A revision of the *divisella* group of the genus *Mompha*, with the description of *Mompha confusella* spec. nov. (Lepidoptera: Momphidae)

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Abstract: A group of species closely related to *Mompha divisella* Herrich-Schäffer is revised, and *Mompha confusella* spec. nov., previously confused with other species of this group, is described. Keys for determination and notes on the biology and distribution of the species are given.

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Introduction

Within the genus *Mompha* Hübner a group of species is characterized by mainly brownish wings, long and acute ventral valvar lobes in the male genitalia, and a very broad antrum opening immediately into the bursa in the female genitalia. We consider this the *divisella* group of the genus *Mompha*. Only three species belonging to this species-complex have been known so far for the Palaearctic Region. The first of these, the widely spread euro-asiatic *Mompha divisella*, was described by Herrich-Schäffer (1853), but nearly twenty years before this species was already known as *Laverna decorella* sensu Stephens, 1834. By chance, the type series of *M. divisella* has been found by the second author in the Zoological Museum of the Humboldt University (Berlin); a male lectotype and a female paralectotype are designated in this paper. The next species, *M. subdivisella,* was described about a hundred years later from Britain by Bradley (1951). The last species, *M. bradleyi*, was described from Poland and Hungary by Riedl (1965). Both Bradley and Riedl mention that the new species are inseparable from *M. divisella* by external features, whereas differences in their genitalia are small but clear.

Examination of a long series of specimens belonging to the *Mompha divisella* group from all over Europe, the Caucasus, and Central Asia revealed the existence of a fourth species with a rather wide distribution from Central Europe to eastern Transcaucasia and previously confused by the authors with the three other species of the *divisella* group. For example, one of the paratypes of *M. bradleyi* originating from Hungary turned out to belong to this new species, which is described in the present paper.

A careful investigation of the external and genital features of both sexes made it possible to separate all species more or less clearly, and these differences have been arranged into a key for determination. Some new biological and geographical data tell us about the presence of definite differences between ecological niches of these semi-sympatric species as well. As all four species were confused during a long time, and many records of *M. divisella* have been based on misidentifications, we have put on the dotted maps only the localities which we were able to verify.

Key of the species of the *Mompha divisella* group

1. Forewings with a rather contrasting pattern, the dorsal margin with two white spots se

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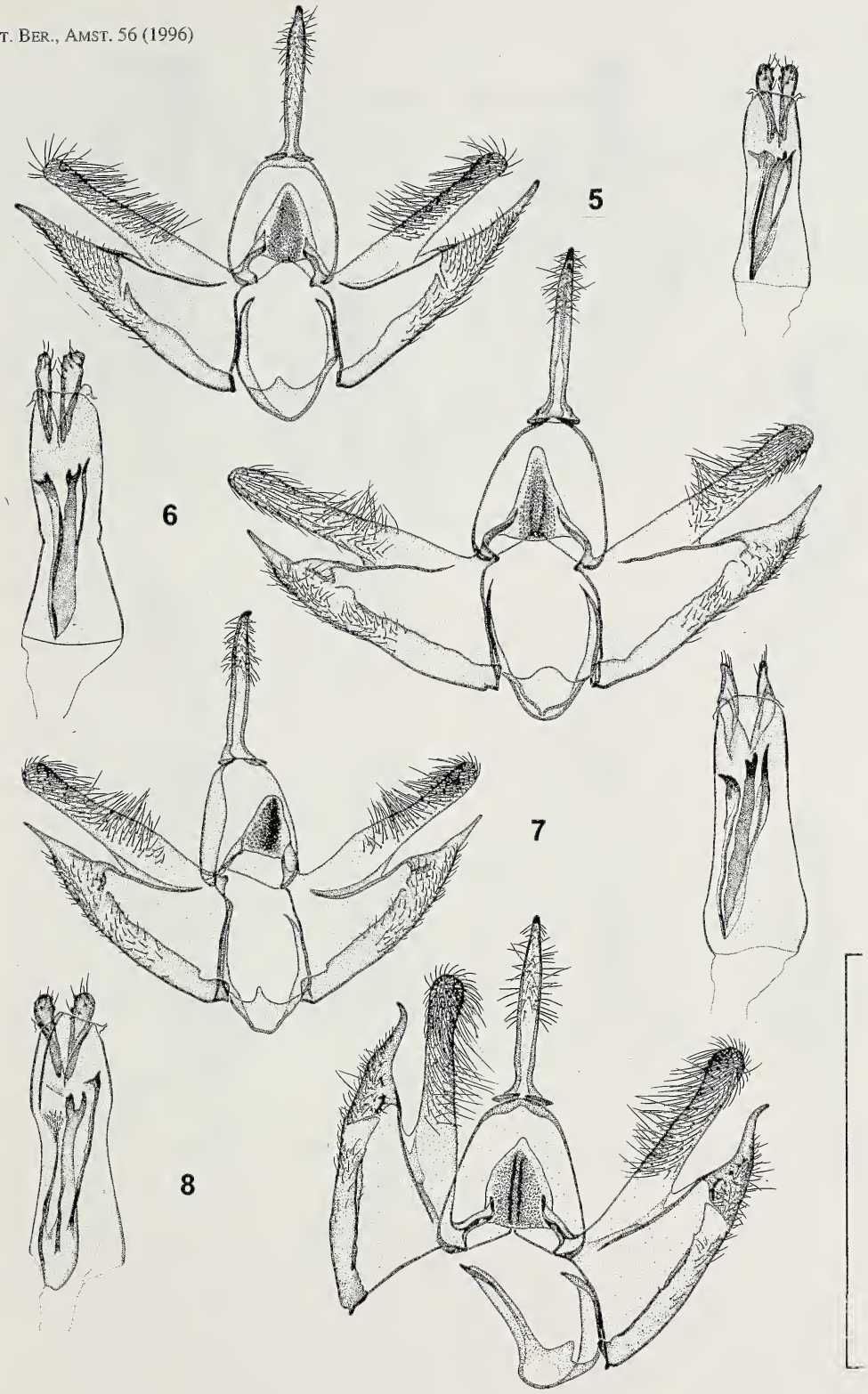
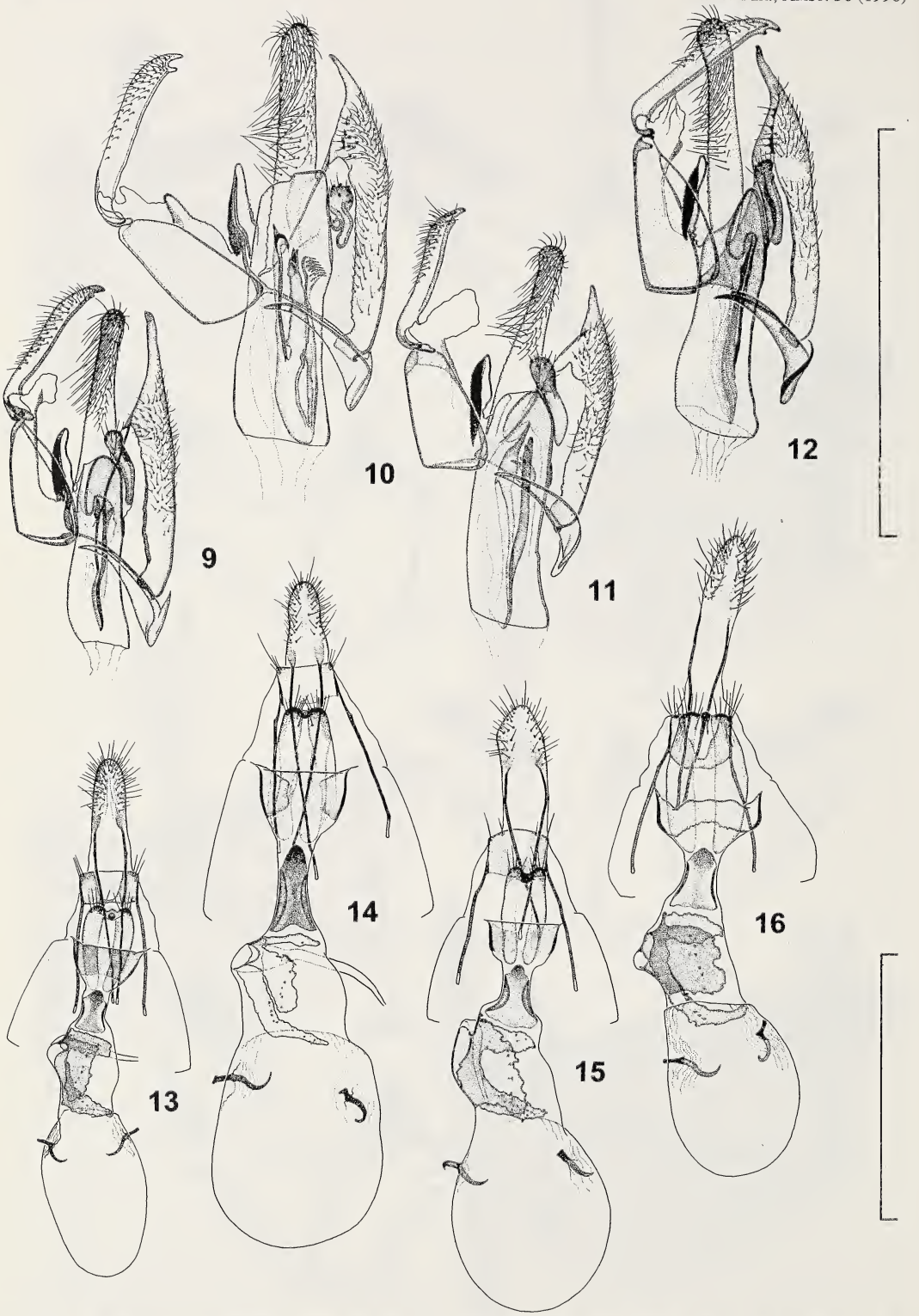
Figs 1-4. Males of *Mompha divisella* group. 1, *M. divisella*; 2, *M. subdivisella*; 3, *M. bradleyi*; 4, *M. confusella.*



Figs 5-8. Male genitalia of *Mompha divisella* group (ventral, scale 1 mm). 5, *M. divisella*; 6, *M. subdivisella*; 7, *M. bradleyi*; 8, *M. confusella*.



Figs 9-16. Genitalia of the *Mompha divisella* group. 9-12, Male genitalia (lateral, scale 1 mm). 9, *M. divisella*; 10, *M. subdivisella*; 11, *M. bradleyi*; 12, *M. confusella*. 13-16, Female genitalia (scale 1 mm). 13, *M. divisella*; 14, *M. subdivisella*; 15, *M. bradleyi*; 16, *M. confusella*.

parated by a dark spot or (especially in the females) coincided (fig. 1). Male genitalia: sacculus somewhat longer than cucullus, gradually narrowing to the apex (figs 5, 9). Female genitalia: fig. 13 ..... *M. divisella*

– Forewings with a less contrasting pattern, light spots on the dorsal margin dull, more or less sprinkled with fuscous scales. Male genitalia: sacculus evidently shorter than cucullus, abruptly narrowing to the apex .. 2

2. Smaller specimens, 9-11 mm. Forewings dull, oily shining, 4.0 to 4.2 times as long as wide (fig. 3). Male genitalia: cucullus enlarges distinctly towards the base of dorsal edge (figs 7, 11). Female genitalia: fig. 15 ..... *M. bradleyi*

– Wingspan larger, 11-13 mm. Forewings brighter, lustreless, with more or less pronounced ochreous or reddish-brown markings in the middle, 4.8 to 5.2 times as long as wide. Male genitalia: dorsal edge of cucullus nearly straight, without distinct enlargement near the base 3

3. Forewings greyish-brown, with ochreous discal markings (fig. 2). Male genitalia: apex of sacculus straight, gnathos narrow triangular (figs 6, 10). Female genitalia: fig. 14 ..... *M. subdivisella*

– Forewings dark brown, with reddish-fuscous discal markings (fig. 4). Male genitalia: apex of sacculus curved, gnathos widely triangular (figs 8, 12). Female genitalia: fig. 16 ..... *M. confusella* spec. nov.

Species account

Mompha divisella Herrich-Schäffer
(figs 1, 5, 9, 13, 17)

Mompha divisella Herrich-Schäffer, 1853.
Anacampsis decorella (non Haworth, 1812): Stephens, 1834.

Type material

Lectotype: ♂, with the labels: H.-Sch.; *Mompha divisella*, Glitz; paralectotype: ♀, without labels but standing in one series with the lectotype. In the collection of the Zoological Museum of the Humboldt University, Berlin (Germany).

Diagnosis

Length of the forewing 4.5 to 5.1 times as much as the width. White dorsal markings near the base of the forewing less irrorated with darker scales than the other species. Thorax light brown with only the anterior edge dark greyish-brown.

Description

Male (fig. 1) 11-12 mm, female 10-11 mm.

Head: frons shining, creamy to ochreous-white; vertex creamy to ochreous-white, irrorated by greyish-brown tipped scales; antennae dark grey with indistinct darker annulations at basal part. Thorax light brown, dark greyish-brown anteriorly and ochreous

Fig. 17. Distribution of *Mompha divisella*.

posteriorly; tegulae light brown, ochreous at sides and posteriorly. Forewings dark greyish-brown with greyish streak at the base, reddish-ochreous discal spot and whitish transverse fascia at the end of the cell, more distinct and broad in the females; basal half of dorsal area white, somewhat ochreous-white to the base, irrorated with a very few greyish-fuscous scales and with a brown dot in the middle; two or three indistinct whitish costal streaks and white outer spot at the apex.

Abdomen shining-grey ventrally, segments shining white banded posteriorly. VI segment in the females almost entirely greyish-brown, anal tuft ochreous-grey, mixed white dorsally, white ventrally.

Male genitalia (figs 5, 9). Sacculus gradually tapering into a long apical process, only slightly bent and with blunt point, reaching at or beyond the top of the cucullus; aedeagus with three cornuti of almost the same length: left broad, hooked and covered with microspicules, middle bifurcate, right slender, sharply pointed and with a small distal hook.

Female genitalia (fig. 13). Tergite VIII twice as broad as the length, unsclerotized part of its posterior edge distinct and U-shaped; sinus vaginalis funnel-shaped, as wide as or slightly wider than the largest width of the enlarged ductus bursae; inception of the ductus seminalis small and oval, situated in the posterior part of the ductus bursae.

Biology

The host plants are generally the smaller members of the genus *Epilobium* (Onagraceae): *E. montanum* L., *E. palustre* (L.) Crantz, *E. lanceolatum* Sebastiani et Mauri and *E. parviflorum* Schreber (Barrett, 1865; Wakely, 1944; Riedl, 1969; Sinev, 1989). In Finland also on *Epilobium adenoscaulon* Hausskn echt, a species originally from North America (Piispala, 1964) (S. Kerppola, personal communication). The records from *E. alpinum* L. and *Chamerion angustifolium* (L.) Scop. should be verified.

The larva lives in June and July in the main stems generally near the leaf bases, causing these to gall. Plants of *E. montanum* containing larvae usually are much branched above the gall, and the stems have a more reddish colour. Such excessive branching above the gall has also been noticed for *E. palustre* and *E. parviflorum* (Barrett, 1865). Prior to pupation the larva spins a white cocoon inside the gall, with silk protruding from the exit-hole at the lower end of the gall. The black pupa lies head downwards in the direction of the exit-hole. The moths are emerging in August and flying after hibernation till May, but sometimes adults have been collected in December and January, probably during mild days.

Distribution (fig. 17)

Mompha divisella is known from Austria, Belgium, Denmark, England, Finland (south), France, Germany, Hungary, Italy, The Netherlands, Poland, Romania, Russia (up to SW Siberia), Slovakia, Sweden, Switzerland, Ukraine. It is also recorded from western Georgia, Kazakhstan and Kirgizia (Sinev, 1986).

Mompha subdivisella **Bradley**

(figs 2, 6, 10, 14, 18)

Mompha subdivisella Bradley, 1951.

Material examined

1 ♂: England, Oxford, 28.viii.1988, em. 22.ix.1988, bred *Epilobium hirsutum*, J. R. Langmaid, coll. Koster; 1 ♀: England, Oxford, 6.viii.1988, em. 7.ix.1988, bred *Epilobium hirsutum*, J. R. Langmaid, coll. Koster.

Diagnosis

Length of the forewings 4.8 to 5.1 times as much as the width. Forewing with a very indistinct pattern and clearly more brownish-grey than in the other species of the *divisella* group.

Description

Male (fig. 2) 12-13 mm, female 11-12 mm.

Head: frons shining creamy-white; vertex ochreous, irrorated by brown tipped scales; collar greyish-brown, ochreous posteriorly; labial palpi creamy-white; scape dark brownish-grey with ochreous-white apical ring, antennae greyish-fuscous.

Thorax and tegulae brown, greyish-brown anteriorly, ochreous at sides and posteriorly. Forewings dark greyish-brown, irrorated whitish, with greyish-brown streak at the base and pale ochreous inward-oblique fascia (interrupted in the males and uninterrupted in the females) at three-fourth; basal half of dorsal area pale ochreous, irrorated with greyish-brown scales; an indistinct discal ochreous spot before one-half of its length and an ochreous (sometimes indistinct) outer spot at the apex.

Abdomen shining brownish-grey dorsally, shining white ventrally; segment VI in the female blackish ventrally, anal tuft white.

Male genitalia (figs 6, 10). Sacculus abruptly tapering distally to a slightly bent, sharp point, not reaching the tip of the cucullus; aedeagus with three cornuti of different length: left shortest, very slender with microspicules at distal end, right longest, slender and apically hooked.

Female genitalia (fig. 14). Tergite VIII about one and a half times as broad as the length, without distinctly traced unsclerotized posterior part; sinus vaginalis slightly narrower than the widest part of ductus bursae; inception of the ductus seminalis small and oval, situated in the posterior part of the ductus bursae.

Biology

Epilobium hirsutum L. has been ascertained as host plant so far. The larva makes a channel in the pith, up to 25 cm long, usually unbranched, although occasional diverticula are found in the main stem or leading into larger lateral branches. Up to three such channels could be found in one plant, usually separated vertically. Prior to pupation the larva makes an exit-hole by boring through the stem wall to the paper-thin brown bark, leaving this untouched as a round or oval cap. The yellowish-brown pupa lies in a cocoon spun of thick whitish silk just below, but sometimes just above the cap. Adults from larvae and pupae collected in early August emerged between late August and October (Sterling & Langmaid, 1989).

The species is probably univoltine and is

Fig. 18. Distribution of *Mompha subdivisella*.

Fig. 19. Gall of *Mompha bradleyi* in stem of *Epilobium hirsutum*.

supposed to hibernate as adult like the other species of the group.

Distribution (fig. 18)

Mompha subdivisella is known from England, France and Spain. The records from Portugal (Zerkowitz, 1946) are probably based on misidentifications.

Mompha bradleyi Riedl
(figs 3, 7, 11, 15, 19-22)

Mompha bradleyi Riedl, 1965.

Material examined

1 ♂, 1 ♀: England, Herefordshire, Wellington marsh, 20-25.ix.1991, galls on *Epilobium hirsutum*, 9.ix.1991, M. W. Harper, coll. Koster; 3 ♂: Kerkrade, Erenstein, 4.viii.1993, galls on *Epilobium hirsutum*, em. 2-10.ix.1993, leg. A. Schreurs, coll. Koster; 3 ♀: Kerkrade, Erenstein, 4.viii.1993, galls on *Epilobium hirsutum*, em. 29-31.viii and 1.ix.1993, leg. A. Schreurs, coll. Koster.

Diagnosis

Forewings much shorter than in the other species of the group: length only 4.0 to 4.2 times as much as the width. Head, thorax and forewings dull, oily shining, without any bright ochreous or white markings.

Description

Male (fig. 3) 10-11 mm, female 9-10 mm.

Head: frons shining creamy to dull ochreous-whitish, vertex pale brownish; antennae dark fuscous, some paler beneath at the basal half.

Fig. 20. Top stalk of *Epilobium hirsutum* with impediment of growth caused by a gall of *Mompha bradleyi*.

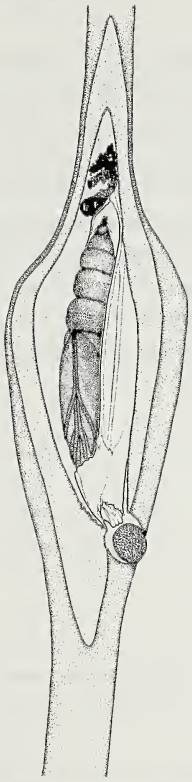


Fig. 21. Gall of *Mompha bradleyi* (longitudinal section).

Forewings dark greyish-fuscous, with a very indistinct and interrupted paler fascia at the end of the cell and whitish basal half of dorsal area densely suffused with grey and fuscous scales.

Male genitalia (figs 7, 11). Sacculus abruptly tapering distally to a slightly bent, sharp point, not reaching the top of the cucullus; cucullus in basal half about twice as wide as in distal half; aedeagus with three cornuti of different length: left shortest, hooked, distally with microspicules, right longest, slender and bent.

Female genitalia (fig. 15). Tergite VIII with a convex posterior margin and indistinct unsclerotized area; sinus vaginalis distinctly narrower than the widest part of ductus bursae; inception of the ductus seminalis large and longitudinally stretched.

Biology

In 1991 small green galls were found in England on *Epilobium hirsutum* L. In the first instance the galls were ascribed to *Mompha divisella*, normally the gall-maker on the smaller species of *Epilobium* (Harper, 1993). In order to rear *Mompha epilobiella* Den. &

Fig. 22. Distribution of *Mompha bradleyi*.

Schiff. Mr. A. Schreurs from Kerkrade, The Netherlands collected in 1992 top and side stalks, of which the leaves have been spun together. Among a series of the expected *M. epilobiella* some specimens of another *Mompha* species hatched. In the meantime some of the small galls found in England had been sent by Dr.J. R. Langmaid to the first author and afterwards Dr.M. W. Harper sent some specimens reared from those galls on request. After examining the genitalia they could be identified as *M. bradleyi*. With this knowledge Mr. A. Schreurs could also find a large amount of galls on *E. hirsutum*. In The Netherlands the galls were found on plants of *E. hirsutum* growing on a chalk slope near Kerkrade, a rather dry habitat for this plant. Attempts to find the galls on plants in a marshy area nearby failed. This in contrast to the findings in England, where the galls have been found in a variety of habitats (Harper, 1994).

The eggs are presumably laid in a leaf-axil in spring. The larva lives in the pith of the stem, and finally causes the development of a gall. The galls are found in the thin top and side stalks, especially in the flowering side stalks (fig. 19). Galls generally occupy a joint and one gall, or in a very few cases two, were found in one stalk. The second gall was never situated at a joint. Sometimes the gall has a conspicuous red colour. When the gall is situated in a top stalk, it causes a distinct impediment of growth (fig. 20), in the side stalks this was less evident. Generally the larva starts feeding the pit of the stem in an upward direction. On very few occasions only it was found to feed downwards. The channel contains dispersed blackish frass. The gall is more or less spindle-shaped, up to 15 mm long and 4 mm wide. The chamber of the larva is not very large. Before pupation the larva gnaws an exit-hole in the lower part. Only a thin layer of bark is left undisturbed to keep the exit closed; this often comes loose at one side, probably caused by the continuing growth of the plant. The channel to the exit is lined with silk providing a smooth way out for the emerging adult. When the exit-hole is filled with frass, what can be seen through the bark, the larva appeared to be parasitized. Inside the gall the larva spins a white, silky and somewhat sticky cocoon with a funnel-shaped orifice, leading to the exit- hole. The pupa is shining pale brown and lies with the head downwards (fig. 21). Larvae affected by parasites do not finish the exit-hole properly. The moths emerge from the second decade of July till early September and are on the wing till the end of May in one generation, hibernating during the winter.

Distribution (fig. 22)

Mompha bradleyi is thusfar known from Austria, England, Germany, The Netherlands and Poland.

***Mompha confusella* spec. nov.**
(figs 4, 8, 12, 16, 23)

Type material

Holotype: ♂, Azerbaijan, Kosmol'ian, 25.iv.1992, Tikhonov leg., genitalia slide J. C. Koster No. 3928, coll. Zoological Institute of the Russian Academy of Sciences, St. Petersburg (ZMAS). Paratypes: 1 ♂, 2 ♀, same data as holotype (ZMAS); 1 ♂, Crimea, Karadagh Natural Reserve, 24.iv.1989, Budashkin leg. (ZMAS); 1 ♂, Hungary, Almar, Bukk-hegys, 4.iv.1951, Reskowits leg., coll. Natural History Museum, Budapest (HNHM); 1 ♂, Hungary, Kaposvar, 21.iii.1948, Pazsiczky leg. (HNHM); 1 ♂, 2 ♀, Austria, [Wien] (ZMAS); 2 ♂, Austria, Wien, coll. Zoological Museum, Helsinki; 1 ♂, Austria, Wien, coll. Deutsches Entomologisches Institut, Eberswalde; 1 ♂, 1 ♀, Austria, Wien, ex l. *Epilob[ium] angustif[olium]* Stengel, Hornig leg., coll. Zoologische Staatssammlung, München; 1 ♂, Austria inf[erior], Modling, Z[ucht] 10.ix, *Epil[obium] hirs[utum]* Anschwell[ung], coll. Zoologisches Museum der Humboldt-Universität, Berlin; 1 ♂, Austria inf[erior], Modling (HNHM).

Diagnosis

One of the largest species of the group. Length of the forewings 4.9 to 5.2 times as much as the width. Forewings dark brown mixed with reddish-brown and irrorated with whitish scales. Differs by the curved apex of sacculus in male and shape of antrum in female.

Description

Male (fig. 4) 12-13 mm, female 11-12 mm.
Head: frons shining creamy-white; vertex creamy-white irrorated by greyish-brown tipped scales; collar greyish-brown, ochreous-white posteriorly. Labial palpi with first joint white, second also white, strongly irrorated ochreous-grey on outside and ventrally, third white with dark brown narrow basal ring and wide dark brownish-grey with white irroration medial ring and apex. Antennae dark grey, apical part slightly serrate; scape white, irrorated dark brownish-grey, giving it a ringed appearance.

Thorax and tegulae dark brownish-grey, irrorated whitish, posteriorly edged ochreous-white. Legs dark brownish-grey, irrorated whitish, tibiae of first and second pair with an indistinct white medial spot and apical ring, third pair with distinct white medial and apical rings, tarsi whitish at joints, spurs greyish-white. Forewings dark brownish-grey, irrorated whitish; indistinct and inward oblique white fascia at three-fourth (more pronounced in the female), narrowed in the middle, with reddish-brown streaks on both sides, of which the inner forked towards apex and the lower branch reaching the dorsum, the outer edged on costal side by a narrow dark brown streak and on dorsum by a dark brown spot followed by an indistinct greyish-white spot. Basal half of dorsal area whitish, at base and on dorsum strongly mixed (especially in the males) with brownish-grey scales, also some ochreous-brown scales in the remaining white part; an indistinct subcostal white spot before one-half of its length; a dark brown streak in the fold, widening in the middle towards dorsum; a dark brown spot at one-half, above the inner ochreous-brown streak. Underside shining dark greyish-brown. Cilia light grey with two dark brown lines around apex, ochreous-grey on dorsum towards base. Hindwings shining grey, underside shining dark greyish-brown at costal half and shining grey at dorsal half; cilia grey, ochreous-grey on dorsum, the basal half pale yellow.

Abdomen brownish-grey dorsally, segments shining light grey banded posteriorly, shining white ventrally; anal tuft brownish-grey, ventrally lighter.

Male genitalia (figs 8, 12). Cucullus narrow with almost parallel sides, subapically slightly narrowing, top rounded; sacculus shorter than cucullus, broad at base, abruptly tapering distally to a strongly outward bent, sharp point; uncus slender, apex with a blunt point and slightly hooked; height of the tegumen less than the length of the uncus; gnathos triangular; aedeagus with three cornuti of somewhat different length and basally united, left one shortest, bifurcate and covered with spicules, middle one bifurcate, right one longest, slender and sharply pointed; juxta lobes small, clavate.

Female genitalia (fig. 16). Tergite VIII slightly broader as the height, rounded anteriorly, distally with a large, V-shaped unsclerotized part, suggesting an excavation; sinus

Fig. 23. Distribution of *Mompha confusella.*

vaginalis wide, bowl-shaped, wider than the largest width of the ductus bursae; antrum with a sclerotized plate provide with lateral rims; ductus bursae with 2 large sclerotized plates of irregular shape, connected on top and surrounding the inception of the ductus seminalis, which has the shape of a keyhole; corpus bursae oval, with two shickle-shaped signa.

Biology

The only data on the biology of this species are on the labels of specimens from Austria. One specimen bears a label: "*Epil[obium] hirs[utum]* Anschwell[ung]", and another specimen is labelled: "*Epilob[ium] angustif[olium]* Stengel".

Distribution (fig. 23)

Mompha confusella is known from Austria, Hungary, Ukraine (Crimea) and Azerbaijan.

Concluding remarks

The species of the *Mompha divisella* group are not only very similar morphologically, but they also have a comparable life-history: all are gall-makers in the stems and twigs of different *Epilobium* species. But it is evident that every species has his own trophic preference as usual in the family Momphidae (Sinev, 1989).

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