

Comparison of the imaginal and larval taxonomy of some taxa of the subfamily Hadeninae s.l. in: 'Noctuidae Europaeae, Hadeninae I', Hacker 2002 with 'Die Larven der europäischen Noctuidae', Beck 1999/2000 and valuation of the taxonomic differences by an all-stages-investigation*

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Abstract: The imaginal- and larval- systematically rather different classification and taxonomy of some selected taxa of the European Noctuidae, Hadeninae s.l. are discussed; for evidence of the taxonomical interpretation by the author differences in the structures of the chrysalids and of the eggs (at *Tholera* and *Neuronia*) are also considered. As examples for the comparison were chosen:

A *Tholera cespitis* ([DENIS & SCHIFFERMÜLLER], 1775), *Tholera decimalis* (PODA, 1761), *Tholera hilaris* (STAUDINGER, 1901) (comb. Hacker) contra *Tholera cespitis*, *Neuronia decimalis*, *Neuronia hilaris* (comb. Beck). With exception of the appearance of the larvae and their lifestyle, including *Cerapteryx graminis* (LINNAEUS, 1758)- all investigated characters are heavy different and support the generic concept of BECK and former authors.

B *Sideridis (Aneda) rivularis* (FABRICIUS, 1775), *Sideridis (Sideridis) turbida* (ESPER, [1790]) and *Sideridis (Sideridis) lampra* (SCHAWERDA, 1913) (comb. HACKER) contra *Aneda rivularis* (Hadenina BECK), *Sideridis lampra* and *Colonsideridis turbida* (= *albicolon* HÜBNER, [1813]), both Conisaniina BECK.

C *Conisania (Luteohadena)* (comb. Hacker), Conisaniina contra *Hadena (Luteohadena)* (comb. Beck), Hadenina.

The comparison of the available data proves that the taxing by Beck is in all the investigated examples correct.

Key-words: systematics – taxonomy – imaginal-systematical results, all-stages-results, Lepidoptera, Noctuidae, Hadeninae, *Tholera/Neuronia*, *Aneda*, *Hadena (Luteohadena)*

Taxonomical changes: *Neuronia* HÜBNER, [1821], **gen. rev.**, *Neuronia decimalis* (PODA, 1761) **comb. rev.** *Neuronia hilaris* (STAUDINGER, 1901) **comb. rev.** *Aneda* SUKHAREVA, 1973, **gen. rev.**, *Aneda rivularis* Hadenina **comb. rev.**, *Hadena (Luteohadena)* Hadenina **comb. rev.**

Introduction

As the paper on the taxonomy of *Noctua* LINNAEUS s.l. (BECK 2014 in this volume) demonstrates there are very different opinions about the taxonomy of the Noctuidae (of Europe but also of the world) between the imaginal- and larval-systematists (see the contribution ‘Taxing of *Noctua* s.l. - the genus *Euschesis* HÜBNER, [1821], presence of principles for taxonomical working in the series ‘Noctuidae Europaeae’?). In all the subfamilies of the Noctuidae already treated - as well by the authors of the series ‘Noctuidae Europaeae’ as by Beck (1999-2000) within ‘The larvae of the European Noctuidae’ there are to be found these differences, which often arose independently from each other. There are of course also taxonomical decisions of the author which are either little supported or provisional.

Now the time has come to discuss all these differences and to establish a mutual acknowledged system of the European Noctuidae.

As examples for the many differences here are chosen from the Hadeninae I (Noctuidae Europaeae, HACKER, H., RONKAY, L. & M. HREBLAY 2002) and discussed:

A *Tholera cespitis* ([DENIS & SCHIFFERMÜLLER], 1775), *Tholera decimalis* (PODA, 1761), *Tholera hilaris* (STAUDINGER, 1901) (comb. HACKER) contra *Tholera cespitis*, *Neuronia decimalis*, *Neuronia hilaris* (comb. BECK).

B *Sideridis (Aneda) rivularis* (FABRICIUS, 1775), *Sideridis (Sideridis) turbida* (ESPER, [1790]) and *Sideridis (Sideridis) lampra* (SCHAWERDA, 1913) (comb. Hacker) and *Hadena bicruris* (HUFNAGEL, 1766) contra *Hadena (Aneda) rivularis*, *Sideridis lampra* and *Colonsideridis turbida* (=albicolon HÜBNER, [1813]) (valuation by Beck).

C *Conisania (Luteohadena)* (comb. Hacker) contra *Hadena (Luteohadena)* (comb. Beck).

Materials

Figures in the cited literature (BECK 1999-2000, HACKER & AL. 2002, PATOCKA. & TURCÁNI 2005, DÖRING 1955).

Quoted figs. of these literature are set in parenthesis, e.g.: ‘figs. 56, 60, 64’ or figs. (images) ‘B640, B641, B641x’...

Methods

Comparison of the figures and the interpretation of these

- a) comparison of the appearance of the prepared adults (upperside)
- b) comparison of the male genitalia
- c) comparison of the female genitalia
- d) comparison of the appearance of the larvae, ultimate instar (= LL-instar)
- e) comparison of larval morphologically important traits
- f) comparison of the host-plants

- g) comparison of striking pupal characters
 - h) comparison of the eggs (as far as available)
- (in some cases the investigation is concentrated only on some of these items)

Comparing investigations

A Tholera cespitis, Neuronina decimalis, Neuronina hilaris

Appearance of the adults, forewings, fig. 1 (the adults, all ♀♀, are chosen from HACKER & al. 2002, plate 10, 'figs. 56, 60 and 64').

The pattern of the forewings of *decimalis* and *hilaris* (the '*Neuronina*'-spp.) is by the pale 'neuration', the large and equally distinct and pale outlined spots of the reniform, the orbicular and claviform spots completely different from the pattern of *cespitis* in which the veins are hardly visible and also not the claviform spot; the striking dark wedges at the subterminal crossline are missing in *cespitis* and the rather dark and uniform ground-colour of the forewing is quite different from the pale ground-colour at the '*Neuronina*'-spp. Beyond these details the shape of the forewing is conspicuous different, in the '*Neuronina*'-spp. the apex is stretched, the postmedian surrounds therefore the reniform spot in a large distance; the antemedian and postmedian cross-lines are at *cespitis* in the caudad half of the forewing parallel (in the '*Neuronina*'-spp. towards the costa divergent) and there is nearly no place for the therefore very small claviform spot.

Result: as compared with the common experience of valuation the wing-pattern and shape of the forewing offer sufficient arguments not to combine *Tholera* and *Neuronina* in the one genus *Tholera* HÜBNER, [1821] s. HACKER & al.

Male genitalia, fig. 2 (HACKER & al.: 'fig. 127': *cespitis*, 'fig. 128': *decimalis*, 'fig. 129': *hilaris*)

The description of HACKER & al. concentrates to the shape of the vesica, which indeed in all three taxa is the same, but all the other characters are very different: the form of the valva is in the '*Neuronina*'-spp throughout straight, the cucullus is tapered to rounded towards the apex and therefore without a corona and at its basis on the ventral side with a +/- distinct process ('digitus' at *decimalis*) which is missing in *cespitis*. At *cespitis* the valva is angled as a whole from the end of the costa and is then continued in an even large cucullus with a corona. In the '*Neuronina*'-spp. the harpe is basally bifurcate, then stout, straight and at the end bowed to the 'digitus' or with a process in this direction. At *cespitis* the harpe is extremely stout distally quadrangular enlarged towards the costa and in this direction ending in a strong thorn. The juxta is not considered at HACKER & al., it is short and heart-shaped at *cespitis*, at the '*Neuronina*'-spp. shieldlike to roundish.- Contrary to the more conservative valva of *cespitis* this species has an unusually shaped aedeagus which in the basal half is narrow and in the distal half enlarged to twice and more of the basal width (coecum) because of the extremely large carina which is ending in a huge thorn (which basally has the width of the coecum). In the '*Neuronina*' spp. the aedeagus is throughout equal wide the carina is dentated to combed, the vesica bears distad a field of spines which is missing at *cespitis*.

Result: as compared with the common experience of valuating of the different parts of the male-apparatus the described differences between *Tholera* and *Neuronina* are in all details so heavy that there have to be recognized the two different genera *Tholera* and *Neuronina*.

Appearance of the larvae of the three taxa, fig. 3 [BECK 2000, III: *cespitis*, 'fig. B640'; *decimalis*, 'fig. B641'; *hilaris* 'fig. B641x' - only the end of the abdomen in comparison with that of *decimalis* -; and for comparison 'fig. B642' *Cerapteryx graminis* (LINNAEUS, 1758)]. The dark sepia ground-colour is for all four taxa the same and (besides *graminis*) also the unusually and some equally large and throughout straight Dorsale, Subdorsale and the less conspicuous Epistigmatale. Just this closely related pattern of the larvae in contrast to the very different appearance of the adults demanded a thoroughful examination of the morphology of the larvae of all four taxa.

Result: The appearance (shape and pattern) of the larvae of the four taxa is so similar that only by this a combination of *cespitis* with *decimalis* and *hilaris* but also with *graminis* would be of sense; this relation for all four taxa is expressed with the subtribe Tholerina BECK, (1996) 1999.

Morphology of the larvae in part, fig. 4 ('figs. 880a. 879a')

The very close pattern of the larvae - in contrast to the very different appearance of the adults - demanded a thoroughful examination of the morphology of the larvae of all four taxa.

Here the attention is focussed only to the quite different spinneret which also forbids the combination of *Neuronia* with *Tholera*: In *cespitis* ('fig. 879a') the lower lip ends in two processes, at *decimalis* ('fig. 880a') the lower lip is throughout some dentated.

Result: according to the common experience the different structure of the lips of the spinneret does not allow the combination of the two genera in question.

Pupae, comparison of the abdominal end of the pupae, fig. 5 (*Cerapteryx graminis*, 'figs. 38, 39'; *Tholera cespitis*, 'figs. 42, 44'; *Neuronia decimalis*, 'figs. 46, 47')

At *cespitis* the abdomen ends in two well separated cones, each bearing a strong straight bristle (D2) and only the cones and A10 itself there are structured, the anal pore is rounded. At *decimalis* the abdomen ends in one cone which bears the two hooked D2 bristles which touch one another basally, the cone itself is without structure, but A10 is basally transversally ringed and towards the inverted, heartlike anal-porus parallelly and longitudinally rilled. *C. graminis* is closer to *decimalis*.

Result: for valuation of the described differences there lacks experience of the author, but alone the different position and shape of the D2-bristles and the following configuration (structure of the surface, shape of the anal-porus) of A10 does not allow the combination of *Tholera* and *Neuronia* also in respect to *Cerapterix graminis* which in these details is closer to *Neuronia* than to *Tholera*.

The eggs of *Neuronia decimalis* and of *Tholera cespitis*

Fig. 6 (phot. I. Altmann): *Neuronia decimalis* on the left, on the right side *Tholera cespitis*

Fig. 7: shape and structure of the eggs of *Neuronia decimalis* and of *Tholera cespitis* by figs. of Doering. *T. cespitis*: the egg is spherical but equally flattened on both poles, its diameter is 2/3 of that of *decimalis*, it has many, about 40 to 44 meridional ribs which are not connected with horizontal fine ribs as at *decimalis*.

decimalis: the egg is conical-spherical, large (1 ½ the diameter of the egg of *cespitis*), it has only about 20 meridional ribs which are horizontally connected by numerous small ribs.

Result: There are very heavy and fundamental differences between the eggs of the two taxa which clearly argue for two different genera.

Valuation of the investigation, discussion, conclusion

As compared with the very weak evidence for the combination of the two genera *Neuronia* and *Tholera* in the one genus *Tholera* by HACKER & al. 2002, the many heavy differences here outlined in all investigated stages, organs and characters between *Tholera* and *Neuronia*, prove that *Tholera* and *Neuronia* **st.rev.** are two well characterized genera and therefore *Neuronia* has to be revived. The very close appearance of the larvae of the species of *Tholera* and *Neuronia* is to be interpreted as a common character of the higher taxon Tholerina; this opinion is also supported by the appearance of the larva of *Cerapteryx graminis*.

B *Sideridis (Aneda) rivularis* (FABRICIUS, 1775), *Sideridis (Sideridis) lampra* (SCHAWERDA, 1913), *Sideridis (Sideridis) turbida* (ESPER, [1790]) (all comb. HACKER & al.) and *Hadena bicruris* (HUFNAGEL, 1766) contra *Aneda rivularis*, *Sideridis lampra* and *Colonsideridis turbida* (=albicolon HÜBNER, [1813]) (valuation and combination by BECK).

Note: arguments against the present imaginal-systematics of this group are already presented in Beck, 1999: 579-580, 596-597.

Appearance of the adults, fig. 8 (taken from HACKER & al. 2002): *Sideridis (Aneda) rivularis* (plate 5, 'figs. 19, 20'), *Sideridis (Sideridis) lampra* (plate 5, 'fig. 3') *Sideridis (Sideridis) turbida* (plate 5, 'fig. 9') and *Hadena bicruris* plate 7, 'figs. 20 and 21').

At *Sideridis lampra* the impression of the forewing is completely different as compared with the other taxa of the group, besides the brownish homogeneous ground-colour, the whole Noctuidae-pattern is clearly visible and by this appearance there seems to be no closer relationship with all the other European species of this group (the species of *Sideridis* s.l. and *Conisania* s.l.). *Sideridis (Colonsideridis) turbida* (= albicolon HÜBNER, [1813]) is as the name says marked by a white 'colon' of the reniform spot at its lower edge of the distad margin [this character occurs independently at several taxa in very different positions, e.g. at *Abromias 'Apamea' auct. platinea* (TREITSCHKE, 1825) or here and widespread in the Conisaniina Beck, see below) and there this colon is some angled and turned distad; otherwise the pattern of *S. turbida* is rather inconspicuous, the typical Noctuidae-pattern is more or less recognizable by some pale markings, the ground-colour is greyish-brown. *Sideridis (Aneda) rivularis* is remarkable by its rosy-violet tinge. The distinct white encircled reniform and orbicular spots which both are longish-rectangular and basally clined to one another to touch them especially by the process of the reniform, its 'toe', a very specific contact as compared with similar arrangements in some *Chersotis* BOISDUVAL-spp. [e.g. at *elegans* (EVERSMANN, 1837), *anatolica* (DRAUDT, 1936) and the *alpestris*-group] are very specific and characteristic and these are in contrast to the very dark black-brown and large claviform spot. The subterminal line is whitish and conspicuous too, with a +/- distinct 'w'-marking. Hence the author is convinced that the combination of this species with the Conisaniina (instead of the combination with the Hadenina) is wrong, for comparison is taken *Hadena bicruris* with which *S. (A.) rivularis* is often mistaken: the reason for this is the same construction and colour of the reniform, orbicular and the claviform spots as at *S.(A.) rivularis*, but the former two spots do not touch one another, the brownish(greyish) groundcolour is also different and the white 'w'-marking of the subterminal line is only rarely distinct.

Result: by the pattern of the forewing *S. (A.) rivularis* is conspicuously closer to the Hadenina than to the Conisaniina.

Male genitalia, fig. 9: as to expect, the apparatus of *S. lampra* is less complicate, the valva is straight, especially the central part of the costa, the so conspicuous harpe (termed by Hacker, 1992, saccular process) is at *S. lampra* very distinct, long and throughout parallel and 'bound' to the costa, without a costal thorn at the distal end, cucullus short, bowed back to touch the ventral edge of the valva, ending in a large corona-field, which in *turbida* is the same).

At *S. turbida* this situation is very difficult because of the heavy shortened and semicircular rounded costa which, according to the drawing of Hacker ('fig. 55' in Noc.t. Europ. 4: 270) forces the long and strongly tapered cucullus to turn and bow! back by 180° (what functionally would be nonsense because the corona has to lie inside as is evident in Hacker's drawing); according to the more scientific and convincing drawing of Berio (1985: 174, fig. 47) the cucullus is basally not turned by 180° but reclined by 100° as compared with the axis of the valva. According to Berio the distal enlarged cylindrical harpe proceeds from a lamina which unites distally with the costa and the thornlike process at the end of the costa. At Hacker this lamina forms a tube (ring) which bears the harpe which is missing at *lampra*; both, the valva and the aedeagus with vesica are so different from the type (*lampra*) of *Sideridis* that the separation of *turbida* with the genus *Colonsideridis* BECK **stat. rev.** is fully justified. Already the so extremely different appearance of the adults of both species forbids the combination in the same genus (it is the same as with *Conisania* and *Renisania*). The aedeagus evenly is different between *S. lampra* and *C. turbida*: at *S. lampra* longish, straight and throughout of the same width, at *S. turbida* only 2/3 of the length of *S. lampra* and angled towards the orificium which is double as wide as the coecum and there with strongly sclerotized parts which are missing at *S. lampra*. At *S. turbida* the vesica turns at once backward and down and is helical with two turns, also with a long narrow field of spines in the relative same position as at *S. lampra*; at the latter the vesica turns basally at once towards the observer and goes then down with only one turn basally.

At *Aneides rivularis* the costa is also enforced by a fold as usual in the Hadeninae (s. KITCHING & RAWLINS, 1998) and armed with a stout short process at its end as usual in *Hadena*, the harpe (termed by Hacker, 1992, saccular process) is parallel to the costa and distally tapered to pointed towards the process of the costa; the sacculus is very distinct and in the area of the clavis armed with a large field of small spines (similar to the *Conisania* spp without *Renisania renati* OBERTHUR), it misses the short distad heavy sclerotized process of *Hadena*; the cucullus is distad spoonlike without corona but there with a field of resp. bristles; the long and arched aedeagus (especially its arming in the area of the orificium) and the vesica are unique and heavy to be understood as compared with *Hadena*: These characters express a strong specialization perhaps at the basis of the *Hadena*-configuration or as a basal construction of this or more in the sense of a reduction of this because of the otherwise many-fold specializations of *A. rivularis*; e.g. it is reasonable to compare the vesica with the anchor-like vesica of e.g. *H. bicruris*: the strong knee at the basis represents the reduced diverticulum I of the anchor.

At *Hadena bicruris* the construction of the valva is distad of the sacculus the same as at *A. rivularis*, the sacculus has an additional short and stout process towards the costa; cucullus some spoonlike with no distinct corona; vesica as typical for *Hadena*, together with the aedeagus anchorlike: at the exit of the aedeagus with the large diverticulum to the left and with the end of the vesica to the opposite side, armature of the vesica specific.

Results: the comparison of the male apparatus proves the closer relationship of *A. rivularis* to *Hadena* than to the *Conisaniina*.

Female genitalia, fig. 10: the comparison of the figs. at once demonstrates the close relationship of *A. rivularis* to the Hadenina as compared with the very different apparatus of *S. turbida*. In all the important parts of the apparatus of *H. bicruris* the apparatus of *A. rivularis* is congruent: the ball-like corpus bursa with the long cylindric appendix bursae, the strong, cylindrical and straight ductus bursae and especially the ovipositor-part prove clearly the close relationship with the Hadenina and not with the Conisaniina.

Result: the female apparatus of *Aneda rivularis* proves the close relationship to *Hadena*, *Hadenina*.

Appearance of the larvae, fig. 11: as the comparison of the pictures of *S. lampra* ('fig. B587') and *C. turbida* ('fig. B588') with those of *A. rivularis* and *H. bicruris* at once demonstrates, the former two have not at all any pattern in the sense of a secondary pattern (by the specific concentration of dark elements s. Beck); these elements form in *A. rivularis* and in *H. bicruris* the characteristic dark arrow-head-pattern in the dorsal zone; the heavy specificity of the pattern of *A. rivularis* is expressed by the plain white setae-point-spots (especially of D2) and some such points in the Subdorsale, further by the extreme waving of the dorsal margin of the Stigmatale. *S. lampra* has some indistinct scattered dark elements in the zones of the dorsal region, the primary pattern (the Dorsale, Subdorsale and Stigmatale) of this species is rather indistinct; this is still more the case at *C. turbida* where besides the very indistinct primary pattern no elements are to be seen in the zones.

Result: the secondary pattern of the larvae proves the relationship of *A. rivularis* with the Hadenina; two very striking autapomorphies (the plain white D2-spots and the extreme waving of the Stigmatale) signalize a very isolated position within the Hadenina.

Hostplants: Similar to all *Hadena*-spp.-larvae which can be found with Caryophyllaceae the larva of *A. rivularis* lives in the blossoms and fruits of *Silene vulgaris* and demonstrates by this the relationship with the Hadenina, too. The larvae of *Sideridis lampra* and *Colonsideridis turbida* prefer Umbelliferae, e.g. *Daucus carota*.

Result: The very different and specific host-plants corroborate the combination of *Aneda* with the Hadenina.

Larval-morphology (in part: mouth-parts), fig. 12: the comparison of the mandibles and spinnerets proves the presence of two groups: on one side the Conisaniina with a large apically dentated inner tooth of the mandible and a broad and broadly grooved spinneret with a characteristic structure on the upper side of parallel rills, the lower lip never fringed or dentated, the upper lip finely crenulated. Because of the great specialization of *Aneda* the Hadenina-group is inhomogeneous: at *Aneda* the mandible has a strong rounded inner tooth which is flat at *H. bicruris*; the relatively short spinneret of *Aneda* is highly specialized by the bilobed lower lip, the lobes of which are fringed to dentated; at *H. bicruris* the spinneret is long, the upper lip some crenulated.

Result: the Conisaniina are doubtless characterized by the described mouth-parts; at the Hadenina the situation is not so clear.

Pupae, fig. 16: by the broad, cylindrical end of the pupa and the two distant, stout and evenly pointed D2-bristles the relationship between *Aneda* and *Hadena* is supported; at *Aneda rivularis* the sideward thorn of the *Hadena*-cremaster is missing. At the Conisaniina the D2-bristles are each sticklike, cylindrical, narrowed to touch at the basis at *Conisania leineri* and at *Colonsideridis turbida*, distant at *S. lampra*; the latter also with characteristic radial rills from the end towards the anal-pore.

Result: By the presented pupal characters no clear relationship is to be recognized between *Aneda* and the Conisaniina.

C *Conisania* (*Luteohadena*) (combination by Hacker) contra *Hadena* (*Luteohadena*) (combination of Beck). Comparison of *Conisania* HAMPSON s.str. spp. with *Hadena* (*Luteohadena*)-spp.

Note: arguments against the present imaginal-systematics of this group are already presented in Beck, 1999: 586-587.

Appearance of the adults fig. 13 [*Conisania poelli* (STERTZ, 1915), *arida nupponenorum* (HACKER & FIBIGER, 2002), *Conisania* (*Renisania*) *renati* (OBERTHUR, 1890), *Hadena* (*Luteohadena*) *luteago* ([DENIS & SCHIFFERMÜLLER], 1775), *andalusica* (STAUDINGER, 1859) *literata* (FISCHER DE WALDHEIM, 1840), taken from HACKER & al. 2002, plate 6: 'figs..3, 8, 13, 27, 32, 37'].

The most characteristic difference in the fore wing-pattern between both groups, the *Conisania*-spp. and the *H. (Luteohadena)*-spp., are the markings. In the latter group the so characteristic *Hadena*-mark, the bright diagonal patch towards and up to the postmedian line between the orbicular and the claviform spot, and below of the reniform spot is very distinct and this spot is not to be seen in any of the '*Conisania*'-spp.

Result: alone by the typical pattern of the forewings a combination between *Hadena* (*Luteohadena*) and *Conisania* is not possible.

Male apparatus fig 14a (see also BECK, 1999: 586-587). Again, as with *Tholera*, HACKER & al. overemphasizes the some similar character concerning the shape of the vesicae of both groups but under neglectation of the specific differences, e.g. the thorn of the carina of *Hadena* (*Luteohadena*) is homologized with the different basal and flat diverticulum of *Conisania*; the typical, anchorlike vesica (the bifurcation of the vesica just at the orificium) of *Hadena* (and of course also of *Luteohadena*) with the large and long basal diverticulum is set equal with the respective structure of *Conisania* in which a more median and short to large diverticulum with one cornutus (resp. a rather indistinct fascia of cornuti) instead of a patch of cornuti [at *Hadena* (*Luteohadena*)] is typical; about these details Hacker has forgotten the main difference, the configuration of the vesica as a whole: this is in *Conisania* [but not in *Conisania* (*Renisania*) *renati*, at which the construction is very similar to that of the *H. (Luteohadena)* spp., also by the presence of a thorn on the carina] after the orificium at once curved and coiled; at *Luteohadena* the vesica is at the 'exit' at once forked, recurved (but not coiled) parallel to the aedeagus and about its length and with a large field of cornuti near the end and at the basis with a distinct diverticulum (about a third the length of the aedeagus) with a group of cornuti at the top but not with the very flat and shield-like diverticulum with a tiny cornutus of the real *Conisania* spp, but carina with a thorn-like tooth.

The more difficult and complex structures of the male apparatus also give no evidence for the combination by Hacker: in the *Conisaniina* the uncus is always medially enlarged and flattened, at *Hadena* (*Luteohadena*) normal and hooklike; at *Conisania* (e.g. *poelli*, but not at all at *Renisania renati*) the area of the clavis (of the sacculus) is flat and spined but in the opposite part the sacculus is enlarged in the whole width as a process half way in direction to the cucullus, this sacculus-process is accompanied by a second process, the harpe; at *H. luteago* the clavis-area is smooth and the sacculus centrally some bulged in direction to the cucullus; from this bulge seems to run a slender process to the cucullus, but this is separated from the sacculus as the harpe. In *Conisania* the inforcement of the costa is linear and ends in a strong thorn parallel to the basis of the cucullus; this thorn is missing at *Hadena* (*Luteohadena*); in the latter the costa is heavy sclerotized in the whole length and its fold continuously enlarged towards the large and basally not enlarged cucullus; the cucullus of *Conisania* is basally enlarged and heavy enlarged towards the large corona with

a field of spines before it; at *Hadena* (*Luteohadena*) there is only a field of spines at the end of the cucullus.

Result: There are enough and specific differences in the male apparatus between *Conisania* s.str. (s. Beck) and *Hadena* (*Luteohadena*) to revise the combination of *Luteohadena* with *Conisania* (HACKER 1996).

In the treated differences between *Conisania* s. Beck and *Hadena* (*Luteohadena*) it reveals that *Conisania* (*Renisania*) *renati* OBERTHUR is very different in the sacculus, the sclerotization of the costa and the large cucullus with only one row of spines of the corona. Therefore the concept of *Conisania* s. Hacker, Ronkay & Varga and also of *Sideridis* has to be revised, also in respect to the now eliminated *Hadena* (*Luteohadena*) which returns to the Hadenina. *Porosania porosa* (EVERSMANN, 1854) also not fits to *Conisania* (the configuration of the vesica is very different from *Conisania* s. Hampson, s. Beck (type *leineri* Freyer)

Female genitalia, fig. 14b: As at *Aneda*, the typical configuration of the female *Hadena* (*Luteohadena*)-apparatus as compared with that of the female-*Conisania*-apparatus at once corroborates the impossibility to combine both taxa in the Conisaniina, for details see above under *Aneda*, resp. '*Sideridis* (*Aneda*)': In all the important parts of the typical *Hadena*-apparatus (e.g. of *Hadena bicruris*) the *Luteohadena*-spp. are congruent: these are the ball-like corpus bursae with the long cylindrical appendix bursae, the strong, cylindrical, straight and heavy sclerotized ductus bursae and especially the long conical ovipositor-part, with the long apophyses and the long lobes of the ovipositor (and further details, e.g. the ostium). This construction clearly proves the relationship with the Hadenina and not with the Conisaniina.

Appearance of the larvae, fig.15 ['fig. B591a' *Conisania leineri* (Freyer, 1836) and 'fig. B591b' *leineri pomerana* (G. SCHULZ, 1869); 'fig. B604a, b' *Hadena* (*Luteohadena*) *luteago* (a) and *andalusica* (b) (BECK 2000); instead of the less distinct images for *Conisania poelli*, those of *Conisania leineri* Freyer are taken in comparison]

Because of the cryptic, subterranean lifestyle of the *Hadena* (*Luteohadena*)-larvae, these show no pattern and are therefore not comparable with the pattern of the larvae of the *Conisania*-spp. s.str.; the pattern of the latter is characteristic by the plain white and large primary lines (Dorsale, Subdorsale and Stigmatale) of the early instars inclusively the penultimate instar; in the last instar this pattern is less conspicuous,

Lifestyle: The larvae of *Conisania* s.str. all live on *Artemisia*-spp., the larvae of *Hadena* (*Luteohadena*) live in the plants of Caryophyllaceae, in the last instars especially in the roots, e.g. of *Silene* (*Melandryum*) *album*.

Pupae: at present no pupae of *Hadena* (*Luteohadena*) are available.

Conclusions: all studied characters prove, that *Hadena* (*Luteohadena*) **comb.rev.** belongs to the Hadenina and not to the Conisaniina.

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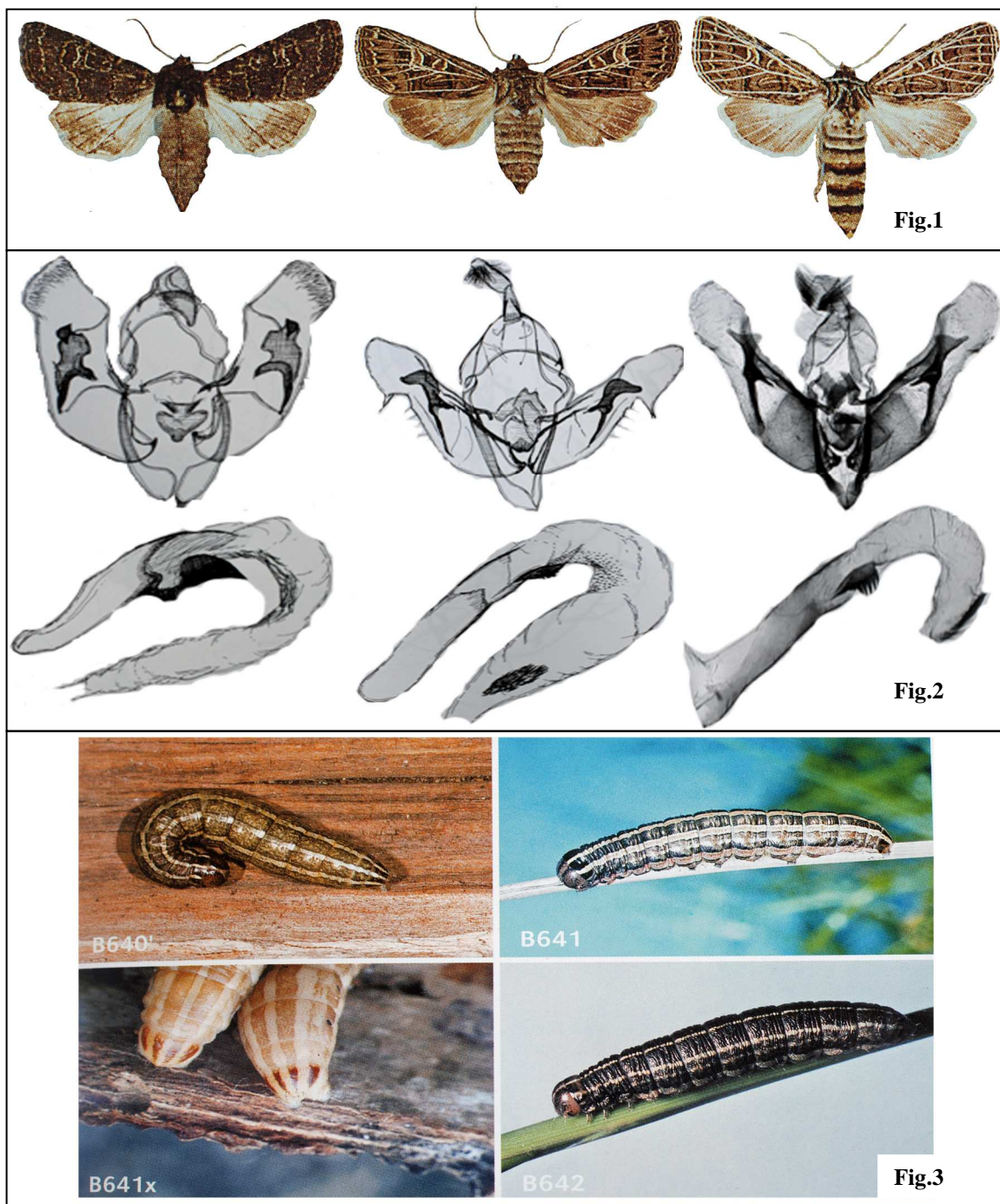


Fig. 1: Adults of *Tholera cespitis*, *Neuronina decimalis*, *hilaris* (taken from HACKER & AL. 2002, Noctuidae Europaeae, vol. 4, plate 10).

Fig. 2: Male genitalia of *Tholera cespitis*, *Neuronina decimalis*, *hilaris* (taken from HACKER & AL. 2002, Noctuidae Europaeae, vol. 4, plate 10).

Fig. 3: Images of the larvae of the Tholerina *Tholera cespitis* (B640), *Neuronina decimalis* (B641), *Neuronina hilaris* (B641x, end of abdomen, left *hilaris*, in comparison with that of *N. decimalis*, right), *Ceraapteryx graminis* (B642) (taken from BECK, 2000, III).

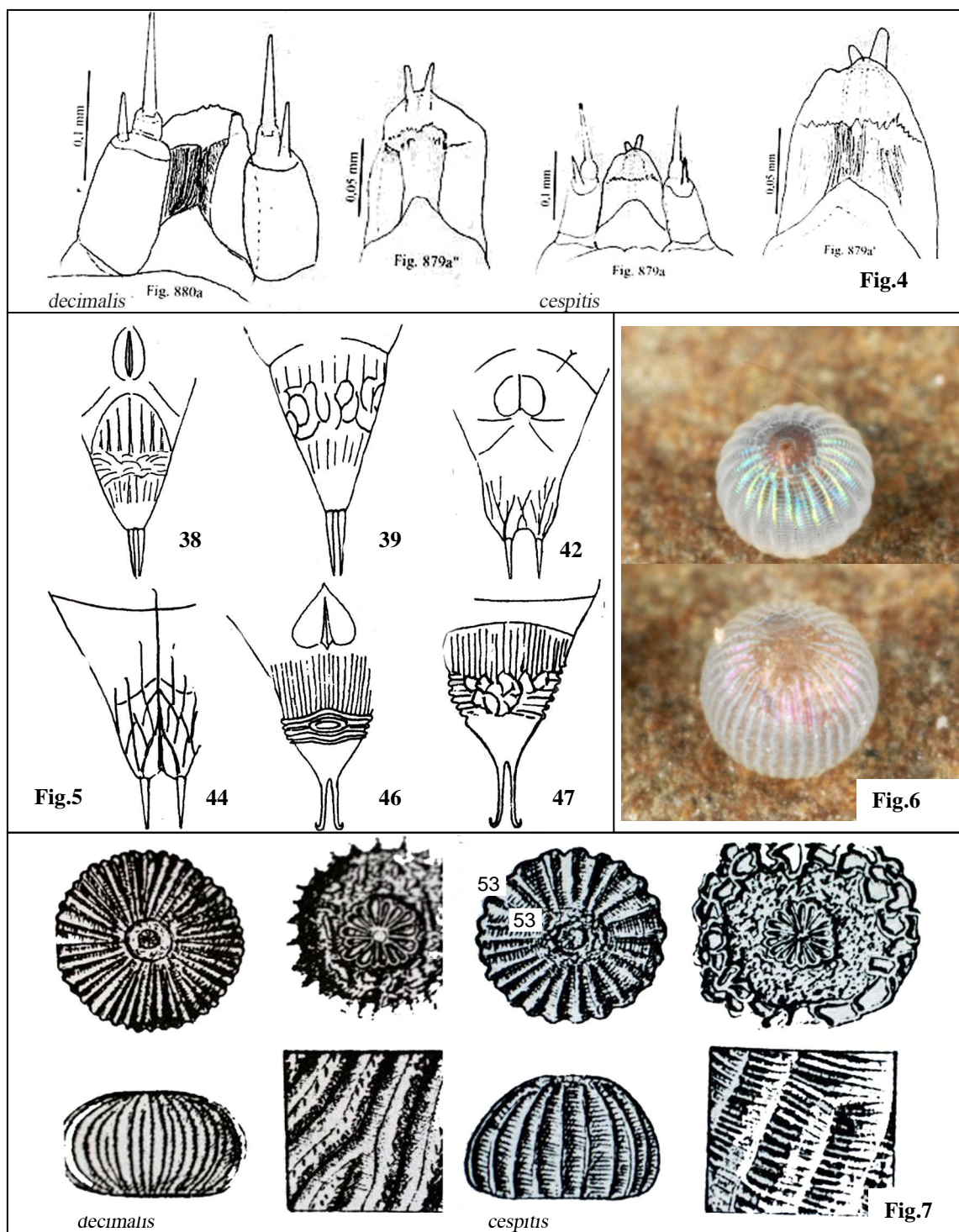


Fig. 4: Comparison of the spinnerets of *Tholera cespitis* (right half) and *Neuronina decimalis* (left half) (taken from BECK, 1999, II).

Fig. 5: Comparison of the end of abdomen of the pupae of *Cerapteryx graminis* (38,39) *Tholera cespitis* (42,44) and *Neuronina decimalis* (46,47) (taken from PATOCKA & TURCANI, 2005).

Fig. 6: Eggs of *Neuronina decimalis* (down), *Tholera cespitis* (up), phot. I. Altmann.

Fig. 7: Shape and structures of the eggs of *Tholera cespitis* (right half) and *Neuronina decimalis* (left half) (taken

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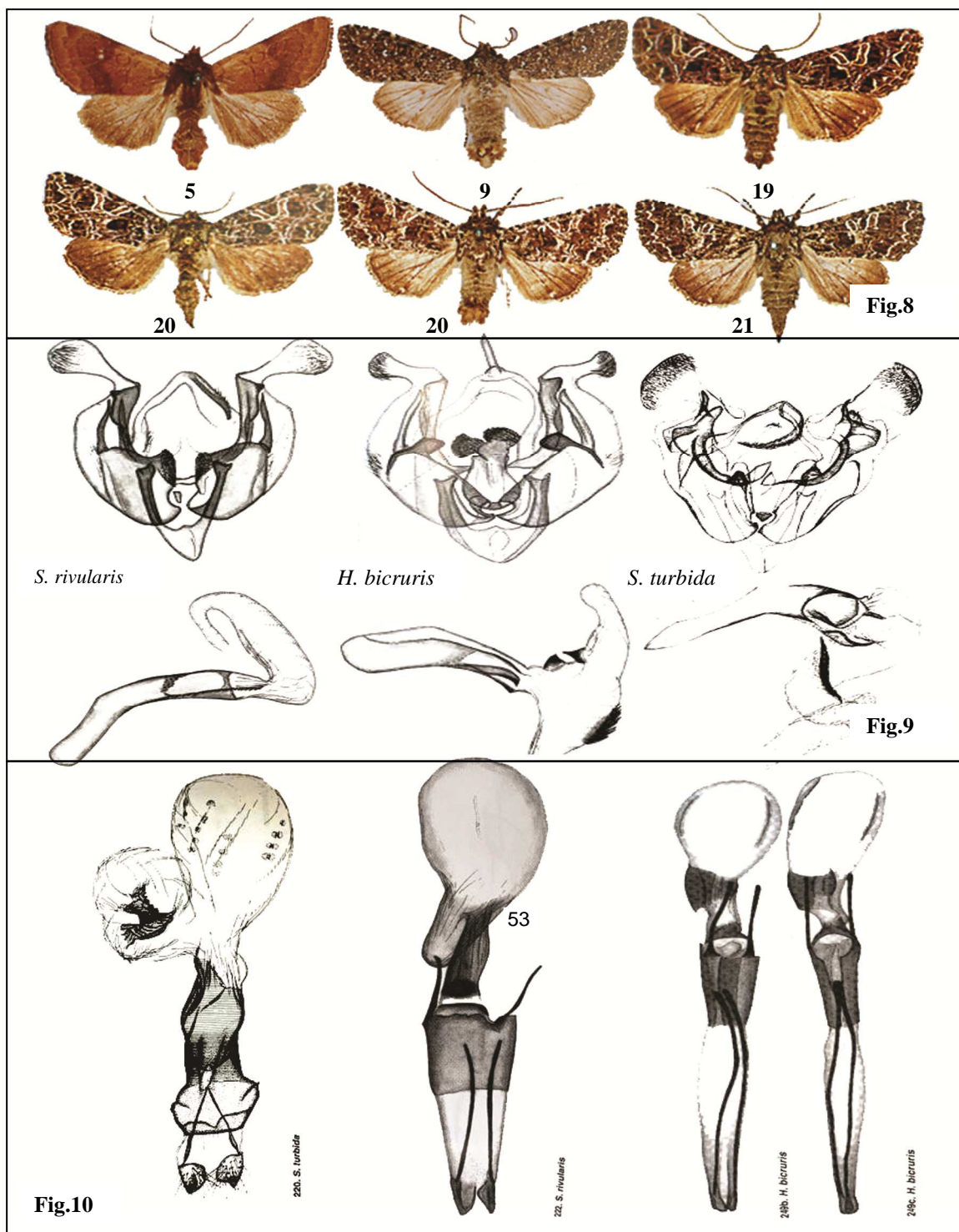


Fig. 8: Images of *Sideridis (Sideridis) lampra* (no 5), *Sideridis (Sideridis) turbida* (no 9), *Sideridis (Aneda) rivularis* (no 19, 20) (all taken from plate 5, HACKER & al., 2002) and *Hadena bicruris* (no. 20, 21, HACKER & al. 2002, plate 7); because of the similar appearance *rivularis* often is mistaken with *bicruris*.

Fig. 9a: Male genitalia of *Sideridis (Aneda) rivularis*, *Hadena bicruris* and *Sideridis (Sideridis) turbida* (= *albicolon*). Fig. 9b: valva of *Colonsideridis turbida* (= *Heliophobus albicolon*) drawing by Berio.

Fig. 10: Female genitalia of *Sideridis (Aneda) rivularis*, *Hadena bicruris* and *Sideridis (Sideridis) turbida*.

For the taken images, the author declares that he owns the right to use the photos.

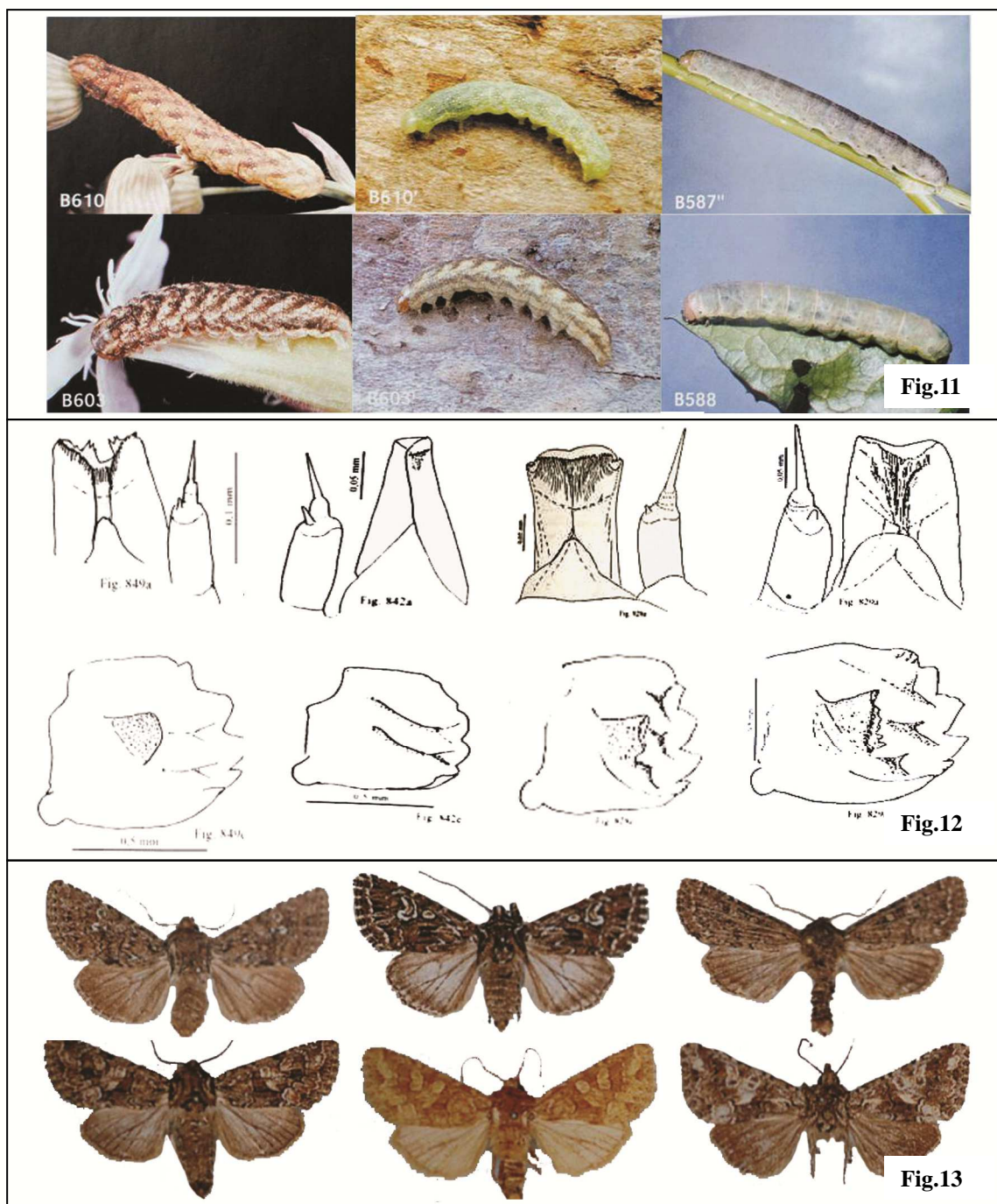


Fig. 11: Images of the larvae of *Aneda rivularis* (B610), *Hadena bicruris* (B603), *Sideridis lampra* (B587) and *Colonsideridis turbida* (B588).
 Fig. 12: Mouthparts (spinneret and mandible, inner side) of the larvae. *Aneda rivularis* (fig. 849), *Hadena bicruris* (fig. 842), *Sideridis lampra* (fig. 828) and *Colonsideridis turbida* (fig. 829).
 C *Conisania* HAMPSON spp., *Hadena* SCHRANK (*Luteohadena* BECK) spp.
 Fig. 13: Adults of *Conisania poelli* (STERTZ), *arida nupponenorum* (HACKER & FIBIGER) and *Conisania* (*Renisania*) *renati* (OBERTHÜR) and *Hadena* (*Luteohadena*) *luteago* ([DENIS & SCHIFFERMÜLLER], 1775), *andalusica* (STAUDINGER, 1859) and *literata* (FISCHER DE WALDHEIM, 1840) (taken from HACKER & al. 2002, plate 6: nos 3, 8, 13, 27, 32, 37).

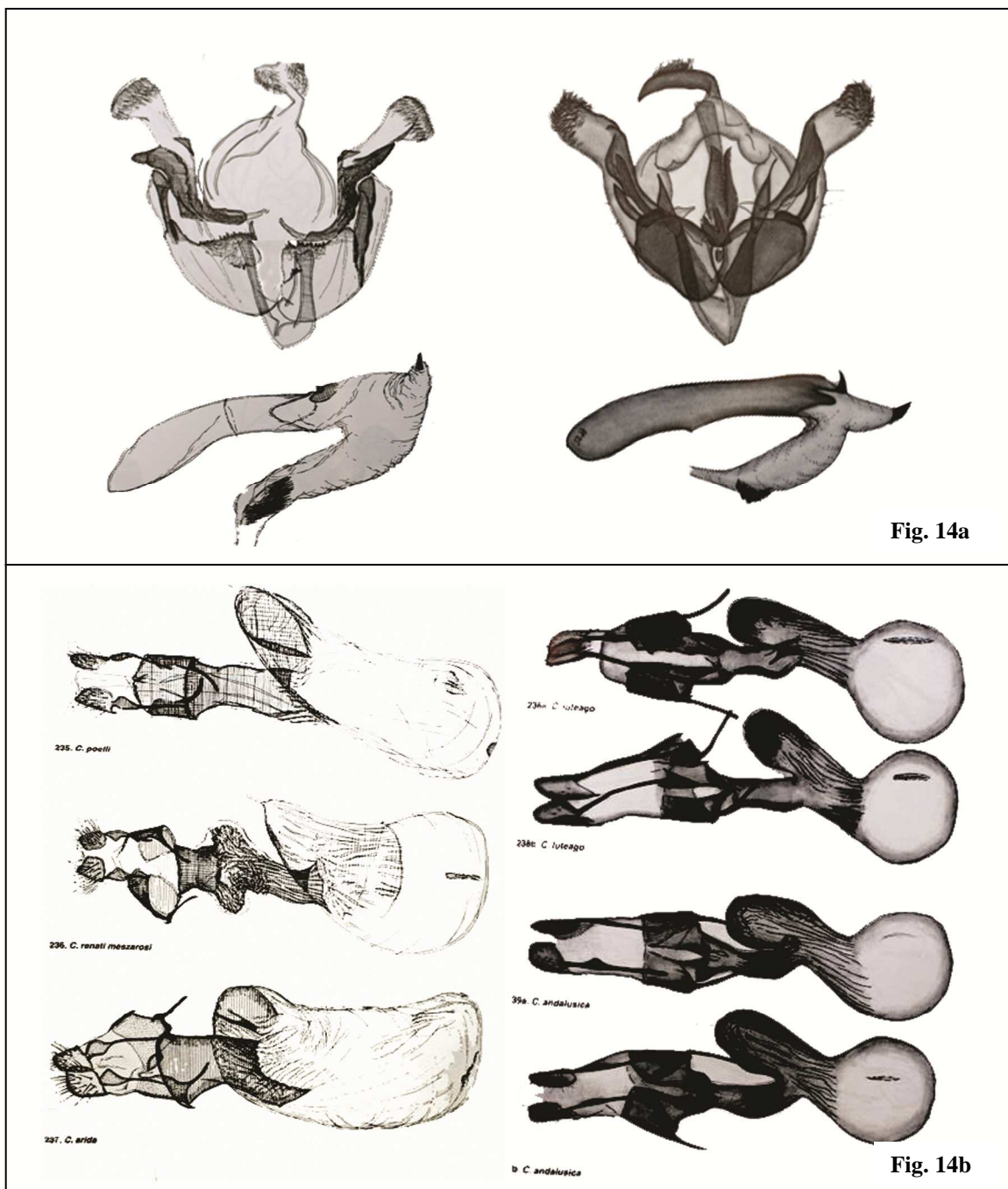


Fig. 14a male genitalia, left *Conisania pölli*, right *Haden (Luteohadena) luteago* (taken from HACKER & al. 2002: figs. 70 and 73a)

Fig. 14b: female genitalia, left *Conisania (Conisania)*-group, right *'Conisania' (Luteohadena)*-spp. (taken from HACKER & al. 2002: figs. 235-237 and 238-239)



Fig. 15

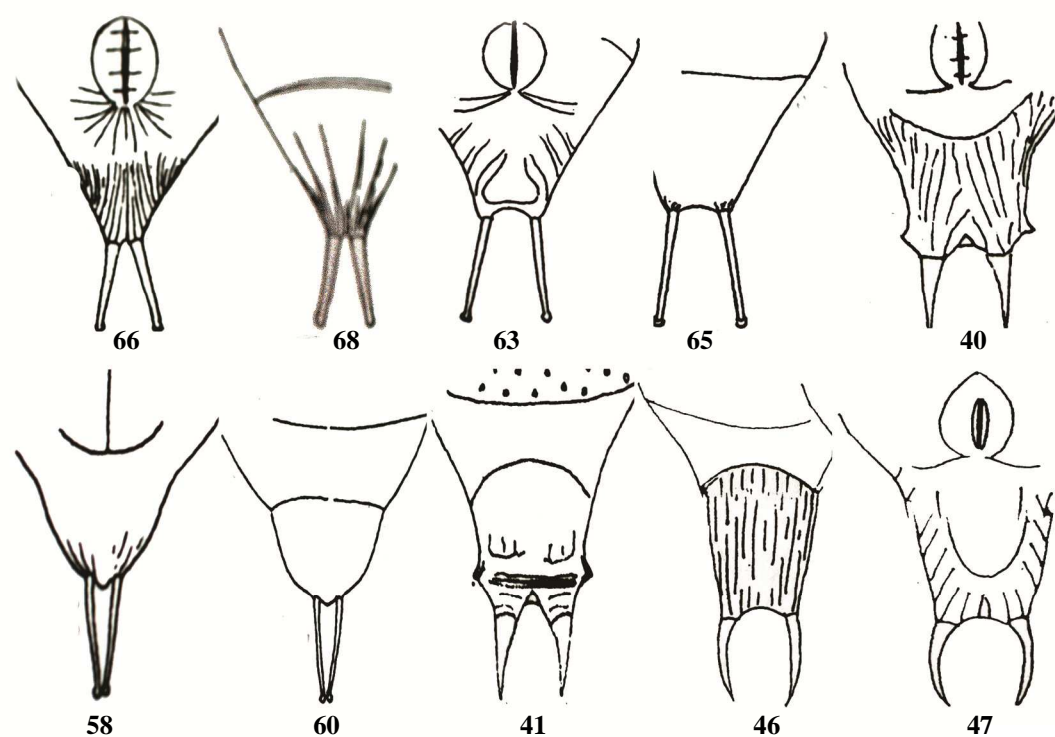


Fig. 16

Fig. 15: Images of the larvae: B591a *Conisania leineri* (FREYER, 1836) and B591b *Conisania leineri pomerana* (G. SCHULZ, 1869); B604a, b *Hadena (Luteohadena) luteago* (a) and *andalusica* (b) (BECK, 2000).

Fig. 16: End of abdomen of pupae: 40,41 *Hadena bicruris*; 46,47 *Hadena (Aneda) rivularis*; 58,60 *Conisania leineri*; 63,65 *Sideridis lamprea*; 66,68 *Sideridis turbida*. (taken from PATOCKA & TURCANI, 2005).

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