

Splitting the genus *Noctua* LINNAEUS s.l. and characterization of three *Noctua* s. auct.-species - *Euschesis janthina* ([DENIS & SCHIFFER-MÜLLER], 1775), *E. janthe* (BORKHAUSEN, 1792) and *E. tertia* (VON MENTZER, MOBERG & FIBIGER, 1991) - by external characters of adults and larvae patterns. Possible family- and genus- level principles of taxonomic classification in the series Noctuidae Europaeae. * **

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Abstract

Again the generic differentiation (BECK & al. 1993) of *Noctua* Linnaeus is demanded and it is put the question of the presence of common principles for taxonomic decisions in the different levels (species-, genus- and also family-level) in the Noctuidae Europaeae as compared with the latest taxonomic act in the genus *Cosmia* Ochsenheimer, 1816 with five species in Europe and distribution of these now into five subgenera (FIBIGER & HACKER 2007), and still more the splitting of the Noctuidae s. Hampson into the families Erebiidae (for the quadrifine subfamilies of the Noctuidae s. Hampson, including also the previously autonom families Lymantriidae and Arctiidae) and Noctuidae s.str. for the trifine subfamilies of the Noctuidae s. Hampson (FIBIGER & LAFONTAINE, 2005, LAFONTAINE & FIBIGER 2006). Since then the systematics of the Noctuoidea has undergone a revolution, which is not at all supported by the larval-systematics. But even as most of the generic changes of the larval-systematist Beck have not been acknowledged by the imaginal-systematists, because of the rivalry between imaginal- and larvalsystematics, the same is it with the higher systematics. The many molecular-genetical investigations of the recent years (ZAHIRI & AL. 2010-2013) are not able to support the present systematics of the Noctuoidea by Lafontaine & Fibiger (BECK 2009, BECK, lecture on the SEL-Congress, 2013 and BECK in press.). The causes for misidentifications of the adults of the *Euschesis* Hübner [1821] spp. on the basis of their appearance since the description of *Noctua janthe* Borkhausen, 1792 are discussed. A correct determination of the three taxa by the appearance of the adults is often impossible. The development of the larval pattern in the three taxa is documented from the L3- to the last instar. The differences in the pattern of the larvae between *E. janthina* and *E. tertia* are slight, but the cause of the difference is essential. The pattern of the larva of *E. janthe* is well characterizable; together with the characters of the adult *E. janthe* may be considered as bona spec. The final taxing of the three taxa awaits the results of the genitalic investigations of the now authentic material and of molecular-genetical investigations of this.

Key-words: rivalry between imaginal- and larvalsystematics, comparison of imaginal patterns and of larval patterns, Lepidoptera, Noctuidae, *Noctua* Linnaeus auct, *Euschesis janthina*, *tertia* and *janthe*.

Zusammenfassung

Wieder ist die imaginalsystematisch nicht nachvollzogene generische Gliederung der so heterogenen Gattung *Noctua* LINNAEUS (BECK & AL. 1993) Gegenstand dieses Artikels, zugleich aber verbunden mit der Frage, ob überhaupt in der Serie der „Noctuidae Europaeae“ allgemeine Prinzipien für taxonomische Entscheidungen auf dem Niveau von Gattungen und sogar Familien existieren. Die Praxis in den Noctuidae Europaeae lässt solche Prinzipien vermissen. Die Folgen davon sind gravierend. Auf Grund des völligen Missverständnisses der phylogenetischen Systematik werden unter Berufung auf diese die klassischen Noctuidae s. Hampson in die Familien Erebidae (für die quadrifinen Unterfamilien der Noctuidae s. Hampson, unter Einschluss der bis zu diesem Zeitpunkt allgemein anerkannten autonomen Familien Lymantriidae und Arctiidae) und Noctuidae s.str. (für die trifinen Unterfamilien der Noctuidae s. Hampson aufgeteilt (FIBIGER & LAFONTAINE, 2005, LAFONTAINE & FIBIGER 2006).

Diese Revolution in der Systematik der Noctuoidea wird keineswegs von der Larvalsystematik mitgetragen (BECK 2009, Vortrag auf SEL-Kongress in Blagoevgrad 2013, in press.). Aber genauso wie die meisten der taxonomischen Änderungen Becks auf dem Gattungsniveau wegen der Rivalität zwischen Imaginal- und Larvalsystematik vor allem von FIBIGER (1997) nicht anerkannt wurden, so ist dies mit der höheren Systematik. Die zahlreichen molekulargenetischen Untersuchungen (ZAHIRI & AL. 2010-2013) seit der folgenschweren Entscheidung von FIBIGER & LAFONTAINE 2005, 2006 sind nicht in der Lage, die Systematik von Fibiger und Lafontaine eindeutig zu unterstützen. Dies ist nach den Darlegungen Becks (BECK, SEL-Kongress 2013, BECK in press.) auch gar nicht möglich.-

Die Ursachen für die Fehlbestimmungen sowohl der Larven wie auch der Imagines der *Euschesis* (*Noctua* auct.)-Arten *janthina*, *janthe* und *tertia* seit der Beschreibung von *Noctua janthe* BORKHAUSEN, 1792 werden dargelegt. Eine sichere Bestimmung nach dem Aussehen der erwachsenen Tiere ist oft nicht möglich. Die Entwicklung des Zeichnungsmusters bei den Larven der drei Arten wird an Hand von parallel montierten fotografischen Aufnahmen für die einzelnen Stadien (vom L3- bis zum L6-Stadium, dem letzten Larvalstadium) aufgezeigt.

Die Unterschiede im Zeichnungsmuster zwischen den Larven von *E. janthina* und *E. tertia* sind gering, aber die Ursache dafür ist essentiell. Das Zeichnungsmuster der *E. janthe*-Larve ist gut charakterisierbar; zusammen mit den imaginalen Merkmalen (auch die Gestalt der Vesica) kann *janthe* daher als eine gute Art eingestuft werden, was für *tertia* weiterhin fraglich bleibt.

Die endgültige Taxierung dieser drei Taxa hängt von der sorgfältigen genitalmorpholog. Untersuchung von nun gesichertem ex-ovo-Material wie auch von molekulargenetischen Untersuchungen desselben ab. Um Beides will sich die „Plontke-Gruppe“ kümmern.

Introduction

For the investigation of the larvae of the European Noctuidae I did not have any material *Euschesis tertia* for a long time and up to now, I could not state the determination of the first tertia-material by BESHKOV (2002), because the larvae were so close to *E. janthina*. In 2005 PLONTKE & AL. doubted the status of *janthe* and *tertia* as full species; on the photos of the „tertia“-larva of this paper no differences could be seen as compared with the larva of *janthina*. That stimulated again my interest in *tertia*. In 2007 again HAGGETT & BECK got material by BESHKOV, but the result of the investigation and comparison was the same as in 2002. Finally in 2008, at random, there again was the chance of parallel-rearing of all three *Euschesis*-taxa, and especially the excellent photographic documentation of all instars of these by Mrs Altmann brought the solution of the outstanding problems. The parallel montage of the pictures of the respective instars of the three taxa were suitable for the final comparison.- Parallel the „PLONTKE-group“ 2005 was concerned with the same problem. Thus, in 2008 the efforts of BECK and HAGGETT as well as of the „PLONTKE-group“ offered the chance to throw new light on the problem with the three *Euschesis*-taxa. Friedrich (member of the „PLONTKE-group“) provided me with real tertia-material (photos) from Cyprus, BESHKOV sent new material from Bulgaria, further the material from N-Italy (leg. Ortner, IX 2008) larvally revealed to be *tertia* and last not least, one of the four „janthe“-♀♀ (leg. BECK & ORTNER, 02-05.09.2008) from France (Drôme, Col de Penne) larvally also proved to be *tertia*, the first statement of *tertia* for France. The identification of the *tertia*-material from so different localities was made possible by the identic appearance of the larvae in comparison with the *tertia*-larva from Cyprus.

Material and methods

Larvae and ex ovo-adults

***Euschesis tertia*:** 1. two ♀♀ (with ex ovo-larvae and adults), leg. Ortner in the end of September 2008: I - Friaul - Caorle (at the coast of the Adria, north of Venice) - Brusse, 2m, ex ovo Ortner, Beck, Haggett, Altmann, adults at Ortner, Goodey (for genitalic dissection), Altmann/Klemmer; preserved larvae at Ahola, Beck, Haggett.

2. France, Drôme, Col de Penne, 1♀. The parent ♀ (coll. Haggett) at first mistaken as „*janthe-2*“, leg. Beck & Ortner, 2.-5.09.2008, France, Drôme, Col de Penne, 900m, the progeny at Beck and Goodey, det. Beck by the pattern of the larva.

3. Bulgaria, Strandzha-Mts., ♀ leg. S. Beshkov & T. Yanakiev, 09.X.2008; progeny at Altmann/Klemmer, Beck, Haggett, Goodey.

***Euschesis janthe*:** three ♀♀ „janthe-1“, „janthe-3“ (both coll. Haggett), „janthe-4“ (coll. Beck), leg. Beck & Ortner, 2.-5.09.2008, France, Drôme, Col de Penne, 900m; the progeny at Beck, Haggett and Goodey, Altmann/Klemmer.

***Euschesis janthina*:** two ♀♀, *janthina-1*, *janthina-2*, leg. KOBES: D-Göttingen, Ende August 2008. Progeny at Kobes, Haggett, Beck, Goodey, Altmann & Klemmer.

The present investigation is based on experiences with ex ovo-material of rearings made during a period of 17 years. In 2008 it was possible for the first time for the author to get and to examine authentic ex ovo-material of *E. tertia* from several localities of Europe. The preliminary determination was afforded by the comparison of the larvae of these different

rearing as compared to the ex ovo-larvae of the two other taxa - *janthina* and *janthe*. The confirmation of the determination was made sure by the comparison to ex ovo-*tertia*-material from Cyprus, where, in the opinion of FIBIGER (pers. comm. to FRIEDRICH) occurs only *tertia*. As compared with the larvae of *janthe* the differences between *janthina* and *tertia* are very slight and therefore it is not easy to separate larvally these taxa. Only by parallel montage of the pictures for comparison of the instars L3- to L6- of all three taxa, the discerning characters could be revealed and by these it was possible to state that all the former material from Bulgaria (leg. BESHKOV & BECK, 2002 and leg. BESHKOV & ZLATKOV, 2007) in fact already was *E. tertia*.

Abbreviations:

A1-A8 = Abdominal segments 1 to 8.

D1=cephalad trapezoidal bristle-point on A1 to A8.

D2= caudad trapezoidal bristle-point on A1 to A8 (the bristles, resp. the bristle-points form on A1 to A8 in dorsal view a trapezium, symmetrical to the dorsal median axis, therefore the name for these bristles „trapezoidals“) L1- to L6- = larval instars 1 to 6. LL-instar = last or ultimate instar (usually the L6-instar). "fig. 3", figures in parenthesis refer to the numbers in the concerning literature. (♂ = male, ♀ = female)

Taxonomic division of *Noctua* s.l. - the genus *Euschesis* HÜBNER, [1821], presence of principles for taxonomical working in the series „Noctuidae Europaeae“?

Concerning *fimbriata* (SCHREBER, 1759) and *janthina* at least the appearance of these generic type-species are, as compared with the other *Noctua*-sensu FIBIGER-spp. (fig. 1), so different that the decision of HÜBNER, 1821, for the two genera *Lampra* HÜBNER, [1821] (type-species *fimbriata*) and *Euschesis* HÜBNER, [1821] (type-species *janthina*) is well acceptable.

The main characters in the appearance of *Euschesis* are (fig. 3): adult in resting-position similar to *Lampra fimbriata* also concerning the pattern of the forewing; in frontal view patagia contrasting coloured (dorsad dark, ventrad pale greenish, separated by a line in continuation of the costae of the wings); the wings being held as a flat saddle-roof, this character is also shared with *Lampra*, therefore BORKHAUSEN remarks relationship between *janthina/janthe* and *Lampra fimbria* LINNAEUS (respectively *fimbriata* SCHREBER). And DE VILLERS terms *janthina*: „*fimbriaminor*, 1789“. The valvae of the *Euschesis*-spp. are very characteristic and unique, fig. 2. The eggs are (together with those of *Lampra*) within *Noctua* s.l. unique, greenish, large and without colour-pattern (BECK & al. 1993). But already the comparison of only the male genitalia (without the vesica) of the hitherto not upgraded species (around *janthina* and *fimbriata*) proves that the differences of these are so heavy as compared with those of the other *Noctua* s.l. spp. that the genera *Euschesis* and *Lampra* have to be revived and further genera have to be erected for the type-species *interjecta* HÜBNER, [1803], *comes* HÜBNER, [1813] and *orbona* (HUFNAGEL, 1766) as already proposed and done by BECK & al. 1993. These "new" genera are identic with the species-groups of FIBIGER, 1997. Already in the fifties of the 20th century TAMS wrote to BECK that the only representative (species) of *Noctua* is *pronuba* (TAMS had not taken into consideration *atlantica* WARREN, 1905, the closely related species to *pronuba* from the

Azores).- The arguments of FIBIGER (1997: 150) against the upgrading of the *Noctua*-spp. by BECK & al.: „the phylogenetical coherence then would be destroyed and other genera, e.g. *Rhyacia* HÜBNER, [1821] or *Orthosia* OCHSENHEIMER, 1816 would have to be split too” are substanceless. Firstly the coherence of the *Noctua*-taxa may be also emphasized by an upgrading of the whole group (including *Epilecta* HÜBNER, 1821, *Cryptocala* BENJAMIN, 1921 and *Divaena* FIBIGER, 1993) to the subtribe Noctuina. Secondly, the splitting of *Rhyacia* and *Orthosia* is already done and finished, the former by Beck (1991, 1999), the latter, *Orthosia*, also by BERIO 1980, HREBLAY 1993, RAKOSY 1991, BECK 1996, 1999. The wrong transfer of *Rororthosia* BECK (with e.g. *rorida* FRIVALDSKY, 1835) and also of *Anorthoa munda* ([DENIS & SCHIFFERMÜLLER], 1775) to the Perigraphina BECK by HREBLAY is evidence for the heterogeneity of *Orthosia*, too. This change for *Rororthosia* still is held by RONKAY 2001, whilst RONKAY 2001 retransferred *Anorthoa* to the Orthosiina. These working and changes mean that the time has come to reason about further taxonomic working on genus-level.

In this context, in spite of the pretension of the authors for the high scientific level of the series Noctuidae Europaeae (e.g. HACKER 2002: 12: „one of the best and most successful multi-volume taxonomic and faunist projects of the world of the highest scientific standard”) the question is allowed for the presence of principles for taxonomic working in the series „Noctuidae Europaeae”; see also the other paper of BECK in this volume: “Comparison of the imaginal and larval taxonomy of some taxa of the subfamily Hadeninae s.l. in: “Noctuidae Europaeae”, Hadeninae I, HACKER 2002 and in: “Die Larven der europäischen Noctuidae”, BECK 1999/2000”.-

Besides of most to complete rejection and ignoring of the taxonomical changes (BECK 1991, 1996, BECK & al. 1993) by FIBIGER (1997: 22, 150) a lot of these were now accepted (ZILLI, RONKAY & FIBIGER, 2005) and within the Apameini some further species - *myodea* RAMBUR, 1858, *cervago* EVERSMAAN, 1846 and *zollikoferi* FREYER, 1836 - were independently recommended to ZILLI (BECK, pers. comm.) as types of new genera before appearing of volume 8, because in the meantime the larvae of these species were available. But this step was already done by the authors of vol. 8 with *Bifurca myodea*, *Cervinia cervago* and *Fabula zollikoferi*.- But for a thoroughful taxonomic revision of the whole species of the Noctuidae Europaeae we still have to wait and the then (2009) present impression of the taxonomy of the previous volumes suggests that this taxonomy is correct and still held.; otherwise we have to await „the book with the seven seals”, vol. 12 of the series, in which we will have the „whole truth” about the present taxonomy of the Noctuidae. But also this did not happen. Instead of we have now the ominous 13th volume of the „Noctuidae Europaeae” with the split of the Noctuidae s. Hampson in the two families, the Erebidae (including the Lymantriidae and the Arctiidae) and the Noctuidae s.str. -

In contrast to the repeated rejections of necessary taxonomical changes introduced by BECK - FIBIGER & HACKER (2007) split the genus *Cosmia* (with five species in Europe) into five subgenera, an idea which already is suggested in BECK 1999: 436.- This action puts the question for the presence of principles of taxonomic working of the authors of the series Noctuidae Europaeae, too. Possible principles are already proposed by BECK & al. (1993).

The „Credo” for taxonomical decisions of FIBIGER 1997: 25, based on HOLLAND 1905 and SVENSSON 1992, is the following: “At the species-level the taxonomist ought to be a splitter. At the genus-level the taxonomist should be a lumpner”. But makes the differentiating process of evolution stop at any level of the hierarchic system? Now we have the split of the classical family Noctuidae, a completely unnecessary step taking the larval-morphology in consideration.

The history of the investigations and of the attempts to characterize the three species *Euschesis janthina*, *janthe* and *tertia*. - The external characterization of the adults.

The nearly endless confusion about the characterization of *janthina* and *janthe* since BORKHAUSEN, 1792 established *janthe* and further the problem of exact characterization of *tertia*, fig. 4, concerned BECK and HAGGETT since 1992. In 2002 BECK and HAGGETT for the first time got material of „*tertia*” by BESHKOV. But then BECK and HAGGETT were not able for clear separation of the larvae from those of *janthina*. 2007 BESHKOV again provided with eggs of „*tertia*”; the result of the rearing was the same as in 2002; already in 2002 BESHKOV told that the females (of *janthina*-appearance) might be also *janthina*. In between PLONTKE & al. 2005 reared parallel „*janthe*” (the determination of the female as *janthe* was confirmed by HEINICKE) and *tertia*; PLONTKE asked for my opinion about the pattern of the larvae of the „*janthe*”-rearing. I told that there are no differences as compared with those of *janthina*; but because the larvae were very pale I decided for an intermediate position. By the current re-examination of the whole complex (figs. 5, 6) it is clear that the „PLONTKE”-*janthe*-female in fact is a female of *janthina* and therefore it is no wonder that the whole progeny (and not only the specimens with broad-black-fasciated hindwings) is *janthina*. At once the wrong conclusion of PLONTKE & al. was taken as evidence of the conspecificity of *janthe* with *janthina* (REZBANYAI-RESER, L. & M. KADAR 2007; PARENZAN, P. & F. PORCELLI 2008).

The mistake of BORKHAUSEN to withdraw his species *janthe* was his opinion about the reliability of the coloration of the larvae, but this depends on the coloration of the environment, see below.

The puzzling about the determination of the three taxa since v. MENTZER described *tertia* depends on the neglect of the investigation of the pattern of the hindwings of the females.

In spite v. MENTZER & al. write (for the comparison of the three taxa concerning the character of the width of the black fascia of the hindwing upper side) for this investigation, loc. cit. p. 25/26: “We can thus speak of specimens of three types, namely with „narrow fascia”, „wide fascia 1” and „wide fascia 2”. Considering the whole geographical distribution one finds the following differentiating characters in both sexes!” But in the reality these comments, basing on the „figs. 1-3” of v. MENTZER & al. concern only males.- And with this supposition started the puzzling of the following years.

Already this puzzling proves that the present external characterization of the *Euschesis*-taxa is far from being sufficient, for the females of *janthina* and *tertia* possibly impossible at all. The insufficiency of the present external characterization is also demonstrated by corrections of FIBIGER 1997: the „fig. 6” of plate 5 (1993, a ♀ of *janthina*) now is considered to represent *janthe*, here fig. 5. „Fig. 8” of plate 5 and the „fig. 33” of plate 11 show two „salmon-red” ♀♀ of *tertia*, the basis for to attribute sexualdichroism to *tertia* as compared with the male (plate 11, „fig. 32”, a not dissected specimen); hence the differentiation between *tertia* and *janthina* habitually is impossible (pers.. comm.. of Fibiger in the lecture)

the “fig”. 32 may represent as well *janthina*. Over all FIBIGER 1993 states the salmon-red character also for ♀♀ of *janthina* in SE-Europe. A further problem in the investigations of v. MENTZER & al. 1991 and FIBIGER, 1993 is the lack of the external characterization of the ♀♀ as compared with the ♂♂; the comparison of the extension of the black fascia of the hindwings, fig. 4 (v. MENTZER & al., „figs. 1-3” and the comment *ibid.*, page 26, first two lines) concerns both sexes and is therefore incorrect. In all three taxa, especially in *janthina* and *tertia*, there are heavy differences in the width of the black fascia of the hindwings between the ♂♂ and ♀♀. Concerning the width of the black fascia of the hindwings we now see that there is a clear sexual-dimorphism as well with *tertia* as with *janthina*; in the ♂♂ the fascia is very broad and then of the yellow central field remains only a „round” yellow centre of the hindwing, especially in the forma *flavomaculata* GOEZE of *janthina* resp. of *tertia*. At *janthe* this black fascia may be broader at females as compared with the males and then the misidentification as female of *janthina* (FIBIGER 1993, plate 5, „fig. 6”, 1997) is possible (see here fig. 5). On the other hand, also a *tertia*-female may be not recognized only by the width of the black fascia (BECK, 2008, France, Drôme, Col de Penne: „*janthe-2*” = *tertia*); also the misidentification of *janthe* (instead of *janthina*) in the paper of PLONTKE & al. (2005) is due to the insufficient description of this character. The course of the black fascia at the costal region is not always so clear as in fig. 4 („figs. 1-3” of v. MENTZER & al.) suggested (see also the figs. of *janthe* in FIBIGER, 1993, here fig. 5): at *janthe* normally the inner edge of the black fascia runs rectangularly to the costa, giving the appearance of a central rectangular yellow field, running through to the costal margin of the wing; but there are also *janthe* specimens which show the same course of the black fascia at the costal area as the „fig. 3” of MENTZER & al., of course some weaker in the dark coloration (but the latter is also due to worn specimens of all three taxa). The *tertia*-character of a fringed costal process of the black fascia towards the basal shading, fig. 4 („figs. 1-3” in v. MENTZER & al.) could not be confirmed; this is either indistinct to missing at *tertia* or similar in some specimens of *janthe* (figs. of *janthe* in FIBIGER, 1993, here fig. 5) and worthless.

The imaginal characterization of the three taxa by the coloration and pattern of the forewing-upper-side is impossible in *janthina* and *tertia* (this opinion was shared also by FIBIGER in the discussion of the lecture) and this concerns also just hatched imagines; at *janthe* there is a form which is (newly hatched) reliably attributable to *janthe* by the pattern and coloration of the forewing-upperside (fig. 15). At this form the very large triangular patch at the costa between the subterminal line and the postmedian line is dark to bright orange-red as also are the fringes of the forewing (in fresh imagines), further the subterminal line is on the outside +/- covered with white scales, which are concentrated to flecks at the triangular fleck and in the submedian fold (KÖHLER 1995). But there are also specimens the forewing-pattern of which is not to be discerned from the other two taxa. And also the other characters, besides the width and course of the black fascia of the hindwing-upperside – the extension of the blackish field of the forewing-underside or the dentation of this black field at the distal margin are not always reliable (HALL, 2004). Not in vain heavy misidentifications happened with the females of all three taxa (FIBIGER 1993, PLONTKE & al. 2005 and now, detected in the „last minute”, BECK – with „*janthe-2*” = *tertia*) .

Moreover the coloration of the forewings of the progenies of *E. tertia* from Greece and Turkey (fig. 7, PLONTKE & al.) ranges from reddish-brown to greyish-violet and then the latter are not different from typical *janthina*-specimens (with the greyish-lilac suffusion), as well with the ♂♂ as with the ♀♀.- The reasons for these phenomena are as yet not clear. Also the pattern of the forewing in each taxon is so variable that there are no specific char-

acters for one of the three taxa, this concerns as well the course of the ante- and postmedian line, of the subterminal line and the triangular patch at the costa and also the character of the reniform and orbicular spots; if the reniform spot is distinct it is always divided in the four outside segments of an „8”. Not yet clear is the status of the new material of „*tertia*” from Cyprus (leg. FRIEDRICH 2008): as well imaginal-habitually (fig. 7, below), as larvally (fig. 12) – there are slight differences as compared with the continental material. By the genitalic dissection (GOODEY) the specimens of Cyprus (leg. FRIEDRICH) seem to be *tertia*.

Last not least - the curious puzzling experience of BORKHAUSEN: at first the larvae of *E. janthina* were grey and those of *E. janthe* brown (very unlike to the results of so many rearings of *janthe* by BECK), in repeating the investigations BORKHAUSEN got *janthe* from grey larvae and therefore withdraw his species *janthe* (without considering the character of the narrow black fascia of the hindwing of the imago or the specific pattern of the larvae). The different rearings of *janthe* by BECK 2008 (females 1, 3, 4 from COL DE PENNE, 2008) and independently by WIROOKS 2008, revealed surprising results concerning the coloration of the *janthe*-larvae (fig. 9): all larvae reared by WIROOKS from two females were brown (brownish) and all larvae reared by BECK were grey to pale-grey; so I already doubted the correct determination of *janthe* by WIROOKS; then I had to change the jar of *janthe*-4 because of the many and larger larvae. Up to this point all my rearings I had made in white jars (of milk-products); now I took a huge red-orange bucket and after the next moult the coloration of the larvae was changed to brown(ish). Already formerly I was puzzled by these different results concerning the coloration of the *janthe*-larvae in the parallel rearings (eggs from the same female) of BECK (greyish larvae) and HAGGETT [brown(ish) larvae]. So in the larvae, similar to the adults, not the coloration is characteristic but the specific pattern. The latter was the reason to unite the 2008-material of „*janthe*-2” (France, Col de Penne) and of Caorle-1 and Caorle-2 (N-Italy) and that of Bulgaria (Strandzha) all as *Euschesis tertia*.

The characterization of the last-instar-larvae of the three taxa as referred to the L3-instar.

BORKHAUSEN recognized *janthe* as a taxon different from *janthina* primarily by the different coloration of the larvae (an error as is demonstrated here too) there are structural differences which allow the characterization of the three taxa by the pattern of the larvae, fig. 8 (= „figs. 4 and 5” in v. MENTZER & al. 1991), figs. 10, 11a/11b (fig. 11b shows drawings on the basis of fig. 11a).

a) *janthina* shows a less prominent clover-leaf-pattern in the early instars as compared with *janthe*; the white Dorsale is cephalad and caudad of this pattern distinct but not so large as in the figured *tertia*-larva, from T3 to A2 each tapered towards the caudad margin of the segments (at *tertia* enlarged!). In the last instar (fig. 10) the black wedges are prominent on (A5), A6, A7 and A8, larger towards A8 and hinted also on A5; these wedges derive from the construction of the D2-bristlepoint-basespot, which thus is also the fundamental supposition of the wedge-fleck-pattern of so many Noctuini-larvae s.BECK (the construction of this fleck is from A1 to A8 the same): the dorsocephalad quarter of this round spot is black, the rest whitish (see fig. 11b, detail); the caudad vertical margin of the black sector is transversally continued into the Doz, especially on A5-A8, this is the supposition for the wedge-spots but also for the dark „goblet”-pattern in dorsal view, because the dark Doz is

tapered dorsocaudad from D2 and the Doz caudad of D2 paler (the spandrel dorsocaudad from D2 to the caudad margin of the segment); on A1 to A5, at the dark sector of the D2-base-spot, the dark, blackish elements of the Doz are compact concentrated within the dark stripe of the arrowhead-pattern (this stripe runs from the caudad edge of the segment from the position of the Dorsale diagonally ventro-cephalad to D2 and then longitudinal to the cephalad edge of the segment, margining the +/- distinct Subdorsale dorsad); on A7 and A8 the black wedges are throughout compact black from D2 to D1.

b) *tertia*: the construction of the clover-leaf-fleck is the same as at *janthina*; *tertia* shows (not always) in the early instars (and lateron) a dominant broad whitish Dorsale (at the caudad margin of T3 and caudad of the clover-leaf-fleck towards the caudad-margin on A1 to A2; there the Dorsale is each enlarged towards the caudad margin of the segments (at *janthina* narrowed).- In the L5- and L6-instars, the D2-base-spot on A1-A3 is completely white (in the Cyprus-material less distinct; that may mean, that this character is not stable, because also in the characteristic appearance - as full plain spot - it is the same as in *janthina* on the segments caudad of A3), see detail in fig. 11b. The character of the full plain D2-spot allowed the final determination of the obscure *janthe*-2-progeny from the Col de Penne as *tertia* and also the redetermination of the material from Bulgaria/Madzharovo, 2002, and of Bulgaria/Shouman, 2007 as *tertia* and not as *janthina*; the black wedges are present only on A7 and A8 and over all, because of missing of the black sector in the D2-base-spot on A1-A3 the dark stripe of the arrow-head-pattern is on A1 to A3 *continuously arched* (up to the caudad margin of the segment) and up to A6 throughout homogeneously dark netted without a compact concentration at D2 and there (on A1 to A3) without the step of the „goblet“-pattern of *janthina*; on A7 and A8 the black wedges are netted towards D1, towards D2 compact, at *janthina* compact up to D1. By this characterization the fig. 8 („fig. 4“, „*janthina*“ in MENTZER & al.) with the schematic pattern of the dorsal view of „central - abdominal - segments“ (that means cephalad from A6), represents more the dorsal pattern of the larva of *tertia* than that of the larva of *janthina*; this may depend on an insufficient schematic reproduction of the pattern but also on a possible wrong determination of the female of this progeny (♀ leg., coll. MOBERG, N-Greece, Macedonia, Dysoron above Rhodopolis, 27.IX.1986).- Within the progeny of the rearing of „*tertia*“ by FRIEDRICH (Cyprus, 2008), fig. 12, there was a very dark larva which shows on A1 to A3 a D2-spot similar to that of *janthina* but the dark stripe of the arrowhead-pattern was identic with that of *tertia* as described above; an other difference in the pattern of this larva (as compared with the European *tertia*-material) is the homogeneously setting of the zones with pale (whitish) points (P-Elements s. BECK) as well in the dark as in the pale larva, which hitherto has not been seen at *tertia*-larvae of Europe; therefore the infraspecific status of this „*tertia*“-material is to investigate further.

c) *janthe*: depending on the coloration of the environment (e.g. of the rearing-jar) the larva may be (pale) grey to reddish-brown; but the character of the black clover-leaf-pattern in the early instars is essential and up to the ultimate instar dominant in the prominent blackish D1-bristlepoint-basespots and the dark intersegmental (=IS) fleck in position of the Dorsale. In the L3-instar these three blackish flecks are confluent on A1 (and less conspicuous and confluent on A2 and A3) and form one large dark median fleck in the cephalad half of the segment, diameter half the length of A1 (in fig. 10); in *janthina* and *tertia* the three flecks (the D1-spots and the equal large median fleck at the cephalad margin of A1) are on A1 (and less striking on A2. and A3) in the L3-instar separated and in the L4-instar and the following instars less distinct to inconspicuous.- This led to the opinion that the larvae of *janthina* may be discerned from *janthe* by missing of the dark clover-leaf-fleck on

the cephalad margin of A1 to A3 (KINKLER 1995); but this blackish clover-leaf-pattern is more spread in the *Noctua* s.l. species: it occurs so far regularly in the early instars of *Paranoctua comes* (HÜBNER, [1813]) and at *Internoctua* (*Triphaena* s. FIBIGER) *interjecta* (HÜBNER, [1803]) and very rarely at *Latanoctua orbona* (HUFNAGEL, 1766); over all the figure and opinion of KINKLER refers to a photo (KINKLER, Abb. 4) which shows larvae of the L4- and L5-instar of *janthe* and there is no evidence (photo) for the respective condition at *janthina*.- Specific as compared with *janthina* and *tertia* is in the following instars the dark grey to blackish intersegmental spot (in position of the Dorsale, the cephalad part of the clover-leaf) which on all segments is to be seen on both sides of the intersegment (and split and cephalad +/- continued to D2 and caudad continued to D1, yielding intersegmental dark „X”-marks s. WIROOKS) and which is +/- divided by the pale Dorsale. In the last instars (L5- and especially in L6-) this dark fleck is the supposition for the continuous or broken dark margins of a rhombe (or, intersegmental, of a dark „X”) which is centrally pale (with the dark spots of the suture-do3); the corner-points of the rhombe are the dark intersegmental flecks (in position of the Dorsale) and the dark D2-spots; when the dark D2-spot is elongated to the D1-spot and this to the intersegmental dark spot then the margins of the rhombe are continuous, otherwise broken in the cephalad half of the segment. As compared with *tertia* and *janthina* the black wedges on A7, A8 are less prominent because of the dark pattern of the rhombe.

Results & Discussion

One supposition for the present paper was the clearing of the taxonomical rank of the three taxa – *janthina*, *janthe* and *tertia* - as a whole. As already Hübner proposed these have to be arranged in the separate genus *Euschesis* HÜBNER, [1821]. In this context the remark on the presence of principles for the taxonomical working in the series Noctuidae Europaeae with the pretension of its very high scientific standard is necessary. It is impossible not to acknowledge the revision of *Noctua* LINNAEUS s. FIBIGER by BECK & al. 1993 and now to split *Cosmia* into five subgenera (FIBIGER & HACKER 2007).

The reasons for the endless confusions about the existence of *janthe* and also of *tertia* and of the correct determination of the three taxa *janthina*, *janthe* and *tertia*, since *janthe* and *tertia* were described, are demonstrated.

The adults of *janthina* and *tertia* are also in the opinion of FIBIGER (discussion at the SEL-congress 2009) not reliably to be discerned by the appearance and the wing-pattern. Also the separation of *janthe* from the two other taxa by the width of the black fascia of the hindwing-upperside is only relative, because the females of *janthina* and *tertia* have similar narrow black fascia. In this respect the description of v. MENTZER & al. 1991 does not consider the females. Also the character of sexualdichroism (the female of *tertia* is salmon-red) for to discern between *janthina* and *tertia* does not stand. And Fibiger states additionally that in SE-Europe *janthina* occurs also in a salmon-red form. The sexualdichroism of broad black fascia at the males of *janthina* and *tertia* as compared with the relatively narrow black fascia of their females is not mentioned by v. MENTZER & al. 1991. Because the females of *janthe* have vice versa broader black fascia than the males the confusion in the determination of the females of *janthina* and *janthe* (and also of *tertia*) is programmed, the more as at *janthe* this fascia also may be enlarged at the costa towards the wing-basis.

The comparison of ex ovo-material of *tertia*-larvae of three different localities in Europe with material from Cyprus (were in the opinion of FIBIGER occurs only *tertia*) with ex ovo larvae of *janthina* from Germany and ex ovo larvae of *janthe* from France give the basis of a new external characterization of the three taxa, as well larvally as (with restrictions) imaginally and especially the authentic material for further genitalic investigations.

Hitherto the taxonomical working with the three taxa has been concerned with „at random-specimens“ (PLONTKE & al.) which led to heavy irritations. Only ex ovo material can provide with reliable and enough material for further working as well genitalmorphologically as moleculargenetically.

By the investigations a clear characterization of the larvae is possible (a morphological investigation is outstanding).

By the material of „*janthe-2*“/= *tertia* from France, Col de Penne, the existence of *tertia* in France seems to be proved (for definitive confirmation the genitalic investigation is needed).

The doubts about the justification of the existence of three *Euschesis*-taxa (PLONTKE & al. 2005, RESER & KADAR, 2007 and PARENZAN & PORCELLI, 2008) are rejected. The taxonomic grade of *tertia* is debatable, but because there occurs a ?subspecies of *tertia* in Cyprus the status of a bona species seems to be justified. *Janthe* is well characterizable, as well imaginally - especially in specimens which show the characteristic rectangular yellow field throughout of the hindwing - as larvally and therefore there is no doubt about its status as bona species (this is also corroborated by the specific construction of the vesica).

In the discussion after the lecture Fibiger agreed that it is impossible to discern *janthina* and *tertia* by the appearance, for confirmation of the determination genitalic dissection is necessary. Fibiger further announced to investigate the whole problem (clear habitual and genitalic characterization of the three *Euschesis*-taxa as well for the males as for the females) again in the following winter (2009/10), but then his heavy disease hindered him to do this. The genitalic preparations by GOODEY of males of *tertia* from Cyprus, Greece and Turkey (fig. 16) did not reliably confirm *tertia* but this depends primarily on the insufficient preparation of the vesica of *tertia* by FIBIGER 1997 in Noctuidae Europaeae 3, „fig. 181“, here fig. 17; the larvae of Cyprus (phot. FRIEDRICH 2008, fig. 12) are distinctly different from continental *tertia* and *janthina* as well.

Final conclusions

Now, by a large authentic material of the larvae and the adults of the progenies of these there have to be made further investigations to characterize the adults of *janthina* and *tertia* by the genitalic structures (series of preparations) of unmated females and of the males and also by molecular-genetical investigations; also the larval-morphological results are outstanding.

The question whether *tertia* is a good species (sister-species in the opinion of FIBIGER 1993) is now also to debate on the background of the larval-ornamental differences between continental European *tertia*-material and the larvally some different *tertia*-material from Cyprus. There are also running investigations to solve this problem by barcoding of the new and authentic material.

Hence nobody possesses all wisdom, the time has come to unite and to discuss all the preliminary results of the imaginal-systematics as compared with those of the larval-

systematics of the Noctuidae (Europaeae) to find a convincing and standing system of most of the species of the Noctuidae. No family of the Lepidoptera has a similar broad engagement of specialists as well imaginally as larvally as the family Noctuidae, which represents one of the five families of the world-fauna, richest of species and which therefore is a permanent challenge for the capability of the modern systematics to find the natural (phylogenetical) system of the Noctuidae.

Over all the discussion about the composition of the family Noctuidae s. Hampson [either two families - as in the opinion of the imaginal-systematists and the molecular-genetists – with the family Erebidae which includes also the Arctiidae and the Lymantriidae and the family Noctuidae s.str. – or the one family Noctuidae s. Hampson, s. Beck (2009) without the Lymantriidae and Arctiidae] is still running (lecture of Beck on the SEL-congress, 2013, print in prep.).

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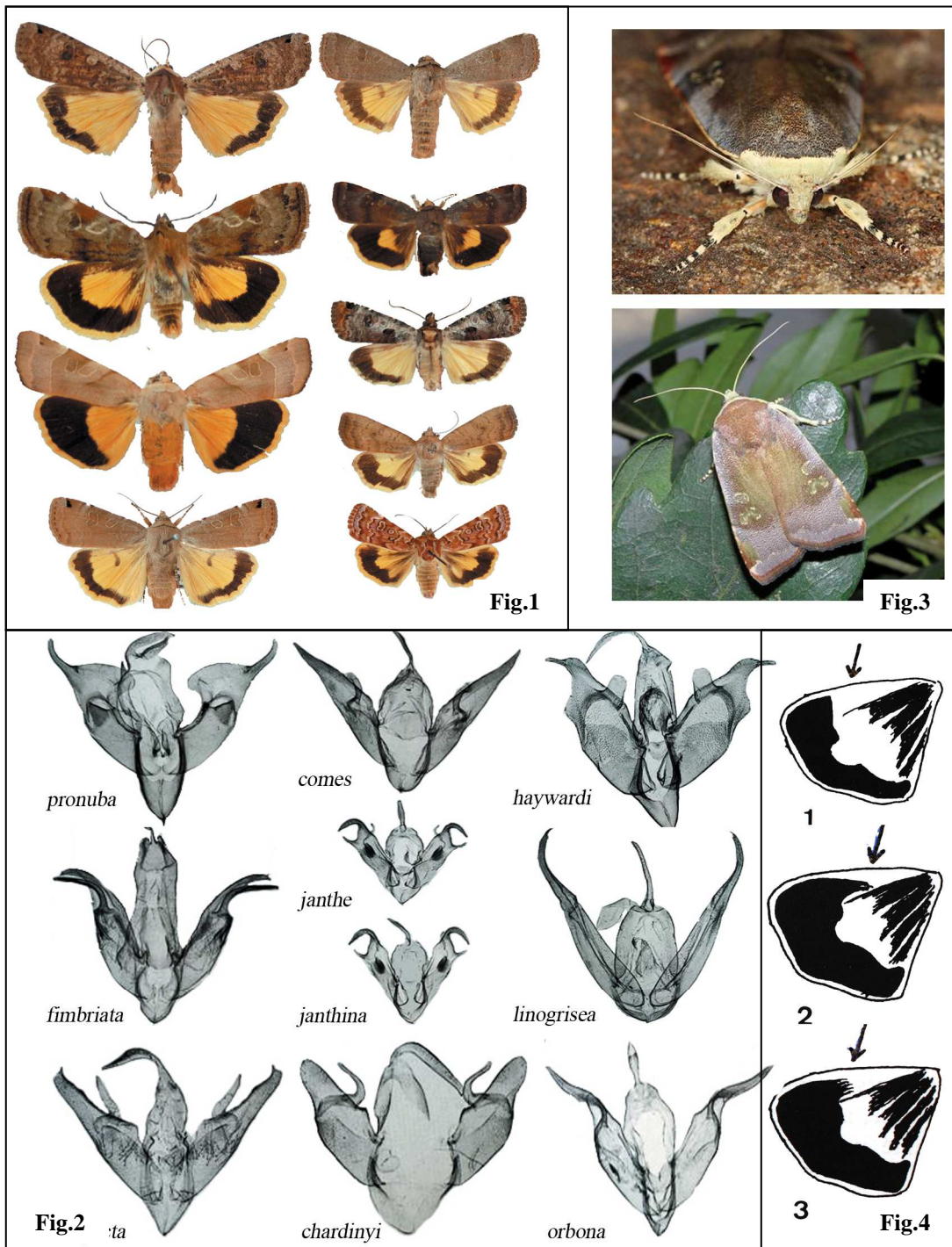


Fig. 1: Overview of the genus-types of the *Noctua* s.l.-spp. (= *Noctua*-complex auct.) after Linnaeus, Hübner, Benjamin, Fibiger, Beck, Kobes & Ahola. Ex coll. Beck, phot. Beck.
 Fig. 2: Male genitalia (without Aedeagus and vesica) of the types of fig. 1 (taken from FIBIGER, 1997).
 Fig. 3: *Euschesis*-spec., above, frontal-view (phot. Altmann), below, *E. tertia*, phot. Plontke.
 Fig. 4: Comparison of the hindwing-pattern, upper side (from left) of *E. janthe*, *janthina*, *tertia* (taken from V. MENTZER & al.); in the opinion of the authors (v. MENTZER & al. 1991) representative for both sexes (v. MENTZER & al., 1991: 26, lines 1 and 2).

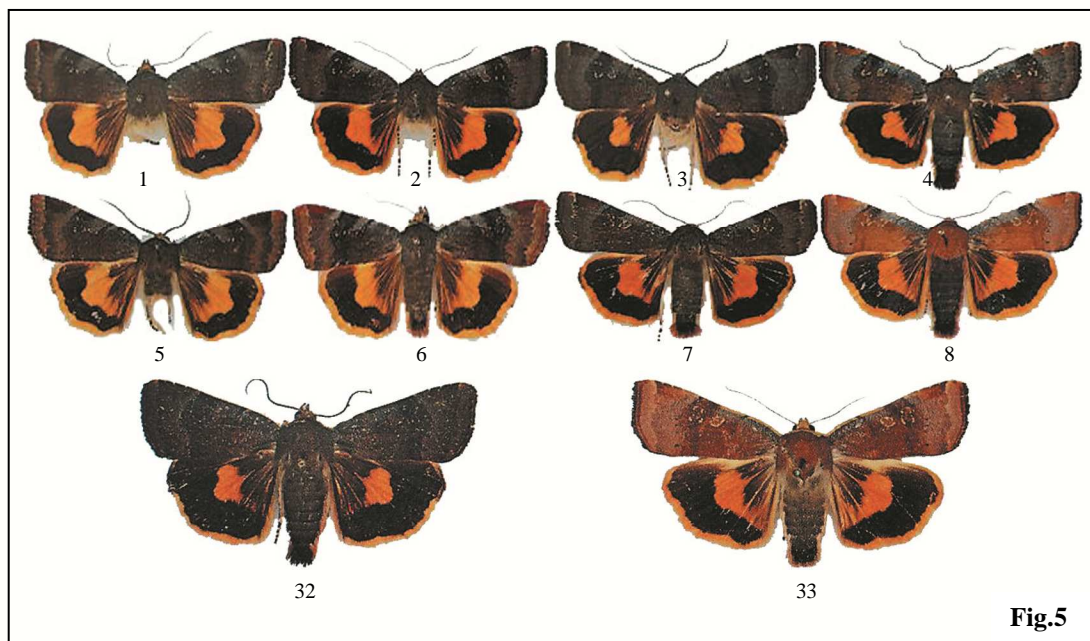


Fig.5



Fig.6

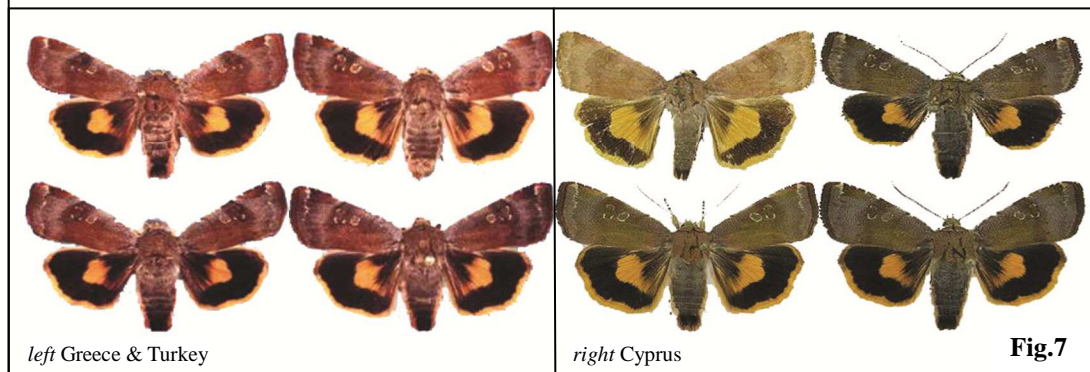
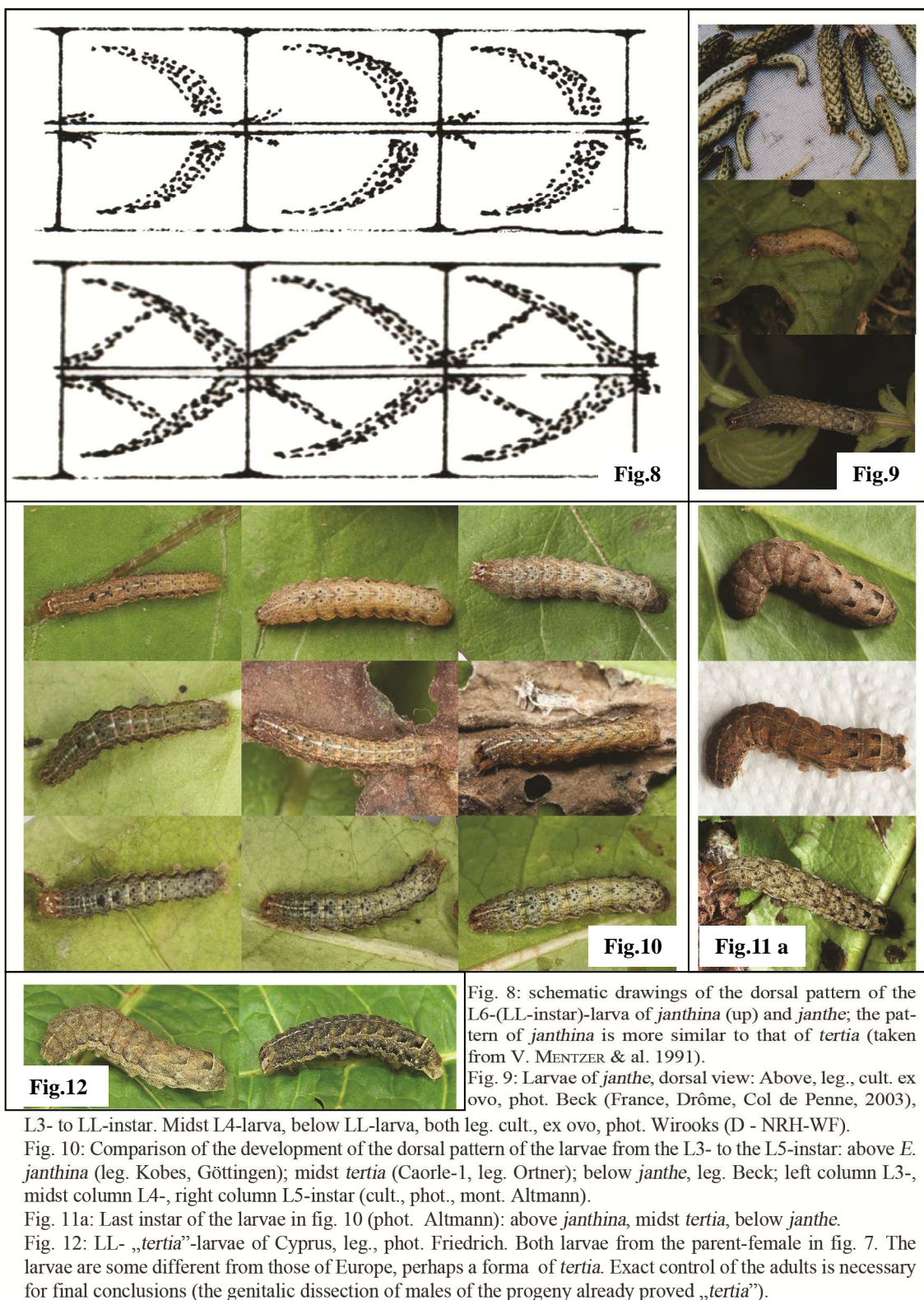


Fig.7

Fig. 5: Above: comparison of *janthe* and *janthina* (FIBIGER, 1993, plate 5, figs. 1-7) and *tertia* (plate 5, fig. 8). Below: *tertia* (FIBIGER, 1993, plate 11, figs. 32, 33); without genitalic dissection fig. 32 (paratype of *tertia*!) may be as well *janthina* as *tertia*. FIBIGER 1997, corrigenda: 407: plate 5, fig. 6 ('*janthina*') is in fact *janthe*.

Fig. 6: Left picture, first series, left, female (very worn) of the '*janthe*'-rearing (of Plontke & al.); this misidentification was also confirmed by HEINICKE as *janthe*; in fact it is *janthina*. Right picture: the F1-progeny of the wrong determined female demonstrates also its being *janthina* (phot. PLONTKE). Fig. 7: *E. tertia*: left half, progeny of females from Greece and Turkey (PLONTKE & al. 2005; phot. PLONTKE); right half '*tertia*' from Cyprus, leg. phot. FRIEDRICH, 2008/9, pers. comm.), parent-female first series left; see also fig. 12.

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



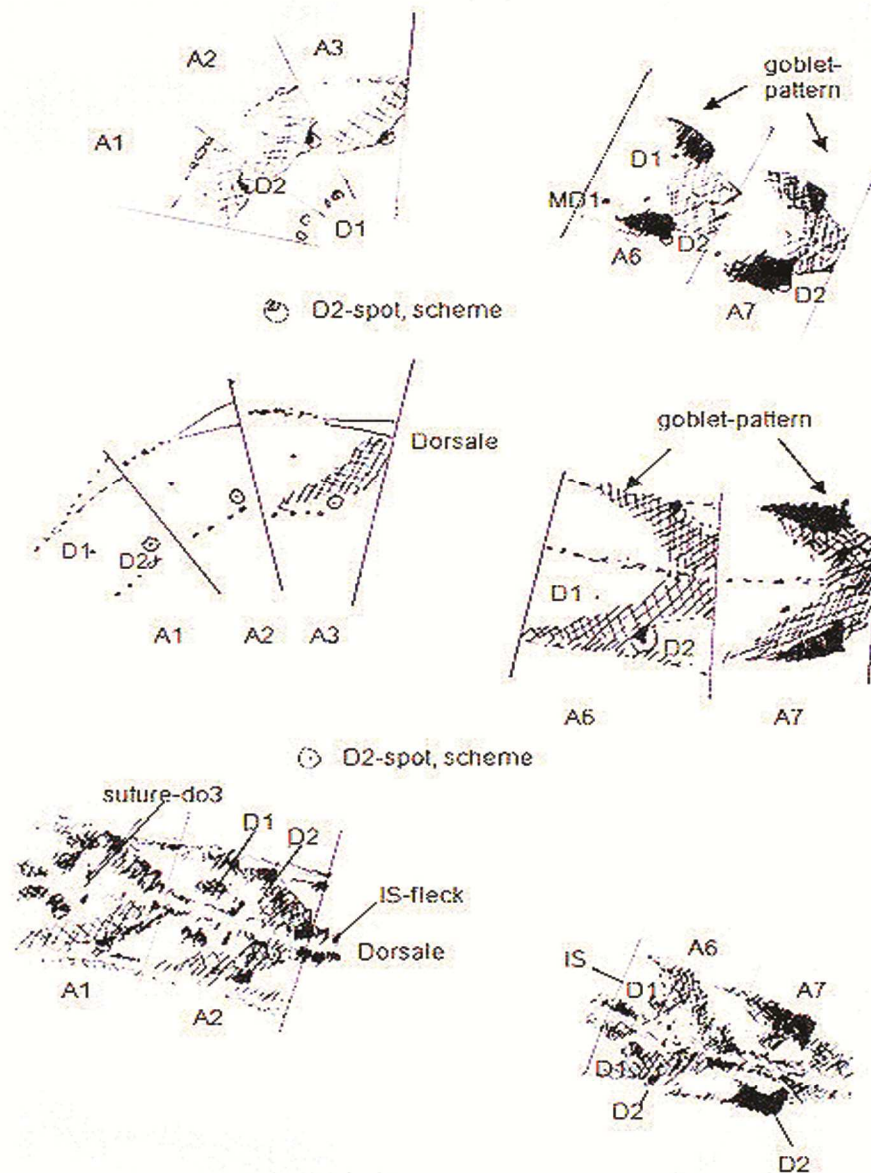
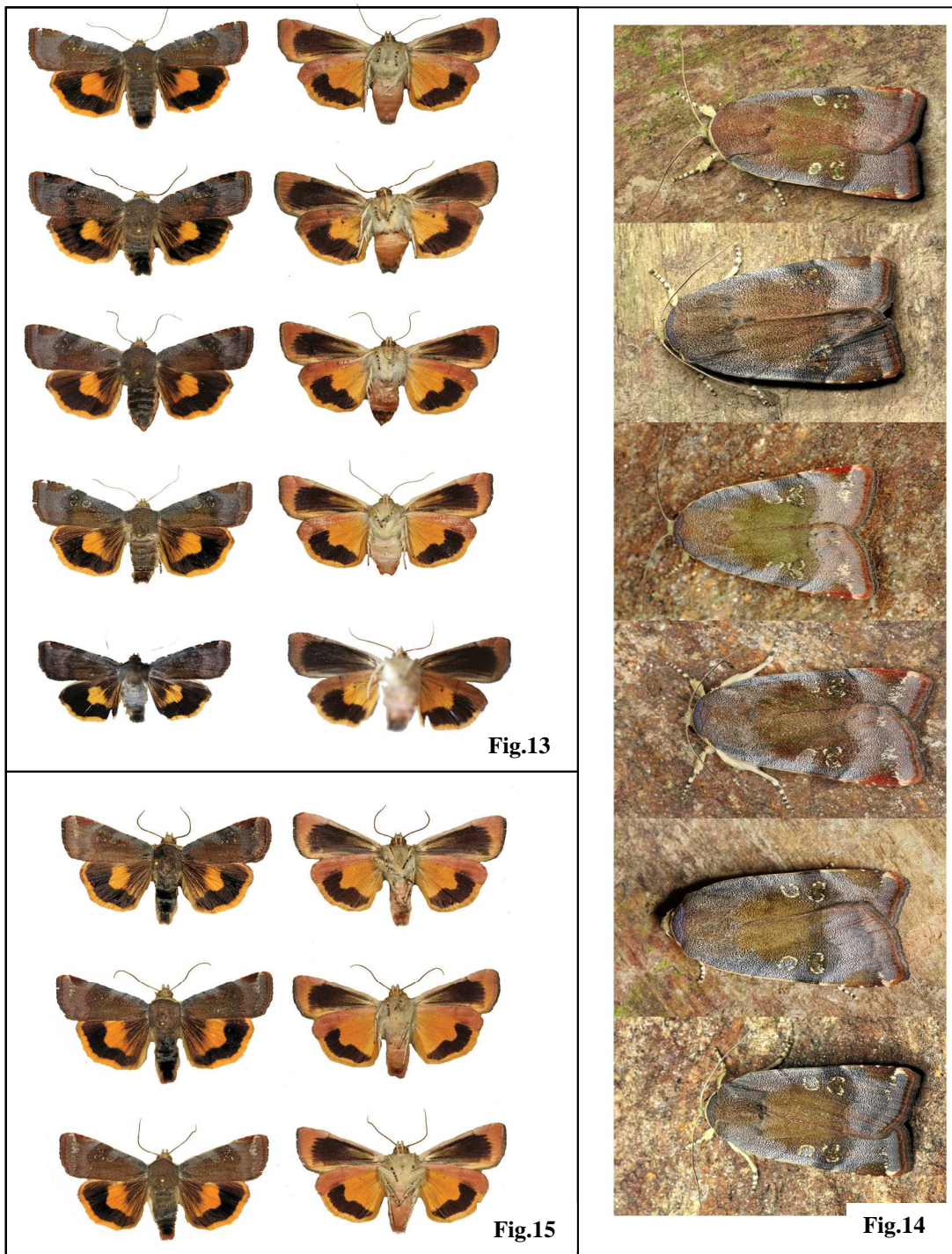


Fig.11b

Fig. 11b: Schematic drawings of the „central” segments A1-A3 and of A6 and A7 in dorsal view, in respect to Fig. 11a (del. Beck). Above (*janthina*): position of the black-white contrast-D2-spot on A1-A3; in the scheme the dorsocephalad quarter to third of the D2-spot is black, the rest pale, whitish. A6, A7 shows the „goblet-pattern” (the schematic sagittal section through a goblet) of the dorsal zone, symmetrically to the median axis with the heavy black sides, the black wedges, which are black throughout (transversely from D2 to D1). Middle (*tertia*): the D2-base-spot is on A1 to A3 to be recognized as a pale full-spot, below schematized. A6, A7: on A6 the side of the goblet is completely netted, on A7 the black wedge extends only half the way from D2 to D1, the rest is netted. Below (*janthe*): on A1, A2 the dark pattern consists of the D1-, D2-spots, the IS-fleck, the small suture-do3-fleck and the sides of the arrow-head which are continued from the caudad IS-fleck to the D2-spot and from there longitudinally to the cephalad IS, dorsally bordering the Subdorsale. On A6 a +/- continuous connection leads from D2 over the D1-fleck to the cephalad IS-fleck forming the +/- distinct margins of a rhombe which is centrally pale.



Figs.13-15 mont. and phot. Altmann:

Fig. 13: *tertia* and *janthina*, upper- and underside, from above:

tertia-female (Caorle-1, Italy), *tertia*-male (Strandzha, Bulg.), *tertia* (Col de Penne, France) - sex not investigated; *janthina*-1, female (Göttingen), *janthina*-2, male (Göttingen).

Fig. 14: resting position, from above: *tertia* Caorle-1, *tertia* Col de Penne; *janthe*-1, Col de Penne, *janthe*-3, Col de Penne; *janthina*-1, Göttingen, *janthina*-2, Göttingen.

Fig. 15: *janthe*-imagines, prepared. Above and below females, in the midst male.

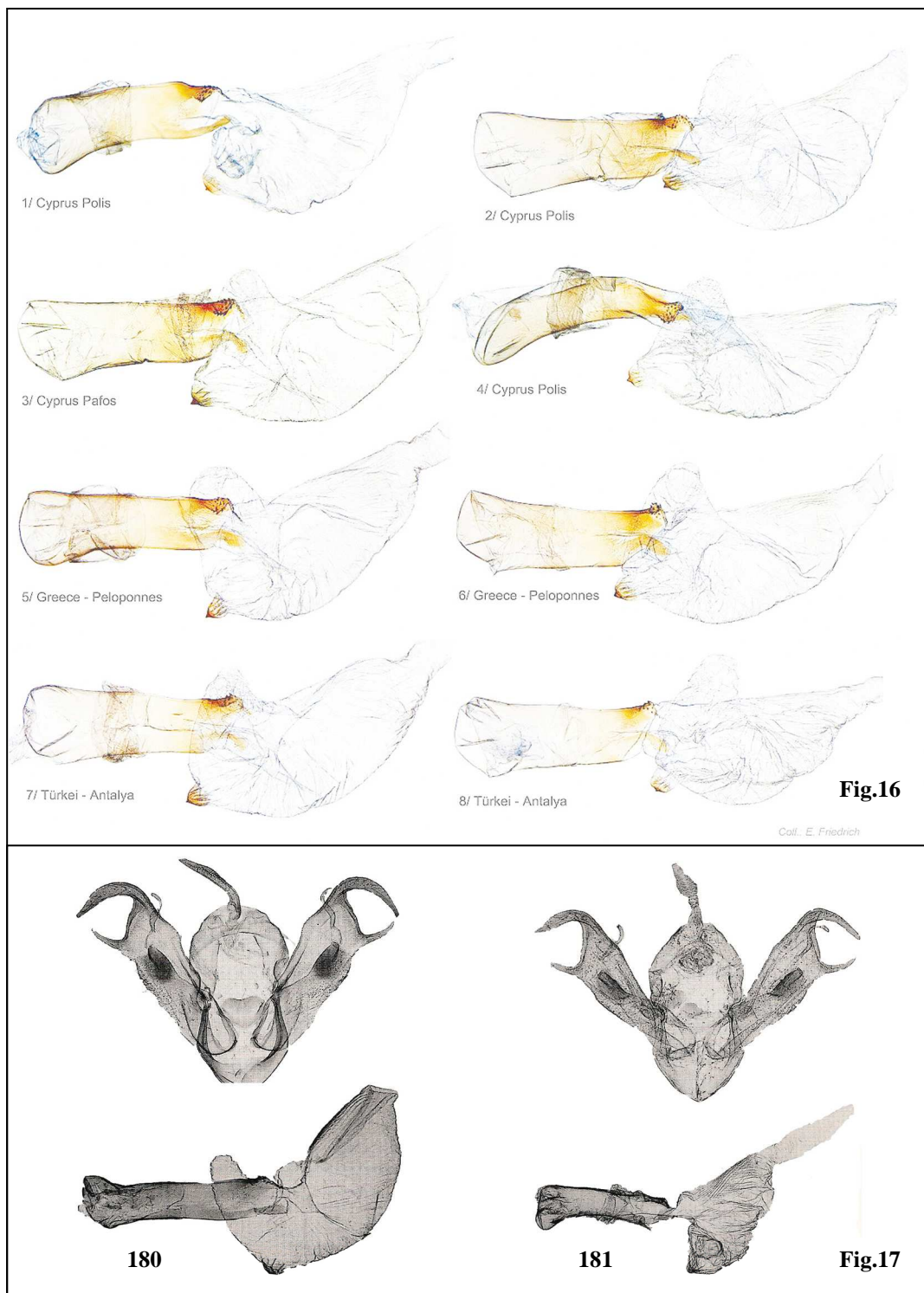


Fig. 16: Genitalic preparations (vesicae) of *Euschesis „tertia”* from Cyprus, Greece and Turkey in comparison with fig. 17 (preparations by Goody)

Fig. 17: Vesica of *tertia* prepared by Fibiger (fig. 181 in Noct. Europ. 3, 1997, in comparison with the vesica of *janthina*, fig. 180): the large diverticulum in „fig. 181” is not inflated!

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