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Luffia lapidella (Goeze, 1783) (Lepidoptera: Psychidae) proved to be the host of *Choeras gielisi* van Achterberg (Braconidae: Microgastrinae), new to Britain

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Abstract

Choeras gielisi is recorded from Britain for the first time, on the basis of two female and two male specimens reared solitarily from sexual and parthenogenetic forms of *Luffia lapidella* at different sites. These rearings, the first with clear host determination, provide strong evidence that the type specimen of *C. gielisi* had not been a parasitoid of the terrestrial caddisfly *Enoicyla pusilla*, as had been supposed from inadequate evidence at the time of its description.

Key words: Rejection of supposed host, Trichoptera

Introduction

For a short time following the description of *Choeras gielisi* by van Achterberg (2002) as a supposed parasitoid of the terrestrial caddisfly *Enoicyla pusilla* (Burmeister) (Trichoptera: Limnophilidae) in the Netherlands, it seemed credible that not all Microgastrinae are parasitoids of Lepidoptera, especially as Trichoptera is a closely related order. However, the rearing was questioned by Shaw (2012) on the grounds of rearing a female *C. gielisi* apparently from a psychid in France, but without unequivocal host determination nor recovered host remains. Subsequently, unsuccessful attempts to rear parasitoids from numerous *E. pusilla* collected in the Netherlands gave me familiarity with the case of *E. pusilla* which could thus be rejected as host of my French specimen. Subsequent personal communications from both Kees van Achterberg and Cees Gielis conceded that the original rearing reported by van Achterberg (2002) had been from a quantity of mixed substrate including lichens, in which *E. pusilla* was one among an unknown assemblage of organisms present, but that no hosts were isolated nor were host remains recovered. These facts led to further objection to the host record (Shaw, 2017 [in which the reared French female specimen was erroneously said to be male]) and, ultimately, to the restoration of the belief (Fernandez-Triana *et al.*, 2020) that Microgastrinae exclusively parasitise 'Heteroneura', with the notable exception of Nepticuloidea.

The present paper provides unequivocal evidence that the psychid genus *Luffia* is the true host of *C. gielisi*, and also reports this microgastrine from Britain for the first time. Since the British checklist now places the parthenogenetic form *Luffia ferchaultella* (Stephens, 1850) as a junior synonym of *L. lapidella* (Goeze, 1783) (Agassiz *et al.*, 2019), the two nominal taxa are here referred to as the parthenogenetic and sexual forms of *L. lapidella*, respectively.

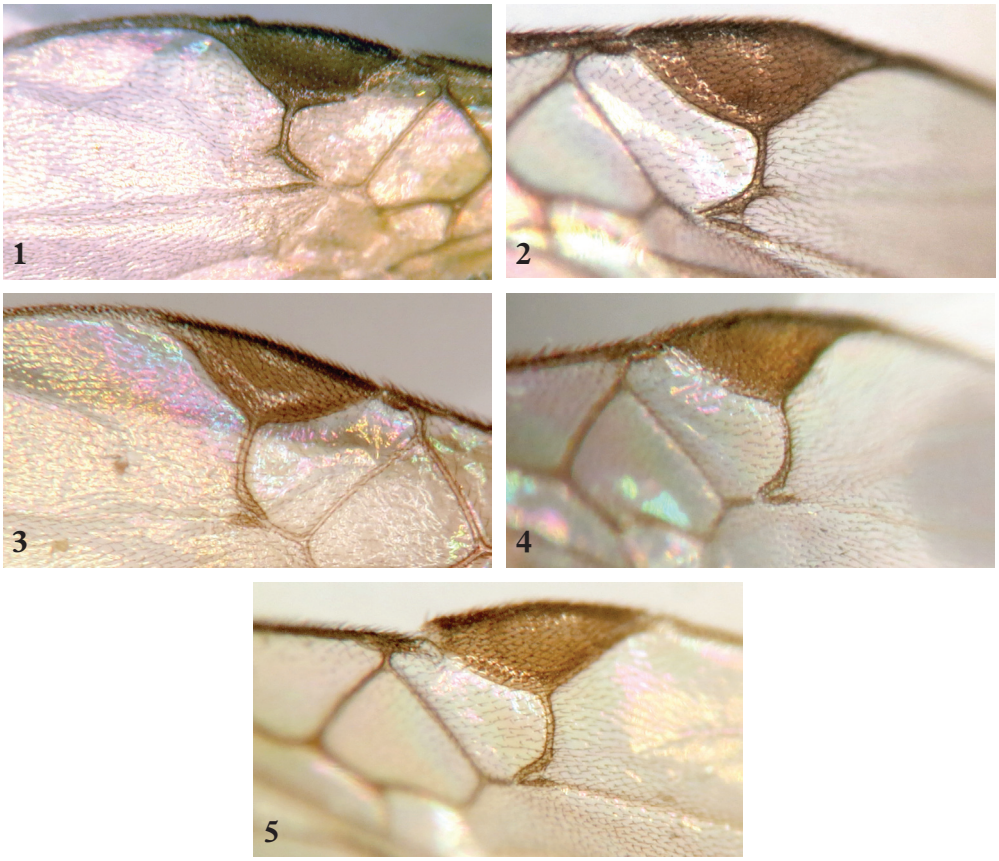
Rearings from Britain

The British specimens now determined as *C. gielisi* have the following data and are deposited in the National Museums of Scotland (NMS) collection:

1 ♀ [England] Sandy, Bedfordshire, ex the parthenogenetic form of *Luffia lapidella* coll. v.2006, em. 2006, A. Banthorpe. (Figs 1, 2).
1 ♀, 2 ♂ [England] Marazion, Cornwall, ex the sexual form of *Luffia lapidella* coll. 26.vi.2001, em. 10.vii.2001, I. Sims. (Figs 3–5).

Identification

Within Europe the genus *Choeras* Mason is one of the more difficult microgastrine genera to recognise and define (cf. Mason, 1981), partly owing to the wide variation in the form of the areolet (second submarginal cell) in the fore wing. However, in the European fauna *C. gielisi* differs from all other Microgastrinae in having (all of) a wedge-shaped first metasomal tergite, propodeum lacking carinae (except for its margins), hypopygium strongly folded along its mid-line, setose part of ovipositor sheath about 0.6 times as long as hind tibia (the ovipositor projecting almost as long as hind tibia), and – most importantly, and especially for the recognition of males – the extremely proximal position of vein r-m in the fore wing that closes, or almost closes, the second submarginal cell to form a minute areolet.



Figs 1–5. *Choeras gielisi*, fore wings. **1**, (left) and **2**, (right) ex parthenogenetic form of *Luffia lapidella*, Sandy; **3–5**, separate specimens ex sexual form of *L. lapidella*, Marazion.

Rather to my shame, around ten years ago I had placed these specimens (that I had failed to determine when sent to me) in a box of 'indet. *Dolichogenidea*' and rather forgotten about them, only recently reviewing them. All four of the specimens prove to be *Choeras gielisi*, but in all cases the closure of the fore wing areolet, resulting from an extremely proximally placed vein r-m (cf. Mason, 1981), is easy to overlook (as indeed I had done previously): in one case r-m is virtually absent in the left fore wing (Fig. 1) although clearer in the right one (Fig. 2), and in others it is rather indistinct (Fig. 3), or marked by little more than a slight thickening of veins (Figs 4, 5).

Allowing for minor variation in the position and strength of r-m (Figs 3–5), the material from the sexual form of *L. lapidella* detailed above fits van Achterberg's (2002) description of his single specimen closely. (The latter paper can be downloaded free of charge from the Naturalis website). The specimen reared from the parthenogenetic form in Bedfordshire (Figs 1, 2) has a well-defined stub in the fore wing marking the junction of 2r with Rs+r-m (cf. Mason, 1981) not seen in the other specimens discussed and it also has a slightly less apically narrowed first metasomal tergite, but otherwise agrees well. Although it seems unlikely that this specimen represents a further species, more material – especially if fresh enough to barcode – from both forms of the host could provide a useful test of that view.

Discussion

It is of course impossible to be absolutely certain that the type specimen of *Choeras gielisi* was not reared from *Enoicyla pusilla*, but the circumstantial evidence that it was not is rather overwhelming and, in my view, strong enough to absolutely discount any such association. Quite apart from the unsatisfactory evidence surrounding that rearing, because I failed to rear it from a large (*ca* 100) collection of *E. pusilla* from a high-quality site in the Netherlands (Gelderland, Hoge Veluwe – about 60 km east of the type locality of *C. gielisi*) despite successfully rearing many of the caddisfly to the adult stage, it seems most unlikely to be a regular parasitoid of that host. Now these rearings from *Luffia*, all four of which are accompanied by the all-important host case from which the adult parasitoid emerged, provide certain evidence of the true host of this interesting microgastrine. In retrospect I am fairly sure that the host psychid from which I reared a specimen in France was also compatible with *Luffia*, though as stated above unfortunately the host's case was not recovered.

More than eighty years ago McDonogh (1939) published a survey of the parasitoids of *Luffia* '*ferchaultella*' conducted mostly in southern England. Among large numbers of other species reared from almost 7000 cases, he records '*Apanteles* sp. It is not yet possible to identify this species. 1 female and 1 male were bred from Bourne End (Bucks) and Wokingham (Berks). They emerged between 30th July and 5th August'. At that time '*Apanteles*' was employed to cover all microgastrines with the fore wing areolet open and, unless they were minutely examined, it might well have appeared to be so if these specimens were *C. gielisi*, as they may have been. I have not been able to trace the specimens (unfortunately no depository is stated), but it would be interesting to review them if they ever come to light.

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