

Cnephasia ecullyana RÉAL, 1951,
a species native to Central Europe
(Lepidoptera, Tortricidae)

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Summary

Cnephasia ecullyana RÉAL, 1951 (= *tyrrhaenica* AMSEL, 1951 [1952]) must be considered a locally common native species in warmer parts of central Europe (along the valleys of the Rhine and its tributaries, and in Thuringia). New distribution data are documented. There is considerable taxonomic confusion in the older literature prior to 1950, because the species was confounded with the externally similar Cnephasiini species *Neosphaleroptera nubilana* (HÜBNER, [1796-99]). Thus far, the types of the relevant taxa (if still existing) have not been checked for the correct identities. In several museum collections specimens of *C. ecullyana* have been found among series of *N. nubilana*. Both species can easily be distinguished without dissection by a scale dimorphism on the forewings of the genus *Cnephasia*. Collecting at light is an inadequate method to sample for *C. ecullyana*; flight activity obviously occurs during dawn and early morning only. In appropriate biotopes (e.g., extensively cultivated thermophilous orchards), males can easily be collected in great numbers in attractant traps baited with cis-9-dodecenyl acetate (Z9-12 :Ac) in late July.

Zusammenfassung

Der Wickler *Cnephasia ecullyana* RÉAL, 1951 (= *tyrrhaenica* AMSEL, 1951 [1952]) muß als eine einheimische und stellenweise nicht seltene Art in warmen Bereichen Mitteleuropas, zumindest im Bereich des Rheintals und seiner Zuflüsse, sowie in Thüringen, angesehen werden. Neue Fundorte werden angegeben. In der älteren Literatur (vor 1950) ist die Art mit der äußerlich ähnlichen Cnephasiini-Art *Neosphaleroptera nubilana* (HÜBNER, [1796-99]) verwechselt worden; die Typen der betreffenden Taxa (soweit noch vorhanden) wurden noch nicht überprüft, mit Fehlidentifikationen muß gerechnet werden. In mehreren Museumssammlungen wurden Falter von *C. ecullyana* in Serien von *N. nubilana* entdeckt. Beide Arten können problemlos ohne Genitalun-

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tersuchung anhand des „Schuppendiformismus“ auf den Vorderflügeln der Gattung *Cnephasia* getrennt werden. Der Lichtfang ist ungeeignet zum Nachweis von *C. ecullyana*, da die Flugaktivität offensichtlich nur in der Morgendämmerung stattfindet. In geeigneten Biotopen (z.B. extensiv bewirtschafteten thermophilen Streuobstwiesen) können Männchen in großer Zahl mittels Lockstofffallen mit cis-9-Dodecenylnacetat (Z9-12 :Ac) gegen Ende Juli angelockt werden.

Résumé

Cnephasia ecullyana RÉAL, 1951 (= *tyrrhaenica* AMSEL, 1951 [1952]) doit être considérée comme une espèce indigène relativement commune dans les régions chaudes d'Europe centrale (le long des vallées du Rhin et de ses affluents, ainsi qu'en Thuringe). Les auteurs indiquent de nouveaux lieux de capture. Dans la littérature antérieure à 1950, cette espèce a été confondue avec un *Cnephasiini* qui lui ressemble extérieurement ; *Neosphaleroptera nubilana* (HÜBNER, [1796-99]). Jusqu'à présent, les types des taxa concernés (pour autant qu'ils existent encore) n'ont pas été contrôlés, et il faut s'attendre à des erreurs d'identification. Dans plusieurs collections de musées, on a découvert des exemplaires de *C. ecullyana* dans des séries de *N. nubilana*. Ces deux espèces sont faciles à distinguer sans examen des genitalia grâce au «dimorphisme des écailles» sur les ailes antérieures du genre *Cnephasia*. La chasse à la lampe ne convient pas pour obtenir des *C. ecullyana* parce que cette espèce ne vole apparemment qu'à l'aube et tôt le matin. Dans les biotopes appropriés (p.ex. vergers thermophiles à culture extensive), on peut récolter des mâles facilement et en grand nombre au moyens des pièges appâtés à l'acétate cis-9-dodécénylique (Z9-12 :Ac) vers fin juillet.

Introduction

The species *Cnephasia ecullyana* RÉAL, 1951 ⁽¹⁾ described from southern Europe, was first recorded for central Europe by KASY (1965) from Austria in 1960, and from the Federal Republic of Germany in 1967 (THOMAS 1974). SAUTER (1981) recorded an additional specimen from south-western Germany collected at light and listed further references for recent observations of *C. ecullyana* from south central Europe. SAUTER interpreted these observations as a recent invasion of *C. ecullyana* from South to North in central Europe. Ten additional specimens were then recorded by STEUER (1984) from central Germany, Thuringia, near Bad Blankenburg.

⁽¹⁾ = *tyrrhaenica* AMSEL, 1951 [1952] ; regarding the synonymy and priority questions we follow here LERAUT (1980) ; in contrast, RAZOWSKI (1959) listed RÉAL's name as junior synonym. *C. tyrrhaenica* was described from Sardinia, *C. ecullyana* from southern France.

During a field-screening project using traps baited with synthetic sexual attractants in extensively cultivated orchards near Frankfurt am Main (FR Germany) between May and August 1981, the first author trapped 309 male specimens of *C. ecullyana* in a trap baited with Z9-12:Ac (for details of method and results, see below) (NÄSSIG 1982) and some additional specimens in other traps. Similar results were found in subsequent years at other localities, and we have been informed that the Hoechst AG, Frankfurt also trapped hundreds of males of *C. ecullyana* during its own field-screening experiments near Frankfurt in those years (KNAUF, BURKHARD, pers. comm.). Parallel collecting at light by one of us (W.A.N.) in 1981 at the same site did not yield any specimens of *C. ecullyana*.

The collection of such large numbers of a previously nearly unknown species was quite surprising, so we checked several museum collections to see whether the species really was absent from the material or previously overlooked.

Combining the results of pheromone trapping, consulting museum collections, and literature studies, eventually a different view of the presence of *C. ecullyana* in central Europe arose: the species seems to be autochthonous at least in warmer parts of Germany and was only overlooked or confounded with another Cnephasiini species (*Neosphaleroptera nubilana* (HÜBNER, [1796-99])) for many decades, probably because traditional collecting methods are largely inadequate to specifically detect the species.

Trapping results with synthetic sexual attractants

The field-screening experiments took place in 1981 near Mühlheim am Main, ca. 20 km east of Frankfurt/Main, on old sand dunes called „Gailenberg“. This thermophilous area is covered with a few agricultural fields and is mainly an extensively managed orchard, rich in plant and insect species (NÄSSIG 1982). In 1982-84, additional traps were placed near Rodheim/Wetterau (ca. 25 km N Frankfurt, in orchards) and near Schlüchtern, ca. 80 km NE Frankfurt on a thermophilous calcareous slope above a small orchard.

Adhesive traps were used, mainly so-called „tetra traps“ as described by ARN et al. (1979). The chemicals used as lures were provided by E. PRIESNER, Max-Planck-Institut für Verhaltensphysiologie, Seewiesen, and applied to rubber caps (100 µg per cap).

Males of *C. ecullyana* were trapped with cis-9-dodecenyl acetate (Z9-12:Ac). The effectiveness of the artificial bait was demonstrated by the fact that all 309 males lured in 1981 near Mühlheim with pure Z9-12:Ac were found within a single trap. Single specimens of *C. ecullyana* in other traps must be interpreted as purely incidental, except for the 14 specimens in the trap with 91% Z8-12:Ac + 9% E8-12:Ac. Receptor cell combinations for different isomeres of Z/E8- and Z/E9-dodecenyl acetates are well known for different cnephasiine species (PRIESNER, 1984), and besides the main combination, secondary alternative attractants may exist. A third possible attractant for *C. ecullyana* was reported by SZIRAKI (1980), who found the species in traps baited with „Atralin“ where the main component is E5-10:Ac mixed with Z5-10:Ac.

Dodecenyl acetates with different positions of the double bond and in different mixtures are well-known sexual attractants for *Cnephasia* species (BATHON & GLAS, 1983; GLAS, 1985; ARN et al., 1986b). Pure Z9-12:Ac is known to be attractive to males of *C. longana* (HAWORTH, 1811) (NÄSSIG, 1982; BATHON & GLAS, 1983; GLAS, 1985) and *Eupoecilia ambiguella* (HÜBNER, [1796]) (Cochylidae; ARN et al. 1986a, 1986b); of these, only 3 males arrived each, probably due to the type of biotope where the project took place, which might be considered as being largely inappropriate for these two species. *N. nubilana* is not attracted by Z9-12:Ac; Z5-10:Ac may be a useful attractant for that species (ARN et al., 1986b).

Repeated trapping in Mühlheim in 1982-1984 with Z9-12:Ac consistently resulted in similar numbers of *C. ecullyana* as in the first season. In 1983, *C. ecullyana* was also detected in Rodheim/Wetterau in a similar type of orchard in considerable abundance as in the Gailenberg area near Mühlheim. Near Schlüchtern, only two specimens were collected, which may be due to the wrong type of biotope chosen. During the field-screening project of 1981, *C. ecullyana* was by far the most common species within the traps baited with Z9-12:Ac. In the Rodheim biotope in 1983 *C. longana* was more abundant in traps with Z9-12:Ac than 1981 near Mühlheim, and generally more numerous than *C. ecullyana*.

Material in museum collections

We checked the collections of The Natural History Museum, London (BMNH), Landessammlungen für Naturkunde, Karlsruhe (LNK), Museum Alexander Koenig, Bonn (MAKB), Naturhistorisches Museum

der Humboldt-Universität, Berlin (NMHU), Senckenberg-Museum, Frankfurt (SMF), and Zoologische Sammlungen des Bayerischen Staates, München (Munich) (ZSBS). We examined all the series of *N. nubilana* and dark *Cnephasia* specimens in these collections, with dissections in some cases.

The BMNH, LNK, and NMHU collections contained only southern European specimens of *C. ecullyana*, and we did not find any *C. ecullyana* in ZSBS. However, we found several specimens of *C. ecullyana* in MAKB, NMHU, and SMF, always among series of *N. nubilana*. Many specimens were either unlabeled, or the labels were without exact locality data, but all specimens of *C. ecullyana* we found (except AMSEL's type series of *C. tyrrhaenica* from southern Europe in LNK) were collected early in this century or before.

The following localities were clearly identifiable :

MAKB : Two specimens of *C. ecullyana* ex coll. HAUDER from Linz a. d. Donau (Austria) among *N. nubilana*.

NHMU : No specimens of *C. ecullyana* in the collection HINNEBERG among *N. nubilana*. The STAUDINGER collection contained two mixed series of *N. nubilana* and *C. ecullyana* in different drawers (following REBEL, 1901) : Under the name *oxyacanthana* there were 7 specimens of *N. nubilana* and 4 specimens of *C. ecullyana*. Two of these were without locality, one was from „Macedonia“ [Yugoslavia or Greece], one from „Dalm[atia]“ [Yugoslavia]. Under the name *nubilana* there were 17 specimens of *N. nubilana* and 4 specimens of *C. ecullyana* (or possibly another similar *Cnephasia* species ; the specimens were not dissected). Two of these were without locality, one was from „Amasia“ [Turkey], one from „Peloponnes“ [Greece].

SMF : *N. nubilana* was found in two different drawers under the names *nubilana* and *oxyacanthana*, similar to STAUDINGER's collection in NMHU. Among the series of „*Eulia oxyacanthana*“ there were 4 specimens of *C. ecullyana* ; one without label, three with the locality Frankfurt, (Hessen, FR Germany), ex coll. [C.] v. HEYDEN (Carl H. G. VON HEYDEN lived from 20/I/1793 to 7/I/1866 in Frankfurt, see BROCKMANN, 1990).

During this survey we discovered a reliable character to identify *Cnephasia ecullyana* without dissection in mixed series of *Neosphaleroptera nubilana* : there is a scale dimorphism of slightly erect, enlarged, dark, spatulate scales mixed under the normal wing scales in bands along the fasciae on the forewings of *Cnephasia* moths

(described and figured in more detail by NÄSSIG, 1989), which allows, together with the differences of the palpi (more prominent in *C. ecullyana*), communicated by K. TUCK (BMNH), a fast and safe identification of the genus *Cnephasia*. This scale dimorphism appears to be a reliable character for all species of *Cnephasia*, and its value in phylogenetic analysis should be tested. Although some earlier authors, e.g., HEINEMANN (1863) or even AMSEL ([1952]), noticed „erect scales“ on the wings of *Cnephasia* specimens, this character was never studied in detail.

The distribution of *C. ecullyana* in Europe

Combining the results of the pheromone trapping and the museum and literature data, the following distribution pattern of *Cnephasia ecullyana* in Europe can be summarized :

C. ecullyana is known thus far from southern France (several localities : RÉAL, 1951) ; Italy : Sicily (RÉAL, 1951), Sardinia (AMSEL, [1952]) ; Germany (Singen am Hohentwiel : SAUTER, 1981 ; several localities in southern and central Hesse : THOMAS, 1974, NÄSSIG, 1982, this publication ; Thuringia : STEUER, 1984) ; Austria (Linz : MAKB ; Burgenland : KASY, 1965) ; Hungary (SZIRAKI, 1980) ; Yugoslavia and Greece (NHMU) ; and possibly Turkey (NHMU).

Cnephasia ecullyana may therefore preliminarily be characterized as a thermophilous European species, which reaches north to central Germany and is widespread in southern and south-eastern Europe. Whether or not the species can also be discovered in south-western Europe (Iberian Peninsula) or in other areas awaits further research (best with synthetic sex attractants).

Taxonomic problems

Most authors before 1950 denied that there are two externally very similar small dark Cnephasiini species in Europe. RÖSSLER (1881) exemplifies that opinion ; he cited only the species „*nubilana*“ with *oxyacanthana* HERRICH-SCHÄFFER 1848 in synonymy. According to his description his species should in fact have been the true *N. nubilana* as interpreted today.

Most interestingly, KENNEL (1921 : 213, Fig. 22) figured the male genitalia of *C. ecullyana* under the name of „*nubilana*“ (with *oxyacanthana* as a synonym). Obviously he had only *C. ecullyana* genitalia before him and, therefore correctly, classified his „*Tortrix*“ *nubilana*

as „a *Cnephasia*“. However, the specimens he figures on his plate 11, figs. 4 & 5, may just as well have been true *nubilana* (differentiation of the two variable and sexually dimorphic species only from printed colour figures is difficult), and his notes on biology may well describe *nubilana* instead of *ecullyana*. Regrettably he did not state the locality of the specimen of which he illustrated the genitalia. It might be interesting to check his collection, which is said to be deposited in Zoological University Museum in Riga (Latvijskaja SSR, USSR) (HORN & KAHLE, 1935). He most probably had a mixed series before him.

In contrast, HEINEMANN (1863) listed two distinct species (in different genera) : „*Eulia oxyacanthana*“ (p.43) and „*Cnephasia nubilana*“ (p.62). According to his description (he had already described the erect scales along the forewing fasciae and the late summer flight of the imagines in central Europe), his „*oxyacanthana*“ may well have been *C. ecullyana* (see also RÉAL, 1951), whereas his „*nubilana*“ was more likely the species known today as *N. nubilana*. HEINEMANN'S view was adopted by REBEL (1901), who listed „*Cnephasia nubilana*“ (with *hybridana* DUPONCHEL 1836 as a synonym) and „*Eulia oxyacanthana*“ in different genera ; the collections of NMHU and SMF were arranged following REBEL'S list.

Most more recent authors like, e.g., HANNEMANN (1961) included *hybridana* as well as *oxyacanthana* in the synonymy of *nubilana*.

Therefore, it must be taken into account that type specimens — if still existing — of these early taxa like *nubilana* HÜBNER, [1796-99], *perfusca* HAWORTH, 1811 (a synonym of *nubilana* according to LE-RAUT, 1980), *hybridana* DUPONCHEL, 1836 or *oxyacanthana* HERRICH-SCHÄFFER, 1848 (and possibly others) may be the species today called *C. ecullyana*. We did not look for the types of these taxa. A thorough revision of the European Cnephasiini should bear in mind such misidentifications, and if the type material proves to be lost, it would seem advisable to designate appropriate neotypes to avoid further misinterpretations and promote stability of nomenclature. An identification only from the plates of the original descriptions will remain dubious. External differences between the two species, when only painted, are minimal.

Remarks on adult behaviour and biology of *Cnephasia ecullyana*

The pheromone traps near Mühlheim in 1981 were checked at different times during the 24-hour day ; all specimens of *C. ecullyana* came to

the traps sometime between 2 :00 h (last check during night) and 9 :00 h (first check in the morning) (Central European Standard Time). No specimen arrived at the collecting light (fluorescent tubes with „black light“ and superactinic light, hanging in a white gauze tower, run just ca. 20 m from the pheromone traps) from sunset until 2 :00 h. In 1967, 1969, and 1972 a light collecting site (in one year an automatic light trap) was run every day during summer in Friedberg/Wetterau (THOMAS, 1974). These lights were active from before sunset until after sunrise ; this could explain why some specimens were collected at light.

The mating flight of several species of *Cnephasia* takes place around dawn or is at least crepuscular (CHAMBON, 1976 ; CHAMBON & GENESTIER, 1980 ; BALMER, 1982). Although proof under laboratory conditions is still lacking, it is evident that *C. ecullyana* also has its main flight activity around dawn.

Although one of us (W.A.N.) repeatedly collected *Cnephasia* larvae in May from herbaceous plants on the site where the traps were exposed, there were no specimens of *C. ecullyana* emerging from these larvae. This may indicate that *C. ecullyana* differs in its biology slightly from other species of the genus. Except for short notes of RÉAL (1951) from South France (larvae found on *Saxifraga*, *Teucrium*, and *Geranium*), larval foodplants, ecology and biology of *C. ecullyana* in central Europe remain unknown.

It is interesting that GLAS (1985) did not report any specimens of *C. ecullyana* collected during his 1983 survey in Z9-12 :Ac traps. This may be due to the type of biotope (cereal fields) where he conducted his survey, which seems to be inappropriate for *C. ecullyana*. Whether or not the amount of artificial pheromone used by him (1 mg, as compared with 100 µg in our research) influenced his results remains to be assessed.

Conclusions

Cnephasia ecullyana is a species native to the warmer parts of central Europe rather than a southern species recently expanding its range from South to North. There are reliable central European records of the species over a period of more than 150 years. Inadequate collecting methods and confusion with another species are responsible for the lack of further records.

Collecting at light is the standard method for faunistic surveys on nocturnal Lepidoptera, but with respect to *Cnephasia ecullyana* we

must state that this method is largely inadequate for detecting the species ; even light trapping beyond sunrise clearly does not result in reliable records for estimating the true abundance of the species. The only reliable and effective method known today to assess the presence and abundance of *C. ecullyana* is the use of attractant traps baited with Z9-12 :Ac.

In central Europe, *Neosphaleroptera nubilana* flies from June to July in late afternoon and early evening ; *Cnephasia ecullyana* overlaps with *N. nubilana* in the second half of July and flies until ca. 10th August, probably mostly around sunrise. This overlap of the seasonal flight period, in addition to a similar external appearance, may be responsible for misidentifications of earlier authors. *C. ecullyana* seems to be the least widely distributed species, locally common only in central Europe and rarely collected at light.

Generally, the use of synthetic sexual attractants in faunistic field research should be given much more attention. Faunistic research using synthetic lures can result in a significant increase of knowledge on distribution data, as has been documented, for example, by CHAMBON (1979) and BATHON & GLAS (1983) for *Cnephasia* species.

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