

Distribution and phenology of the *Ancistrocerus* and *Symmorphus* species in eastern Fennoscandia (Hymenoptera, Eumenidae)¹

Antti Pekkarinen & Larry Huldén

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Distribution and phenology of ten *Ancistrocerus* and eight *Symmorphus* species in Finland and the northwestern U.S.S.R. are presented on the basis of 8495 specimens from public and private collections. *A. nigricornis*, *S. fuscipes* and *S. murarius* are shown to have retreated during the last few decades from a large area of their former range in Finland. The proportions of *A. antilope*, *A. parietum*, *S. allobrogus* and *S. crassicornis* have decreased, while the proportion of *A. parietinus* has considerably increased in the area after the year 1970. Decrease of dead deciduous trees is one possible reason. *A. parietum* and *A. trifasciatus* are possibly bivoltine in southern Finland.

Antti Pekkarinen, Department of Zoology, University of Helsinki, P.Rautatiekatu 13, SF-00100 Helsinki, Finland

Larry Huldén, Zoological Museum, University of Helsinki, P.Rautatiekatu 13, SF-00100 Helsinki, Finland

1. Introduction

Ten species of *Ancistrocerus* and eight species of *Symmorphus* have been recorded from Finland and the northwestern U.S.S.R. Four new species were recorded from the area after the study by Forsius & Nordström (1923), namely: *S. gracilis* (Niemelä 1941), *A. ichneumonideus* (Valkeila 1953), *S. connexus* (Kangas 1963) and *A. gazella* (Pekkarinen & Perkiömäki 1987). The aim of the present study is to give detailed information on distribution and phenology of eumenids on the basis of the large material collected in eastern Fennoscandia. Special attention is paid to possible changes in distribution.

Material inspected for the present study originates mainly from the collections of the zoological museums of the universities of Helsinki, Turku and Oulu, the Department of Agricultural and Forest Zoology of the University of Helsinki (the last-named collection includes the large material collected by the late Erkki Valkeila and Aimo Merisuo) and the private collections of Jaakko Kangas, Markku Käpylä, Jonny Perkiömäki, Ilkka Teräs and Matti Viitasaari. All specimens available have been inspected, and about half of the material was undetermined or incorrectly determined. A few records originate from unpublished notes by the late Erkki Valkeila. The numbers of specimens and sexes of various species inspected are given in Table 1.

¹ Contribution to the Vespoidea fauna of northern Europe 5.

2. Comments on the distribution and some bionomic and taxonomic characters of the species

Records on rare species or northernmost observations are given as follows: abbreviation for the province, locality with grid reference according to the Finnish uniform grid system (if known), numbers of specimens inspected, sex (only if the date is known) and collector (in parentheses). The nomenclature is according to van der Vecht & Fischer (1972) and Cumming (1989).

A. antilope (Panzer, 1798) (Fig. 1)

Northernmost records: *Lt*: Kola (Hellén); *Lk*: Kolari (Hellén); *Ob*: Rovaniemi Kaihua 1 ♀ 20.7.1933 (E. Kangas); *Ks*: Vuorikylä (Hellén), Paanajärvi (Frey). There are only old records from northern Finland.

The low proportion (7 %) of males in the material is remarkable. Similarly, Haeseler (1978) noted quite a low proportion of males (21 %) in his material ($n = 62$) from northern Germany. In contrast, in the material obtained by Krombein

(1967) from trap-nests in North America the proportion of males was even higher than that of females, and thus the apparent biased sex ratio in collection materials is possibly caused by hiding behaviour or the short lifespan of male imagoes.

About 60 % of male and 15 % of female specimens in the present material have mites, mainly on the propodeal and metapleural areas. According to the studies by Cooper (1955) and Krombein (1967) in North America, immature stages of the mite *Kennethiella trisetosa* (Cooreman) (Saproglyphidae) suck nutrients from tissues of wasp larvae in their nest cells. The female wasp larva in a mite-infested cell eats all of the mites before spinning her cocoon, and when the adult wasp emerges from the nest, mostly males only are infested by mites. Mites are then transmitted during copulation from the male to the female and enter her genital chamber.

A. claripennis Thomson, 1874 (Fig. 2)

Northernmost records: *Ob*: Tornio (E. Kangas), Oulu (Wuorentaus).

Table 1. Sex distribution of the entire material, temporal distribution of the Finnish specimens, and number of Finnish UTM grid squares with observations.

| | Entire material | | | Specimens from Finland | | | | | Squares from Finland | | | | | | |
|--------------------------|-----------------|------|------|------------------------|-----|------|------|------|----------------------|-------------|-----|-----|-----|-----|-----|
| | ♀♀ | ♂♂ | Sum | Before 1910 | | | | | Sum | Before 1910 | | | | | |
| | | | | 1910 | -29 | -49 | -69 | -89 | | 1910 | -29 | -49 | -69 | -89 | |
| <i>A. antilope</i> | 324 | 24 | 348 | 42 | 83 | 91 | 56 | 14 | 286 | 16 | 11 | 24 | 17 | 8 | 46 |
| <i>A. claripennis</i> | 420 | 861 | 1281 | 59 | 108 | 273 | 578 | 127 | 1145 | 9 | 9 | 31 | 27 | 19 | 50 |
| <i>A. gazella</i> | 6 | 0 | 6 | 1 | 0 | 0 | 4 | 0 | 5 | 1 | 0 | 0 | 1 | 0 | 2 |
| <i>A. ichneumonideus</i> | 31 | 6 | 37 | 0 | 4 | 4 | 9 | 15 | 32 | 0 | 1 | 5 | 4 | 5 | 12 |
| <i>A. nigricornis</i> | 59 | 58 | 117 | 29 | 19 | 14 | 25 | 22 | 109 | 7 | 6 | 5 | 2 | 1 | 14 |
| <i>A. oviventris</i> | 274 | 535 | 809 | 50 | 73 | 122 | 372 | 153 | 770 | 9 | 13 | 22 | 29 | 28 | 68 |
| <i>A. parietinus</i> | 550 | 449 | 999 | 28 | 76 | 253 | 252 | 289 | 898 | 6 | 15 | 32 | 25 | 37 | 68 |
| <i>A. parietum</i> | 307 | 431 | 738 | 103 | 102 | 157 | 199 | 35 | 596 | 15 | 16 | 25 | 22 | 15 | 58 |
| <i>A. scoticus</i> | 53 | 78 | 131 | 28 | 26 | 21 | 23 | 25 | 123 | 9 | 11 | 11 | 11 | 16 | 42 |
| <i>A. trifasciatus</i> | 827 | 661 | 1488 | 109 | 115 | 256 | 574 | 236 | 1290 | 11 | 16 | 27 | 28 | 36 | 66 |
| <i>S. allobrogus</i> | 426 | 279 | 705 | 78 | 133 | 159 | 148 | 63 | 581 | 13 | 23 | 39 | 21 | 18 | 69 |
| <i>S. angustatus</i> | 50 | 57 | 107 | 6 | 23 | 29 | 25 | 30 | 113 | 5 | 6 | 8 | 10 | 5 | 27 |
| <i>S. bifasciatus</i> | 684 | 659 | 1343 | 47 | 118 | 317 | 512 | 164 | 1158 | 11 | 7 | 41 | 31 | 26 | 61 |
| <i>S. connexus</i> | 11 | 1 | 12 | 0 | 0 | 0 | 6 | 6 | 12 | 0 | 0 | 0 | 4 | 3 | 6 |
| <i>S. crassicornis</i> | 140 | 82 | 222 | 10 | 43 | 101 | 44 | 14 | 212 | 2 | 4 | 19 | 11 | 7 | 26 |
| <i>S. fuscipes</i> | 13 | 8 | 21 | 6 | 2 | 4 | 4 | 0 | 16 | 5 | 2 | 2 | 2 | 0 | 10 |
| <i>S. gracilis</i> | 15 | 8 | 23 | 0 | 0 | 2 | 20 | 1 | 23 | 0 | 0 | 1 | 2 | 1 | 3 |
| <i>S. murarius</i> | 73 | 35 | 108 | 10 | 43 | 39 | 10 | 1 | 103 | 2 | 6 | 9 | 5 | 1 | 14 |
| Total | 4263 | 4232 | 8495 | 606 | 968 | 1842 | 2861 | 1195 | 7472 | 121 | 146 | 301 | 252 | 226 | 642 |

Haeseler (1978b) noted a remarkable decline in the species in northern Germany after the year 1950, and the present material indicates decline after the year 1970.

***A. gazella* (Panzer, 1798) (Fig. 3)**

Only the following records: *Al*: Åland 1 ♀ (Bergroth) (possibly at the end of the last century), Eckerö Torp 2 ♀♀ 17.7.1967 and 18.7.1967 and Eckerö Storby 1 ♀ 17.7.1967 (Perkiömäki) and Eckerö 24.7.1967 (R. Iivarinen); *Ka*: 1 ♀ Viipuri (Löfgren).

***A. ichneumonideus* (Ratzeburg, 1844) (Fig. 4)**

List of localities (and collectors): *Al*: Hammarland (Hellén); *Ab*: Nagu (Käpylä, Lindblom), Pargas (Lindblom), Perniö (R. Elfving), Rymättylä (Merisuo); *N*: Hanko (Hå. Lindberg, Perkiömäki), Lappvik and Tvärminne (Valkeila), Rural commune of Ekenäs (664:28) (Valkeila); *Ta*: Hattula and Vanaja (Valkeila); *Ka*: Viipuri (Löfgren), Virolahti (Perkiömäki, Ranta); *Sa*: Joutseno 677:58 (Valkeila), Taipalsaari and Valkeala 6776:499 (Viitasaari); *Kb*: Kitee and Tohmajärvi (Valkeila).

The nests are in resin galls of the tortricid moth *Retinia resinella* (L.) on *Pinus sylvestris* (Blüthgen 1961). The species is rare all over northern Europe (see e.g. Haeseler, 1978).

***A. nigricornis* (Curtis, 1826) (Fig. 10)**

List of localities (and collectors): *Al*: Eckerö Skag and Lemland (Nordman), Finström (Merisuo), Föglö Storclubben (Valkeila), Geta (Montell), Hammarland (Hellén), Saltvik (Hellén, Valle); *Ab*: Karislojo (Forsius, J.Sahlberg); Korpo Jurmo (Valkeila), Muurla (Renvall), Nagu and Korpo (Lindblom), Pargas (Nordman), Rymättylä (Merisuo); *N*: Espoo (Elmgren, V. Karvonen), Helsinki (Nylander), Pärnä (Nordström), Sjundeå (Mäklin), Tvärminne (Nordström); *Ka*: Viipuri (Mäklin, Nyberg); *Ik*: Kivennapa (Boman); *Ta*: Kuhmoinen (Ehnberg); *Sa*: Rantasalmi (Vesterlund), Ruokolahti (Helenius); *Sb*: Kuopio (Fabritius, Ruotsalainen); *Kb*: Pielis (Nordmann).

***A. oviventris* (Wesmael, 1836) (Fig. 5)**

Northernmost records: *Li*: Norway TRi: Skibotn 1 ♂ and 2 ♀♀ 29.7.1946 (Niemelä); *Li*: Ivalo 761:52 1 ♂ 30.6.1974 (Valkeila).

Several specimens with light patterns, almost white instead of yellow, have been found in Alandia and *Ab*: Rymättylä. Blüthgen (1937) described this form as subspecies *hibernicus* and recorded it (1937, 1960) it from Scandinavia, Ireland and England. In Finland the distribution of the *hibernicus* form is restricted to the south-western coastal areas. The white colour is more pronounced in males, and specimens of the *hibernicus* and nominal form have been collected in the same localities. Thus the variation in question is locally limited polymorphism, and the subspecific recognition is not justified.

***A. parietinus* (Linnaeus, 1761) (Fig. 6)**

Northernmost records: *Ob*: Kemi Karihaara (Saarinen); *KN*: Suomussalmi (Sorsakoski).

***A. parietum* (Linnaeus, 1758) (Fig. 7)**

Northernmost records: *Ks*: Saija and Salla (E. Kangas), Kuusamo (several collectors); *Ob*: Rovaniemi (Rantalainen).

***A. scoticus* (Curtis, 1826) (Fig. 8)**

The species is distributed throughout the whole area and is the most common eumenid species in northernmost Fennoscandia. In southern Finland the distribution is confined mainly to coastal areas. Specimens with almost white light patterns (instead of yellow) — (*albotricinctus* Zetterstedt), are fairly common on the south-western coast of Finland, *Ks*: Kuusamo and *Le*: Kilpisjärvi. Most of the *albotricinctus* specimens are males. The form corresponds with the *hibernicus* of *A. oviventris*, and its subspecific recognition is not justified.

***A. trifasciatus* (Müller, 1776) (Fig. 9)**

Northernmost records: *Li*: Utsjoki Nuorgam 1 ♀ 10.7.1973 (E. Räsänen), Ivalo 761:52 30.6.1974 3 ♂♂ (Valkeila).

Several oplomerocephalic (see Blüthgen 1961:145) male specimens from various localities have been recorded.

S. allobrogus* (Saussure, 1855) (*S. bifasciatus* auct. nec. Linnaeus) (Fig. 15); see *S. bifasciatus

Northernmost records: *Lps*: Petsamo (Hellén); *Lt*: Nuortijärvi (Envald); *Li*: Ivalo and Lemmenjoki (Hellén)

***S. angustatus* (Zetterstedt, 1838) (Fig. 14)**

Northernmost records: *Li*: Utsjoki 775:50 1 ♂ 7.8.1973 (P. Keskinen), Ivalo 761:52 5 ♂♂ 30.6.1974 (Valkeila). There is only one record from central and southern Finland from the period 1970–88, *N*: Sipoo Nevas 6687:417 1 ♀ 4–9.6.1984, by Malaise trap (Albrecht & Pekkarinen).

In central Europe the species is very rare and recorded mainly in mountain areas (Blüthgen 1961, Haeseler 1978, Cumming 1989).

***S. bifasciatus* (Linnaeus, 1761) (*Odynerus sinuatus mutinensis* Baldini, 1894) (Fig. 18)**

Northernmost records: *Ob*: Kemi Karihaara (Saarinen), Rovaniemi (Merisuo); *Ks*: Kuusamo (Perkiömäki).

Day (1979) designated in the Linnean collection one of the two female specimens agreeing with the original description as lectotype and placed a paralectotype label on the second specimen (lacking the abdomen). According to Cumming (1989:57) the designated lectotype is conspecific with the nominal species *S. mutinensis* (Baldini) and the second specimen with *S. allobrogus* (Saussure). This designation was very unfortunate, as Cumming has stated (1989), the concept of *S. bifasciatus* for most authors (already in Fabricius, 1793) being equivalent to the nominal species *S. allobrogus* (Saussure).

***S. connexus* (Curtis, 1826) (Fig. 12)**

List of records: *Ab*: Rymättylä 1 ♂ 15.7.1971, 6 ♀♀ 13.7.1968, 10.7.1971, 12.7.1973, 10.8.1974, 21.8.1974 and 21.7.1977 (Merisuo); *N*: Tvärminne 2–6.8.1979 (Cumming 1989:65), Helsinki 6680:390 1 ♀ 3.8.1976 (Viitasaari); *Ta*: Hämeenlinna 2 ♀♀ 17.7.1964 and 10.7.1965 (Valkeila), Pälkäne 1 ♀ 16.7.1961 (Ranta), Urjala 1 ♀ 3.9.1965/1965 (Brander).

A closely related species, *S. debiliatus* (Saussure), has been recorded from Sweden in the counties of Närke, Södermanland, Uppland, Västmanland, Dalarna and Gästrikland (Erlandsson 1971, Nilsson 1985, 1991, Cumming 1989:62). For the present this species has not been recorded from Finland (the range extension to Finland in Cumming 1989:154 is incorrect).

***S. crassicornis* (Panzer, 1798) (Fig. 13)**

Northernmost records: *Kb*: Nurmes (Saarinen), Kontiolahti (Hå. Lindberg); *Sb*: Kuopio (R. Elfving, Nauha).

***S. fuscipes* (Herrich-Schaeffer, 1838) (Fig. 16)**

List of records: *Ab*: Lojo (Engström), Karislojo (J. Sahlberg), Pargas (Reuter, Lindblom); *N*: Pärnä 1 ♀ 5.7.1949 (Nordström); *Ta*: Hausjärvi 1 ♀ 15.7.1950 and Vanaja 2 ♂♂, 2 ♀♀ 1950 (Valkeila), Hämeenlinna (Listo), Kangasala 1 ♂ 29.6.1944 (Grönblom); *Ik*: Muolaa and Terijoki (Löfgren), Rautu (J. Sahlberg); *Kl*: Impilahti (Forsius), Sortavala 1 ♀ 3.8.1927 (Rantalainen); *Sa*: Joutsa (Merisuo); *Sb*: Iisalmi (J. Sahlberg), Kuopio (Levander); Karelia (Nylander).

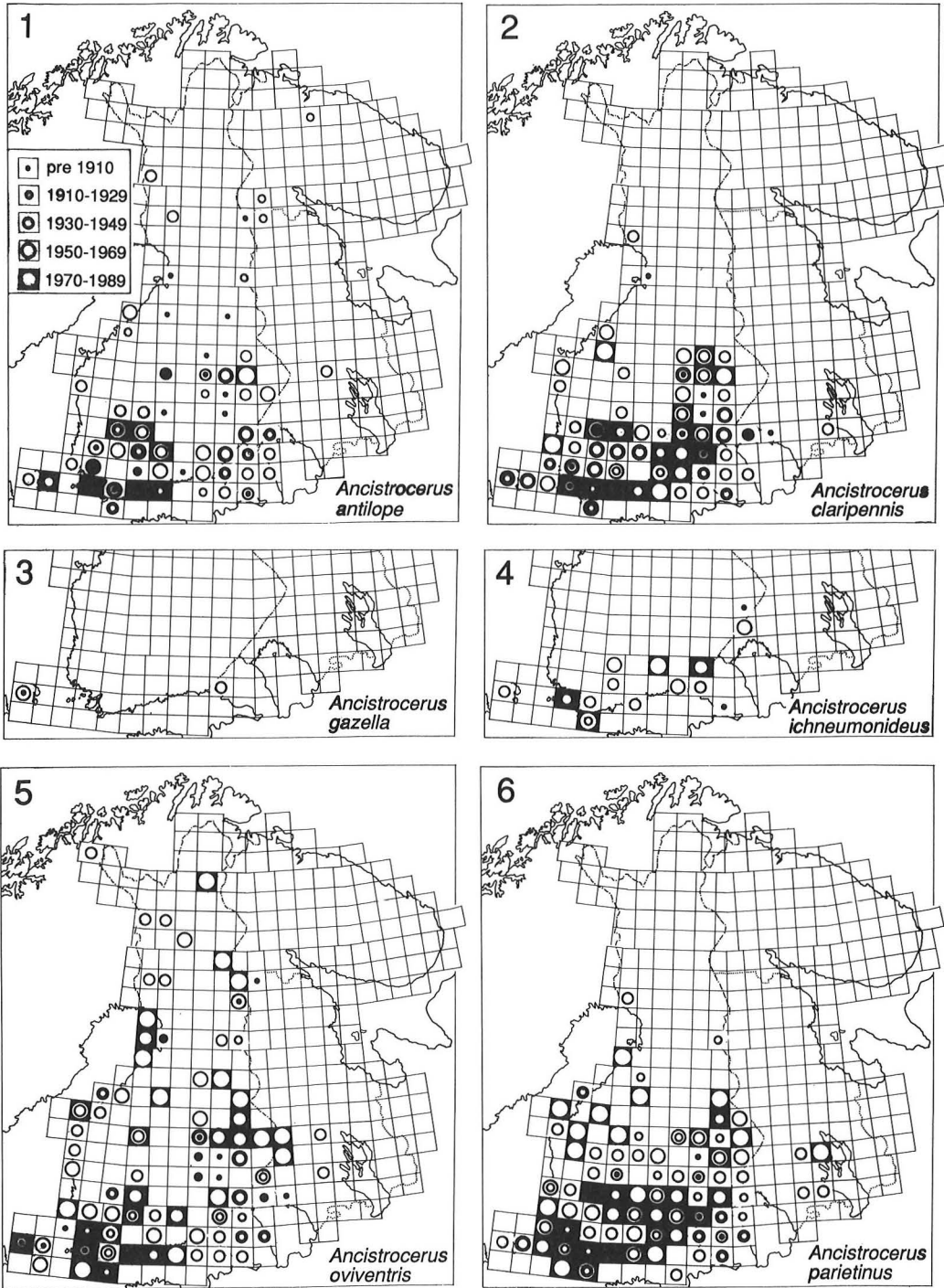
The latest records are from the year 1950.

***S. gracilis* (Brullé, 1832) (Fig. 17)**

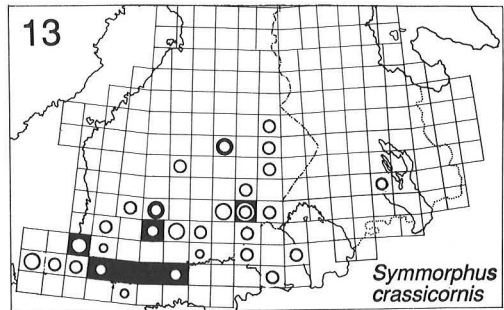
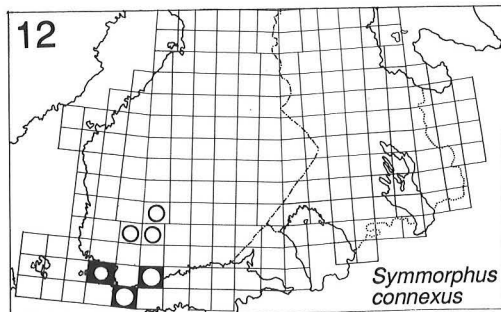
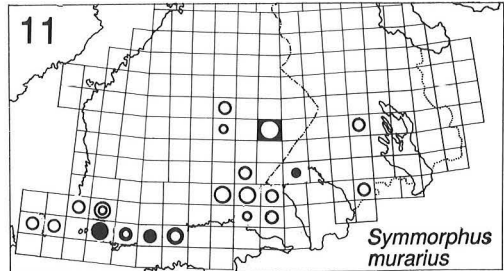
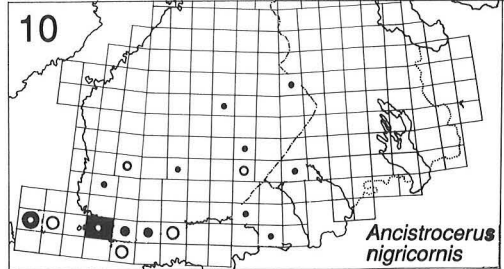
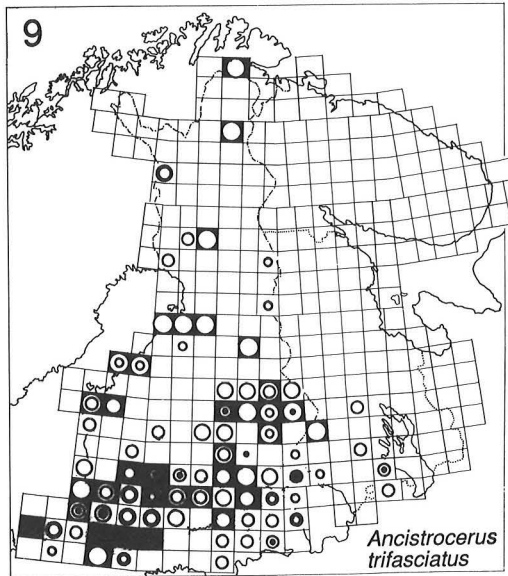
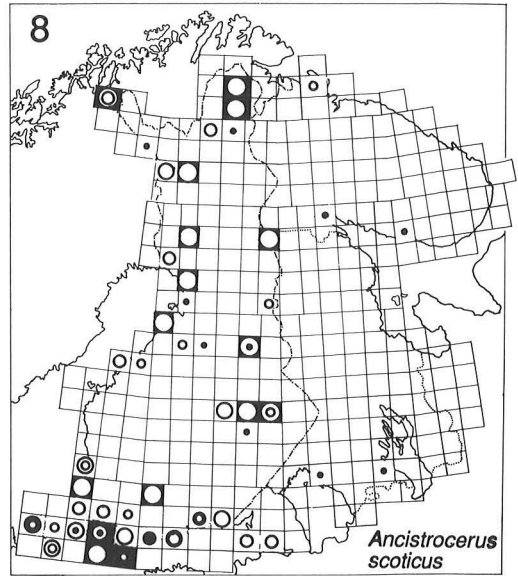
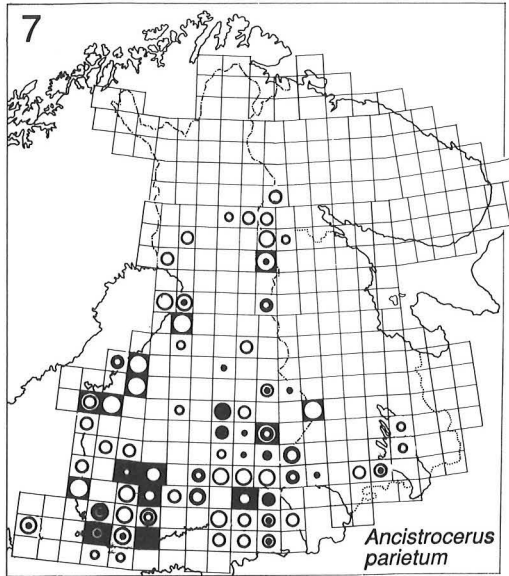
List of records: *Al*: Eckerö 1 ♂ 14.7.1943 (Hå. Lindberg), 1 ♀ and 1 ♂ 9.7.1961 (Iivarinen), Geta 671:10 several ♀♀ 16.7.1957 (Perkiömäki), Hammarland (Hellén), Hammarland Äppelö 1958 (Ölund), Lemland Apalholm 1955 (Nordman), Lemland 667:12 1 ♀ 3.7.1962, 2 ♂♂ 15.7. and 3.8.1962; *Kl*: Terijoki (Tiensuu) (Niemelä 1941); *Sa*: Ruokolahti 1 ♂ 6798:598 4.7.1975 (Iivarinen); *Kb*: Kontiolahti 1 ex 15–25.8.1942 (Hå. Lindberg) (the record is based on notes by E. Valkeila, and the specimen in question may be mislabelled).

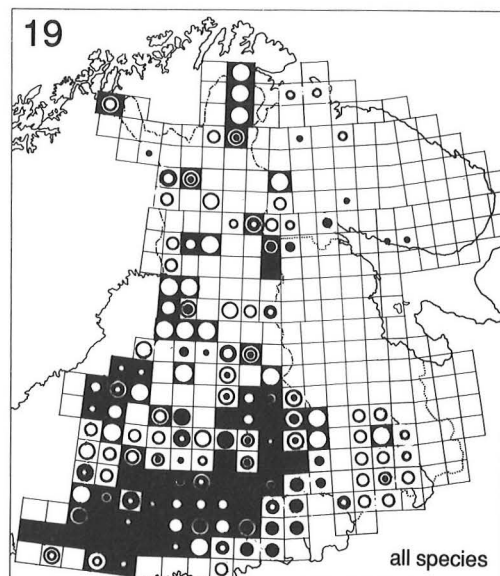
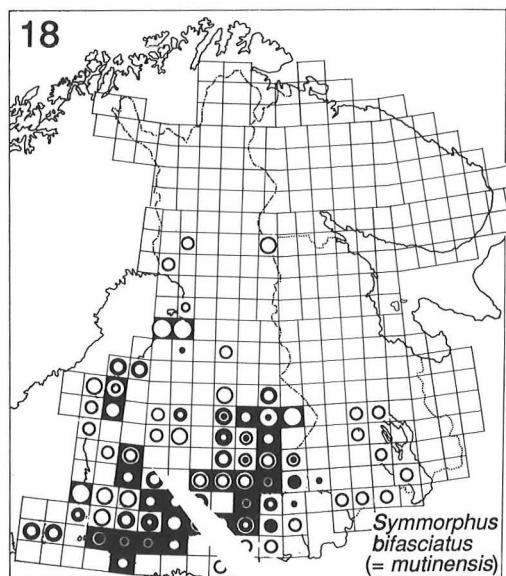
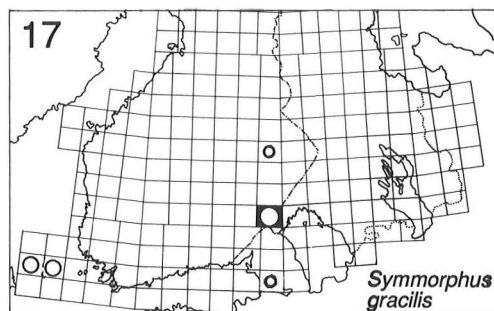
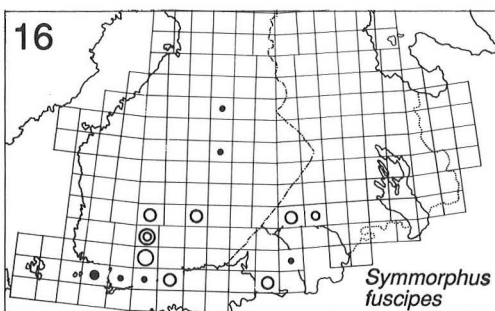
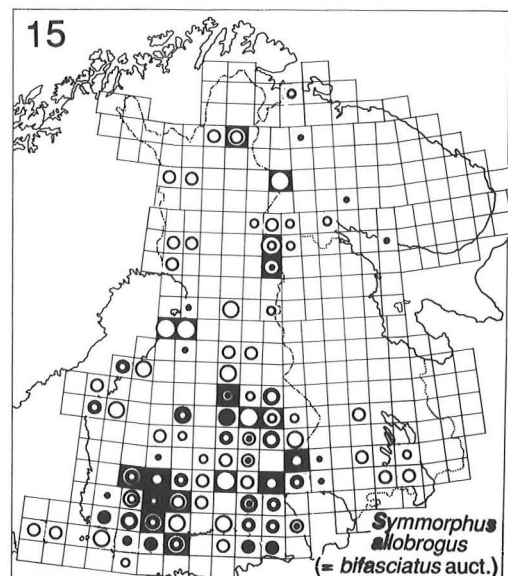
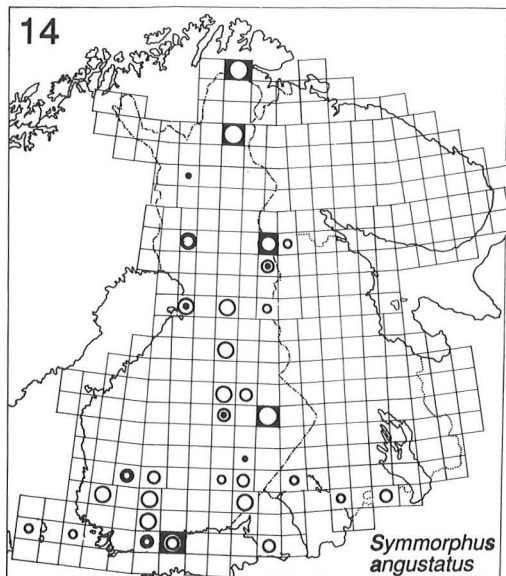
***S. murarius* (Linnaeus, 1758) (Fig. 11)**

Northernmost records: *Sb*: Kuopio 1 ♀ 18.7.1948 (R. Elfving), Suonenjoki (Laitinen); *Kb*: Joensuu 1 ♀ 1–9.7.1975 (O. Martin); *Kon*: Tiutia 1 ♀ 22.6.1943 and Uslanka 1 ♀ 14.7.1943 (Hellén). The latest records: *Ab*: Rymättylä 1969 (Merisuo); *Kb*: Joensuu 1975 (O. Martin).



Figs. 1–19. Distribution and periodical records of *Ancistrocerus* and *Symmorphus* species and all records from Finland and the northwestern USSR according to the European UTM grid system. Practically all records from USSR territory are pre 1945.





3. Changes of distribution

Many eumenid species in northern Europe have quite a similar general appearance, and therefore specific determination is often difficult without a microscope. We suppose and, from our experience, even know that eumenid specimens are caught more randomly than are specimens of the insect groups with great specific differences in external morphology. Thus proportions of species in the collection material (Fig. 20) roughly reflect actual proportions and make possible quantitative comparisons between periods.

The retreat of *A. nigricornis*, *S. fuscipes* and *S. murarius* is evident over a large area of Finland (Figs. 10, 11, 16, 20). For the present, *A. nigricornis* occurs possibly only in southwesternmost Finland, and there exist only quite old records from the interior of the country. There are no new records of *S. fuscipes* (the latest in 1950) and *S. murarius* (the latest in 1975). Numbers of *A. antilope* and *A. parietum* have drastically decreased (Fig. 20), and *A. antilope* has possibly retreated in northern Finland, as well (Fig. 1). Other possibly retreated or decreased species are *S. allobrogus*, *S. angustatus* (in southern Finland, Fig. 14) and *S. crassicornis* (Fig. 20). The proportion of *A. parietinus* has considerably increased after 1970 (Fig. 20). In northern Germany (Haeseler (1978a) noted a corresponding decrease in *S. crassicornis* and *S. murarius* and an increase in *A. parietinus*, while he also noted an increase of *A. antilope* and *A. nigricornis*.

All species studied (except for *A. oviventris* which constructs its mud-protected cells on open surfaces) make their nests in various holes, e.g. in dead trunks of old trees, in walls (wooden or masonry) and in hollow straws of reeds and plants with large pith centres (like *Rubus* and *Sambucus*) (Spradbery 1973, Haeseler 1978a). According to Haeseler (1978a) an increase is often connected with high or a decrease with low flexibility for nesting sites. For example, three earth-burrowing species with low flexibility for nesting sites have decreased in northern Germany (Haeseler 1978a), and two species (*Odynerus melanocephalus* and *O. reniformis*) in Finland (Pekkarinen 1988). However, a drastic decrease is seen in the present material for *A. antilope*, *A. nigricornis* and *A. parietum*, which have great flexibility.

Further, some species (e.g. *A. nigricornis*) had already declined in Finland several dozen years ago (Fig. 20), and decline of eumenids thus seems quite complicated. Nilsson (1991) emphasized the importance of dead deciduous trees as nesting sites for some rare eumenids (*Symmorphus debilitatus*, *S. connexus*, *S. murarius* and *Discoelius zonalis*) in the archipelago area of lake Mälaren in Sweden. However, decrease in nesting sites is only one possible reason, and changes of climate (see e.g. Pekkarinen 1989) or foraging habitats are other possible causes.

4. Phenology

The length of flight period in southern Finland is in every species (with sufficient material) at least two months and often considerably longer (Fig. 21). Thus no great specific differences in flight periods are possible during the relatively short season in Finland. On the other hand, annual variations in weather conditions are quite large, and differences of several weeks are possible in general phenology between exceptionally cold and warm springs and summers in southern Finland. Annual differences are reflected in flight periods, and thus actual flight periods in one season are shorter and overlap between species less than in Fig. 21.

A. gazella, *A. parietum*, *A. scoticus* and *A. trifasciatus* are regularly bivoltine in northern Germany (Haeseler 1978b). Distribution of the dates in Fig. 21 are not double peaked for these species, but in southern Finland the long flight periods of *A. parietum* and *A. trifasciatus* indicate bivoltinism. *A. nigricornis* is the only eumenid in northern Europe hibernating as an adult. Only females hibernate, and the females from June in Fig. 21 are hibernated individuals. *A. nigricornis* is bivoltine in central Europe (Blüthgen 1961, Westrich 1979), but possibly univoltine already in northern Germany (Haeseler 1978) as well as in Finland.

On the basis of the present material *A. allobrogicus* and *A. oviventris* can be characterized as early species, while *A. antilope*, *A. parietinus*, *S. angustatus* and possibly *S. murarius* have their highest peak approximately in the middle of summer; *A. claripennis*, *A. ichneumonideus*, *S. bifasciatus*, *S. connexus* and *S. crassicornis* are on average the

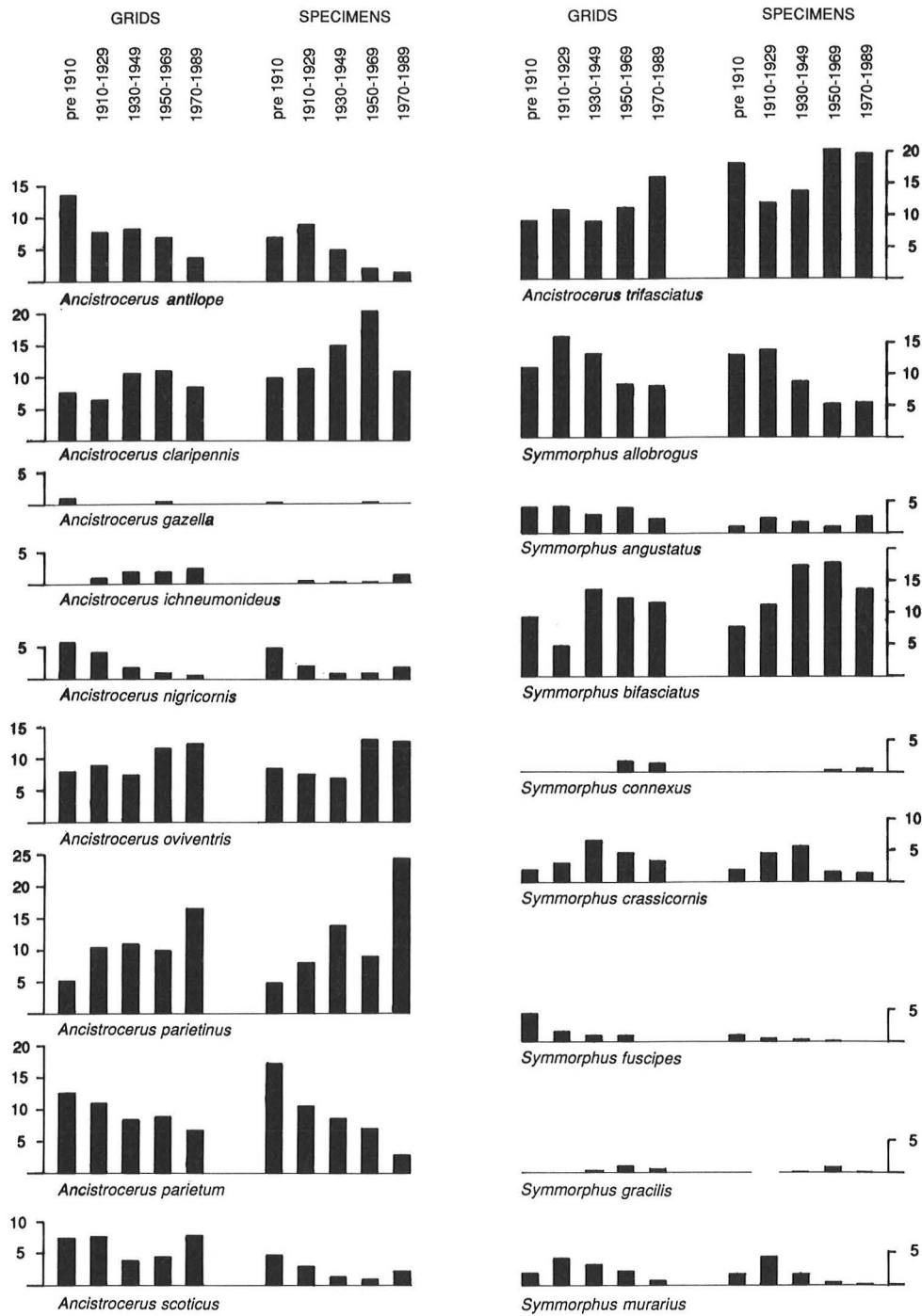
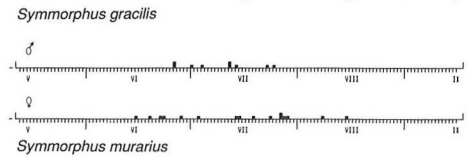
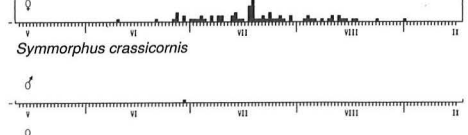
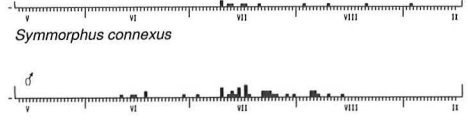
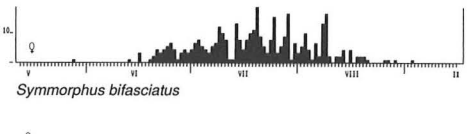
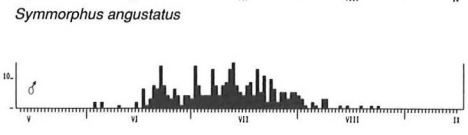
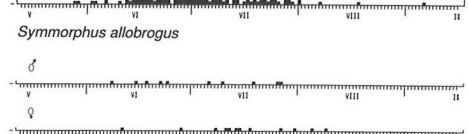
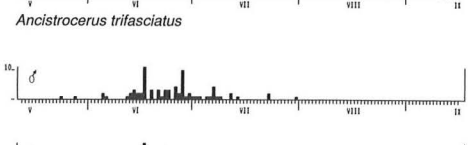
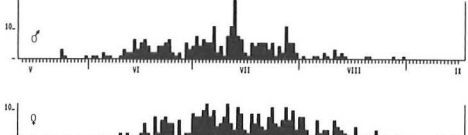
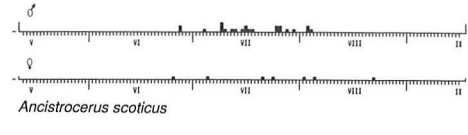
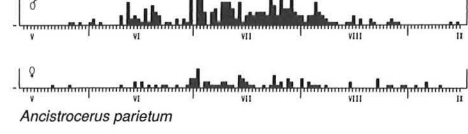
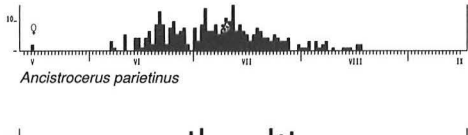
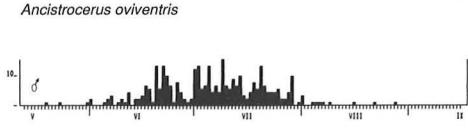
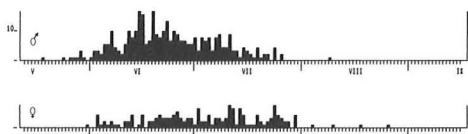
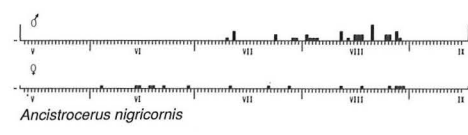
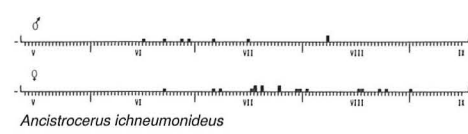
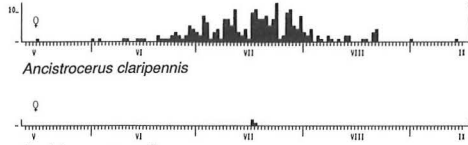
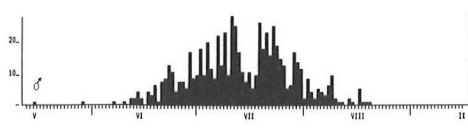
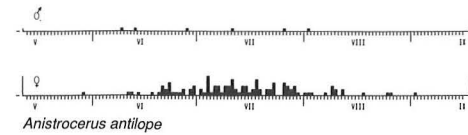


Fig. 20. Numbers of specimens of various species and UTM grids with records as percentages of all material during the five periods in Finland.



latest species. The flight periods of males are on average several days earlier than those of females, which is a common phenomenon in many aculeates.

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Fig. 21. Collecting dates for *Ancistrocerus* and *Symmorphus* species in southern Finland (60°–62°N) and dates for *A. scoticus* in northern Finland (north of 63°N). Material from public and private collections, from different years, mainly the last five decades.