no new records. *Acta Entomologica Musei Nationalis Pragae* **60**: 269–290. doi: 10.37520/aemnp.2020.015

ROHÁČEK J. & BARBER K. N. 2005: Revision of the New World species of Stiphrosoma Czerny (Diptera: Anthomyzidae). *Beiträge zur Entomologie* **55**: 1–107.

ROHÁČEK J. & BARBER K. N. 2011: Quametopia, a new genus of Nearctic Anthomyzidae (Diptera), with description of two new species, immature stages and life history. *European Journal of Entomology* **108**: 287–326.

ROHÁČEK J. & BARBER K. N. 2013a: A worldwide review of the genus Arganthomyza Roháček, with revision of the Nearctic species (Diptera: Anthomyzidae). *Zootaxa* **3604 (1)**: 1–72.

ROHÁČEK J. 2013b: Reliquantha variipes gen. & sp. nov., a peculiar new taxon of Anthomyzidae (Diptera) from Great Britain with uncertain relationships. *Acta Entomologica Musei Nationalis Pragae* **53(2)**: 793–814.

ROHÁČEK J. & BARBER K. N. 2016: Nearctic Anthomyzidae: a monograph of Anthomyza and allied genera (Diptera). *Acta Entomologica Musei Nationalis Pragae* **56 (Supplement)**: 1–412.

ROHÁČEK J. & HOFFEINS C. 2020: Protanthomyza ryszardi sp. nov., another Eocene species of †Protanthomyzinae (Diptera: Anthomyzidae) from Baltic amber. *Palaeoentomology* **3 (5)**: 473–482. doi: 10.11646/palaeoentomology.3.5.5

ROHÁČEK J., PETRÁKOVÁ L. & TÓTHOVÁ A. 2019: Molecular phylogeny and timing of evolution of Anthomyza and related genera (Diptera: Anthomyzidae). *Zoologica Scripta* **48**: 745–760.

ROHÁČEK J. & PRZHIBORO A. 2016: Anthomyzidae (Diptera) of Iturup Island (Russia: Kuril Islands). *Acta Musei Silesiae, Scientiae Naturales* **65**: 203–213.

ROHÁČEK J., TKOČ M. & PREISLER J. 2017: Additions to the Diptera Acalyptrata fauna (Anthomyzidae, Stenomicridae, Carnidae, Milichiidae, Heleomyzidae) of the Czech Republic and Slovakia. *Acta Musei Silesiae, Scientiae Naturales* **66**: 87–96. doi 10.1515/cszma-2017-0009

ROHÁČEK J. & TÓTHOVÁ A. 2021: Mumetopia interfeles sp. nov., a new species of Anthomyzidae (Diptera) occurring en masse in an urban grassy habitat in Chile: its taxonomy, phylogeny and biology. *European Journal of Taxonomy* **731**: 135–158. https://doi.org/10.5852/ejt.2021.731.1211

SNOW D. & PERRINS C. M. (eds) 1998: *The Birds of the Western Palearctic. Concise Edition*. Vol 1, Non-Passerines. Oxford University Press, Oxford, xxxii + 1008 pp. + 43 pp. (indexes).

SOÓS Á. & PAPP L. (eds) 1992: *Catalogue of Palaearctic Diptera*. Vol. 1 Trichoceridae – Nymphomyiidae. Hungarian Natural History Museum, Budapest, 520 pp.

SUEYOSHI M. & ROHÁČEK J. 2003: Anthomyzidae (Diptera: Acalyptrata) from Japan and adjacent areas. *Entomological Science* **6**: 17–36.

WANG Q., WANG D. & SHI L. 2021: A genus and three species of Anthomyzidae newly recorded from China (Diptera). *Zoological Systematics* **46 (2)**: 163–175.

WIEGMANN B. M., TRAUTWEIN M. D., WINKLER I. S., BARR N. B., KIM J.-W., LAMBKIN C., BERTONE M. A., CASSEL B. K., BAYLESS K. M., HEIMBERG A. M., WHEELER B. M., PETERSON K. J., PAPE T., SINCLAIR B. J., SKEVINGTON J. H., BLAGODEROV V., CARAVAS J., KUTTY S. N., SCHMIDT-OTT U., KAMPMEIER G. E., THOMPSON F. C., GRIMALDI D. A., BECKENBACH A. T., COURTNEY G. W., FRIEDRICH M., MEIER R. & YEATES D. K. 2011: Episodic radiations in the fly tree of life. *Proceedings of the National Academy of Sciences of the United States of America* **108**: 5690–5695.

WIEGMANN B. M. & YEATES D. K. 2017: 11. Phylogeny of Diptera. Pp. 253–265. In: KIRK-SPRIGGS A. H. & SINCLAIR B. J. (eds): *Manual of Afrotropical Diptera.* Vol. 1. Introductory chapters and keys to Diptera families. Suricata 4. South African National Biodiversity Institute, Pretoria, xiii + 425 pp.

WINKLER I. S., RUNG A. & SCHEFFER S. J. 2010: Hennig's orphans revisited: Testing morphological hypotheses in the "Opomyzoidea" (Diptera: Schizophora). *Molecular Phylogenetics and Evolution* **54**: 746–762.

ZATWARNICKI T. 1996: A new reconstruction of the origin of eremoneuran hypopygium and its implications for classification (Insecta: Diptera). *Genus* **7**: 103–175.