Proc. VIII. Congr. Eur. Lepid., Helsinki 19-23.IV.1992
Nota lepid. Supplement No. 5 : 79-87 ; 31.X.1994 ISSN 0342-7536

The use of wing venation as an additional aid in the identification of species of *Elachista*, as demonstrated by a study of the *E. dispunctella* (Duponchel, 1843) complex (Lepidoptera, Elachistidae)

Ernst Traugott-Olsen

Calle nr 8 — La Retama, Urb. El Mirador, Marbella, Spain

Summary

Many species of the genus *Elachista* present difficult identification problems. The venation is proposed as a simple identification aid within species complexes. Examples are presented from the recently published revision of the *E. dispunctella* complex, which comprises 54 species.

When *The Elachistidae (Lepidoptera) of Fennoscandia and Denmark* (Traugott-Olsen & Nielsen, 1977) was published, it was the first work to fully treat the northern European species of this family and as such satisfied the urgent demand for a guide to their identification. Since then, however, additional species have been described, several mistakes have been corrected and further revisions have been published.

Svensson (1966) published a paper on the separation of *Elachista triseriatella* Stainton, 1854 and *Elachista dispunctella* (Duponchel, 1843). As *Elachista dispunctella*, he considered specimens having genitalia with a long and slender aedeagus without cornuti ; this turned out to be a lucky choice. Svensson also mentioned that the type of *Elachista dispunctella* Duponchel in the Paris Museum was without abdomen, and thus he could not be certain about the genitalia.

In 1986, on my way to the V. SEL Congress in Budapest, I paid a visit to the late Dr. Kasy in Vienna. He generously put the museum collection of *Elachista* "*dispunctella*" Dup. at my disposal and gave me a free hand to study all specimens, including making venation preparations if necessary. I had already found the study of venation valuable in the 1977 work. On my way back to Spain from Budapest, passing through France I took the opportunity to visit the museum in Paris and due to the kindness of Dr. G. Luquet I was allowed to borrow the type of *Elachista dispunctella* Dup. This specimen had both forewings, but only one hindwing, and so I was able to make a venation preparation of one of the forewings.

I have since been able to study a large material of this species complex, and based largely on the venation, colour of the undersides of the wings (Duponchel stated that the undersides of the wings of *dispunctella* were white), and the male and female genitalia, a remarkably large number of new species (44) has been detected. It was found that males and females have an equal or almost equal venation and that the venation was to a high degree species specific within the complex. The results of this study have now been published in detail, including venation, male and female genitalia and colour figures of the upper and undersides of the wings (Traugott-Olsen, 1992). The reader is referred to this paper for the characterisation of the complex.

The species could be conveniently split into 8 groups or sections, based on the venation at the apex of the cell. All of the known species are listed in Table 1, according to section, giving the countries from which they have been reported and the number of specimens examined. The venation characterising the sections are illustrated and defined in Figs 1-8. The method used for visualising the venation is given in Traugott-Olsen & Nielsen (1977 : 34).

Table 1

The *Elachista dispunctella* complex : List of species according to section

Species	Distribution	Material examined Males	Females
Section I			
1. *E. hallini* Traugott-Olsen, 1992	Austria	2	
2. *E. madridensis* Traugott-Olsen, 1992	Spain	1	
3. *E. disemiella* Zeller, 1847	Spain	6	2
4. *E. mannella* Traugott-Olsen, 1992	Austria	6	1
5. *E. multipunctella* Traugott-Olsen, 1992	Austria	2	1
6. *E. skulei* Traugott-Olsen, 1992	Greece	1	
7. *E. occidentella* Traugott-Olsen, 1992	Portugal	3	
8. *E. clintoni* Traugott-Olsen, 1992	France	1	
9. *E. luqueti* Traugott-Olsen, 1992	S. France	1	
10. *E. punctella* Traugott-Olsen, 1992	Austria	1	
11. *E. catalunella* Traugott-Olsen, 1992	Spain	11	1
12. *E. cuencaensis* Traugott-Olsen, 1992	Spain	1	
13. *E. vivesi* Traugott-Olsen, 1992	Spain	8	
14. *E. vanderwolfi* Traugott-Olsen, 1992	France	4	
Section II			
15. *E. hispanica* Traugott-Olsen, 1992	Spain	3	
16. *E. minusculella* Traugott-Olsen, 1992	Turkey	1	
17. *E. blancella* Traugott-Olsen, 1992	Turkey	1	
18. *E. carascoensis* Traugott-Olsen, 1992	Italy	1	
19. *E. dispunctella* (Duponchel, 1843)	Austria	17	1
20. *E. dalmatiensis* Traugott-Olsen, 1992	S.E. Europe	19	
21. *E. bazaella* Traugott-Olsen, 1992	Spain	4	2
22. *E. veletaella* Traugott-Olsen, 1992	Spain	5	2
23. *E. maboulella* Chrétien, 1915	N. Africa	6	
24. *E. grandella* Traugott-Olsen, 1992	Austria	1	
25. *E. parvula* Parenti, 1978	Italy	4	1

Species	Distribution	Material examined Males	Females
Section III			
26. *E. cahorsensis* Traugott-Olsen, 1992	France, Germany, Ireland	7	1
27. *E. imbi* Traugott-Olsen, 1992	Austria	1	
28. *E. senecai* Traugott-Olsen, 1992	Libya	1	
29. *E. toveella* Traugott-Olsen, 1985	Spain	1	
30. *E. anitella* Traugott-Olsen, 1985	Spain	10	
31. *E. gielisi* Traugott-Olsen, 1992	France	1	
32. *E. amparoae* Traugott-Olsen, 1992	N.E. Spain	9	
33. *E. varensis* Traugott-Olsen, 1992	France	2	
Section IV			
34. *E. intrigella* Traugott-Olsen, 1992	Austria	1	
35. *E. karsholti* Traugott-Olsen, 1992	Austria	5	
36. *E. glaseri* Traugott-Olsen, 1992	S.E. Spain	1	
37. *E. moroccoensis* Traugott-Olsen, 1992	Morocco	1	
38. *E. baldizzonella* Traugott-Olsen, 1985	Spain, France	6	3
39. *E. louiseae* Traugott-Olsen, 1992	Spain	1	
40. *E. rikkeae* Traugott-Olsen, 1992	Spain	6	
41. *E. tribertiella* Traugott-Olsen, 1985	Spain	7	
42. *E. povolnyi* Traugott-Olsen, 1992	N.E. Germany, N. Austria	6	1
43. *E. pocopunctella* Traugott-Olsen, 1992	Austria, Rumania	7	1
44. *E. gerdmaritella* Traugott-Olsen, 1992	Spain	4	1
45. *E. wadielhiraensis* Traugott-Olsen, 1992	Tunisia	1	
46. *E. michelseni* Traugott-Olsen, 1992	Tunisia	2	
47. *E. bengtssoni* Traugott-Olsen, 1992	Spain	7	
48. *E. rissaniensis* Traugott-Olsen, 1992	Morocco	1	
49. *E. totanaensis* Traugott-Olsen, 1992	Spain	1	
Section V			
50. *E. berndtiella* Traugott-Olsen, 1985	France, Germany, Italy, Spain	10	
Section VI			
51. *E. contisella* Chrétien, 1922	France	1	
Section VII			
52. *E. nielspederi* Traugott-Olsen, 1992	Austria	2	
53. *E. olemartini* Traugott-Olsen, 1992	Tunisia	1	
Section VIII			
54. *E. lerauti* Traugott-Olsen, 1992	France	1	

Seventeen male specimens (plus one female) from the type locality (lower Austria) of *Elachista dispunctella* (Dup.) all had identical genitalia and white undersides to their forewings. In addition, the venation of all specimens was identical to that of the holotype. These specimens are therefore considered to be *dispunctella*. The male described and figured under that name in Traugott-Olsen & Nielsen (1977, Figs 94, 201, 338, 339) is the recently described *E. multipunctella* Tr.-O., whereas the female (*loc. cit.*, Figs 95, 463) was proven to be *E. pollutella* (Dup.) (Traugott-Olsen, 1990).

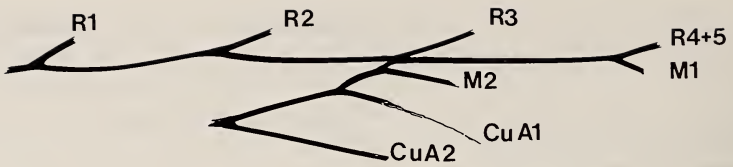

Fig. 1. Section I : R3 arising before apex of cell ; R(4+5) + M1 arising at apex of cell ; M2 arising from terminal vein, just below apex of cell.

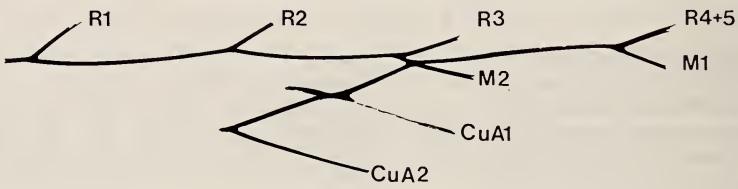

Fig. 2. Section II : R3 arising before apex of cell ; R(4+5) + M1 and M2 arising coincident at apex of cell.

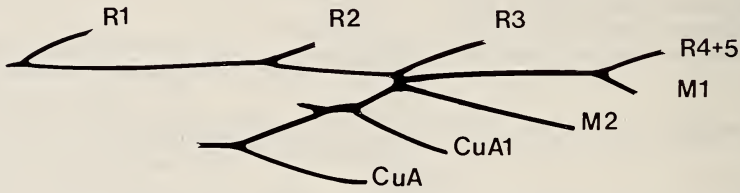

Fig. 3. Section III : R3 arising before apex of cell ; R(4+5) + M1 and M2 shortly confluent basally, arising at apex of cell.

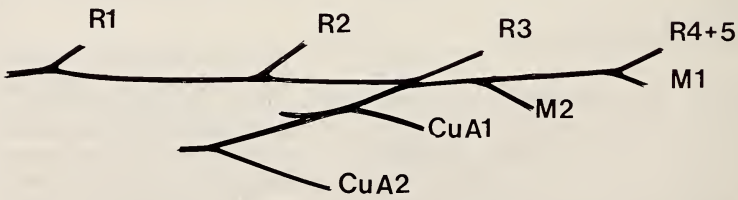

Fig. 4. Section IV : R3 arising before apex of cell ; R(4+5) + M1 and M2 confluent basally, arising at apex of cell, M2 branching off a short distance from base of R(4+5) + M1.

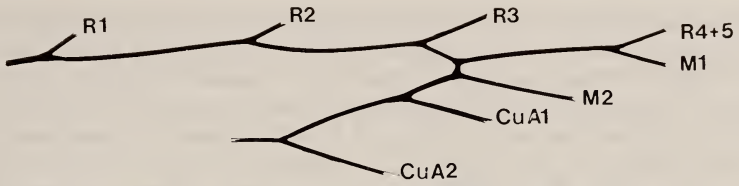

Fig. 5. Section V : R3 arising at apex of cell, coincident with R(4+5) + M1 ; M2 arising from terminal vein, just below apex of cell.

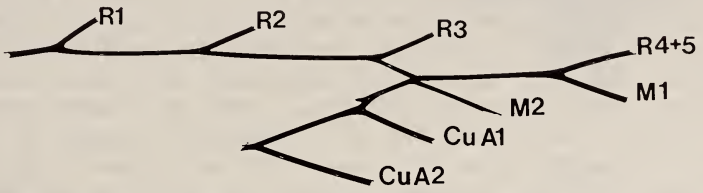

Fig. 6. Section VI : R3 arising from costal vein close to apex of cell ; R(4+5) + M1 and M2 shortly confluent basally, arising at apex of cell ; M1 arising well beyond middle of R(4+5).

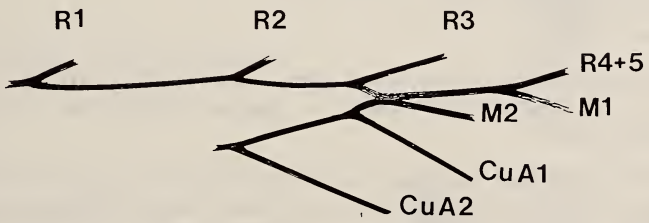

Fig. 7. Section VII : R3, R(4+5) + M1 and M2 arising coincident at apex of cell.

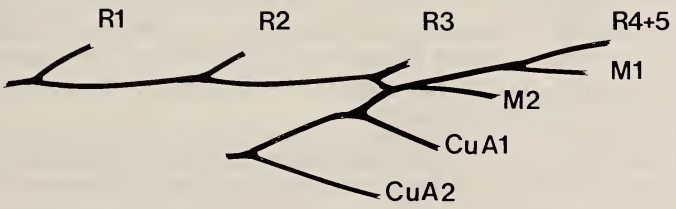

Fig. 8. Section VIII : R3 and R(4+5) + M1 + M2 arising at apex of cell ; M2 arises from R(4+5) + M1 beyond apex of cell.

Elachista mannella Tr.-O. and *E. dalmatiensis* Tr.-O. could be considered to be the species most likely to be confused with *E. dispunctella* in that they all have whitish forewing undersides. However, *E. mannella* belongs to section I, whereas *E. dispunctella* and *E. dalmatiensis* belong to section II. *E. dispunctella* has R2 arising well before the origin of CuA2, whereas *E. dalmatiensis* has R2 arising above the origin of CuA2. Additional differences between these three species can be found in details of the genitalia : Vinculum, juxta lobe, digitate process, anellus and aedeagus (Fig. 9).

To further illustrate the species specific venation, the venation, vinculum and uncus of four species belonging to section IV are compared in Fig. 10. *E. intrigella* has R2 arising well before the base of CuA2, while in *E. karsholti* R2 arises beyond the base of CuA2, paralleling the specific differences in the vinculum. The size of the anellus sac, wing pattern and antennal characters also distinguish the species (Traugott-Olsen, 1992). In *E. baldizzonella*, the saccus is rather pointed, while that of *E. tribertiella* is rounded. In *E. baldizzonella* the distance between the base of R3 and the apex of the cell is much longer than in *E. tribertiella*. R2 arises well before or well after the base of CuA2 in *E. baldizzonella* and *E. tribertiella* respectively. With these characters, it should be easy to distinguish these species. An additional character is seen in the uncus lobes, which are narrowly incised in *E. baldizzonella* and broadly incised in *E. tribertiella*.

Discussion

Colleagues have often been confused when I have tried to explain my points of view on the value of the venation in species identification. I will try to clarify a few points.

1. The results presented here concern only the *Elachista dispunctella* complex. Similar and parallel situations have been found in the *Elachista triseriatella* and *Elachista dispilella* complexes.

2. A complex is first established by the common characters of the genitalia in both sexes and not necessarily including the study of the venation. In two different complexes I have found equality in the specific venation, demonstrating that the venation alone cannot be used to identify a species without knowing to which complex it belongs. The genitalia remain the single most important character to separate species and species complexes, although other factors such as wing markings biology must also be taken into account. The venation is only a separating character for the species within the complex and can be used to group the species.

3. Any description of a new elachistid species will have to state the complex to which the new species belongs, with diagnoses and discussion of all the species of the complex and full descriptions of the adults, including genitalia and venation.

4. Venation is only a secondary character emphasising the polyphyletic nature of the genus *Elachista*. To arrive at a proper division of this conglomerate

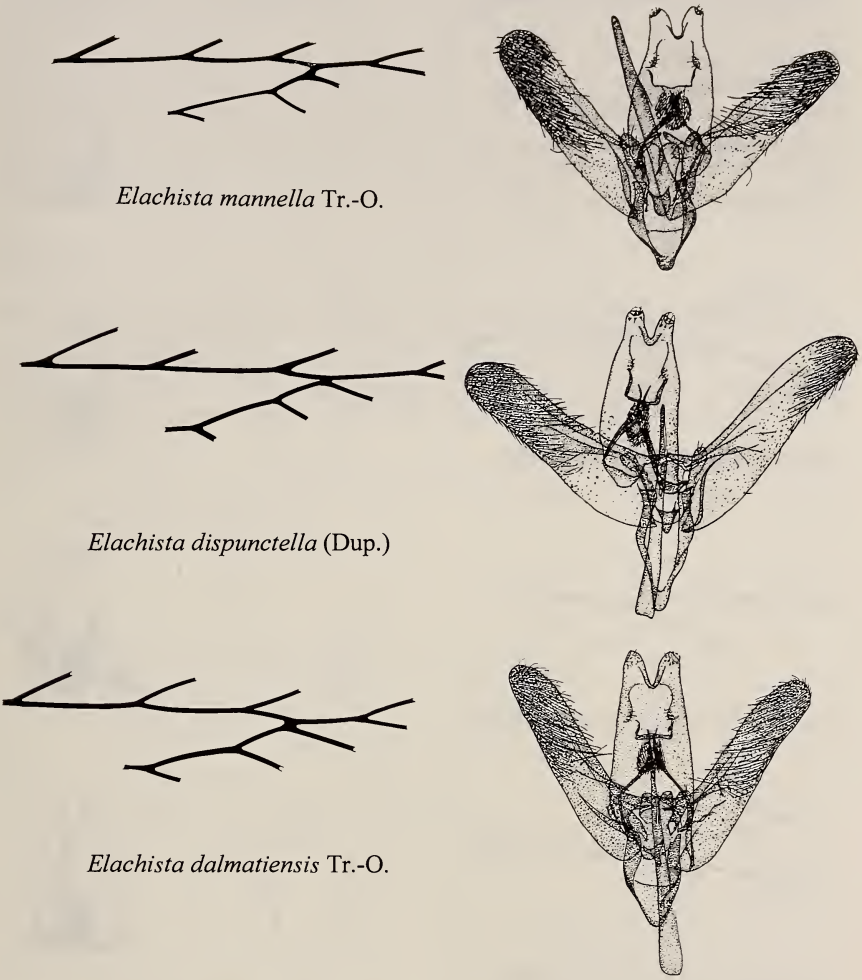

Fig. 9. Forewing venation (apical part) and male genitalia of *Elachista dispunctella* (Dup.), *E. mannella* Tr.-O. and *E. dalmatiensis* Tr.-O.

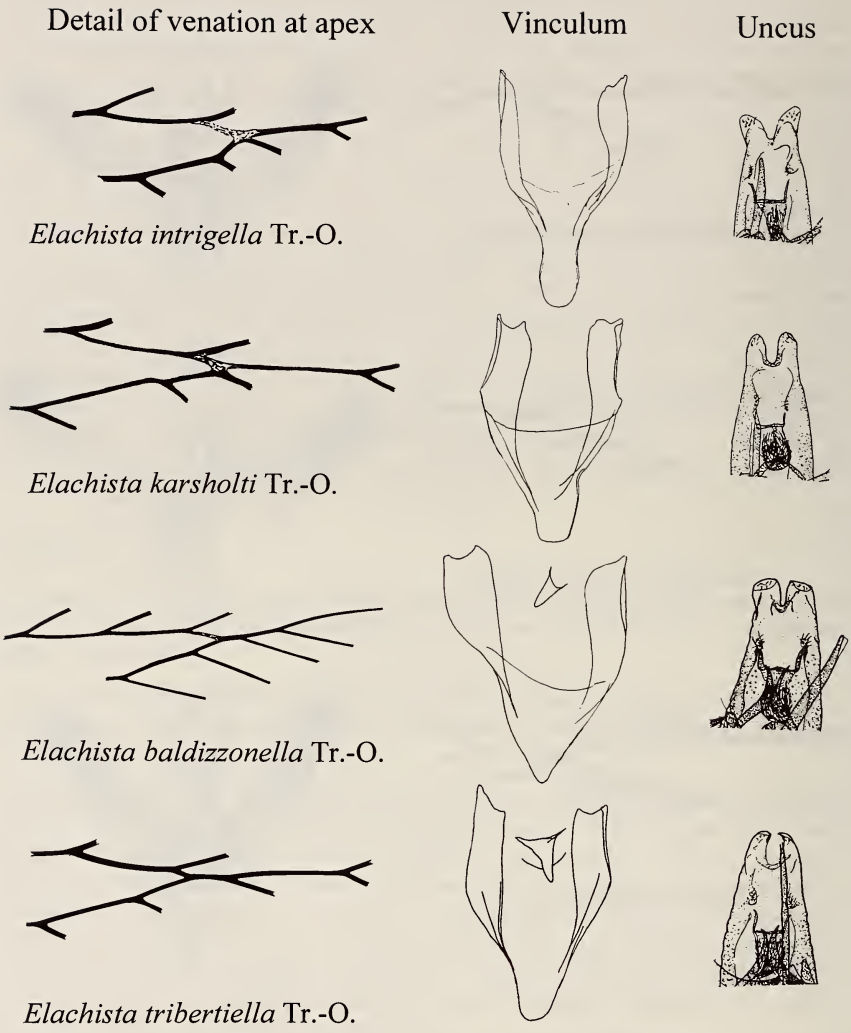

Fig. 10. Forewing venation, vinculum and uncus of four representative species of section IV of the *Elachista dispunctella* complex. Not drawn to scale.

it will be necessary to split the genus into many monophyletic units, such as the complexes mentioned here, which can be understood as a further division of the groups presented in Traugott-Olsen & Nielsen (1977).

It is not suggested that the evolutionary relationships between species within a complex can be determined from their venation, rather that the intra-specific variation is rather small and the inter-specific variation rather large, thereby allowing this character to be used in combination with other characters as an aid to identification. It has also helped to refer previously unknown female specimens to their male counterparts, and vice versa. An advantage of using the venation as an identification aid is that preparations are less likely to suffer the distortions often found in genitalia preparations, thereby avoiding errors of interpretation.

References

Traugott-Olsen, E., 1990. Description of four new species of Elachistidae (Lepidoptera) and diagnoses of *Elachista pollutella* Duponchel, 1843 and *Elachista constitella* Frey, 1859. *SHILAP Revta lepid.* 18(71) : 273-285.

Traugott-Olsen, E., 1992. The *Elachista dispunctella* (Duponchel, 1843) complex with descriptions of new taxa (Lepidoptera, Elachistidae). *SHILAP Revta lepid.* 20(79) : 197-316.

Traugott-Olsen, E. & Nielsen, E. S., 1977. The Elachistidae (Lepidoptera) of Fennoscandia and Denmark. *Fauna Entomologica Scandinavica* 6. 299 pp. Klampenborg, Denmark.