NOTES ON EUROPEAN PHORIDAE (DIPTERA)

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Since publishing new keys to the British Phoridae (Disney, 1983, 1989a) I have been able to examine a greater range of material of poorly known species. In particular the use of my keys in the rest of Europe has prompted the re-evaluation of some species. The new data and conclusions are presented below.

Aenigmatias Meinert

This genus is still somewhat poorly known, especially the females. Gotô & Takeno (1983) give an amplified description of *A. dorni* (Enderlein) and revise Schmitz's (1955) interpretation of the female abdominal terminalia. The segment of which the posterior margin bears stout hooks is the 7th (not the 8th). The small pouch opening behind the posterior border of sternite 7 is engaged by the upper lobes of the postero-dorsal regions of the male epandrium during coupling. Schmitz erroneously thought this pouch was the gonopore. The form of tergite 7 is discussed below.

Of the six Palaearctic species the females of only two were known to Schmitz (1955). I have now procured the female of a third species, which is described below. The known females are keyed below, including the inferred positions in the key of the three species still only known as males.

Key to females of Palaearctic *Aenigmatias*

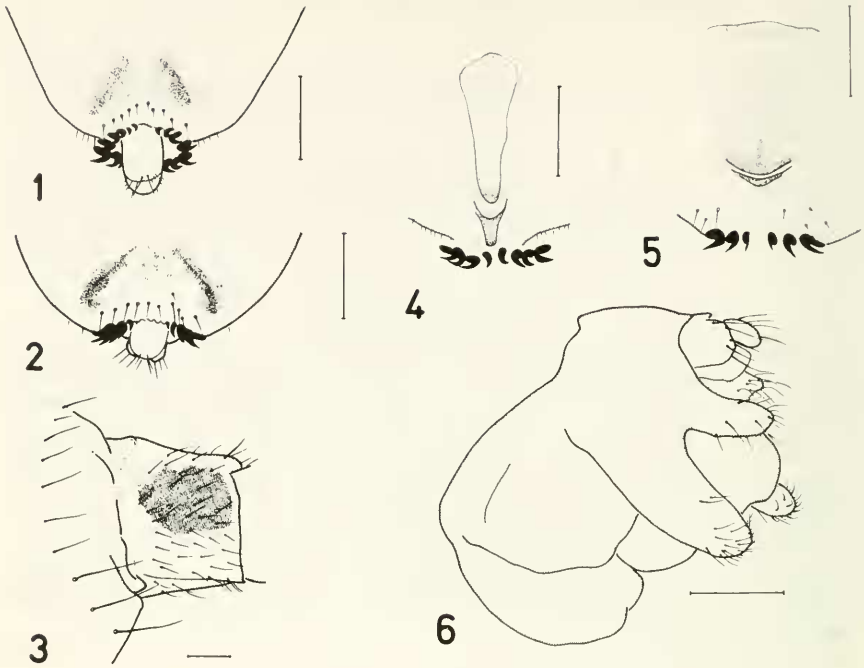
1 Hind femur with basal half, or more, largely yellow 2
– Hind femur uniformly brown. Sternite 7 relatively broad and as Fig. 5. Tergite 7 as Fig. 2 ..... *A. franzi* Schmitz
Note: *A. brevifrons* (Schmitz) and *A. picipes* Schmitz should also run to this point.

2 Abdominal tergite 5 distinctly pale, yellow to yellowish brown, in contrast to other tergites. Sternite 7 relatively broad and more or less parallel-sided (Fig. 5B in Gotô & Takeno, 1983). Tergite 7 with the darkened postero-lateral regions extending laterally and posteriorly so that a crescent-moon shape is formed by these two extensions (Fig. 211 in Schmitz, 1955) ..... *A. dorni* (Enderlein)
—Abdominal tergites all dark (apart from paler postero-median part of 6). Sternite 7 relatively narrow and tapered (Fig. 4). Tergite 7 as Fig. 1 ..... *A. lubbocki* (Verrall)
Note: *A. pyrenaicus* (Becker) should run to this couplet.

Aenigmatias franzi Schmitz, 1950

Peter Skidmore sent me a male and three females of this species collected in a Malaise trap by W. A. Taylor at Thorne Moors, near Doncaster, Yorkshire, 29 vi/14 vii, 1987. The female is described for the first time below. I also illustrate the male hypopygium in Fig. 6, for comparison with that of *A. dorni* (Fig. 4 in Gotô & Takeno, 1983) and *A. lubbocki* (Figs 16–17 in Disney, 1983).

Female. Head brown. Antennae brown with paler arista, which is very short-haired. Palps pale brown with three longer and 1–2 shorter apical bristles. Labella of proboscis small and pale dirty yellow.



Figs 1–3. Abdominal segment 7 of females: (1) *Aenigmatias lubbocki* from above; (2) *A. franzi* from above; (3) *Dohrniphora cornuta* from side. Scale bars = 0.1 mm.

Figs 4–6. *Aenigmatias*. (4)–(5) posterior-median region of ventral face of female abdominal segment 7: (4) *A. lubbocki*; (5) *A. franzi*; (6) *A. franzi* left face of male hypopygium. Scale bars = 0.1 mm.

Thorax and abdominal tergites coloured as head, except that the anterior margins of the abdominal tergites tend to be darkened. Venter greyish brown and devoid of hairs until rear of segment 6. The terminalia as Fig. 2 and sternite 7 as Fig. 5.

Legs with pale dirty yellow tarsi and brown pre-tarsi. Front tibia with a single, dorsal, hair palisade. Middle tibia with a dorsal, an antero-dorsal and an anterior palisade. Below the latter there is a second, irregular and incomplete, anterior palisade. Hind tibia with a postero-dorsal, dorsal and an upper anterior palisade running the length of the tibia. Below the upper anterior palisade are 2–3 irregular palisades. The upper one extends along the apical two-thirds and the lower 1–2 extend along the apical half or less.

The sclerotized patches of the female abdominal segment 7 are discussed below.

Conicera tibialis Schmitz, 1925

Conicera sobria Schmitz, 1936: **syn. nov.**

Schmitz (1953) distinguishes *Conicera sobria* from *C. tibialis* by the generally darker abdominal venter and palps in the latter. In addition he draws attention to a difference

in the length of the hairing of the arista and the hypopygial claspers of the male. I have examined 10 slide mounts of parts of the males of *C. sobria* from the Schmitz collection. It is clear that on every character cited by Schmitz this species lies well within the range of variation for *C. tibialis*. Furthermore Schmitz's statement that the underlying colour of the palps is pale is based on a slide-mounted head that has been cleared of all pigment, even the dense pigment of the eyes. In view of all this evidence I synonymize *C. sobria* with *C. tibialis*.

Megaselia Rondani

This enormous genus, with more than 1380 named species and most species still undescribed, is represented in the Palaearctic region by more than 400 described species. Many European species undoubtedly await description while many others await addition to the European list, being only known from elsewhere in our present state of knowledge.

The identification of specimens in such a large and difficult genus depends in the first instance, on identification keys. With these the number of possibilities can be reduced to manageable proportions. The available keys are cited in my keys to British species and Palaearctic catalogue (Disney, 1983, 1989a, 1991a). About 50 Palaearctic species are still omitted from all published keys. More recent additions have all been related to at least one published key.

Males of the following two European species are available to me, and have been run through the key to British species (Disney, 1989a). *Megaselia fuscoides* Schmitz will run to couplet 162, differing from *M. spinicincta* (Wood) by its dark brown legs, sparsely spinose labella and vein Sc reaching R1. *Megaselia perfusca* Schmitz will run to couplet 271, to *M. fusca* (Wood), or to couplet 293, to *M. spinolabella* Disney. The labella are too sparsely spinose for *M. fusca*, being only moderately spinose, as in *M. spinolabella*. It differs from the latter species by its more slender hind femur with longer hairs beneath (cf. Figs 9 and 10). Other species are discussed below.

Megaselia apophysata Schmitz, 1940

The holotype and six paratypes of this species are all female. They are very distinctive, in that ventrally the eighth abdominal segment bears a pair of long, hairy, processes extending rearwards (see Fig. 3, Taf. IV in Schmitz, 1940, or Fig. 10 in Disney, 1990a). In a footnote to his description Schmitz makes a brief reference to a male, caught at the same locality at the same time, which seemed to belong to the same species ('das mir bestimmt zur selben Art zu gehören scheint'). I have remounted this male on a slide and find it to be *M. clemonsi* Disney. This species was described from a series of males and a single female. The latter was caught visiting hawthorn flowers at the same place and the same time as the holotype male (Disney, 1984). It closely resembles the male. If this association of the sexes is correct then Schmitz's male is not *M. apophysata*.

While the single paratype female of *M. clemonsi* is still the only female recognized to date, the male has been found to be widespread in Great Britain and it is also recorded from Israel (Disney & Nussbaum, 1990). The female resembles the females of many related species and, in the absence of satisfactory keys to the females of the European *Megaselia*, is not likely to be recorded. The females of *M. apophysata*, however, are so distinctive that they are likely to be noticed. So far they are only known from the type series from Portugal. If the associated male did indeed belong to the same species (i.e. if the association of the male and female of *M. clemonsi*

is incorrect, and the males are a synonym of *M. apophysata*) then it is strange that no females have been caught in Britain, in view of the number of males procured to date. I conclude, therefore, that *M. clemonsi* remains a valid species, known in both sexes, and that Schmitz's male attributed to *M. apophysata* is really a misidentified specimen of *M. clemonsi*. The true male of *M. apophysata* awaits description (or recognition, if it is already described under another name).

Megaselia brevicostalis (Wood, 1910)

This species normally has two rectal papillae in the male and four in the female (Disney, 1989a). However, the species exhibits considerable variation in size and I have found that occasional smaller females only have two rectal papillae.

Megaselia coulsoni Disney, 1987

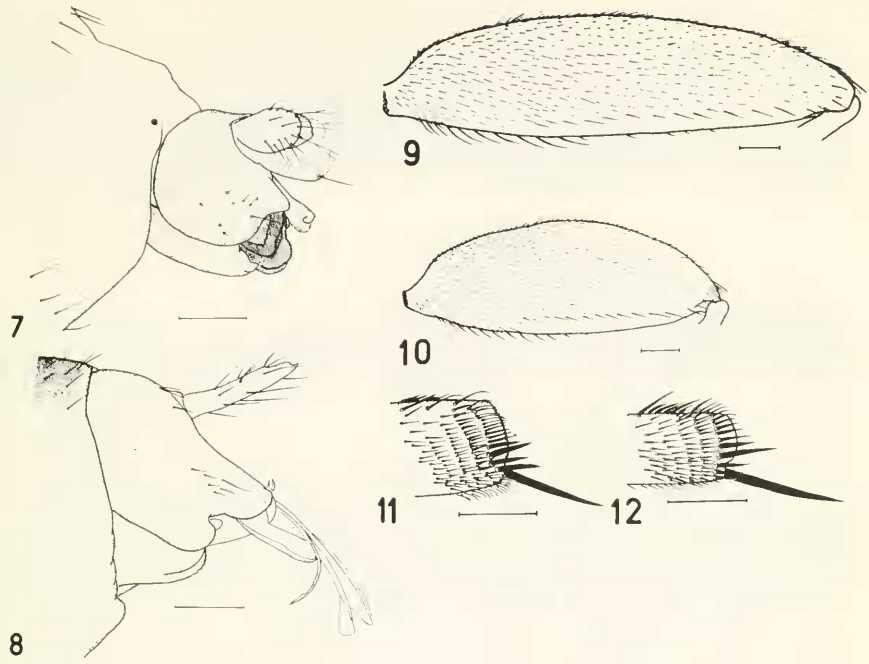
This species was described from a single male from England and was considered to have three bristles on the notopleuron. S.-O. Ulefors has sent me a second male from Sweden. In this specimen, however, there is a larger gap between the anterior pair of notopleural bristles and a third bristle behind. The latter bristle is evidently a pre-alar bristle. In my key (Disney, 1989a) specimens with only two notopleural bristles will run to couplet 212 instead of 241. The subequal posterior lobes of the hypandrium will immediately distinguish this species from the two species in couplet 212.

Megaselia diversa (Wood, 1909)

Megaselia sordescens Schmitz, 1927: **syn. nov.**
Megaselia pollex Schmitz, 1937: **syn. nov.**

The persistent misidentification of *M. producta* specimens as *M. sordescens* (see below) has had the effect of specimens of *M. sordescens* sensu Schmitz being assigned to *M. diversa*. In order to evaluate the supposed distinction between these two species I have remounted on slides, through the co-operation of Dr Brian Pitkin (of the Natural History Museum, London), part of the type series of *M. diversa*. I have designated a male, labelled 'Stoke Wd 6.8.08', as the lectotype. Its hypopygium is consistent with my figure for *M. diversa* (Fig. 292 in Disney, 1989a). Its hind-tibial comb is illustrated in Fig. 12. I have compared this lectotype with a male *M. sordescens* from the Schmitz collection labelled 'Fribourg 6.X.25 *sordescens*' and with slide-mounted legs and wings of the holotype and two paratypes. I conclude that *M. sordescens* is a synonym of *M. diversa*. The latter has proved to be a more variable species than Schmitz realized. This variation is continuous in terms of the supposed distinction in the hairs/bristles beneath the basal half of the male hind femur (Schmitz & Beyer, 1965).

I have examined the specimen of *Megaselia pollex* Schmitz from Glatzer Bergland referred to by Schmitz & Beyer (1965). It proves to be *M. diversa*. I have previously (Disney, 1985) noted that the only British specimen identified as *M. pollex* also proved to be *M. diversa*. I now conclude that *M. pollex* is merely specimens of *M. diversa* at the darker end of the range of variation for the latter species. *M. pollex* must be synonymized with *M. diversa*.



Figs 7, 8. Male hypopygia, left faces: (7) *Megaselia fennicola*; (8) *Puliciphora rufipes*. Scale bars = 0.1 mm.

Figs 9–12. *Megaselia* males, parts of hind legs: (9) *M. perfusca* anterior face of femur; (10) *M. spinolabella* anterior face of femur; (11) *M. producta* posterior face of tibia apex; (12) *M. diversa* posterior face of tibia apex. Scale bars = 0.1 mm.

Megaselia exarcuata Schmitz, 1927

This species was omitted from the keys of Schmitz & Bayer (1965) in error, but was noted in a postscript on page 519. It will key out either at couplet 7 of Abteilung IV, Erste Reihe or on page 522 of Zweite Reihe. It is clearly close to *M. gartensis* Disney, but the latter consistently has a dark haltere knob, while *M. exarcuata* has a yellow to dark yellow knob. No specimens of the latter have been collected in the British Isles. It is possible that *M. gartensis* is merely a subspecies of *M. exarcuata*, but until more evidence is forthcoming the two segregates are being treated as sibling species.

Megaselia fennicola (Beyer, 1958)

This species was described too late to be included in Schmitz's (1957) key to Abteilung II species. It is included in Colyer & Elberg's (1969) key to '*Plastophora*' species, which are now included in *Megaselia*. As this latter key is not readily available, I note that males will run to couplet 30 in the key to British species (Disney, 1989a) and I illustrate the male hypopygium in Fig. 7.

Megaselia longicostalis (Wood, 1912)

I have some males and females of this species from Spain with three rectal papillae. Normally the males have two and the females four (Disney, 1989a). Specimens with three papillae will further complicate the recognition of species in the *M. pulicaria* complex. Indeed this whole complex would benefit from the application of a modern technique, such as cytotaxonomy or investigations of structural enzymes or cuticular hydrocarbons.

Megaselia melanostola Schmitz, 1942

Plastophora balearica Colyer, 1969: **syn. nov.**

Megaselia balearica was described from a single female from Majorca. It was assigned to *Plastophora* Brues. This genus, however, has been synonymized with *Megaselia* (Disney, 1986). *M. melanostola* was described from a single male from Austria.

Dr Peter Bailey has sent me a series of four females and four males reared from a dead grasshopper, being attacked by a fungus, in December 1987 at Grandola, Portugal. The females agree with the description of *M. balearica*, except that the costal index is a little longer (at 0.45–0.46). Colyer (1969) gives this index as 0.42–0.43 (but from his figure it appears to be nearer 0.44–0.45, and Colyer's wing figures—being prepared from photographs—tend to be reliable). Also the first costal section is relatively longer (3.14–4.36:1, when compared with section three) in the specimens from Portugal. The ratio is only 2.6 in Colyer's specimen.

The males from Portugal run down to *M. melanostola*, but differ from the type and from British specimens in having a shorter costal index but a relatively longer costal section one. The hypopygia are indistinguishable (see Fig. 476 in Disney, 1989a). Furthermore a single female of *M. melanostola* has been collected along with males in Scotland (Disney, 1984). This female closely resembles the reared females from Portugal, apart from a longer costal index and relatively shorter costal section one. Its costal ratios, however, closely resemble those of Colyer's specimen from Majorca. The modified ovipositor segments are the same in all these females, and are the feature which caused Colyer to assign his specimen to *Plastophora*.

I conclude that *M. balearica* is a synonym of *M. melanostola*. However, I note that the costal index varies from 0.42 to 0.51 in females, and from 0.44 to 0.51 in males. The ratio of the costal section one to section three ranges from 2.60 to 4.36 in females and from 2.61 to 3.92 in males. The variation in the costal index suggests there may be a cline of increasing costal length with increasing latitude.

Megaselia posticata (Strobl, 1898)

In some males the anal tube proves to be uniformly dark. At couplet 116 of my key such specimens will run to 118 instead of 117.

Megaselia producta (Schmitz, 1921)

Megaselia sordescens auctt. nec Schmitz, 1927, misidentifications.

Sven -O. Ulefors (in. litt.) has carried out a critical review of the 'Kryophilen' group of the European *Megaselia* (see Schmitz & Beyer, 1965). He has exposed a significant cause of confusion. Beyer's Textfig. 319 (loc. cit. p. 552) purports to illustrate the male hypopygium of *M. producta*. However, his portrayal of the postero-dorsal region

of the epandrium is grossly inaccurate, and fails to indicate the extent of the marked inflation of this region (see Fig. 289 in Disney, 1989a). The result is that there has been a failure to recognize this species, the specimens being assigned to *M. sordescens* instead. The correct status of *M. sordescens* is considered above (under *M. diversa*). Fig. 11 illustrates the hind tibial comb of a male *M. producta*.

In my (1989a) Handbook couplet 65 lead 1 should conclude '. . . *producta* (Schmitz)', along with the caption for Fig. 289. *Megaselia producta* also needs to be added to the British list.

Megaselia pseudobrevior Disney, 1988

On the Canary Islands both sexes of this species were reported to have four rectal papillae (Disney, 1988c). However, I have some males from Spain with only two papillae. The females, and some males, from Spain have four.

Megaselia sinuata Schmitz, 1926

A male from Germany has the spines of the apical comb of the hind tibia bifurcated above the postero-ventral spur but simple below it. This variant has not been encountered before. It will still run to couplet 26 in my key. The hypopygium and vein Sc will distinguish it from *M. bifida* Disney.

Phora Latreille

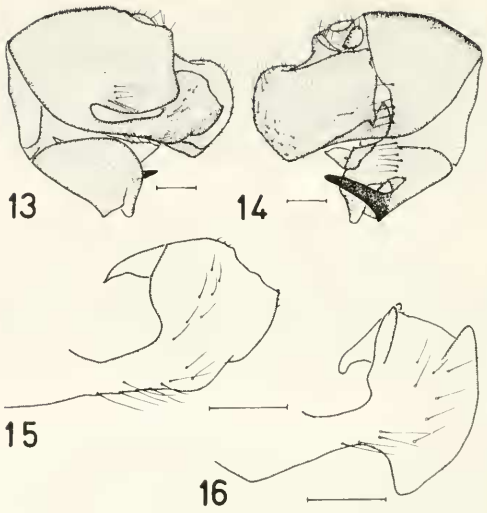
This difficult genus is still inadequately known for the Palaearctic region. Schmitz (1953, 1955) laid the foundations for later advances. The provision of an atlas of the male hypopygia of the British species (Disney, 1983, 1989a) has led to fewer misidentifications. The studies of Japanese species by Gotô (1984, 1985a–c, 1986) have clarified the recognition of several species, as well as adding new species. Further new species have been added by others (Zaitzev, 1977, Michailovskaya, 1986, Disney, 1989b).

A species poorly characterized by Schmitz (1955), and liable to confusion with the generally distributed *Phora atra* (Meigen), is dealt with below.

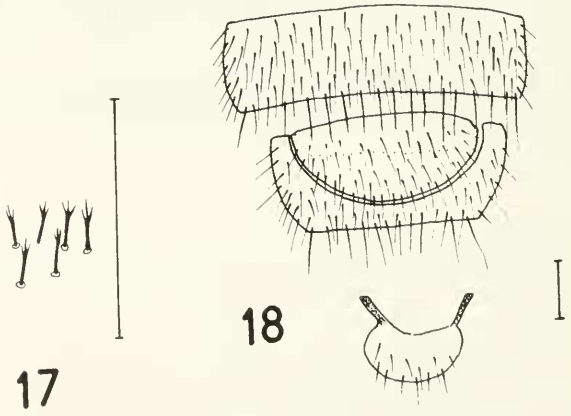
Phora limpida Schmitz, 1935

Schmitz (1955) distinguishes the male of this species from *P. atra* by the less concave hind margin of the upper lobe of the left side of the epandrium (cf. Fig. 13 with Fig. 108 in Disney, 1983). This is not reliable. The more reliable character is the difference in the form of the lower lobes of the left side (Figs 15 and 16).

Schmitz reported *P. limpida* from Italy, France and Spain. I have examined fresh material from Spain and also a male from Algeria (Akbou, Kabylie). *Phora atra* not only occurs in these countries but is widely distributed in Europe. It also occurs in the Nearctic region. I have remounted on a slide a male from a series collected in Spain by C. N. Colyer, and now in the Natural History Museum (London). Colyer attributed these to *P. limpida*. The remounted specimen, collected 14.vi.1966 at Gran Meda, has proved to be *P. atra*.



Figs 13–16. *Phora* males, hypopygia: (13–15) *P. limpida*, left face (13), right face (14) and lower lobe of left face of epandrium (15); (16) *P. atra* lower lobe of left side of epandrium. Scale bars = 0.1 mm.



Figs 17–18. *Puliciphora rufipes* female: (17) frontal hairs adjacent to ocellar triangle; (18) abdominal tergites 4–6. Scale bars = 0.1 mm.

Puliciphora Dahl

The Old World species of this genus are keyed by Disney (1988a, 1990b). A species previously only known from the Neotropical region and South Africa is now reported from France.

Puliciphora rufipes Silva Figueroa, 1916

In 1990 Alain Thomas sent me a female of this species from the Adour Valley, near Tarbes on the French side of the Pyrenees. Dr Loic Matile asked me to examine another female from the French Pyrenees collected (by J. P. Besson) from the Grotte de Sespran, Izeste, on 14.xii.1991.

The species is very similar to *P. borinquenensis* Wheeler, as mentioned in my key to British Phoridae (Disney, 1983). The female is most readily distinguished by the trifid-tipped hairs adjacent to the ocelli (Fig. 17). The male hypopygium is shown in Fig. 8.

Discussion

Brown (1992) is proposing the transfer of *Diplonevra* Lioy and *Dohrniphora* Dahl from the Phorinae to the Aenigmatiinae, on the basis of three postulated synapomorphies discussed below.

Brown's principal postulated neomorph is the development of dorso-lateral sclerites on the female abdominal segment 7. This is illustrated for *Dohrniphora cornuta* (Bigot) (Fig. 3) for comparison with the condition in *Aenigmatias* (Figs 1, 2). I suggest that a more parsimonious interpretation of this feature is that in both genera there has been a reduction and loss of the median third (or more) of tergite 7. In the case of *Aenigmatias* this has been associated with an enhancement and extension of the postero-lateral regions of the tergite, in association with the development of the series of strong hooks at the rear of each side of the segment (Figs 1, 2). In the case of *Dohrniphora* the lateral expansions of tergite 7, while the median band is lost, is associated with the development of a so-called 'sensory complex' of heavily sclerotized spinules at the base of the male hind femur (e.g. Disney, 1983, 1990c). It is now known that in *D. cornuta* these spinules are used to grip and compress the female segment 7 during copulation (Barnes, 1990). I suggest, therefore, that in the case of *Dohrniphora* the modifications of the female's tergite 7 are adaptations allowing both the protection for, and ease of compressibility of, segment 7 during mating.

Aenigmatias males possess no 'sensory complex' at the base of the hind femur. The reduction of the sclerotization of the median band of tergite 7 in females is probably related to the need for compressibility of the segment in relation to the use of the two sets of sclerotized hooks. The probability is high, therefore, that the loss of sclerotization of the median band of tergite 7 in *Dohrniphora* females evolved independently of the reduction of sclerotization of the same region in *Aenigmatias* females. This inference receives support from the observation that in the aenigmatiine genera *Aenigmatpoeus* Schmitz and *Psyllomyia* Loew the female terminalia are less modified than in *Aenigmatias*. However, segment 7 not only lacks the two series of sclerotized hooks but tergite 7 is absent altogether in these two genera. Furthermore in *Aenigmatias* the expansion of the lateral portions of the tergite are essentially postero-laterally. By contrast the expansions in *Dohrniphora* are laterally only, along the entire length of the tergite. It is possible, therefore, that the sclerotized patches in *Aenigmatias* are a neomorph evolved after an initial loss of tergite 7. Their markedly

postero-lateral position, in relation to the original position of tergite 7, would favour such an interpretation. In view of the evidence of much convergent and parallel evolution in the Phoridae (e.g. Disney, 1991b), Brown's hypothesis cannot be regarded as being well-founded.

Another of Brown's postulated synapomorphies, linking *Aenigmatias* to *Diplonevra* and *Dohrniphora*, is the approximation of veins R2+3 and R4+5, so that they are subparallel. This is a transformation of degree only, and one with a high probability of occurring independently several times. This is underlined by the clear evidence of an even more striking independent evolution of the approximation of veins R1 and Rs in different clades of Phoridae (Disney, 1991b).

Brown's third proposed synapomorphy linking these genera is the acquisition of longitudinal hair palisades on the mid and hind tibiae. This is a reversal of the polarity of a transformation sequence proposed by myself (Disney, 1988b). I stand by my proposal until convincing evidence is presented to refute it. I am, however, currently attempting to test my hypothesis.

For the present at least, I propose to reject Brown's transfer of *Diplonevra* and *Dohrniphora* to the Aenigmatiinae. Classifications should only be altered when controversies have been resolved.

Acknowledgements

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BOOK REVIEW

Lepidoptera of North East Essex by B. Goodey and J. Firmin. Published by Colchester Natural History Society as a special issue of *Nature in North East Essex* and available at £4.95 from J. P. Bowdrey, Museum Resource Centre, 14 Ryegate Road, Colchester COI IYG.—The contents of this local list comprise a map of the area covered, a foreword by Col. A. M. Emmet, an introduction explaining the circumstances leading to the compilation of the work, a number of essays on different aspects of the Lepidoptera of the area and a systematic section with introduction and references. There are also a number of pleasing drawings of notable North Essex species which although not particularly useful as identification aids certainly enhance the visual presentation.

Amongst the aspects of the area covered which I found of particular interest were the historical notes written by J. Firmin and covering a number of lepidopterists of the area including the eminent John Ray, Miss Laetitia Jermyn who published *The butterfly collector's vade mecum* in 1827 and Gervase Frederick Mathew after whom *Mythimna favicolor* (Barr) was given its English name—Mathew's wainscot. All of the essays are interesting, but my favourites are the story of Mr Dewick's light trap with fascinating drawings of this legendary machine, which at 28 feet long and 12 feet wide is believed to be the biggest in the country, and Mr Fisher's account of his discovery of *Gortyna borelli* (Piere) with refreshing personal detail such as Mr Chalmers-Hunt saying as he dug out a larva "Mr Fisher, history is being made at this moment".

It is pointed out in the introduction that this work has built on the many additional records which have followed comparatively recent publication of *The larger moths and butterflies of Essex* and the *Smaller moths of Essex*. The systematic list incorporates these additional records and species are recorded under 10-kilometre squares with an indication of residency, range and frequency. This list concentrates on more recent records and gives additional information on more interesting or poorly recorded species.

It took me a little time to get to grips with the abbreviations used in the systematic section, but eventually I concluded that little was sacrificed in clarity for the sake of being concise.

This book, although of primary interest to Essex naturalists has a lot to offer and will find its way onto the shelves of many from outside the area I am sure, provided they can accommodate its A4 format.

A. J. PICKLES