

Microdon rhenanus and *Microdon eggeri* var. *major* (Diptera, Syrphidae) revisited

Ulrich Schmid

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In the light of the description of *Microdon myrmicae* Schönrogge et al. 2002, a sibling species of *M. mutabilis* (Linnaeus, 1758) only separable on features of the developmental stages, *Microdon rhenanus* Andries, 1912 and *Microdon eggeri* var. *major* Andries, 1912 are re-examined. A lectotype is designated for *M. rhenanus* and a neotype for *M. eggeri* var. *major*. The identity of both taxa is discussed. *M. rhenanus* is still regarded as a junior synonym of *M. mutabilis* (L.) sensu Schönrogge et al. but argument is presented that *M. eggeri* var. *major* represents a distinct species *Microdon major* Andries, 1912 **stat. nov.**, which is associated with ants of the genus *Formica*, while *M. analis* (Macquart, 1842) s.str. (= *M. eggeri* Mik), as interpreted here, is associated with *Lasius* species. Information is provided on recognition of the puparia of these taxa. Further investigations on habitat, ant associations and identification of imagines are necessary.

The first records of *M. myrmicae* from Germany are given.

Key words: *Microdon*, type designation, Europe, Syrphidae.

Zusammenfassung

Nach der Beschreibung von *Microdon myrmicae* Schönrogge et al. 2002, einer nur an Merkmalen der Larven und Puparien sicher unterscheidbaren Zwillingsart von *Microdon mutabilis* (Linnaeus, 1758), stellte sich die Frage nach der Identität von *Microdon rhenanus* Andries, 1912 und *Microdon eggeri* var. *major* Andries, 1912 erneut. Für *M. rhenanus* wurde ein Lectotypus festgelegt, für *M. eggeri* var. *major* ein Neotypus. *M. rhenanus* wird nach wie vor als Synonym von *Microdon mutabilis* (L.) sensu Schönrogge et al. betrachtet, *Microdon major* Andries, 1912 **stat. nov.** dagegen als eigene Art. Während *M. analis* (Macquart, 1842) s.str. (= *M. eggeri* Mik) in Nestern der Gattung *Lasius* vorkommt, entwickelt sich *M. major* bei Arten der Gattung *Formica*. Merkmale zur Unterscheidung der Puparien beider Taxa werden angeführt. Weitere Untersuchungen zum Vorkommen, den Wirtsameisen und der Bestimmung von Imagines beider Arten sind notwendig.

Von *M. myrmicae* liegen erste Nachweise aus Deutschland (Bundesländer Brandenburg und Sachsen) vor.

Introduction

Microdon rhenanus and *M. eggeri* var. *major* have been enigmatic taxa since Andries described them in 1912, based on material from western Germany. Unfortunately Andries, in her detailed study (mainly on the anatomy of *Microdon* larvae), failed to specify her material and to designate type specimens and beyond this gave no information about the depositions of specimens in museum collections. The result: in German museum collections Doczkal & Schmid (1999), who revised the central European taxa of the genus, found only one single puparium which was labeled both as *Microdon rhenanus* and as paratype and which agrees with Andries' concept of the species and one specimen labeled as *Microdon eggeri* var. *major* that is most probably not from the original material of Andries (both coll. ZFMK).

As a result of our research we considered *M. rhenanus* to be a synonym of *Microdon mutabilis* (Linnaeus, 1758) and *M. eggeri* var. *major* to be a synonym of *Microdon analis* (Macquart, 1842) (= *Microdon eggeri* Mik, 1897) (Doczkal & Schmid 1999) – and the story of *rhenanus* and *eggeri* var. *major* seemed to be closed.

It was Schönrogge et al. (2002) with their description of *Microdon myrmicae*, a sibling species of *M. mutabilis*, who added a new chapter to the *rhenanus* story. In Great Britain and Ireland they found morphological differences between developmental stages of "*mutabilis*" associated with *Formica* and *Lasius* ants and those associated with *Myrmica scabrinodis*. Describing the latter species as new to science they attributed the name *mutabilis* to the species associated with *Formica* without further discussion of the Linnaean species. Neither the short diagnosis of Linnaeus (1758: 592) ["*M. antennis setariis elongatis tomentosa, abdomine nigro griseoque mutabili, scutello ferrugineo, thorace immaculato. Habitat in Europa.*"] nor the type specimen of *mutabilis*, following Thompson et al. (1982) a headless female, allow for more precise identification. Thompson et al. also restricted the type-locality to Sweden. Since the absence of *M. myrmicae* from Sweden can not be assumed it is necessary to refer the species associated with *Formica* as *M. mutabilis* (L.) sensu Schönrogge et al. (Speight 2002). Adults of *M. myrmicae* and *M. mutabilis* are not definitely distinguishable; *M. myrmicae* is somewhat smaller as *M. mutabilis* but there is a great range of overlapping in measurements. However it is no problem to distinguish the puparia, which have strongly different anterior respiratory horns (Schönrogge et al. 2002). Speight (2002) added another distinctive feature in the form of the larval mouthparts which are attached to the inner, ventral wall of the puparia and often preserved, while the respiratory horns in most cases are lost after hatching of the adults or destroyed by the ants.

The principal host ant species of *Microdon mutabilis* and *M. myrmicae* in Great Britain and Ireland, *Formica lemni* and *Myrmica scabrinodis*, respectively, overlap widely in range, while the two syrphid species do not. *Myrmica scabrinodis* is parasitized by *M. myrmicae* only "in the most waterlogged parts of *M. scabrinodis*' niche" (Schönrogge et al.). While *M. myrmicae* was found in "waterlogged, ungrazed neutral grassland, dominated by *Juncus* spp., or in *Sphagnum* bogs in acid heathland", where

the ant nests were confined to 10-30 cm tall tussocks, *M. mutabilis* prefers "well drained, grazed (1-5 cm tall) early successional or plagioclimax grassland".

The paper of Schönrogge et al. led Speight (2003b) to the suggestion, that "there may be more cryptic European *Microdon* species awaiting description, since the inference to be drawn from their findings is that any of the existing *Microdon* species known to use more than one ant genus as host could be a species complex, with a different cryptic species associated with each of the ants involved. In this regard, the status of *M. rhenanus* Andries, which was described as distinct from *M. mutabilis* on the basis of differences in larval and pupal morphology, but synonymised with *M. mutabilis* by Doczkal and Schmid (1999), requires review (Speight 2003a). Similarly, the status of *v. major* of "*M. eggeri*", also described by Andries (1912) on the bases of distinctions observed in the developmental stages, but synonymised with *M. analis* by Doczkal and Schmid (1999), requires re-examination."

The status of *M. rhenanus* Andries, and *M. eggeri v. major* Andries, is reconsidered here.

Material and methods

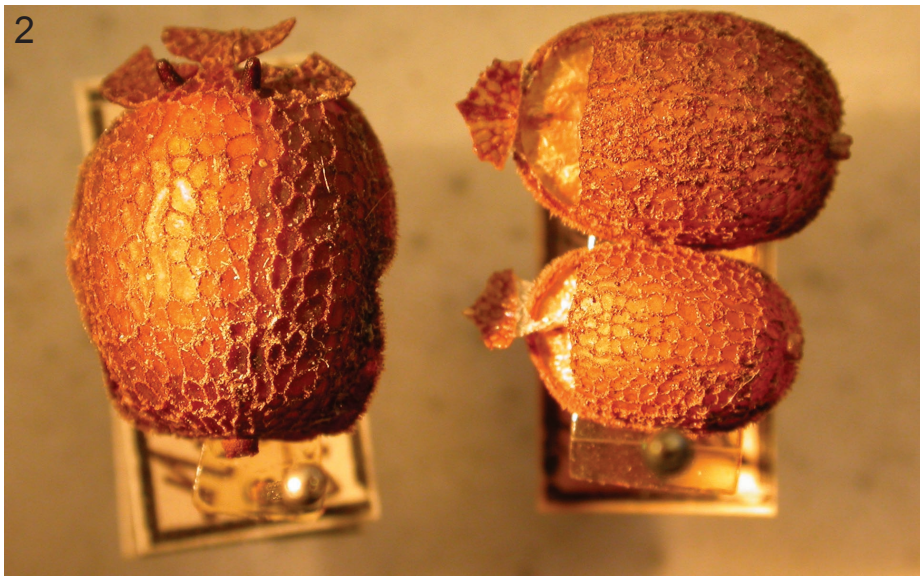
Puparia of several species of *Microdon* have been examined using a Wild M8 binocular microscope (magnification max. 100x). The larval mouth parts have been removed from those puparia. The drawings of larval mouthparts have then been prepared using a Zeiss Axioplan (magnification 400x) microscope and a drawing mirror, from partly dissected mouthparts which have been treated with 10% KOH for some hours and then stored in glycerol.

Abbreviations: SMNG (Staatliches Museum für Naturkunde Görlitz); SMNS (Staatliches Museum für Naturkunde Stuttgart), ZMFK (Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn).

Results and discussion

Microdon rhenanus and *Microdon eggeri* var. *major* – designations of types

Examination of all the material of the genus *Microdon* in the ZFMK collections brought new information about the only *rhenanus* specimen mentioned by Doczkal & Schmid (1999). In spite of the two labels ("Paratypus" and "Paratypoid") it was previously uncertain whether this puparium was part of the material Andries collected and described or if determination and type designation were made later by another person. Now it can be confirmed, that the specimen was collected and determined by Andries herself. The ZFMK collection contains 14 specimens (13 pins) of *Microdon* labeled in the same manner and with same handwriting (7 puparia and 1 imago labeled as *Microdon eggeri* [now known as *M. analis* (Macquart, 1842)], 2 puparia labeled as *Microdon eggeri* var. *major*, 3 puparia of *M. mutabilis* and 1 puparium of *M. rhenanus*). Most of these specimens were collected at localities Andries (1912: 309) mentioned in her paper (Koblenz, Bonn, Linz a.Rh., Laacher See). Years are given on three of the labels: [19]12 and [19]13. There is now no doubt that all of them were collected and labeled by Andries



Figs 1-2: Type specimens of *Microdon*. – 1. *Microdon rhenanus*, lectotype (photo: A. Schultheiss); – 2. *Microdon major*, neotype (left) together with two puparia of *Microdon analis* collected by Andries (photo: U. Schmid).



Figs 3-4: Anterior horns of *Microdon* puparia (from Andries 1912). – 3. *M. mutabilis*; – 4. *M. rhenanus*.

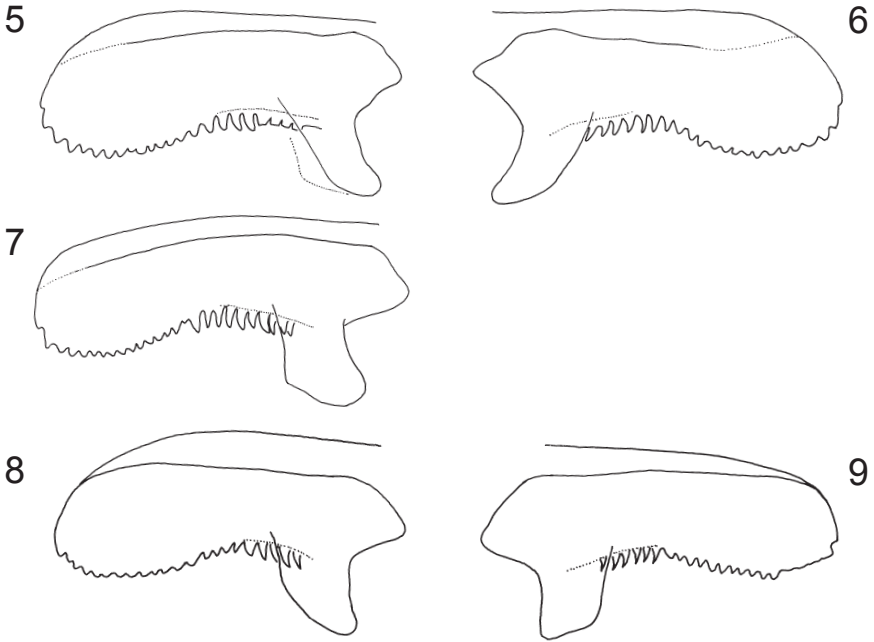
herself. [Some other specimens in the collection of the ZFMK labeled as *M. rhenanus* (in a different handwriting) are all specimens of other species of *Microdon*.]

In order to stabilize nomenclature, and on the assumption that the *rhenanus* puparium collected and labeled by Andries is the only remaining specimen of the original material, it is hereby designated as lectotype and labeled: (1) Rodderbg VI. *M. rhenanum* b. *F. fusca* [handwritten by Andries] (2) Paratypus [printed] (3) Paratypoid [printed] (4) Lectotypus *Microdon rhenanus* Andries, 1912. U. Schmid des. 2004 [printed]. The larval mouthparts have dissected and are in a plastic microvial on the same pine as the puparium.

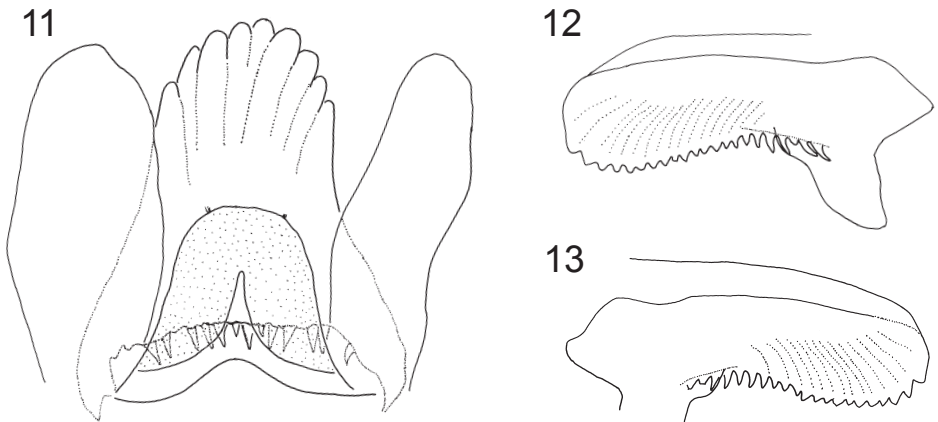
(Remark: Andries' investigations took place mainly in the Kottenforst south of Bonn, West Germany. The Rodderberg is a nature reserve in the immediate vicinity of the Kottenforst.)

There are six puparia of *Microdon major* collected by Andries in the ZFMK collection. In four specimens the collection year is not given; they are labeled as *Microdon eggeri*. The other two specimens are named *Microdon eggeri* var. *major*. The latter two puparia of *Microdon eggeri* var. *major* labeled by Andries can not be part of the original material involved in the description of the species, because they were collected in 1913, while the paper was published in 1912. Nevertheless they agree completely with the descriptions and figures of Andries. In order to stabilize nomenclature and on the assumption that all the specimens on which the published description is based got lost, or are not definitely identifiable, the designation of a neotype is necessary. A neotype is hereby designated and labeled: (1) *M. Eggeri* v. *major*. *F. sanguinea* [handwritten by Andries] (2) Laacher See 2.V.13. [+ an abbreviation which is found on several Andries labels] [handwritten by Andries] (3) Neotypus *Microdon eggeri* var. *major* Andries, 1912. U. Schmid des. 2004

(Remark: The two specimens mentioned above were collected at the same site and on the same date. Both are puparia. The neotype specimen was collected while hatching; the imago is visible inside the puparium.)



Figs 5-9: *Microdon mutabilis*, larval mouthhook. – 5-6. Davos (left and right mouthhook) (coll. ZFMK); – 7. Louxemburg (left mouthhook) (coll. ZFMK); – 8-9. two different individuals without locality (coll. SMNS).



Figs 11-13: *Microdon myrmicae*, larval mouthparts. – 11. Larval labium in ventral view; – 12-13. left and right mouthhook.

10

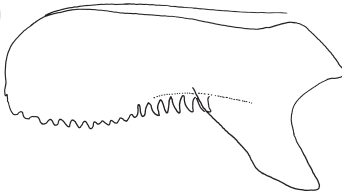


Fig. 10: *Microdon rhenanus*. Lectotype, larval mouthhook.

Notes on *Microdon rhenanus* Andries, 1912

Doczkal & Schmid (1999) listed the main differences between *M. rhenanus* and *M. mutabilis* (Linnaeus, 1758) as can be seen from the paratype specimen and the descriptions of Andries:

- The larvae differ slightly in colour of body and spiracular plate, more clearly in size (*rhenanus*: 8.5 x 6 mm; *mutabilis*: 11 x 9,5 mm), form (more dome-shaped in *mutabilis*) and structure (sculpture of dorsal surface more transparent, polygonal structures less developed in *rhenanus*).
- The puparia differ in a similar way.
- The imagines of *rhenanus* are smaller (9 mm instead of 12 mm in *mutabilis*), the sculpture of the dorsal surface of the abdominal tergites is not as well developed in the midline as in *M. mutabilis*.

Doczkal & Schmid (1999) show that there is a considerable variability in size and form of puparia and imagines of *Microdon mutabilis*. The small size of *rhenanus* together with Andries remark about the very thin surface of the puparia of this species points to development under conditions far from ideal. Subsequently we considered *Microdon rhenanus* to be a synonym of *Microdon mutabilis*. The basis for that conclusion is presented in Doczkal & Schmid (1999) and only its salient features will be repeated here. Three characters help to clarify the identity and status of *M. rhenanus*:

- **Morphology:** Like *Microdon myrmicae* *M. rhenanus* is described as a smaller sibling species of *M. mutabilis*. The major difference between *mutabilis* and *myrmicae* is, as pointed out, the form of the anterior respiratory horns of the puparia. As well as the lectotype the descriptions and figures in Andries (1912) show unambiguously that these structures are very similar in *rhenanus* and *mutabilis* (figs 1, 3-4). Furthermore *M. rhenanus* is not separable from *mutabilis* in the structure of the larval mouthparts (figs 5-9, 10). The figure of the larval mandible of *rhenanus* given in Doczkal & Schmid resembles the drawing for *myrmicae* in Speight (2002) – so we had an extensive discussion about the identity of both taxa. Re-examination of the *rhenanus* type leads to a slightly improved version of the drawing (fig. 10). Thanks to Martin Speight I have also the possibility to examine a specimen of *M. myrmicae* too (figs 11-13). Indeed differences between these taxa are difficult to detect. In my opinion we have to investigate much larger numbers of specimens for understanding variation in these structures. Figs 5-6

shows that there are differences even in the right and left mandible in one individual, and a small series of *mutabilis* (figs 5-9) show considerable intraspecific variation. Furthermore, the examined specimen of *M. myrmicae* does not show the distinct bulge at the antero-dorsal edge of the larval mouth hook Speight (2002) used to separate this taxon from *M. mutabilis*, and differences in the form of the larval labia also are not obvious (fig. 11 and figs 27 and 29 in Doczkal & Schmid 1999).

Indeed in many specimens there are problems to interpret the form of the antero-dorsal edge of the larval mouth hook. The larval mandible is usually heavily sclerotized, at least in the basal parts. The distal part of the mouth hook also may be heavily sclerotized, drawing a clear dividing line between the sclerotized ventral parts and the almost translucent membranous dorsal parts. But in many specimens the distal parts (especially dorsally) are only weakly sclerotized and in that case it may be impossible to draw a distinct line between sclerotized ventral parts and membranous dorsal parts. So we have to be very careful if identification relies only on characters of the distal parts of the larval mandible.

- *Host ants*: Andries (1912, p. 310) wrote: "... die [Larven] von *Microdon mutabilis* und *rhenanus* waren ... stets nur bei *Formica fusca* oder bei var. *fusco-rufibarbis* und zwar fast immer unter Steinen." (= The [larvae] of *Microdon mutabilis* and *rhenanus* were found only together with *Formica fusca* or var. *fusco-rufibarbis* and nearly always under stones). So *M. rhenanus* and *M. mutabilis* are reported from nests of the same ant species of the genus *Formica*.

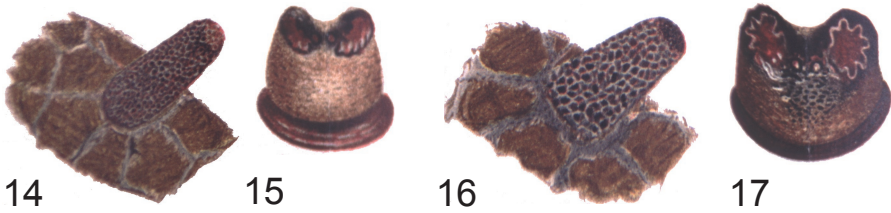
- *Habitat*: In her paper Andries give no detailed description of the sites where she found *M. rhenanus*. However the lectotype specimen was collected at Rodderberg, a nature reserve nowadays (and presumably already in the beginning of the 20th century) characterized by unimproved dry calcareous grassland, a habitat typical for *M. mutabilis* sensu Schönrogge et al.

Conclusion: *M. rhenanus* and *M. myrmicae* definitely do not represent the same species. Furthermore – in spite of Speight's (2003a) statement that "it would seem that *M. rhenanus* is neither *M. mutabilis* sensu Schönrogge et al nor *M. myrmicae*" – data on morphology, host association and habitat give no evidence that *Microdon rhenanus* and *Microdon mutabilis* are different species. Thus the conclusion is maintained here that *rhenanus* is a junior synonym of *mutabilis*.

Notes on *Microdon eggeri* var. *major* Andries, 1912

This variety differs from the typical form of *M. analis* (the senior synonym of *Microdon eggeri* Mik, 1897; see Doczkal & Schmid 1999) in some characters given by Andries (1912) and listed in Doczkal & Schmid, mainly:

- The most important difference visible in larvae and puparia is the form of the posterior spiracular process (figs 15, 17). In *major* the process is shorter and broader, and its walls are less steep. The specialized setae covering the walls of the process are



Figs 14-17: Anterior pupal horns and posterior spiracular processes of *Microdon* spec. – 14-15. *Microdon eggeri*; – 16-17. *Microdon eggeri* var. *major* (from Andries 1912).

somewhat more coarse; the dark red to nearly black coloured spiracular plate is greater, enclosing the main openings of the tracheae and medially somewhat deeper notched.

- Minor differences in larvae and puparia concern the colour (more dark in *major*), the general appearance (flatter in *major*) and the colour and form of the anterior respiratory horns (with rounded tip, basally blackish red and distally reddish in the typical form; somewhat broader, with flattened tip and nearly black in *major*) (fig. 14, 16).

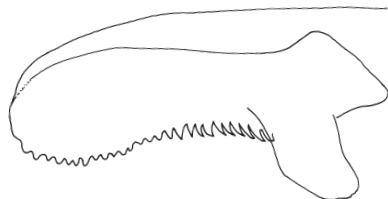
- The two forms differ in size: puparium of the typical form 7-10 mm long, of *major* 9-10,5 mm; adults 7-10 mm and 10-11 mm, respectively.

- Apart from in their different size the adults seem to be indistinguishable.

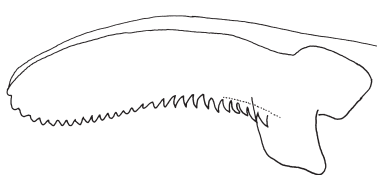
Doczkal & Schmid (1999) regarded these forms as conspecific. But the subsequent examination of much more material shows that the characters of var. *major* are clearly visible not only in both specimens Andries collected (see above), but in many other specimens too. Doubtless assignment of any puparium of *analis* s.l. to one of the two forms is always possible.

- *Morphology*: Puparia of "typical" *analis* and "typical" *major* indeed look like different species (Tab. 1). There is a clear correlation of characters: smaller specimens usually have lighter coloured bodies and lighter brown, more slender and cylindrically formed anterior respiratory horns combined with a longer, flat-ended posterior respiratory process with steeper walls. Larger specimens usually have darker coloured bodies, clearly conically formed pupal horns and a shorter prp with a greater basal diameter and the apical end completely divided into two surfaces by a median dorso-ventral channel. The pupal horns of the latter may be dark reddish-brown or nearly black and are either covered completely with a pattern of wrinkles or may be smooth in the apical third (that may differ occasionally in the left and right horn of the same specimen). The mandibles of the larval cephalo-pharyngeal skeleton of typical and *major* specimens (figs 18-25, see also figs 30-32 in Doczkal & Schmid 1999) show similarities, esp. in the strongly concave dorsal margin of the heavily sclerotized parts of the mouthhook. Figs 18-19 show the mouthhooks of typical *analis*, fig. 20 (from Doczkal & Schmid 1999) shows a typical specimen of var. *major*. Especially in var. *major* variation is considerable and requires further investigation. There seems to be no obvious difference in the form of the larval labium (compare fig. 25 with fig. 31 in Doczkal & Schmid 1999).

18



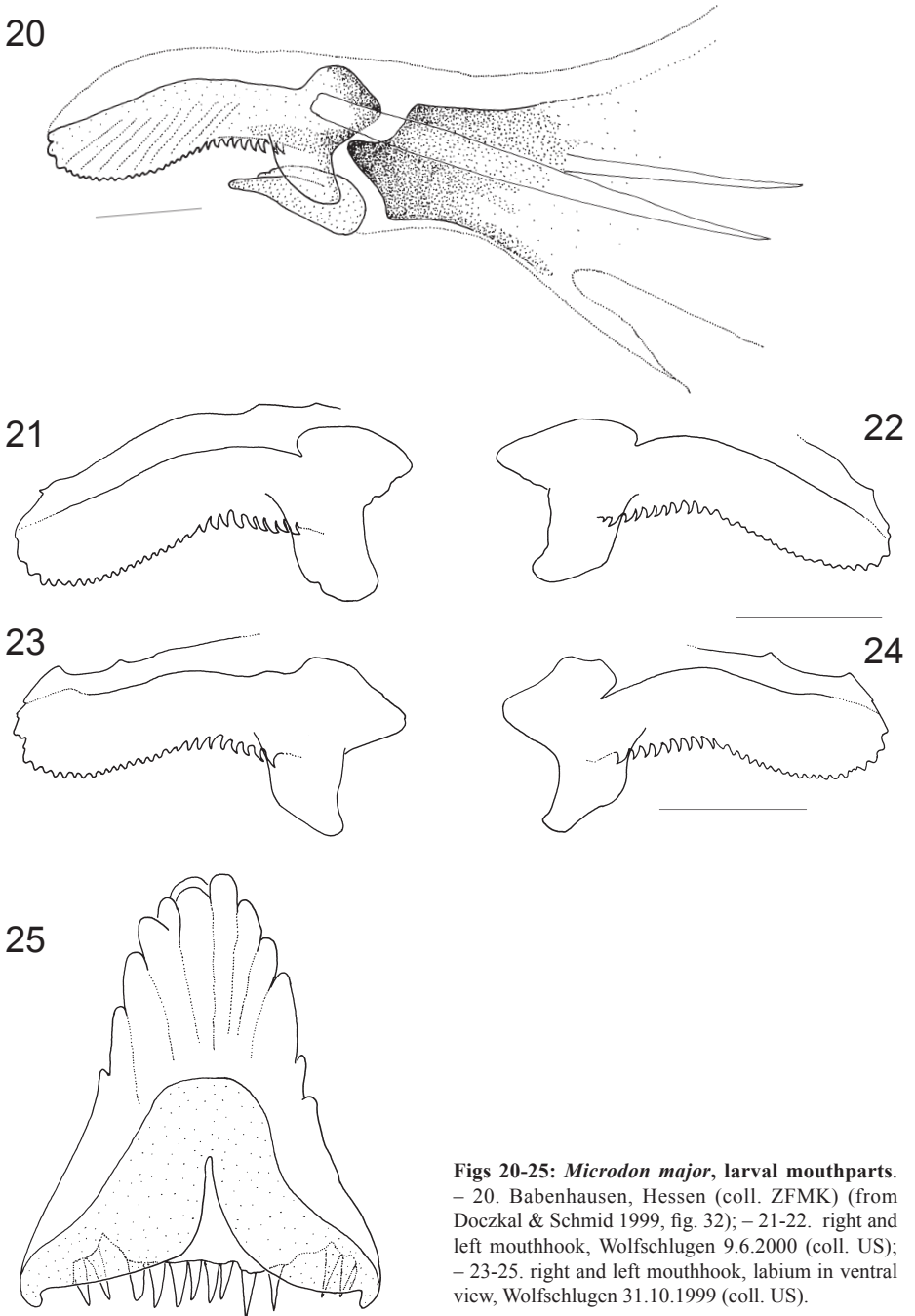
19



Figs 18-19: *Microdon analis* s.str., larval mouthhook, two different individuals (without labels, coll. SMNS).

Table 1: Morphological differences between puparia of *Microdon analis* s. str. and *Microdon major* from several sites in middle Europe.

	<i>analis</i> s. str.	<i>major</i>
Length of puparium	8.0 mm (min. 6.8, max. 9.0 mm) (n=18)	9.8 mm (min. 9.0, max. 11.0 mm) (n=30)
Length of prp	0.49 mm (0.40-0.55) (n=18)	0.40 mm (0.34-0.50) (n=28)
Length of puparium / length of prp	16.3 (14.2-18.0) (n=18)	24.6 (20.0-30.3) (n=28)
posterior respiratory process (prp)	regularly formed truncated cone, covered with light brown setae forming a smooth surface contrasting with the reddish brown spiracular plates; area between the spiracular plates flat; the prp is separated from the body by a very distinct rim	flattened and shorter, with a flatter dorsal and a steeper ventral wall; surface reddish brown, not contrasting to the colour of the spiracular plates; area between the spiracular plates concave; in many specimens no rim between body and prp visible
Colour of pupal horns	light brown to reddish brown	blackish brown
Form of pupal horns:	nearly cylindrical	clearly conical
length	0.63 (0.55-0.68)	0.75 (0.65-0.83)
basal diameter	0.29 (0.28-0.32)	0.46 (0.43-0.50)
subapical diameter (in mm)	0.26 (0.25-0.30) [n=4]	0.33 (0.30-0.38) [n=7]



Figs 20-25: *Microdon major*, larval mouthparts.
– 20. Babenhausen, Hessen (coll. ZFMK) (from Doczkal & Schmid 1999, fig. 32); – 21-22. right and left mouthhook, Wolfschlügen 9.6.2000 (coll. US);
– 23-25. right and left mouthhook, labium in ventral view, Wolfschlügen 31.10.1999 (coll. US).

- *Host ants and habitat*: Unfortunately ecological informations are scarce in Andries (1912): "Die Larven von *Microdon Eggeri* Mik and *Microdon Eggeri* var. *major* finden sich an Baumstümpfen in Waldlichtungen und zwar meist in Kiefern- und Fichtenstümpfen, seltener in Eichen- oder Buchenstümpfen..." and " Die Larven von *Microdon Eggeri* Mik und *Microdon Eggeri* var. *major* fand ich in Gesellschaft von *Lasius niger*, *Formica sanguinea* und *Formica fusca*." (p. 309/310) [= The larvae of *Microdon eggeri* and var. *major* are found in tree stumps in clearings, mostly in stumps of pines and spruce, more rarely in those of oak and beech... – I found the larvae of *M. eggeri* and var. *major* associated with *Lasius niger*, *Formica sanguinea* and *Formica fusca*.] These statements indicate that Andries found neither ecological differences nor different ant associations. If Andries found mixed populations of both forms remains unclear. It is inexplicable, that Andries, whose description of *rhenanus* is based on some very minimal differences from *mutabilis*, does not describe the much better characterized *major* as a separate species.

There are several species of ants mentioned on the *major*-labels in the ZFMK collection (and sometimes additional specimens of ants are given): *Formica sanguinea* (7 labels, 8 specimens), *F. sanguinea* together with *F. fusca* (11 labels, 15 specimens), *F. exsecta* (1), *F. rufa* (1), and *Lasius niger* (1; determined by Andries). *Lasius niger* is also recorded as host species of one of the specimens of *analis* s.str. collected by Andries; unfortunately she apparently did not retain the ant specimen.

Despite these somewhat confusing data there are strong indications that *analis* s.str. and *major* are not associated with the same ant species. Speight (pers. comm.) has found *analis* s. str. in Ireland, Britain, France, Austria and Spain only in nests of *Lasius*. In a small population of *M. analis* s.l. I had observed for some years (SW Germany, Wolf-schlugen, wet clearing in a mixed forest) I found only puparia of the *major* type, and associated only with *Formica sanguinea* and *F. fusca*. Collection data and field observations gave no evidence that both taxa occur in mixed populations. Unfortunately there are only few puparia in most collections and adults still seem to be indistinguishable, apart from in their size. On average, adults of *major* are considerable larger (12-13 mm) than *analis* (< 10 mm). Specimens collected at the same site usually (but not always) belong to one size. It seems most probable that these taxa also differ from one another in habitat selection as well as in host ants.

Conclusion: I agree with Speight (2003b and pers. comm.) that there are two species involved in *M. analis* s.l. The specialisation in habitat use and ant association is still insufficiently known and needs further investigation. However, records in the field and in collections do not indicate the existence of mixed populations. The morphological features of the puparia clearly indicate the presence of two different species, here recognised as *Microdon analis* (Macquart, 1842) s.str. (associated with *Lasius*) and *Microdon major* Andries, 1912 (associated with *Formica*).

Since the adults of *M. analis* and *M. major* cannot yet be distinguished from one another, and the type material of *M. analis* includes no developmental stages, the in-

terpretation of *M. analis* (Macquart) employed here has to be regarded as provisional. There are some other names potentially involved (Doczkal & Schmid 1999), and it has to be accepted that when some way can be found of associating the types of *analis* and these other taxa with their developmental stages, or ways can be found of distinguishing the imagines, nomenclatural change may be necessary.

First record of *Microdon myrmicae* from Germany

M. myrmicae is described from Great Britain (Schönrogge et al. 2002). Speight (2003) confirmed the presence of the species in Ireland. The first records from continental Europe come from Poland (Stankiewicz 2003).

Records from Germany are lacking up to now. There are two specimens in the collection of the SMNG: a mature larva (length 7.5 mm) labeled "Königswusterhausen südl. Prieros – 5 km SW, NSG Dubrow, nasser *Sphagnum*-Schwingrasen, bei *M. scabrinodis*, leg. Seifert 1988 08 18" and a specimen collected immediately after the beginning of pupation (anterior respiratory horns not yet developed; length 7.1 mm) labeled "Dresden ENE Bernsdorf – 4 km NE, nasser *Sphagnum*-Schwingrasen, bei *M. scabrinodis*, leg. Seifert 1989.08.08". Morphological features (pattern of reticulation on the dorsal surface of the larva only weakly developed), habitat (very wet *Sphagnum* bogs associated with typical vascular plants of peat bogs; Seifert in litt.) and ant association (*Myrmica scabrinodis*) clearly show that these specimens represent the first records of *M. myrmicae* from Germany. The two records represent different populations. The distance from Prieros (Brandenburg, about 45 SE Berlin) to Bernsdorf (Sachsen, about 40 km NNE Dresden) is about 100 km.

There is strong evidence that *M. myrmicae* is much more widespread in central Europe and is not restricted to lower altitudes. B. Seifert (in litt.) found (but did not retain) larvae of *Microdon* in *Sphagnum*-bogs in nests of *Myrmica scabrinoidis* in three further localities: (1) Jeseritzen near Weisswasser, Sachsen, 17.7.1981, (2) Breitlohmiß near Kaltenbronn, Black Forest, Baden-Württemberg, 980m, 5.5.1990 (together with *M. Verhaagh*), and (3) Les Granges/Pontarlier, Switzerland, 19.7.1990.

Further investigations in suitable habitats (esp. bogs) are necessary and will most probably show that the species is rare but widespread.

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Address of author:

Ulrich Schmid, Staatliches Museum für Naturkunde Stuttgart, Rosenstein 1, D-70191 Stuttgart, Germany

E-mail: ulrich.schmid.smns@naturkundemuseum-bw.de

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