

### III. DISTRIBUTION MAPS

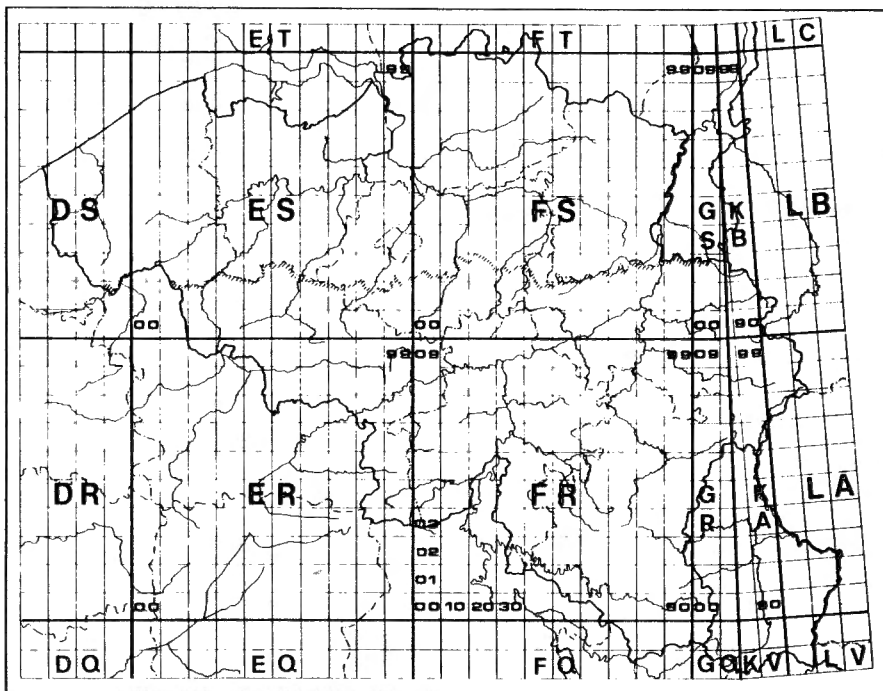
#### APPENDIX 1 : THE CARTOGRAPHY USED IN THE EUROPEAN INVERTEBRATE SURVEY

The map below shows how the U.T.M. (Universal Transverse Mercator) projection is applied to the territory of Belgium, the Grand-Duchy of Luxembourg and the adjacent parts of France, the Netherlands and the Federal Republic of Germany.

Each of the squares measures 10 km x 10 km. They are grouped into larger units 100 km x 100 km. These large squares are given code letters : DS, ES, ER, FQ, etc. The component squares are numbered from 00 to 99. The full grid reference for a locality consists of two letters and two figures. Gembloux, for example, is situated in FS.10 ; Antwerpen in ES.97.

To make up for the curved shape of the earth there are compensation zones. We see such compensation zone along the 6° meridian : the narrow trapezia in eastern Belgium and the Grand-Duchy.

A compendium was drawn up by WONVILLE (1977) which lists the principal place names within the territory followed by their grid reference. This has been used to encode the names of the localities in which Syrphidae were recorded. There is always the possibility of attributing the record to the wrong square : many localities stretch over 2 or even 3 or 4 squares. These errors are unavoidable if no precise location is given, but they are slight and do not influence distribution patterns.



Map from Verstraeten et al. (1986), Bull. Anns Soc. r. belge Ent., 122 p 58.

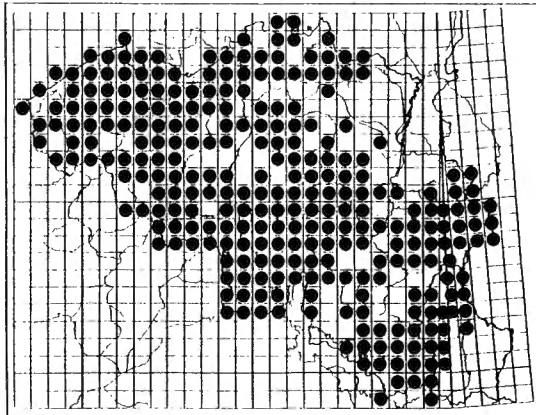
APPENDIX 2 : A COMPARISON WITH THE FIRST 1600 MAPS IN THE "ATLAS PROVISOIRE..."

In order to check whether the data we disposed of would justify their publication, we used J. LECLERCQ et al. (1980) as a touchstone.

We first tried to find out if the geographical spreading of our records would do : we compared our map A (total number of species recorded in each U.T.M.-square) with the corresponding map (N° 5) in J. LECLERCQ's analysis. The result can be judged from the map in this page. In each square marked with a black circle we found a proportionately higher number of species : except in north-east Limburg parts of the Ardennes and the eastern part of the Grand-Duchy we scored higher. We need not consider the environs of Brussel and Liège here : they had scored so high in the "Atlas Provisoire" that the figures could not possibly be equalled : Syrphidae are less generally distributed than many of the species in the "Atlas" and we think it is impossible to record more than 50 % of the Syrphid fauna in a single 10 km x 10 km square.

We then checked the depth of exploration in two manners :

- a) by comparing the number of U.T.M.-squares in the Atlas which had been explored to some depth, with the number of squares where the Syrphid fauna was at least reasonably well known. Map N° 5 in J. LECLERCQ was again the basis for this comparison (the total number of species recorded)
- b) by comparing the number of U.T.M.-squares in which a certain number of rare species had been recorded ; map N° 22 formed the basis here.



The following tables show that we had scored better at least in the squares which had been most thoroughly sampled :

- a) The number of U.T.M.-squares where over 15 % of the total number of species had been recorded:

Total number of species	Atlas Provisoire	Syrphidae maps	increase
over 40 % recorded in	6 squares	12 squares	+ 100 %
25 - 40 % recorded in	18 squares	35 squares	+ 94 %
20 - 25 % recorded in	21 squares	34 squares	+ 61 %
15 - 20 % recorded in	27 squares	42 squares	+ 55 %
over 15 % of the species	72 squares	123 squares	+ 70 %

- b) The number of U.T.M.- squares where a certain number of rare species had been recorded :

Atlas Provisoire (total of 1600 sp.)	Syrphidae Maps (total of 314 sp.)
100 - 200 rare sp. in : 6 squares	20 - 40 rare sp. in : 22 sq. (+ 266 %)
50 - 99 rare sp. in : 7 squares	10 - 19 rare sp. in : 28 sq. (+ 300 %)
10 - 49 rare sp. in : 103 squares	2 - 9 rare sp. in : 113 sq. (+ 9 %)
116 squares	163 sq. (+ 40 %)

Conclusion :

Though it is realised that many more years of intensive, widespread and methodical sampling will be needed in order to get a sufficiently complete picture of the faunistics of Belgian hoverflies, comparison with the "Atlas Provisoire des Insectes de Belgique" shows that we had proportionately more records to our disposal, that they were more widely spread and that thorough sampling had been done over a greater area. Therefore, if the publication of those first 1600 maps in the "Atlas" was justified, so is the present paper.

APPENDIX 3 :

THE PHYTOGEOGRAPHICAL DISTRICTS OF BELGIUM AND THEIR SYRPHID FAUNA.

1. THE MARITIME DISTRICT :

a) The coastal dunes : a very narrow strip, in places interrupted, between the sea and the polders. Only in the extreme north-east and the south-west do the dunes attain a greater width : up to 2 km. The older dunes are partly wooded and some humid depressions occur with dense typical vegetation. Only in a few places the dunes have retained something of their characteristic natural features : the greater part has been destroyed or degraded by tourism. Large tracts are built over and suburbanised ; the remainder is subject to excessive pressure from recreation.

In the best preserved parts a few typical hoverflies survive : Paragus tibialis, Eumerus sabulorum, Cheilosia bergestammi, C. mutabilis, C. cynocephala. These species (used to) occur elsewhere in B too, but not in adjacent parts.

b) The polders : apart from a very limited area the original salt marshes have gone. They have been transformed into polders, mostly permanent grassland, crossed by ditches and dikes. In recent years part of the sea-polders near Brugge and most of the river-polders north of Antwerpen have been covered with a thick layer of sand, transforming them into a sort of sand-dunes. These are largely built over with industrial complexes, but in the most humid parts a vegetation could develop reminiscent of the sea-dunes.

Typical hoverflies of salt marshes and brackish ditches and ponds are Platychirus immarginatus and Lejops vittata. The agricultural part of the polders where clay-pits, a few tiny woods and some decoys form the only semi-natural features the hoverfly fauna is very meagre ; it consists almost entirely of trivial species. Paradoxically the man-made industrialised zone contains far rarer elements : in those tracts that remained undisturbed a number of xerophilous and wetland species have settled which are quite rare elsewhere : Heringia heringi, H. senilis, Lejogaster splendida, ...

The Syrphid fauna of the Maritime District is the poorest of the country : only 137 species (43.4 % of the total number) have been recorded, many of them only from the eastern part, the contact zone near Antwerpen. Only 2 have not been taken since 1950 : the region has been thoroughly sampled lately. Woodland species are scarce in this almost treeless area. Moreover in the sea-polders even common species may be scarce.

2. THE FLEMISH DISTRICT (VLAAMS DISTRICT) :

Most of it is a low-lying, almost featureless plain, where human habitation is almost omnipresent. Apart from the sea-polders it is poorer in woodland and other 'natural' sites than any other part of the country. The transformation of the sandy plains into agricultural land started in the Middle Ages and few parts escaped this transformation. A few wetlands, small wood and heath relicts, some country house parks harbour a more interesting entomofauna, but most of this densely populated region is very poor in hoverfly species. Many of the rarer species that were recorded here in pre-1950 days may be extinct now, as most of the sites where they were taken have been destroyed.

Wetland species of the genera Anasimyia, Lejogaster, Neoascia are probably the most interesting components of the hoverfly fauna. In all 181 species (57.4 %) are known from these parts, but 22 of these were last recorded before 1950.

3. THE KEMPEN DISTRICT :

Until a century ago much of this sandy plain, which slightly rises towards the east, was covered with dry and humid heaths, acid bogs and land dunes. These have now almost disappeared, transformed into meagre Pinus plantations and agrarian steppe. The remaining heaths are degraded by excessive recreation and lowering of the subterranean water level, or have been confiscated by the military.

The hoverfly fauna of heathland is not very rich in species, but many of these are highly characteristic (Pelecocera, Psarus, Chamaesyrrhus, Chrysotoxum octomaculatum). These and the bog species (Eristalis cryptarum, Orthonevra intermedia) have either disappeared or become much scarcer. The Syrphid fauna is richest in some nature reserves (woods and wetland) and the narrow water-logged alluvial valleys of the numerous small streams, some of which are not too badly polluted. Typical species of the latter are : Cheilosia chlorus, Brachyopa pilosa, Xylota meigeniana and many less uncommon species which are reminiscent of the Brabant District rather than the surrounding countryside. The extreme north-east may still be fairly rich in hoverfly species, but this remote area has hardly been explored yet.

A total of 189 species are known from the Kempen, i.e. 60 % of the total. Though some intensive sampling has been done lately 18 species that were taken here before 1950 have not been collected again.

4. THE BRABANT DISTRICT :

Between the flat northern plains and the Sambre-Meuse valley there are undulating low plateaux (up to 200 m), for the greater part covered with thick layers of fertile loess and as a consequence cultivated intensively. In the western part there is the Belgian version of the Black Country, the centre is heavily urbanised (Brussel), most of the remainder is treeless agrarian land. In places, however, the topsoil is sandy and here a few large and many small woods survive. These as well as the hedgerows lining the sunken roads, ancient parkland, abandoned or neglected orchards and a few alluvial valleys harbour a surprisingly rich Syrphid fauna : 242 species (76.8 %), many of which are confined to the eastern half of the district (the continental element). Even the smallest "islands" (tiny copses, ponds, small streams) in the windy agrarian deserts that dominate the landscape here, may be very rich in hoverflies (6.3.1; 6.3.2.). Notwithstanding intensive recent sampling 22 species remain unrecorded since 1950.

5. THE MOSAN DISTRICT :

Corrugated low plateaux (mainly 200 - 300 m) with numerous river valleys. On the whole the ridges are wooded, the lower parts mainly grassland. Chalk and limestone grassland contain the most original element of the hoverfly fauna here. The Montagne St. Pierre, north of Liège (FS.82), both banks of the Meuse and many of its tributaries contain many of the richest entomological sites in the country. Pipizella divicoi, P. zeneggenensis, Merodon aeneus and M. rufus occur here in isolated colonies far beyond their normal range. Many Cheiliosia, Epistrophe, Eumerus, Paragus ... are more numerous here than anywhere else in B.

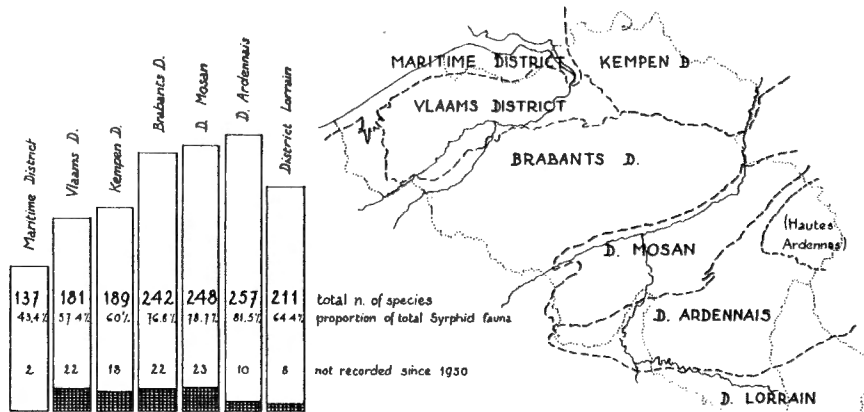
Of the total of 248 species (78.7 %) ever recorded here, 23 have apparently not been seen since 1950 ; few of the best sites have been systematically explored in recent times, however.

6. THE ARDENNES DISTRICT :

This is the highest (300 - 700 m) and most densely wooded part of the country. It is a high plateau deeply cut by river valleys. The highest plateaux in the east are now mainly planted with conifers, but still retain large acid bogs. On the southern slope there are still large deciduous woods. The climate is quite different from the rest of the country : it is characterised by lower temperatures, high rainfall (up to 1500 mm, twice as much as the centre) and long harsh winters with much snow and frost. Especially in the Hautes Fagnes and the Plateau de Tailles there may be long periods of snow cover and night frosts may occur in all months of the year. The hoverfly fauna has been examined only in the northern part of the district. The southern plateau of Libramont remains virtually unexplored. Still the Ardennes have the richest Syrphid fauna in B : 257 species (81.3 %), only 10 of which have not been recorded since 1950. Mountain species (Xylota coeruleiventris, Eristalis jugorum, Blera fallax, Arctophila bombiformis) are the most original element. A few species (Sphegina sibirica, Brachyopa vittata, Xylota curvipes) are known exclusively from the Hautes Fagnes.

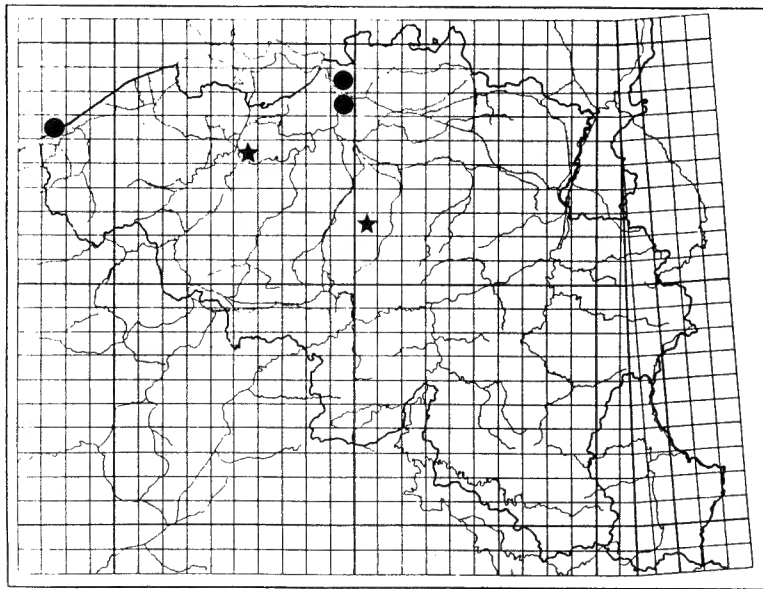
7. THE LORRAINE DISTRICT :

Though it is geologically quite different the landscape resembles the Mosan District, and so does the hoverfly fauna. As it is rather remote exploration has been both patchy and limited to late spring and summer. The southern part of the Grand-Duchy has hardly been sampled, though it may contain southern elements in the Moselle Valley. In contrast to other insect groups no mediterranean hoverfly elements have turned up here, not even in the famous site of Torgny. 211 species (64.4 %) have been recorded so far, none of which is exclusive for the region. 8 species were recorded before 1950 only.

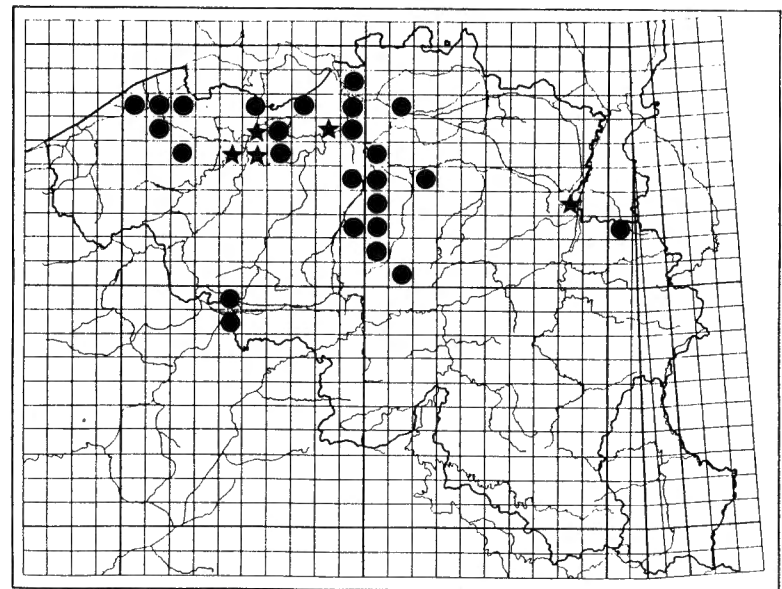


Map G : The phytogeographical districts and their Syrphid fauna





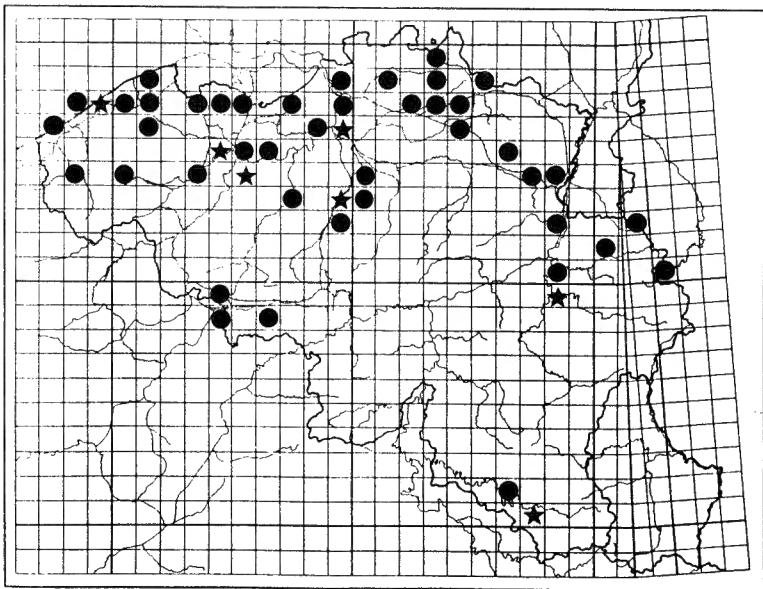
1. *Anasimyia contracta*



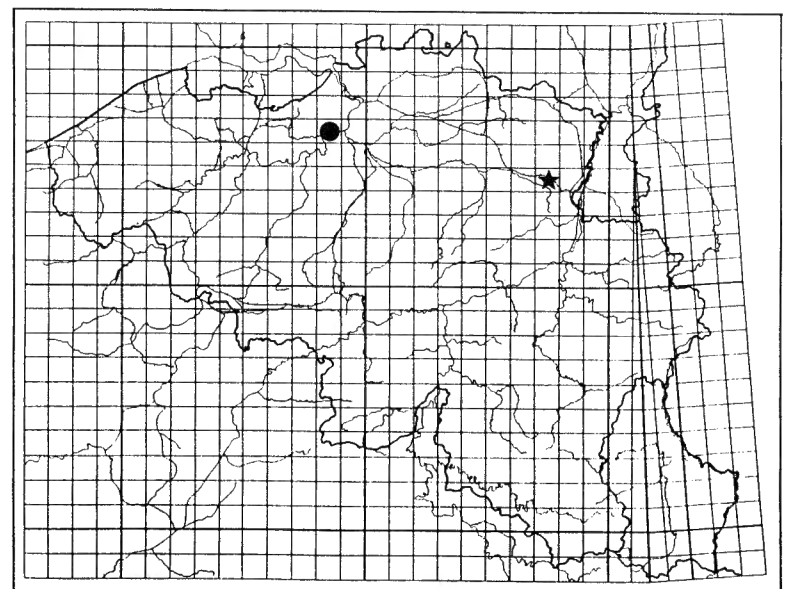
2. *Anasimyia interpuncta*

★: species recorded exclusively before 1950

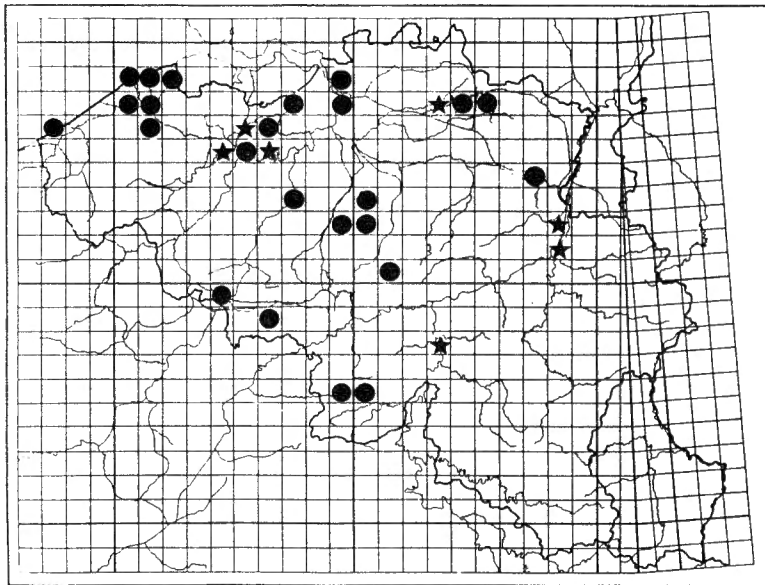
●: species recorded since 1950



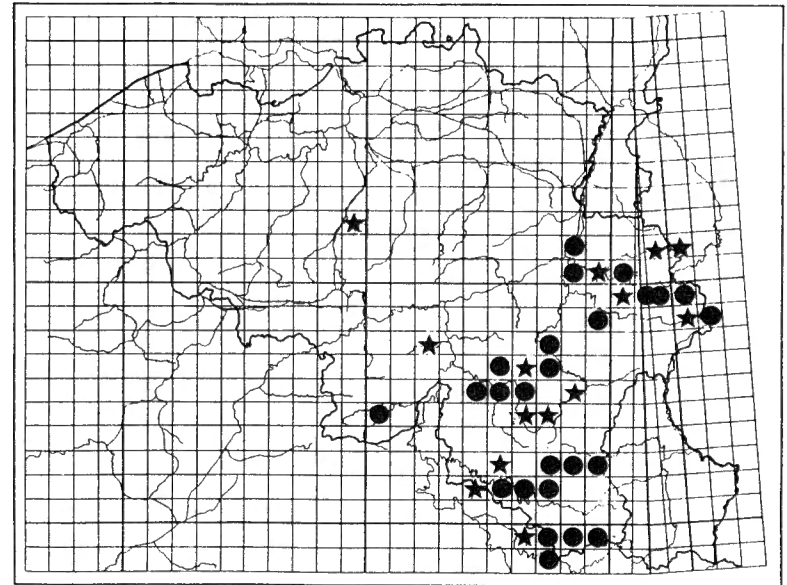
3. *Anasimyia lineata*



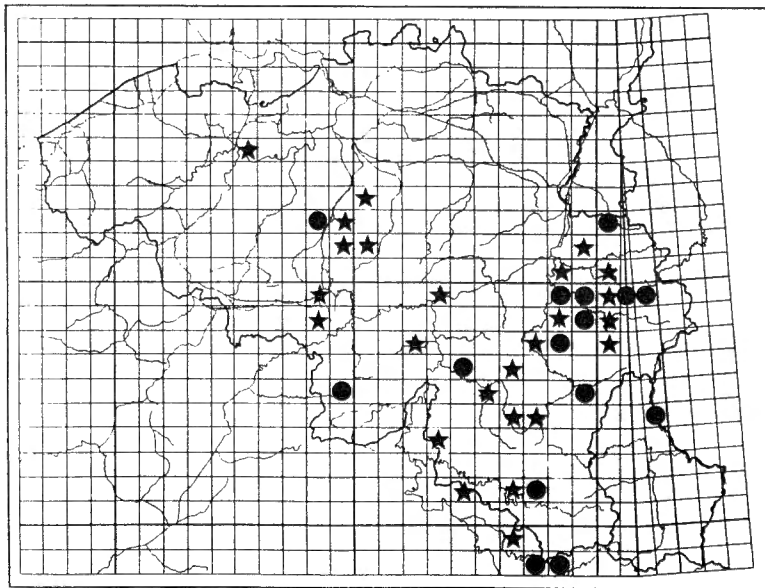
4. *Anasimyia lunulata*



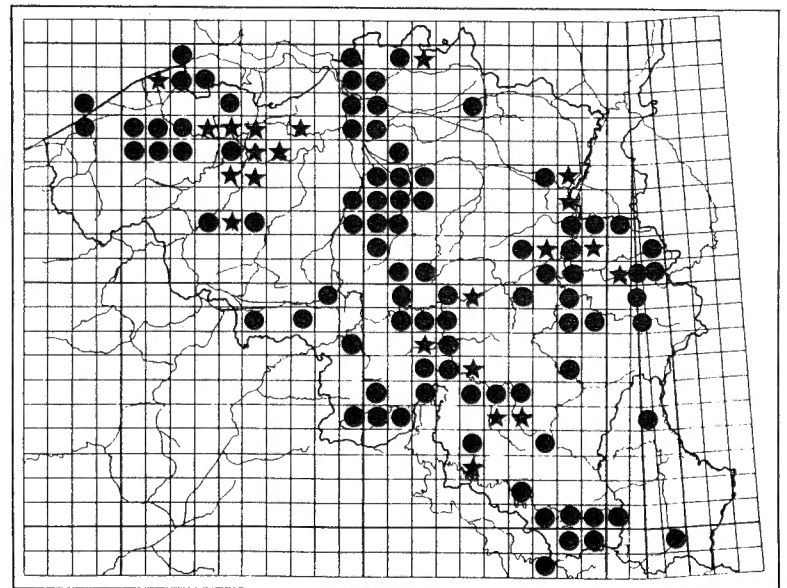
5. *Anasimyia transfuga*



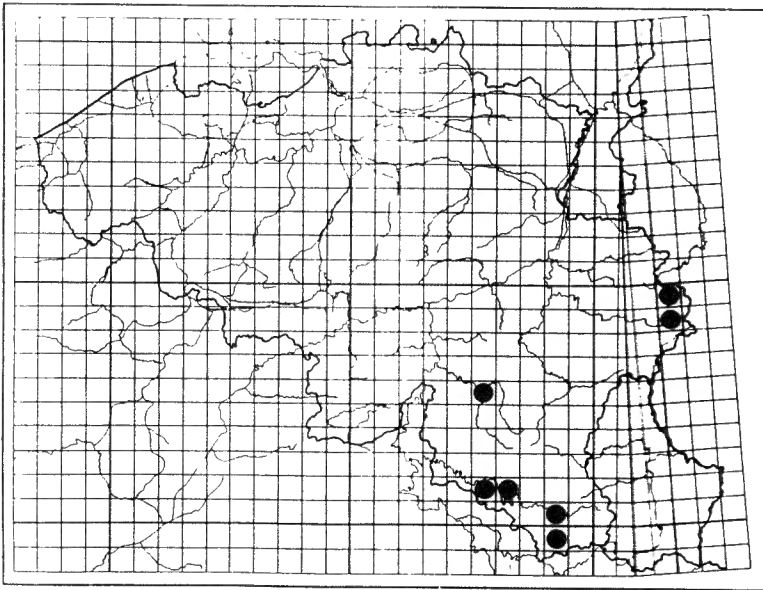
6. *Arctophila bombiformis*



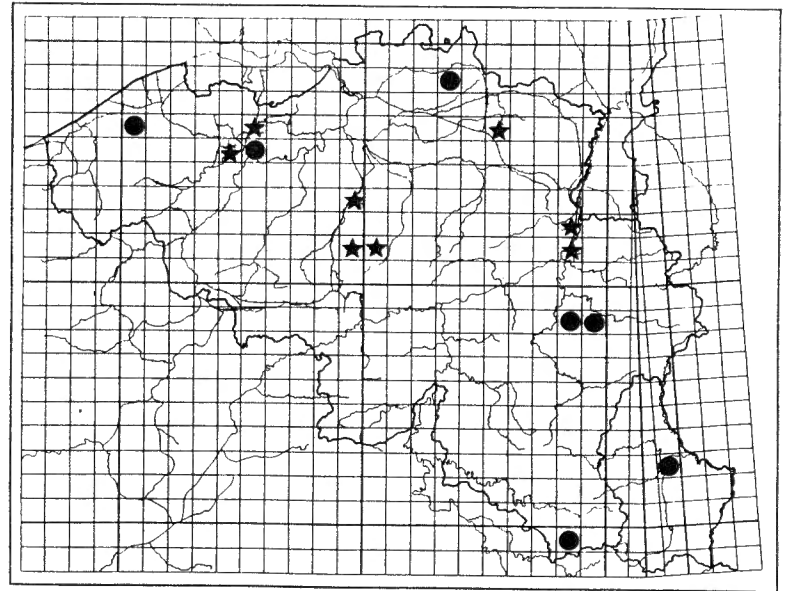
7. *Arctophila fulva*



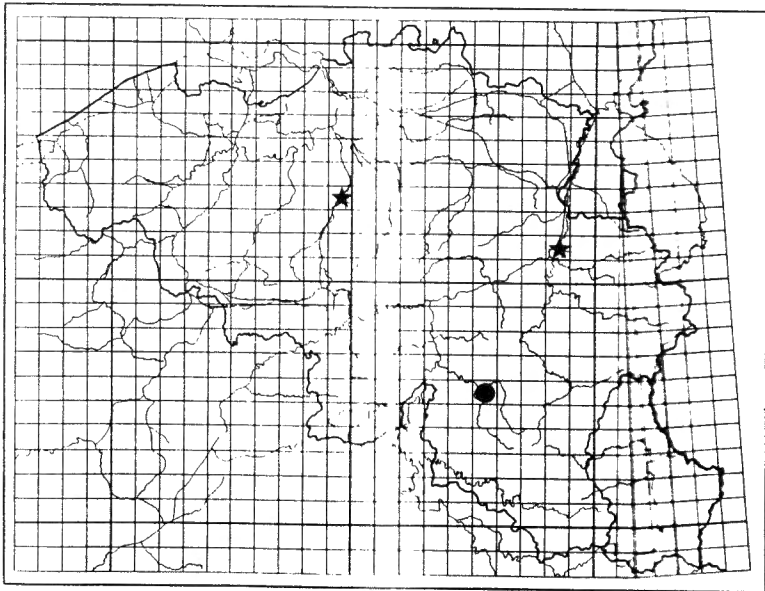
8. *Baccha elongata* + *B* "obscuripennis"



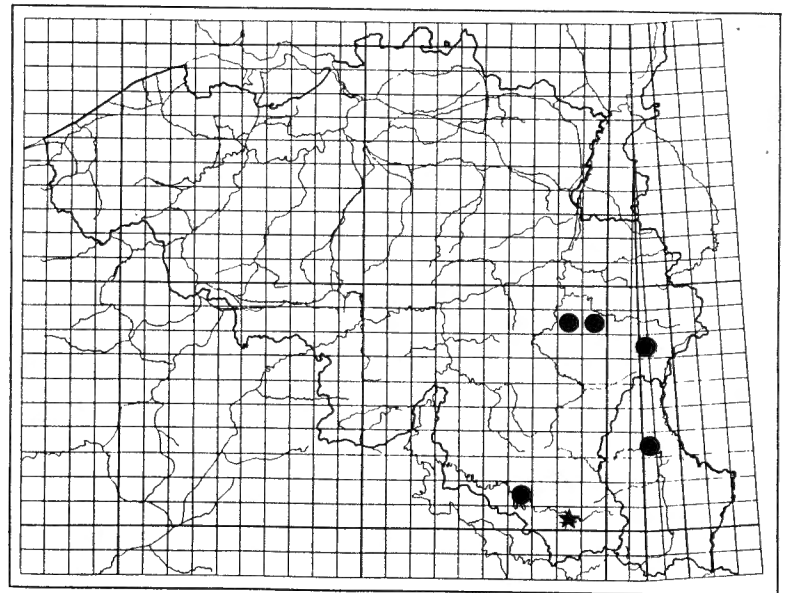
9. *Blera fallax*



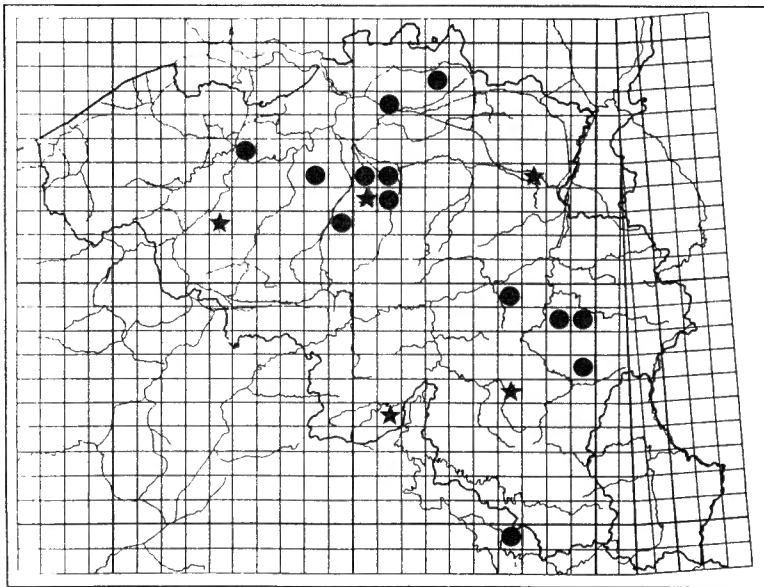
10. *Brachyopa bicolor*



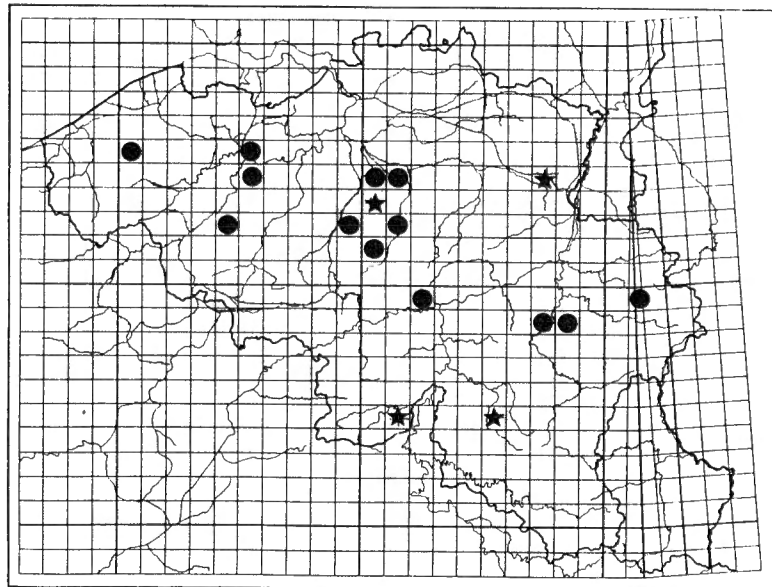
11. *Brachyopa insensilis*



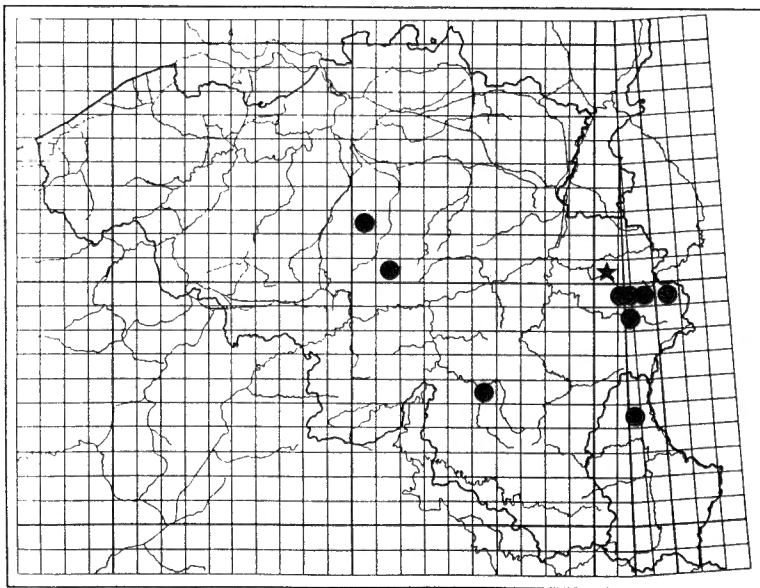
12. *Brachyopa panzeri*



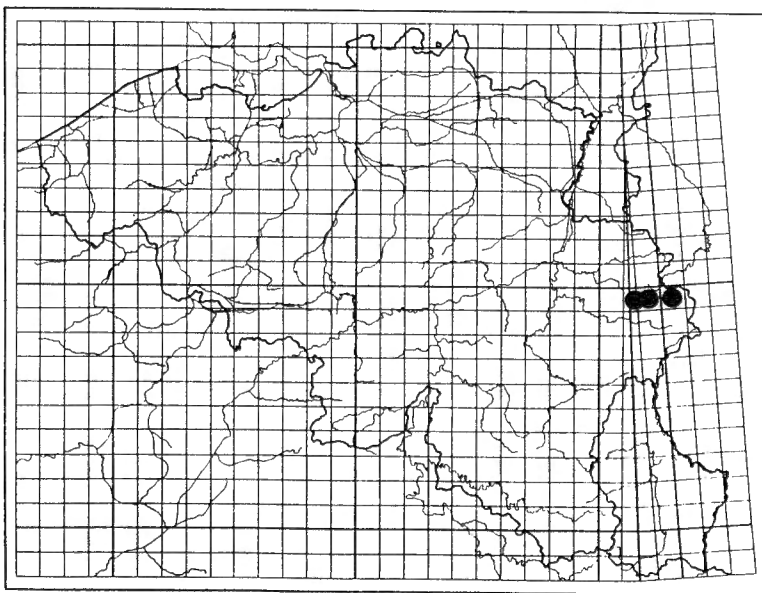
13. *Brachyopa pilosa*



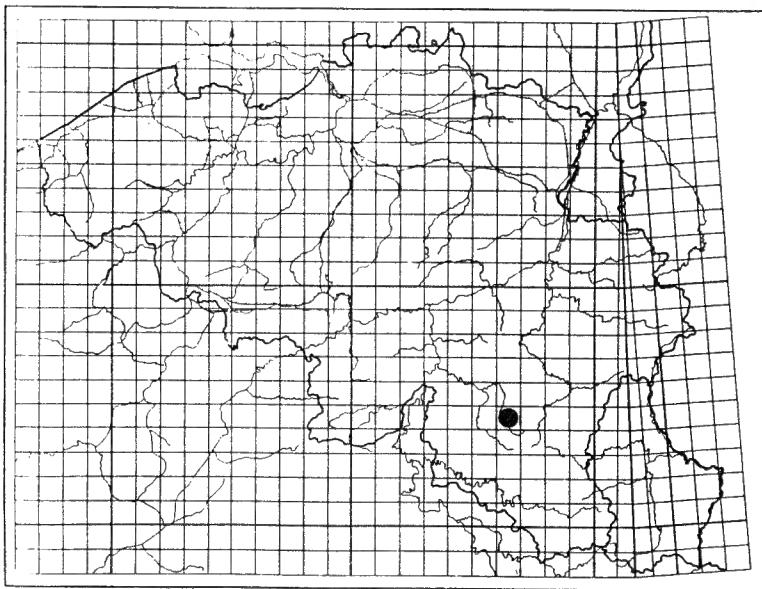
14. *Brachyopa scutellaris*



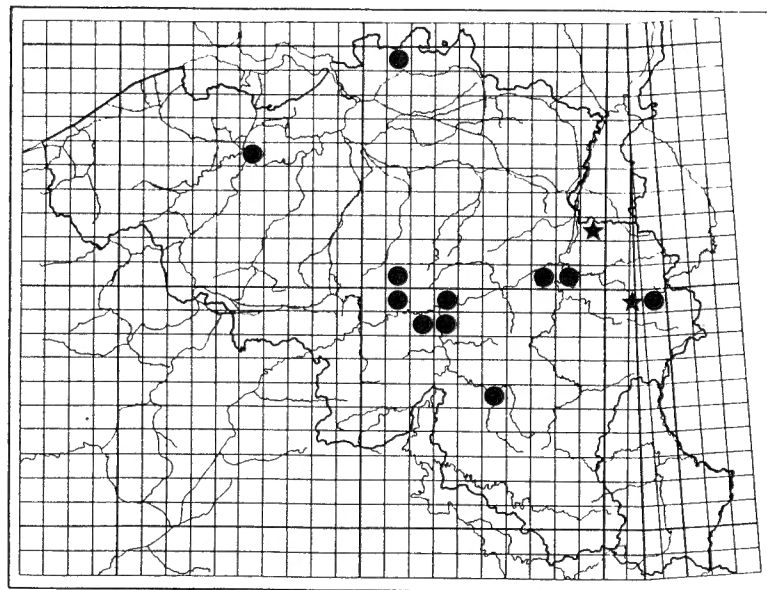
15. *Brachyopa testacea*



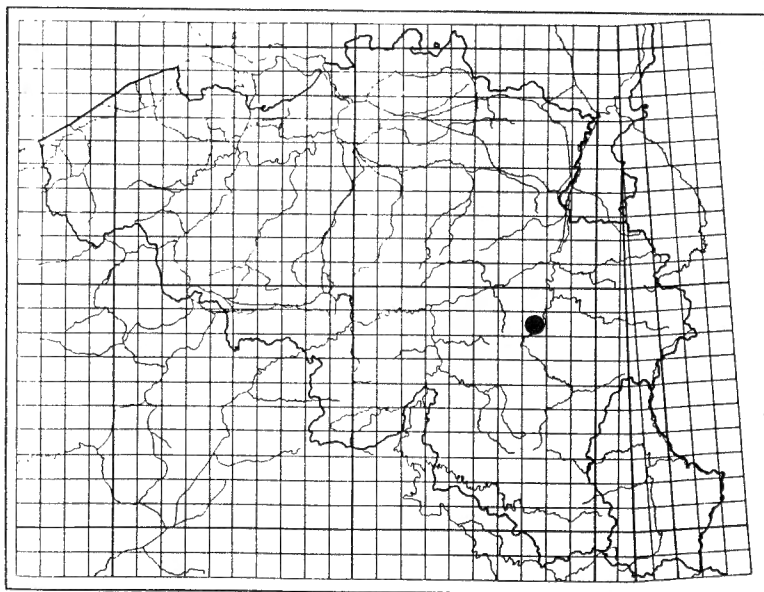
16. *Brachyopa vittata*



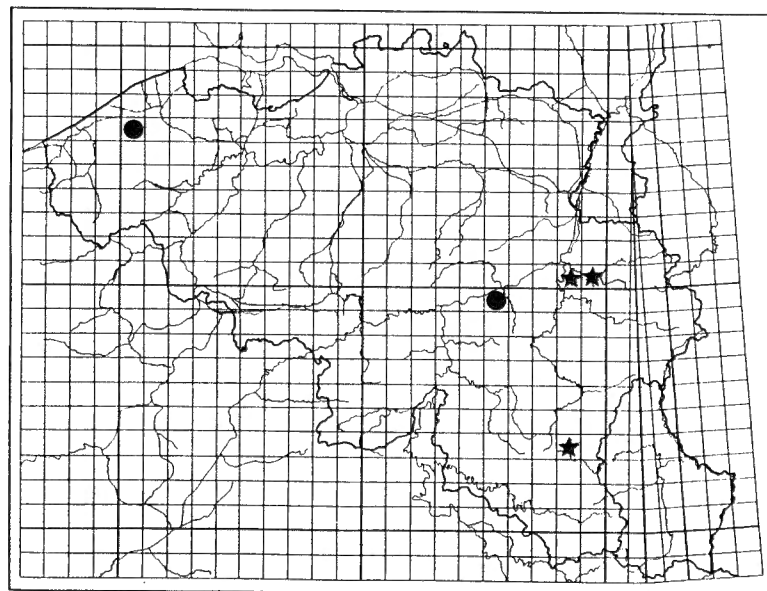
17. *Brachypalpus eunotus*



18. *Brachypalpus laphriformis*

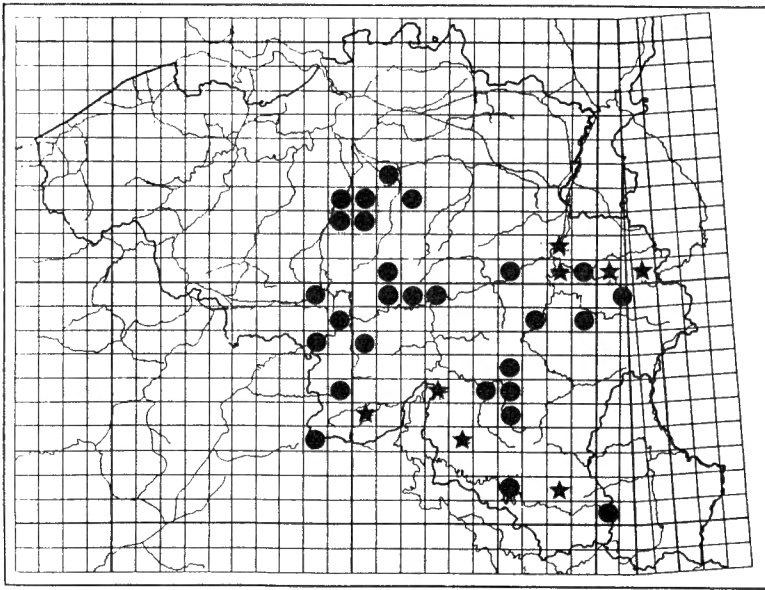


19. *Brachypalpus meigeni*

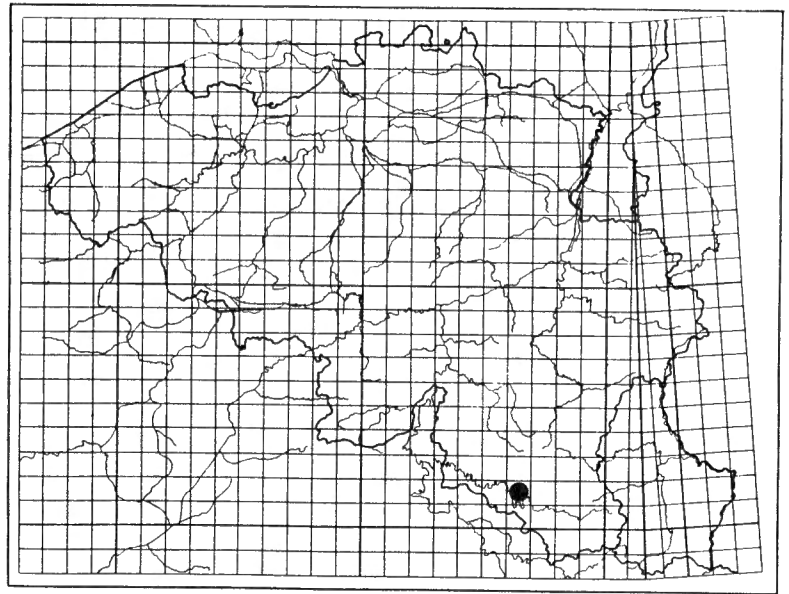


20. *Brachypalpus valgus*

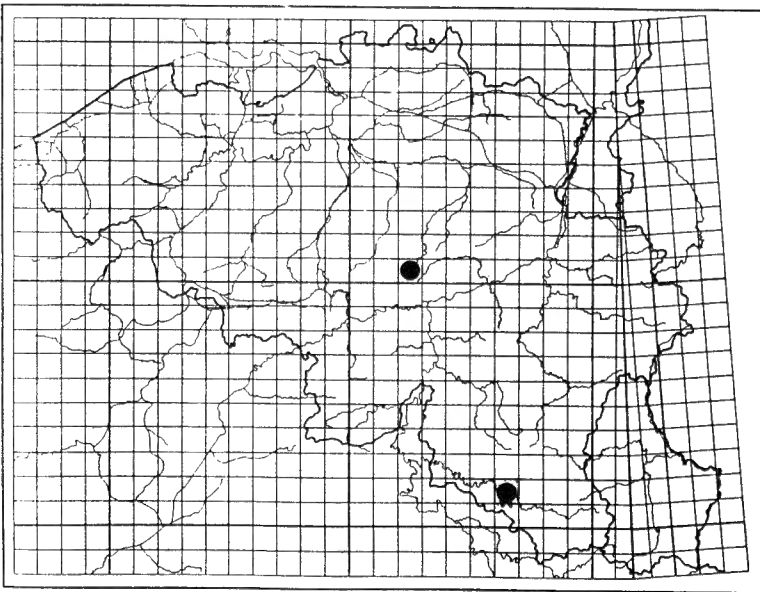




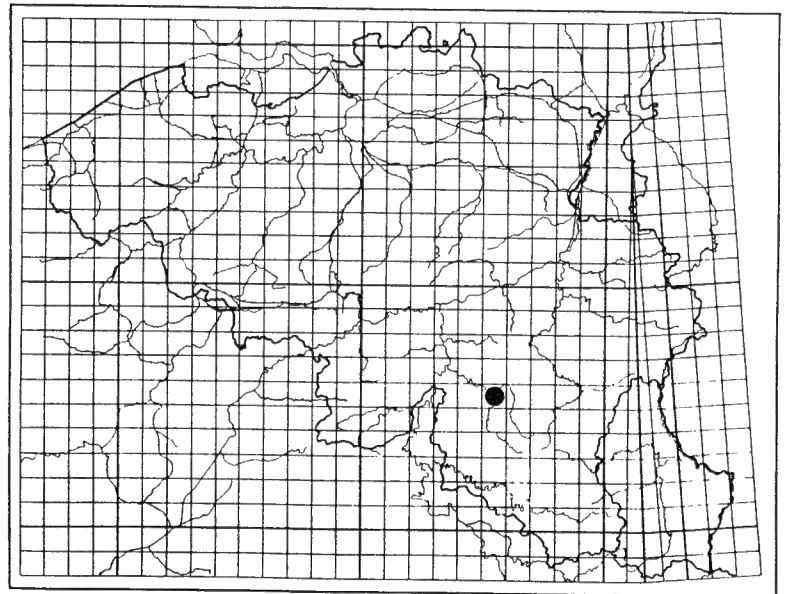
21. *Caliprobola speciosa*



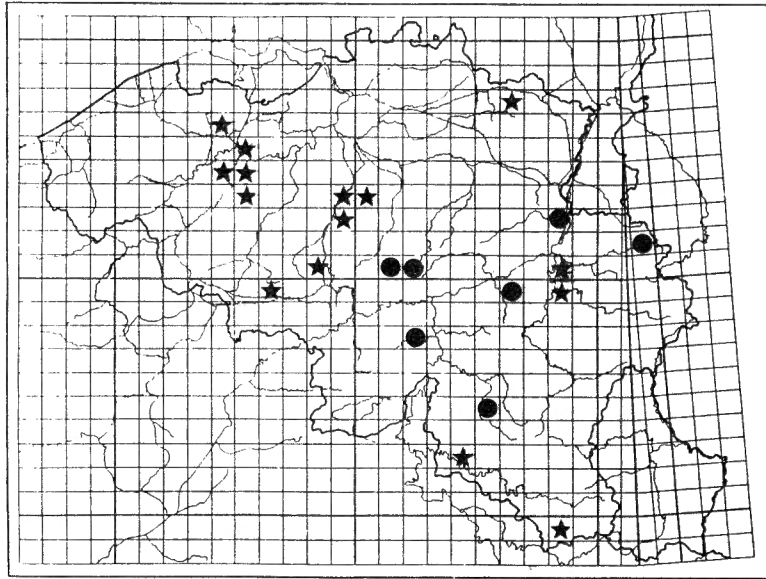
22. *Callicera aenea*



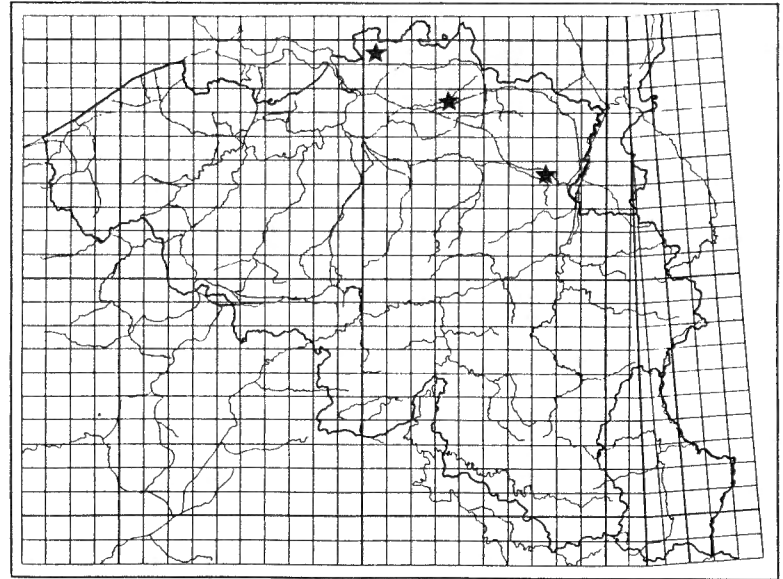
23. *Callicera bertolonii*



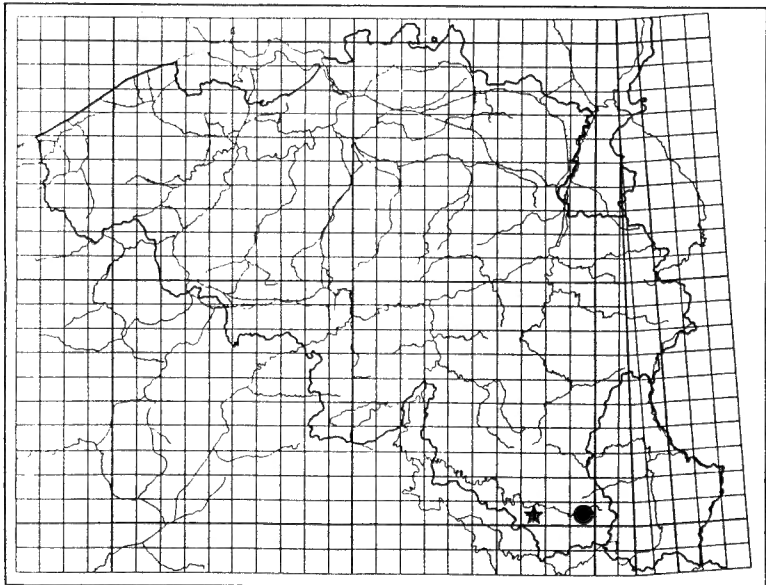
24. *Callicera rufa*



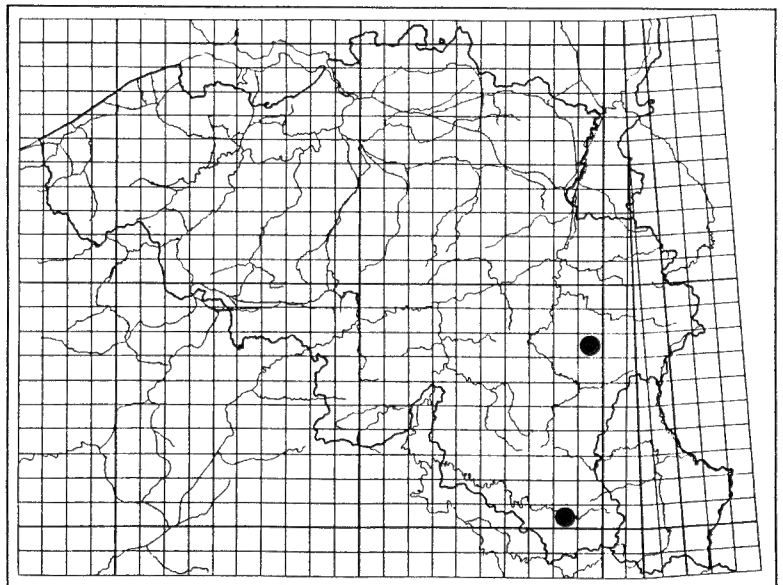
25. *Ceriana conopsoides*



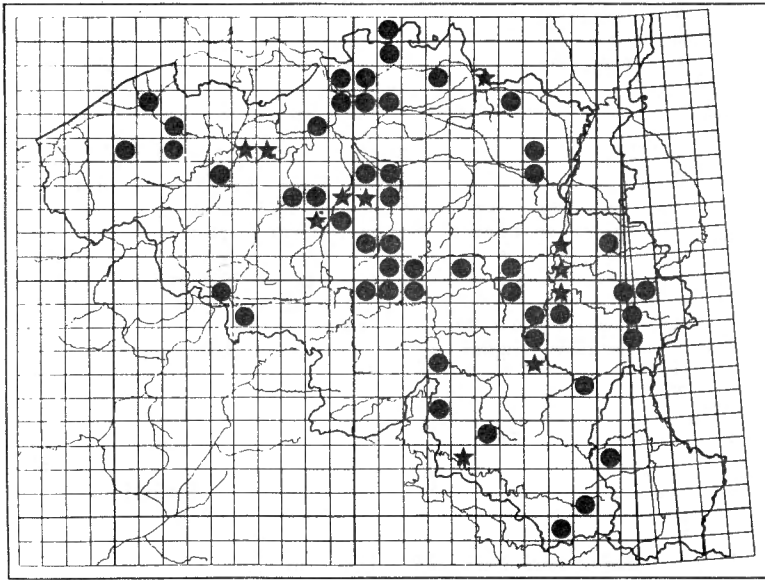
26. *Chamaesyrrhus lusitanicus*



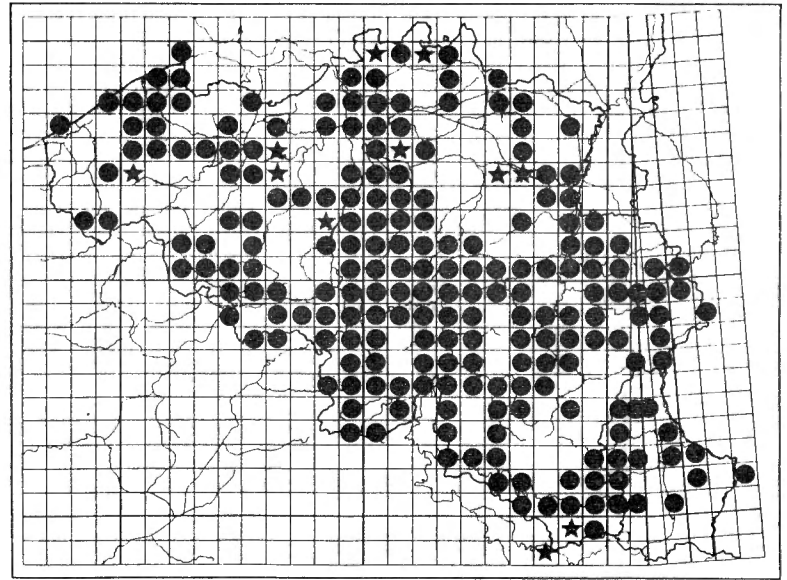
27. *Chamaesyrrhus scaevoides*



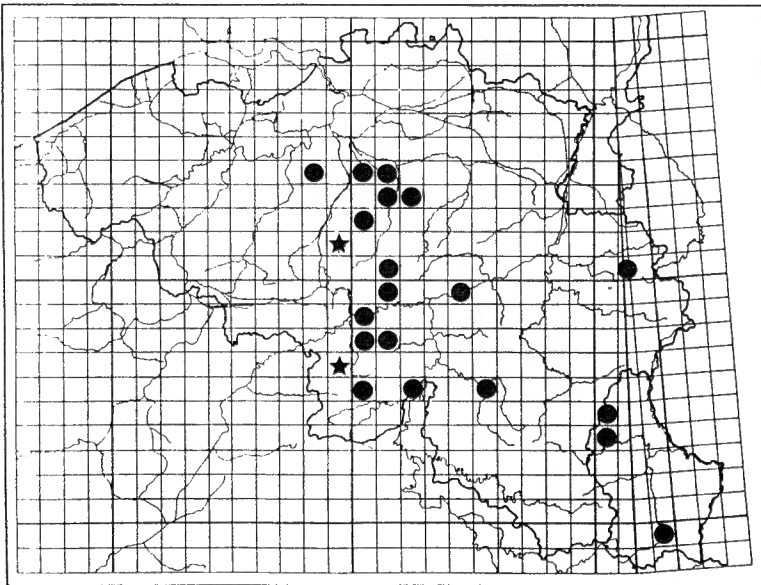
28. *Cheilosia acutilabris*



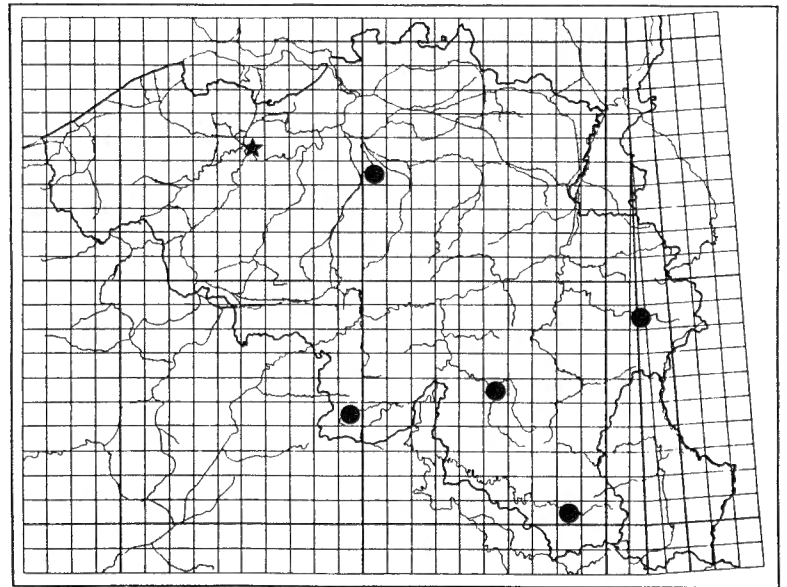
29. *Cheilosia albipila*



30. *Cheilosia albitarsis*

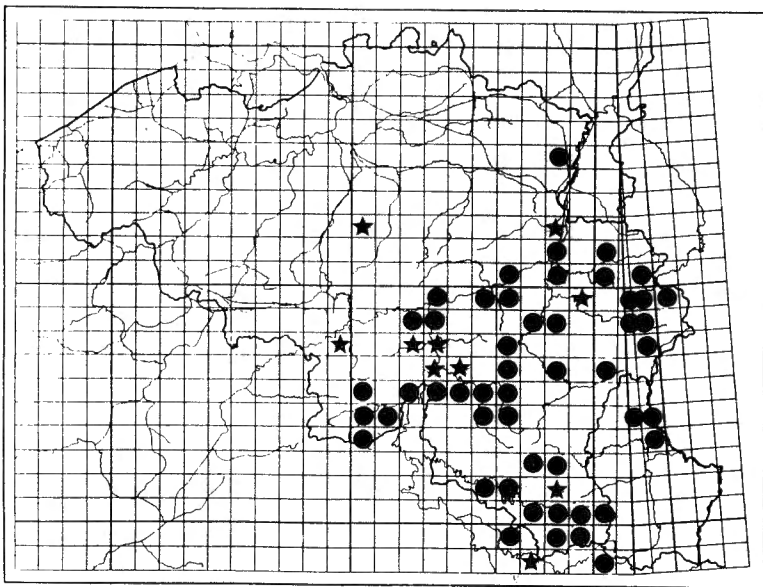


31. *Cheilosia antiqua*

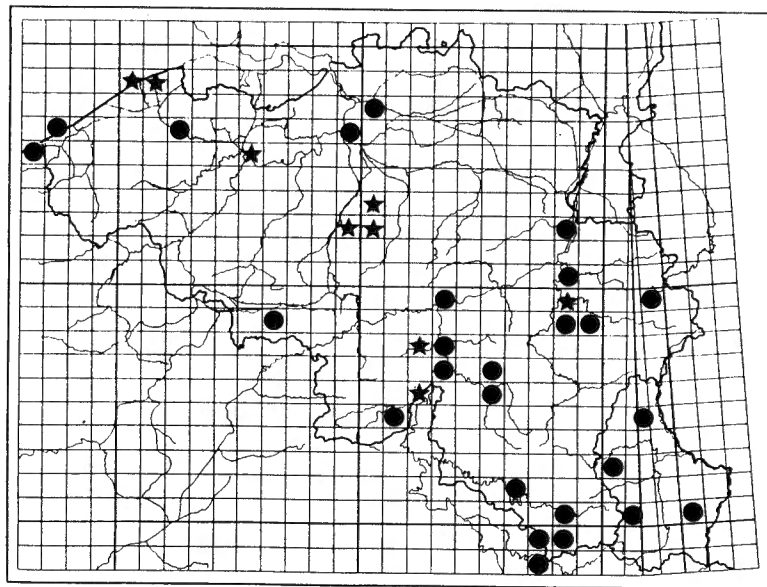


32. *Cheilosia argentifrons*

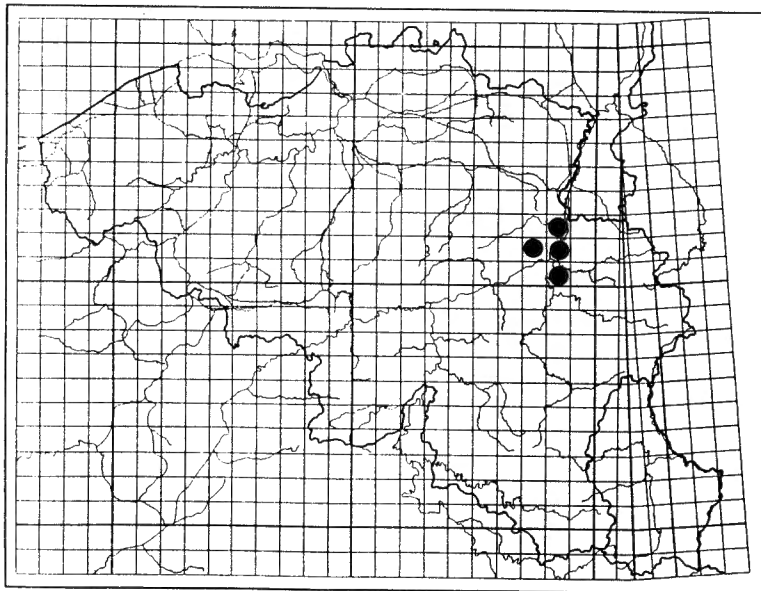




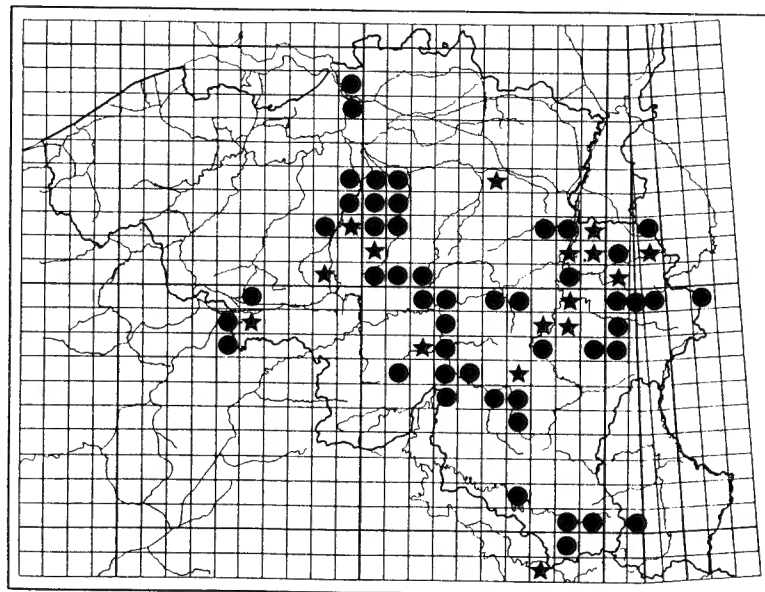
33. *Cheilosia barbata*



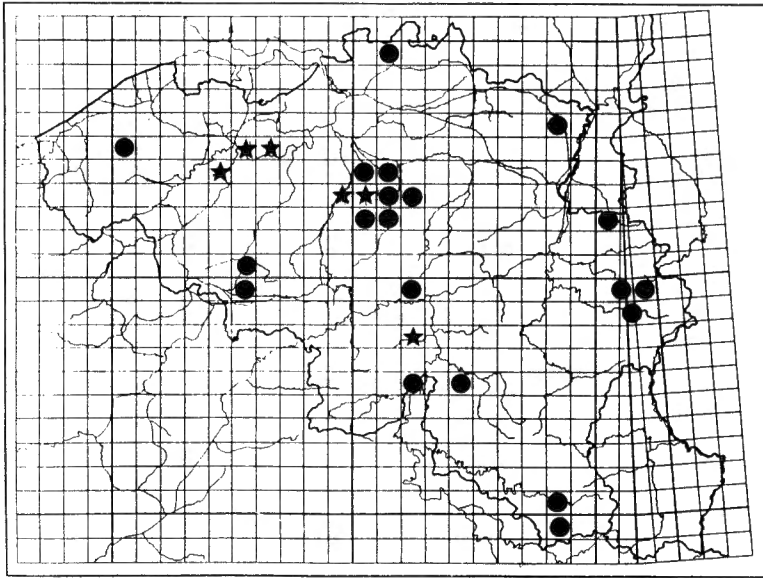
34. *Cheilosia bergenstammi*



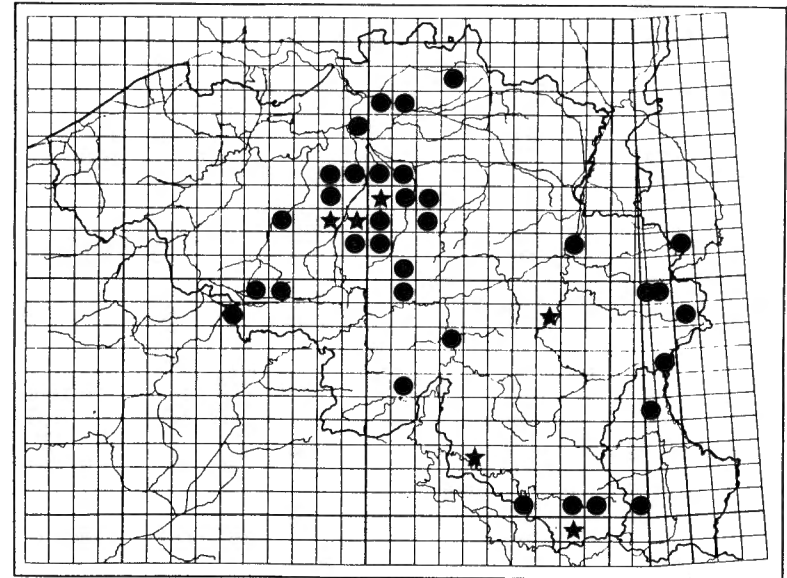
35. *Cheilosia caerulescens*



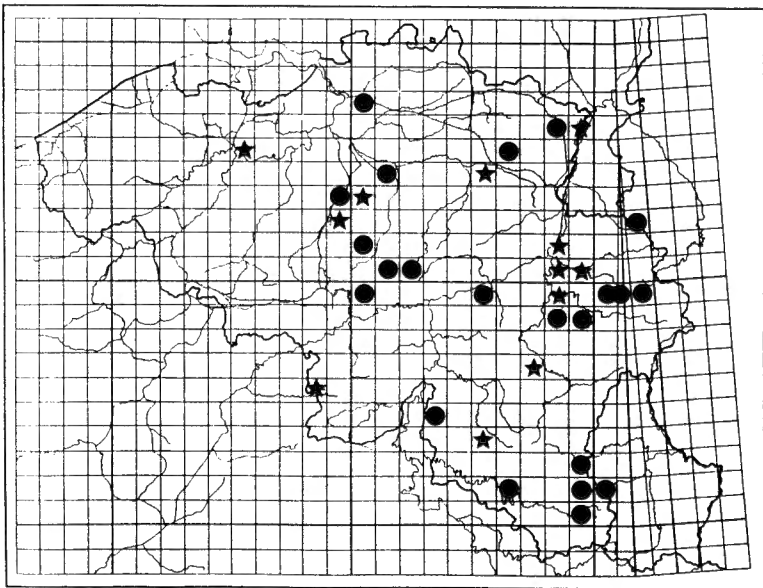
36. *Cheilosia canicularis*



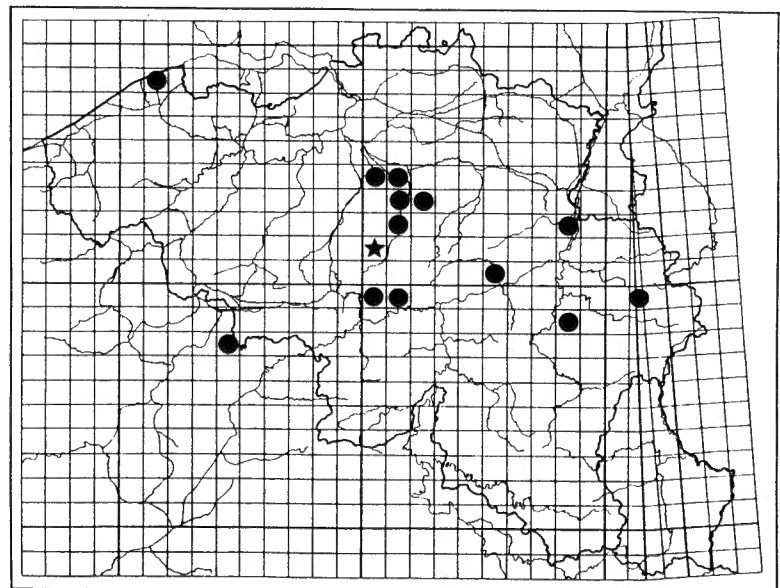
37. *Cheilosia carbonaria*



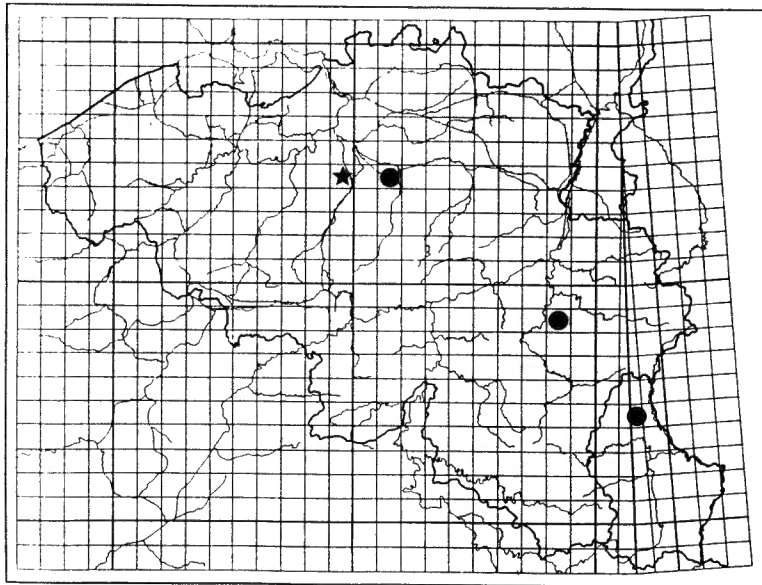
38. *Cheilosia chlorus*



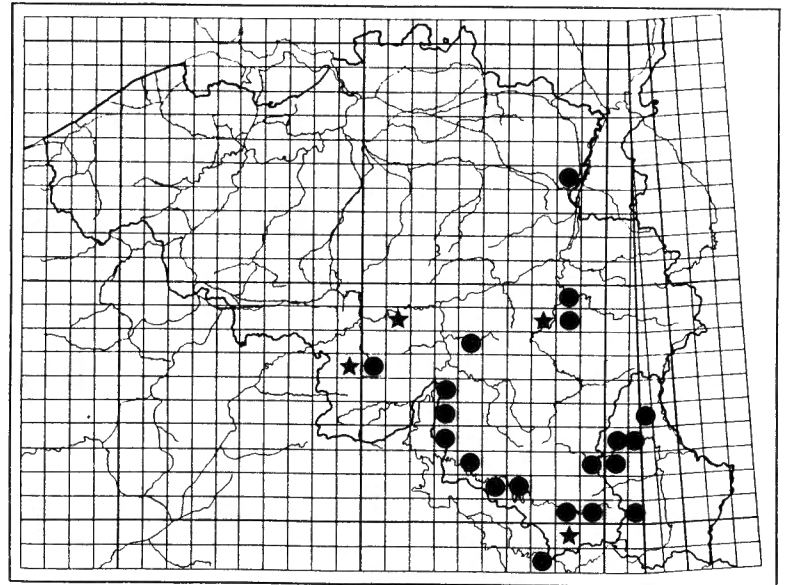
39. *Cheilosia chrysocoma*



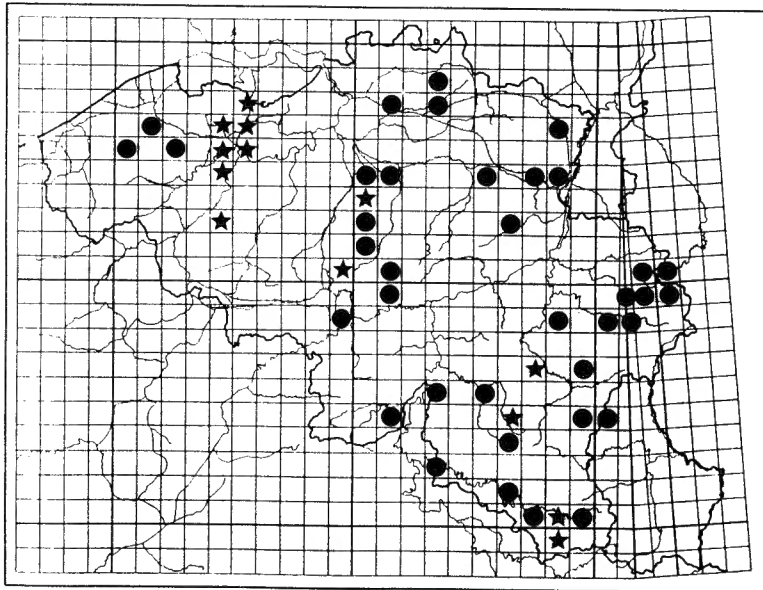
40. *Cheilosia cynocephala*



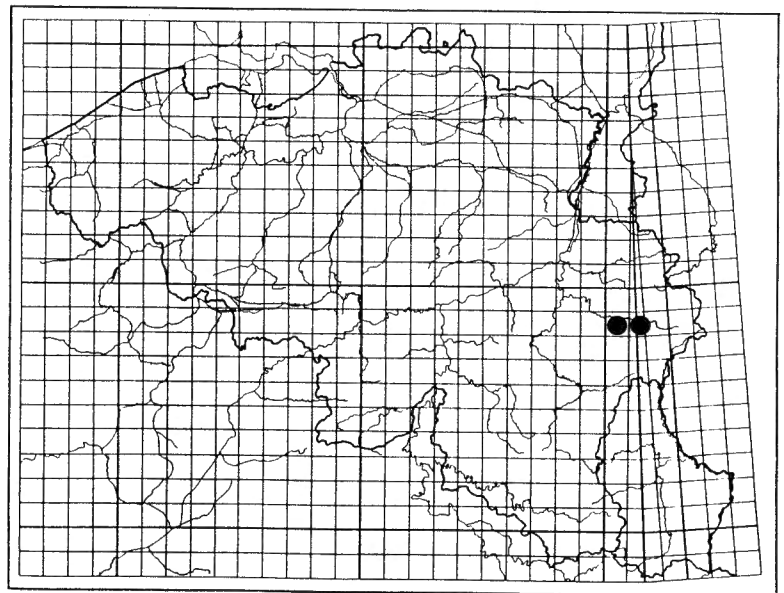
41. *Cheilosia fasciata*



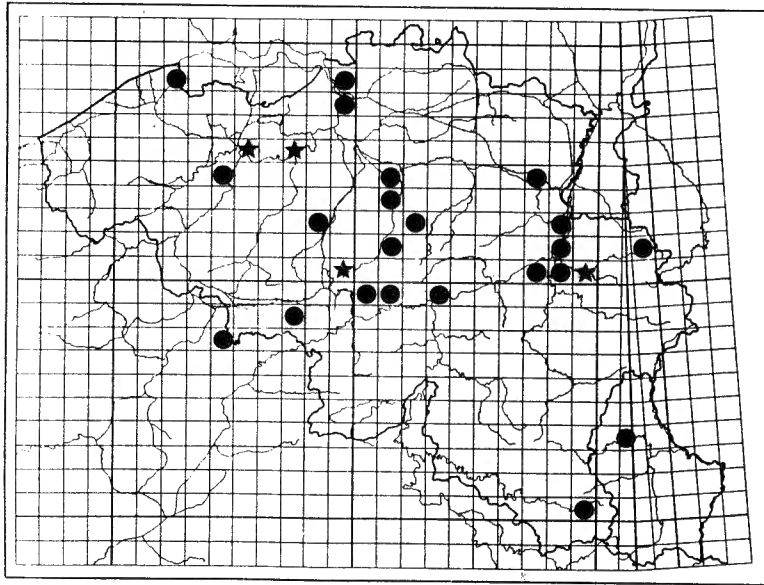
42. *Cheilosia flavipes*



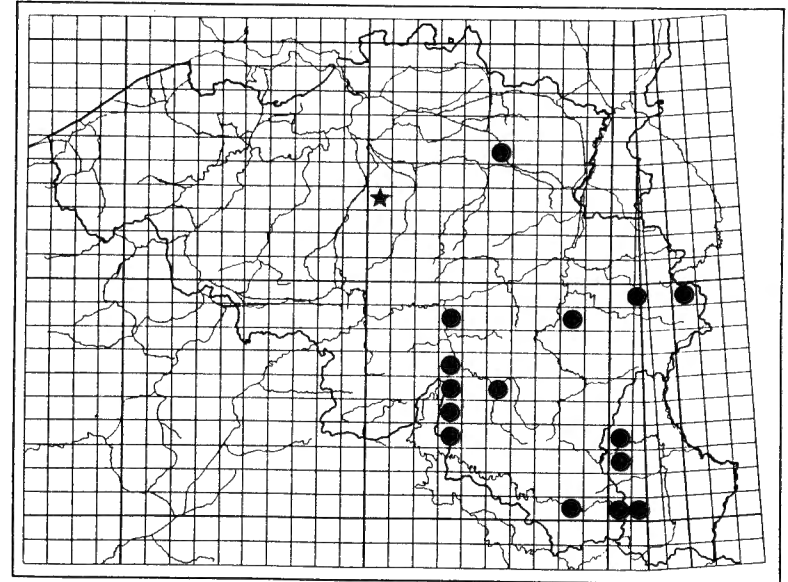
43. *Cheilosia fraterna*



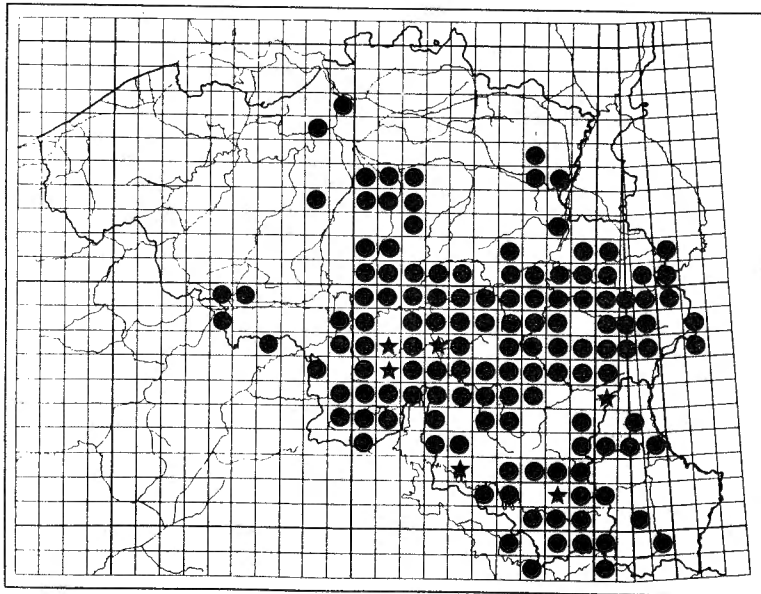
44. *Cheilosia frontalis*



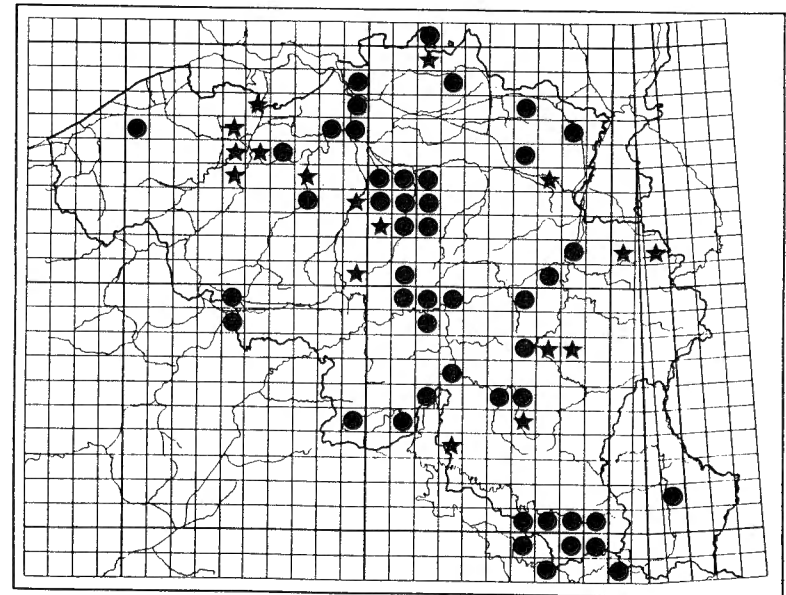
45. *Cheilosia grossa*



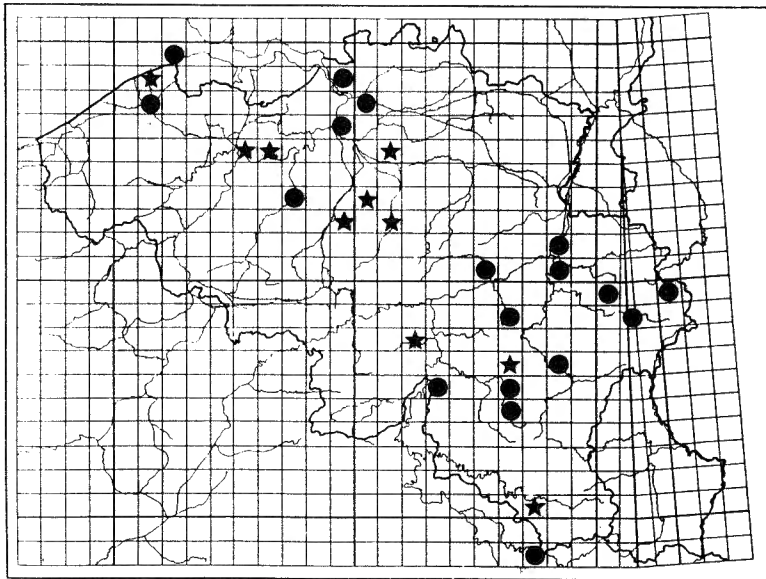
46. *Cheilosia honesta*



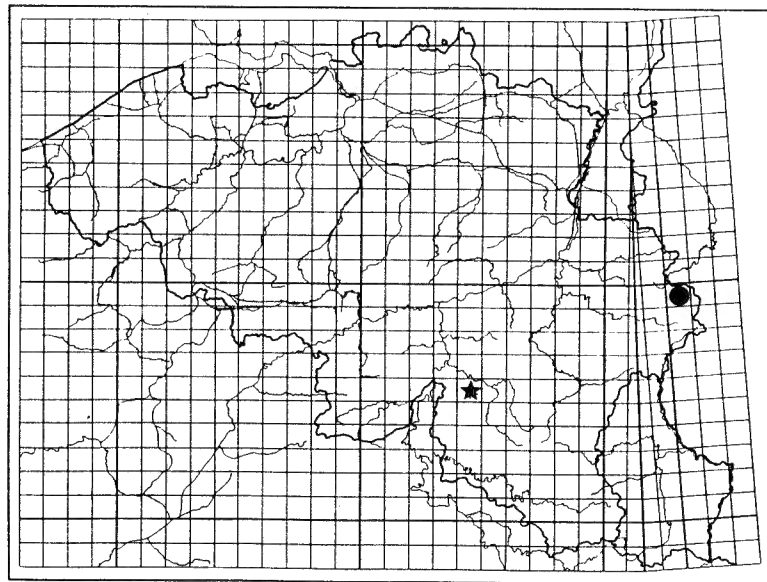
47. *Cheilosia illustrata*



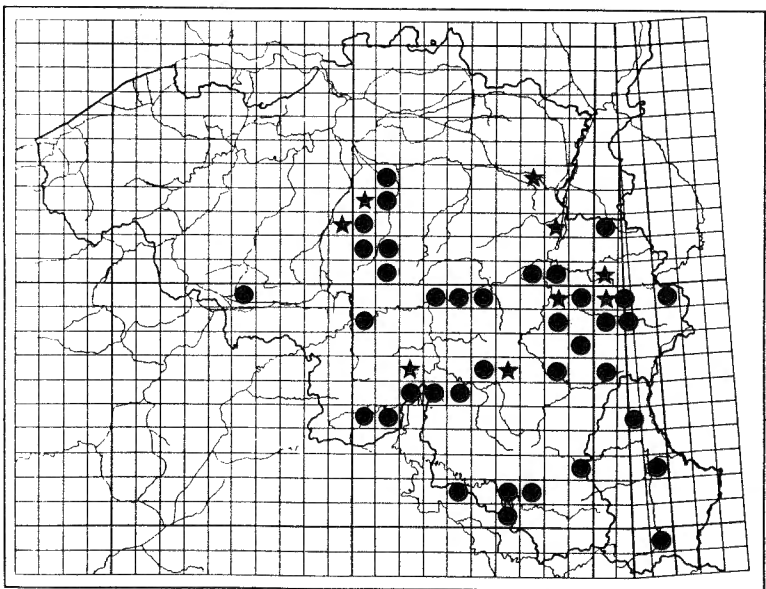
48. *Cheilosia impressa*



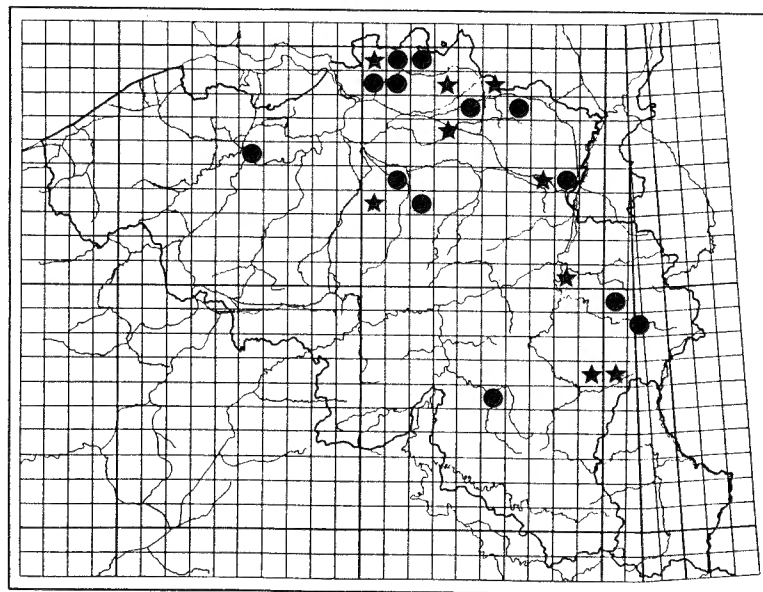
49. *Cheilosia intonsa*



50. *Cheilosia langhofferi*

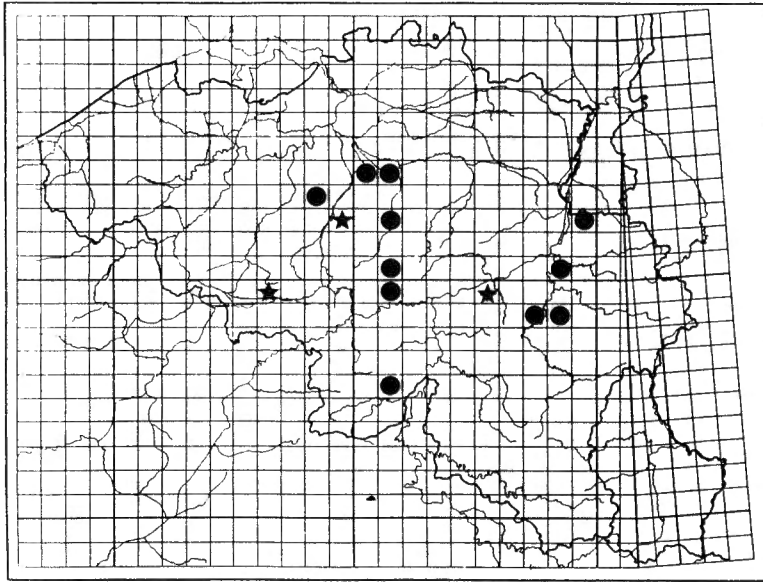


51. *Cheilosia lenis*

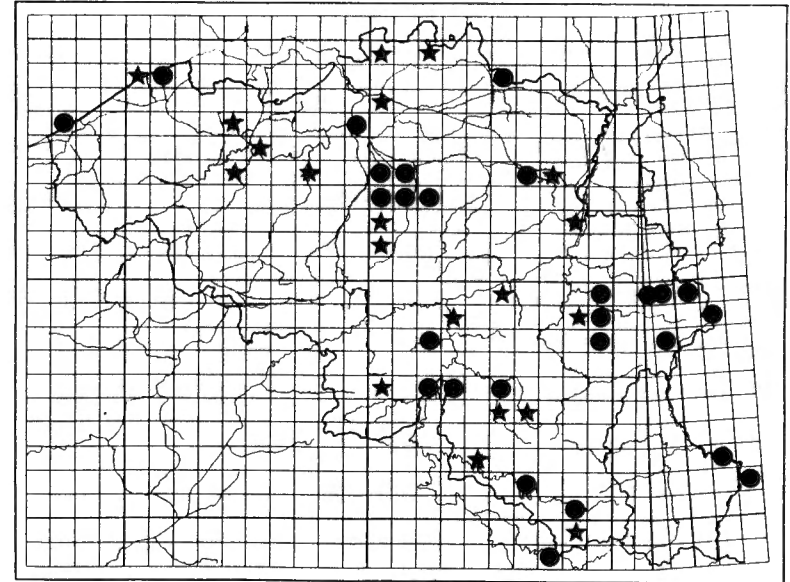


52. *Cheilosia longula*

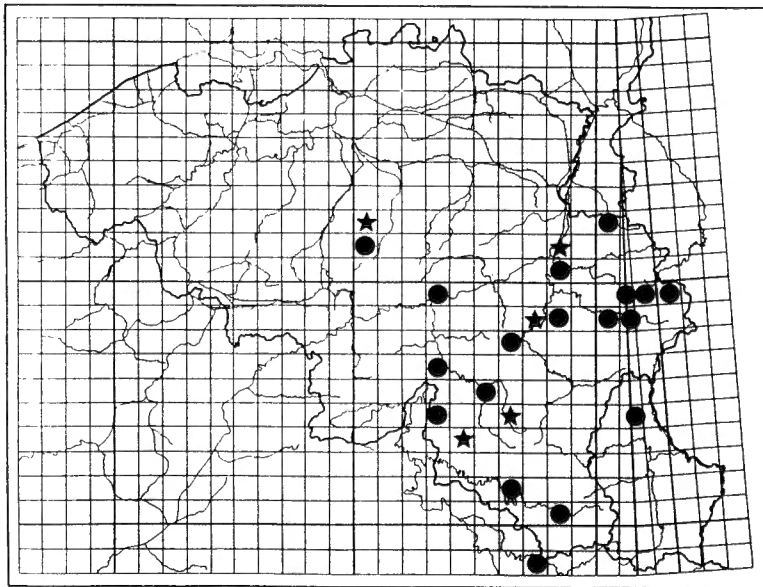




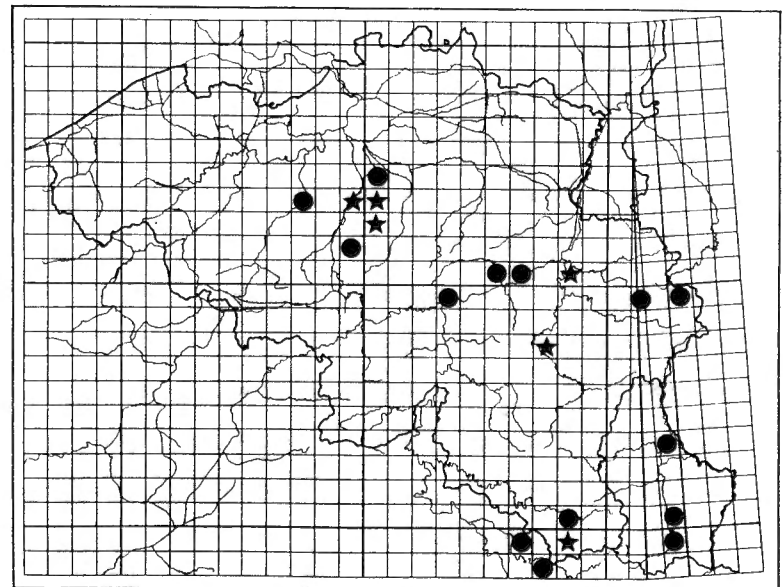
53. *Cheilosia maculata*



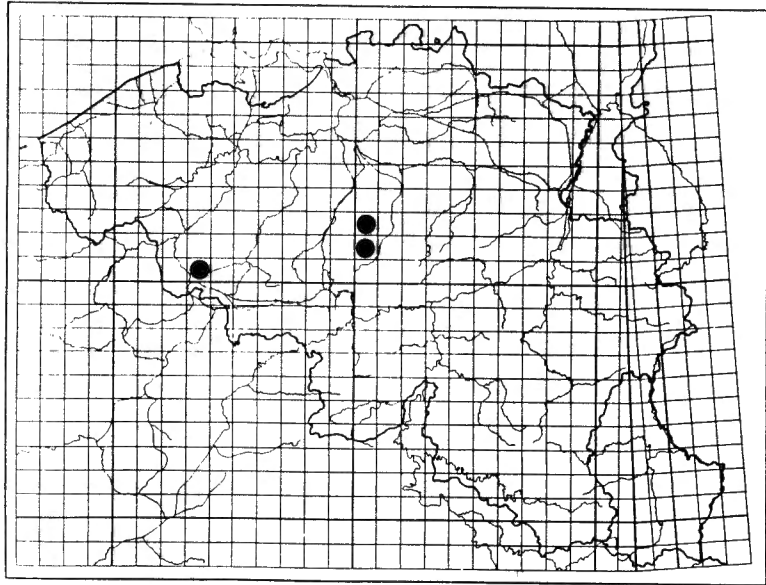
54. *Cheilosia mutabilis*



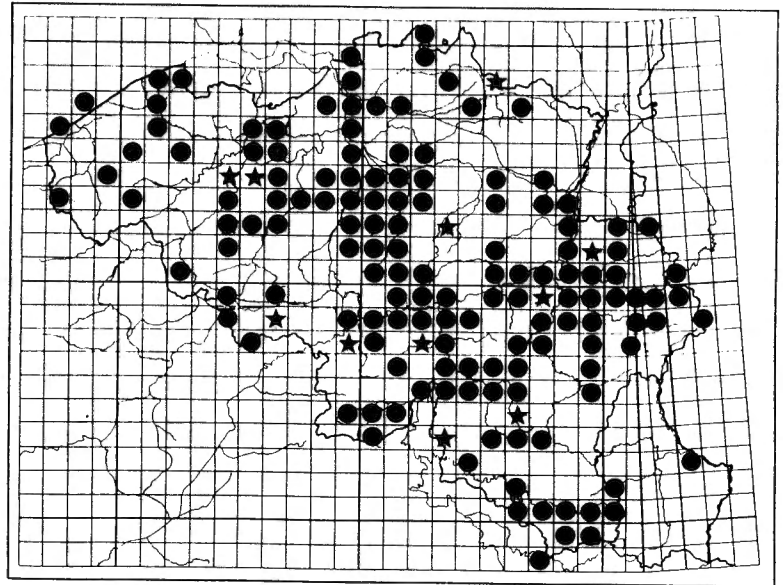
55. *Cheilosia nasutula*



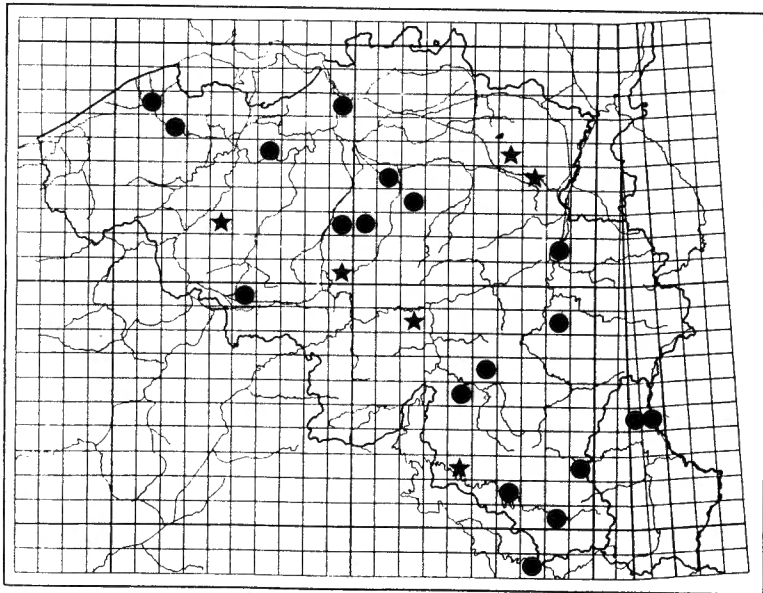
56. *Cheilosia nigripes*



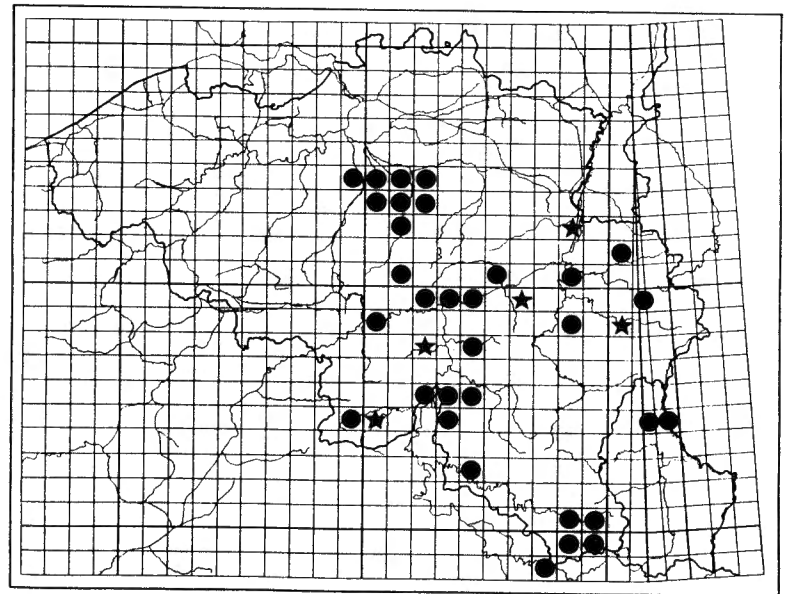
57. *Cheilosia omissa*



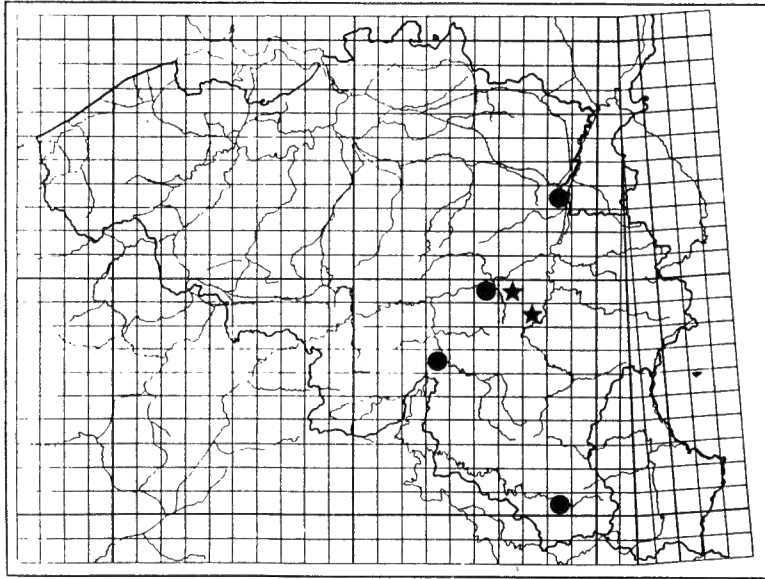
58. *Cheilosia pagana*



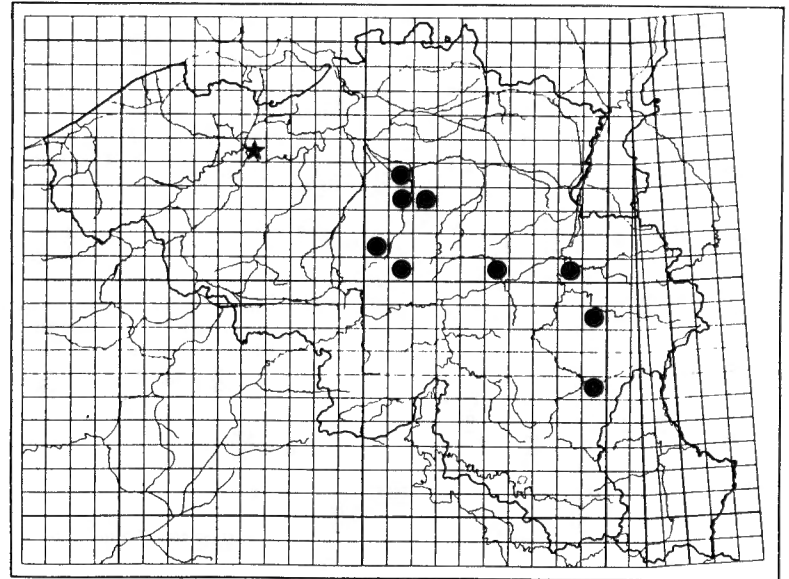
59. *Cheilosia praecox*



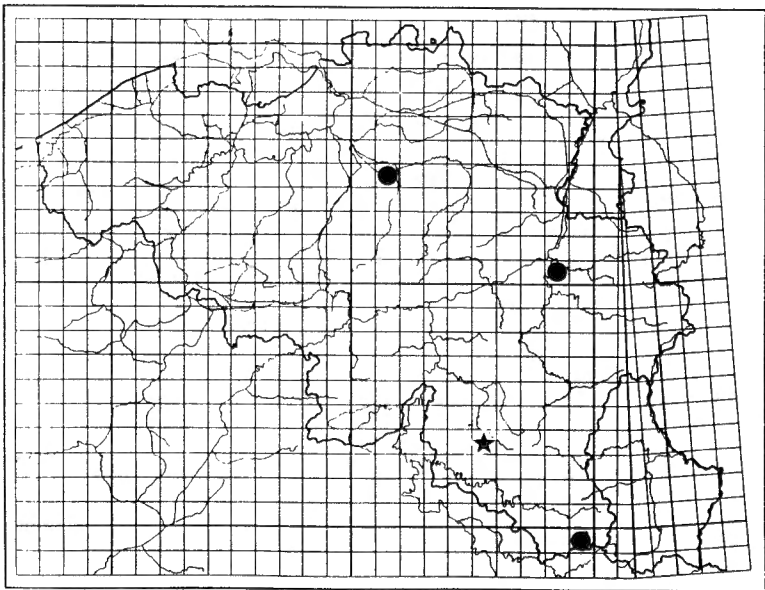
60. *Cheilosia proxima*



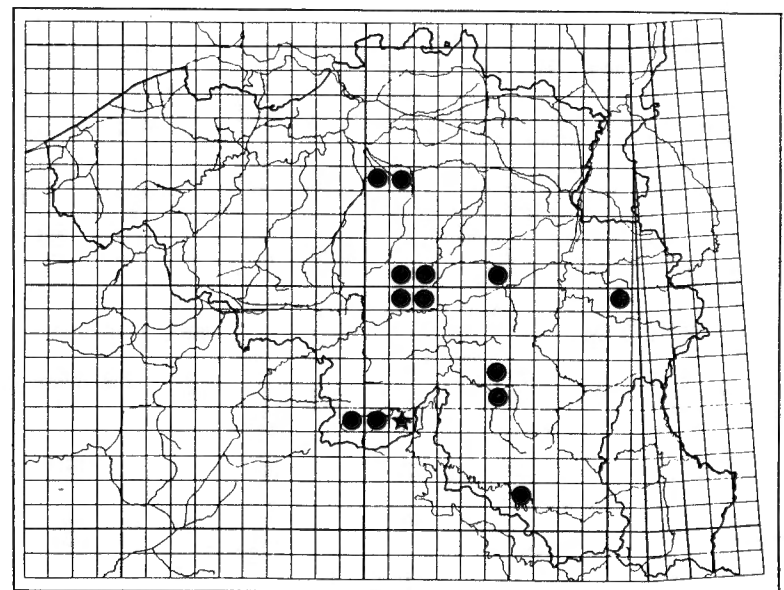
61. *Cheilosia pubera*



62. *Cheilosia rotundiventris*

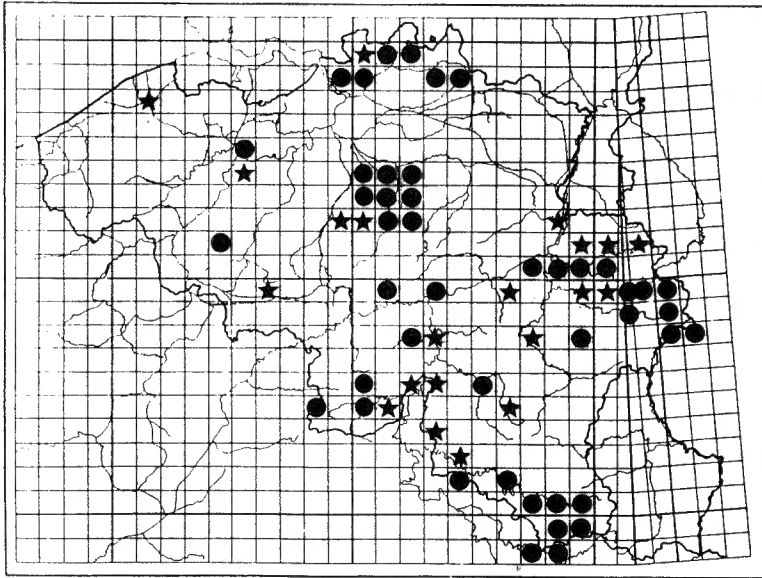


63. *Cheilosia ruficollis*

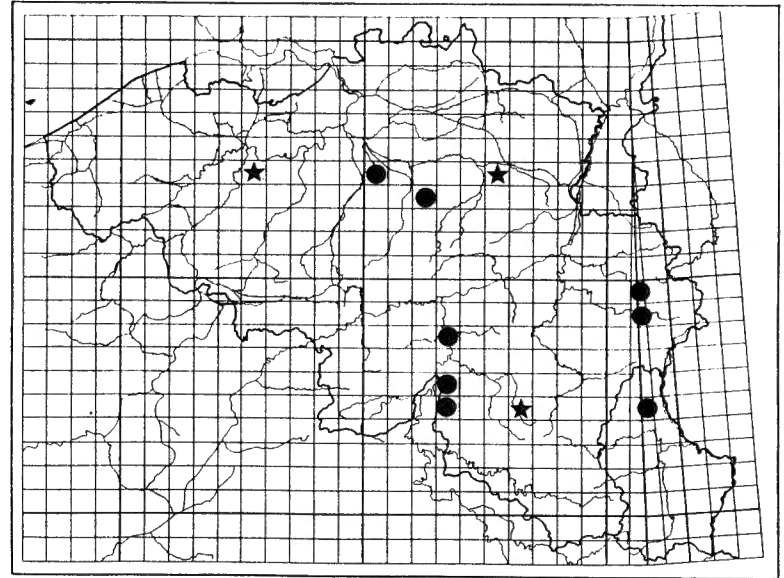


64. *Cheilosia rufimana*

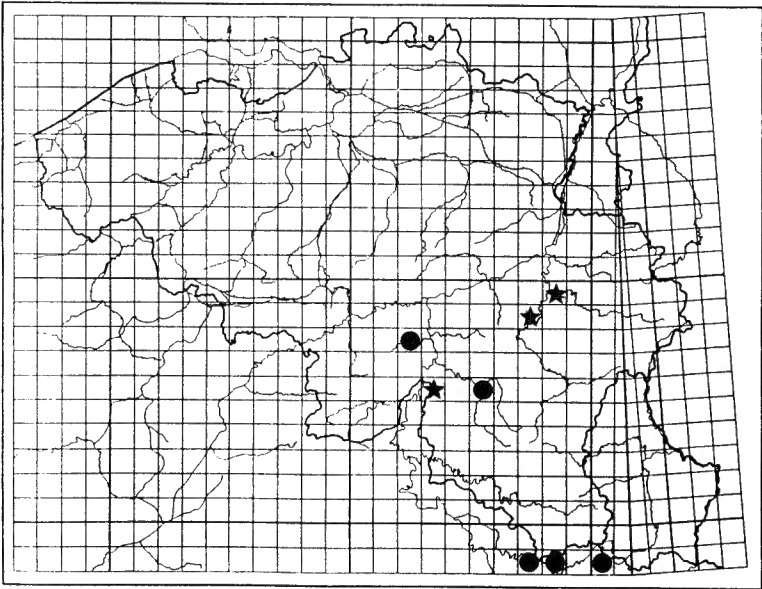




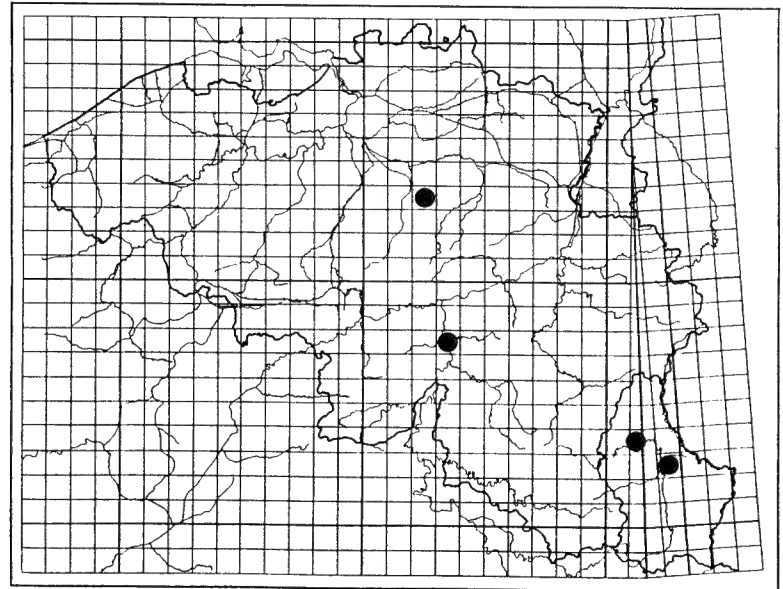
65. *Cheilosia scutellata*



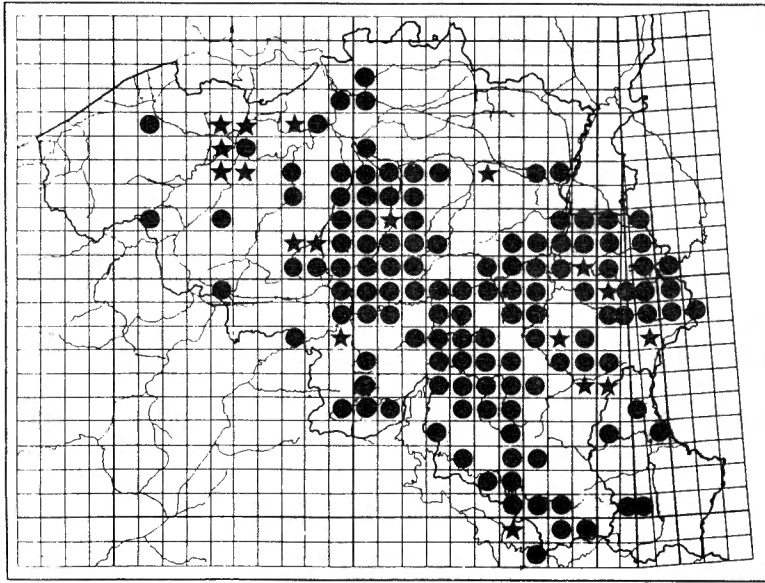
66. *Cheilosia semifasciata*



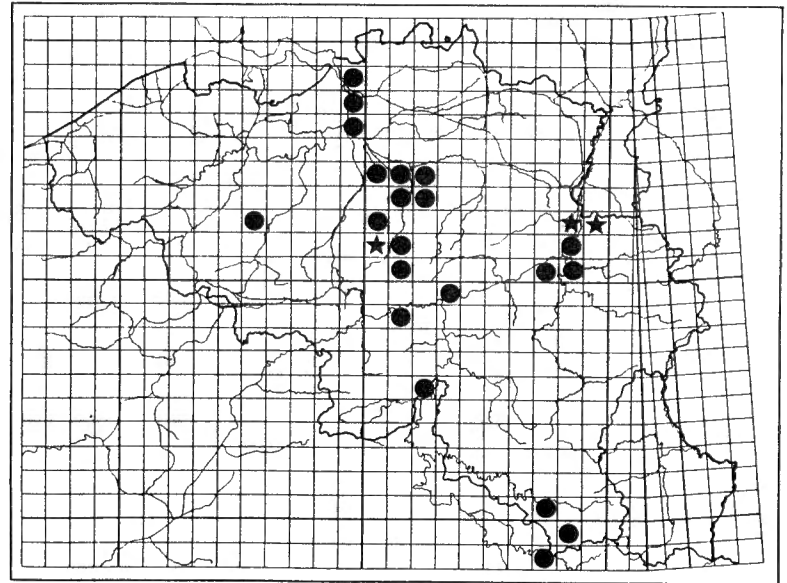
67. *Cheilosia soror*



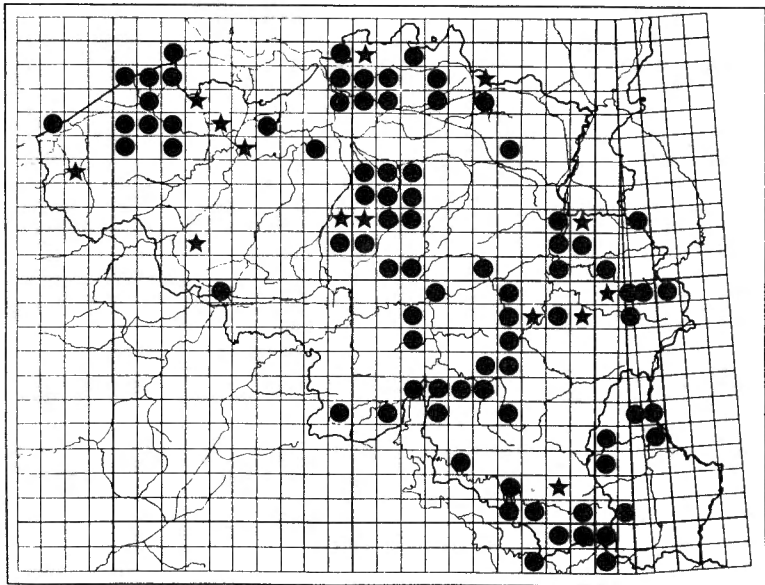
68. *Cheilosia trisulcata*



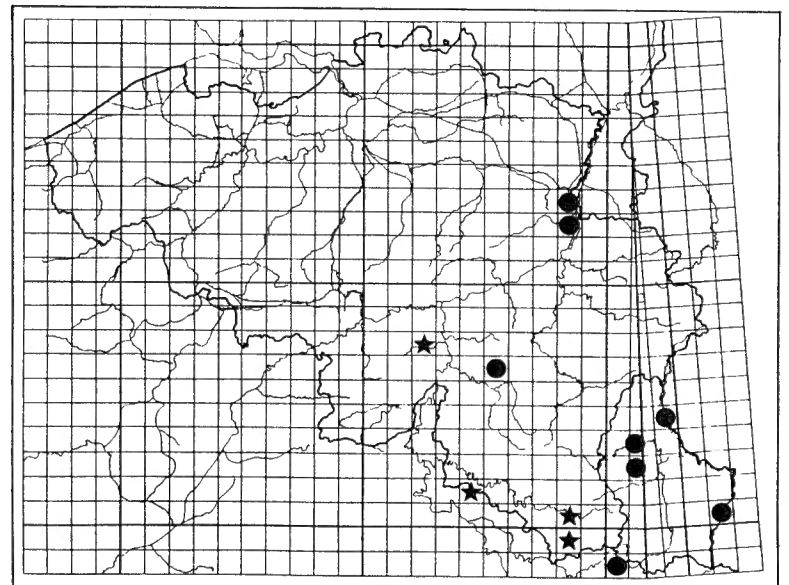
69. *Cheilosia variabilis*



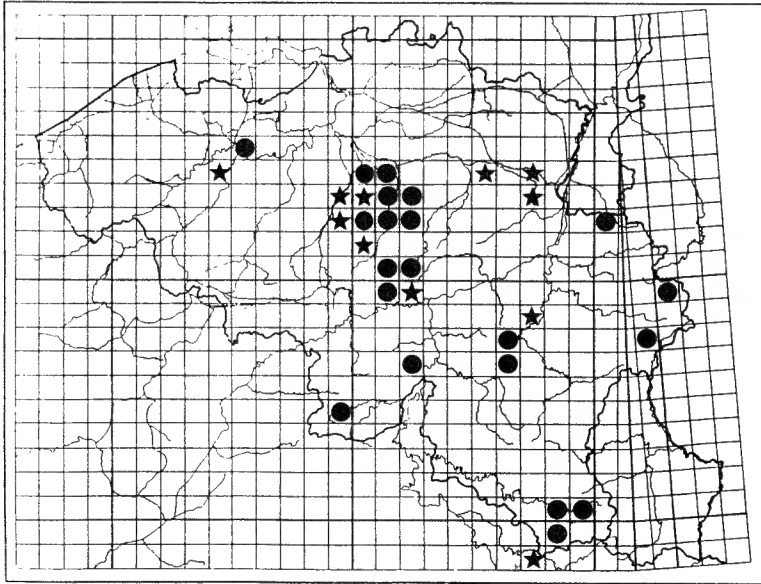
70. *Cheilosia velutina*



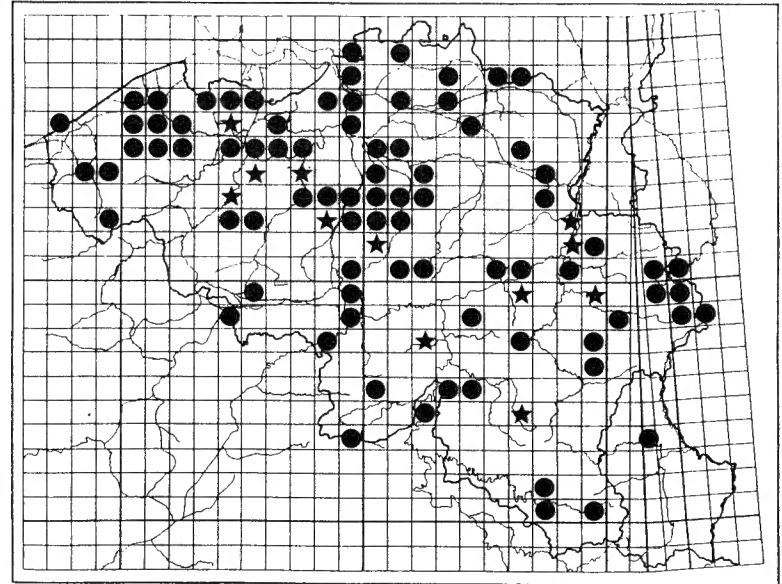
71. *Cheilosia vernalis*



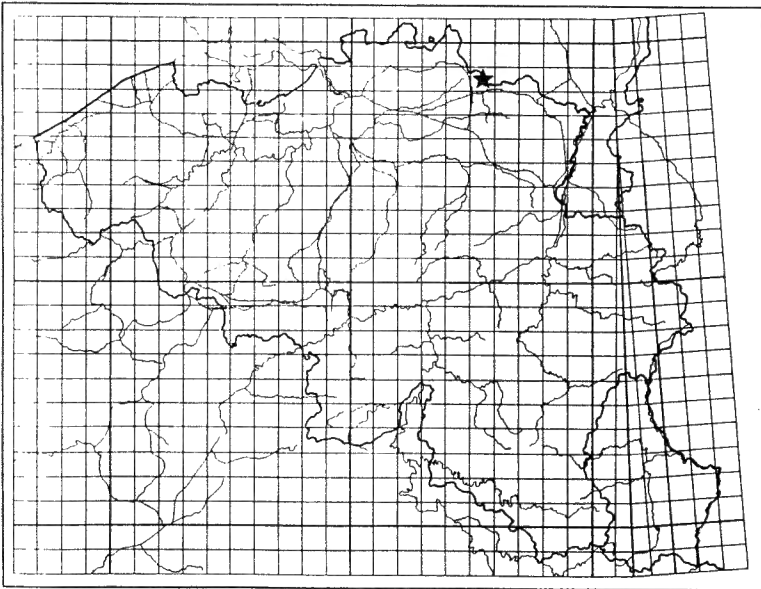
72. *Cheilosia vulpina*



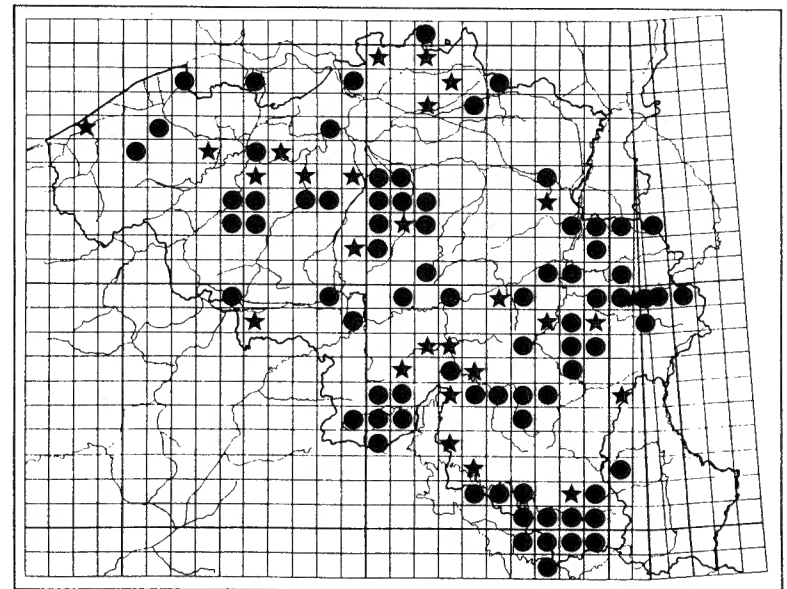
73. *Chrysogaster chalybeata*



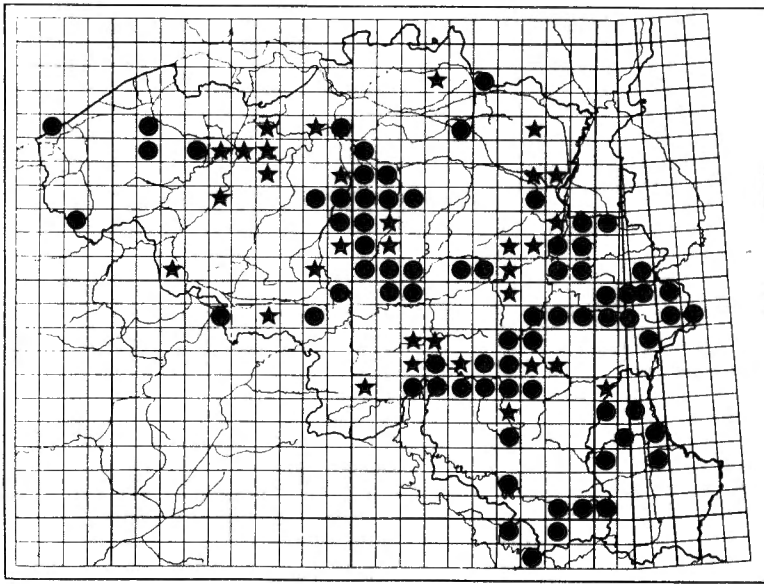
74. *Chrysogaster hirtella*



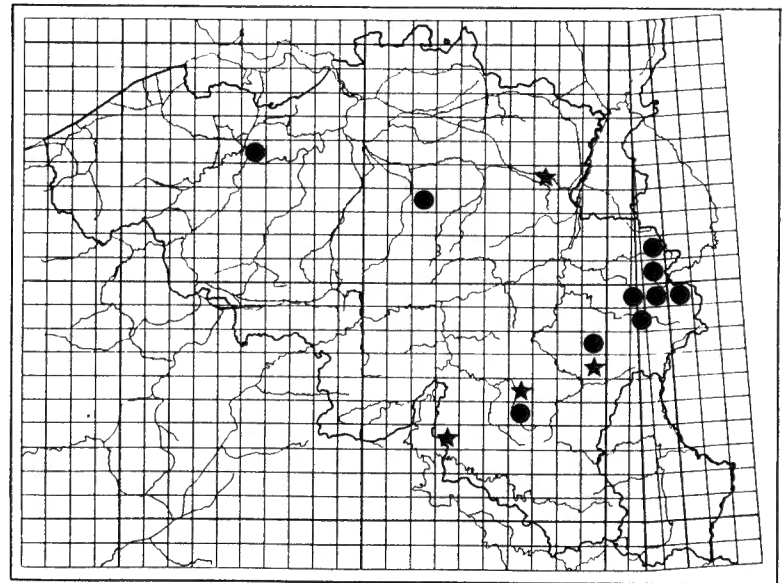
75. *Chrysogaster macquarti*



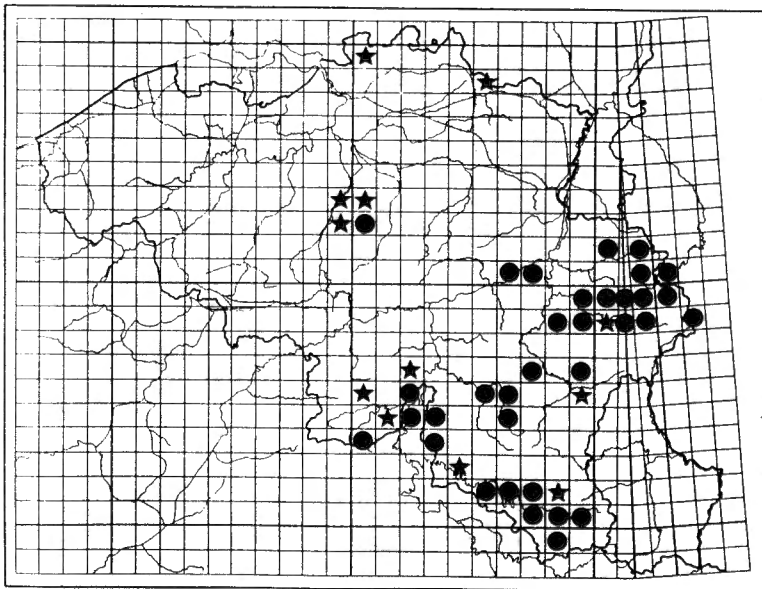
76. *Chrysogaster solstitialis*



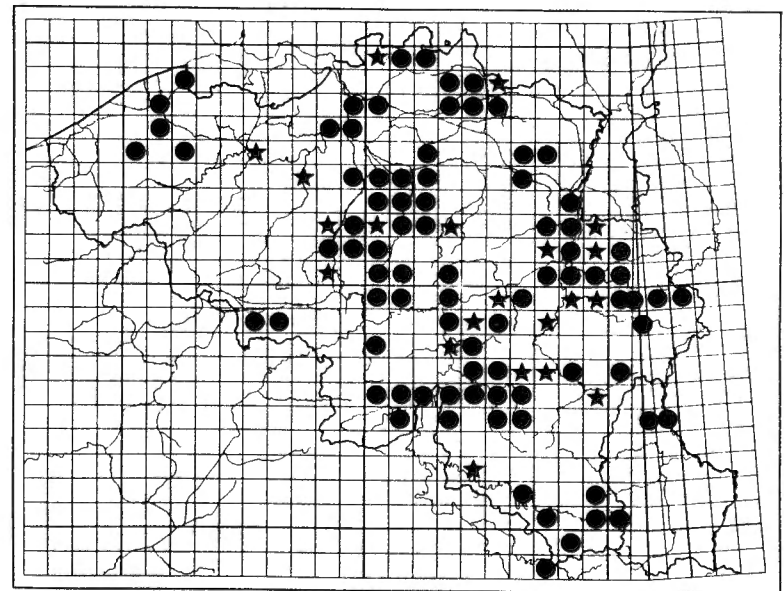
77. *Chrysogaster viduata*



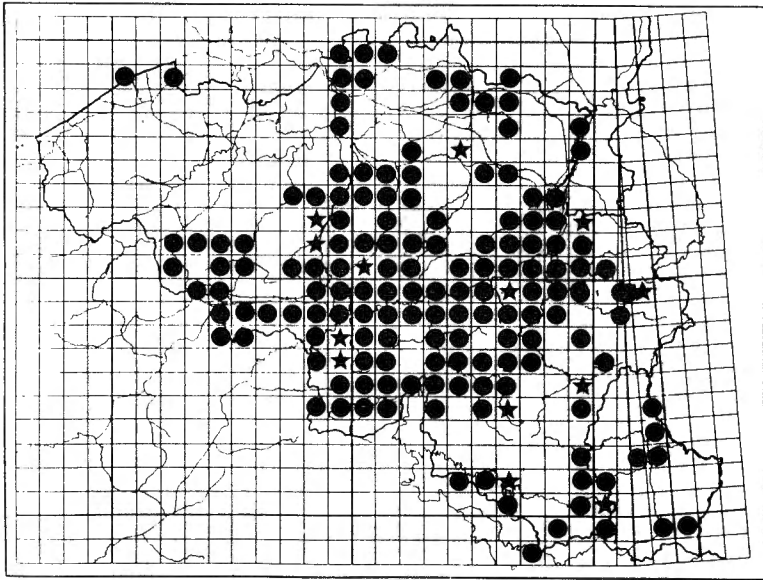
78. *Chrysogaster virescens*



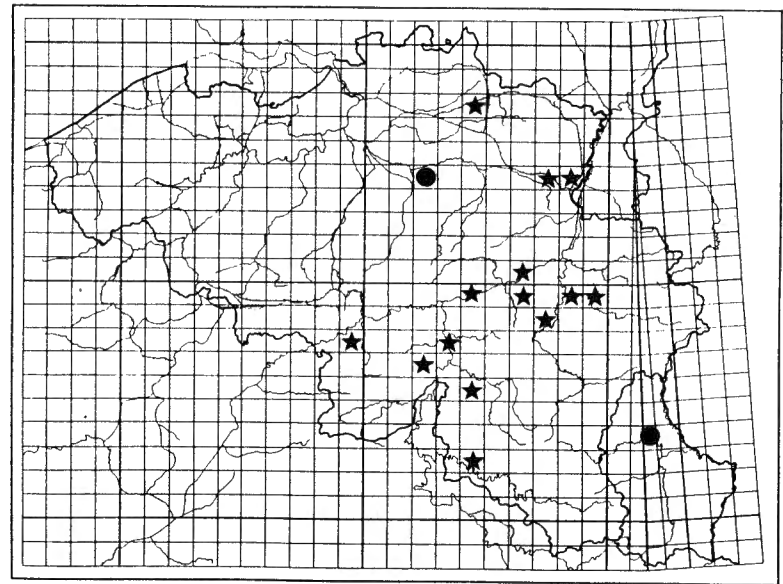
79. *Chrysotoxum arcuatum*



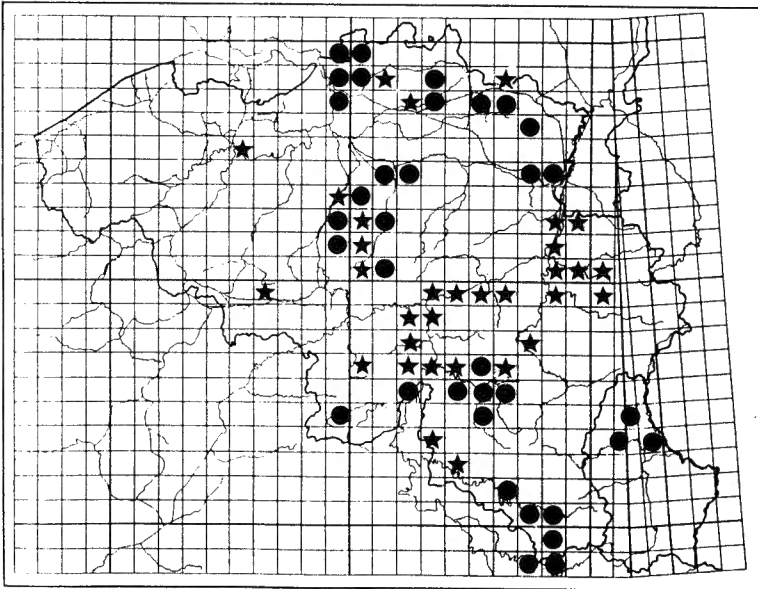
80. *Chrysotoxum bicinctum*



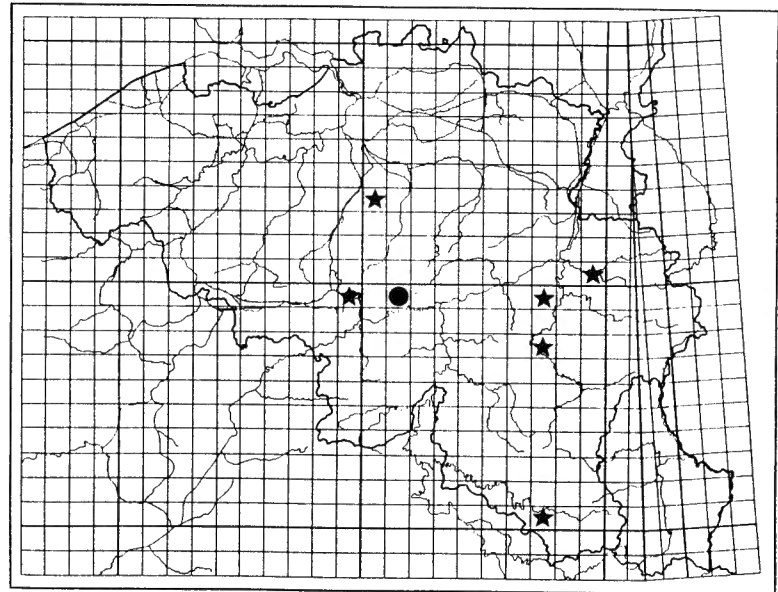
81. *Chrysotoxum cautum*



82. *Chrysotoxum elegans*

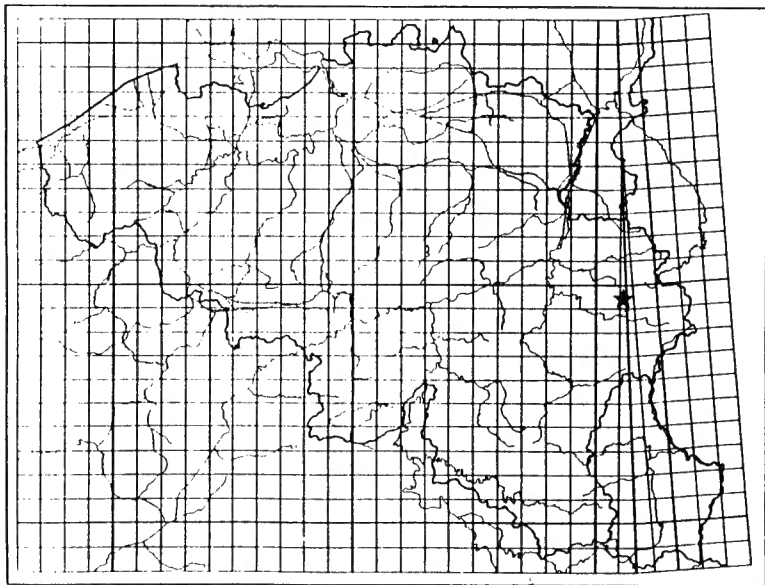


83. *Chrysotoxum festivum*

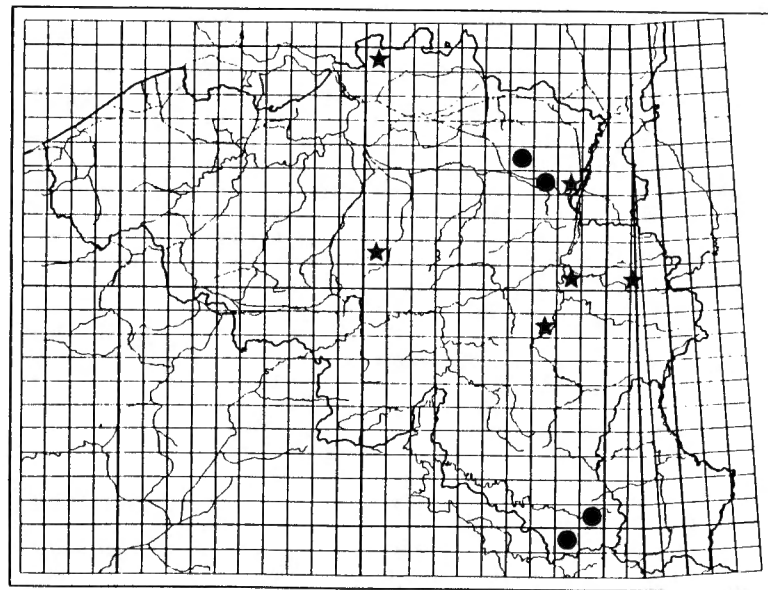


84. *Chrysotoxum intermedium*

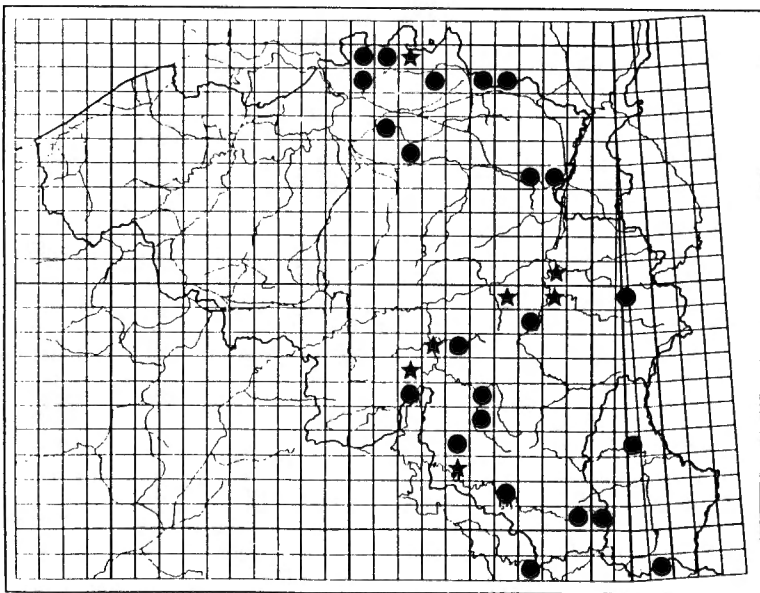




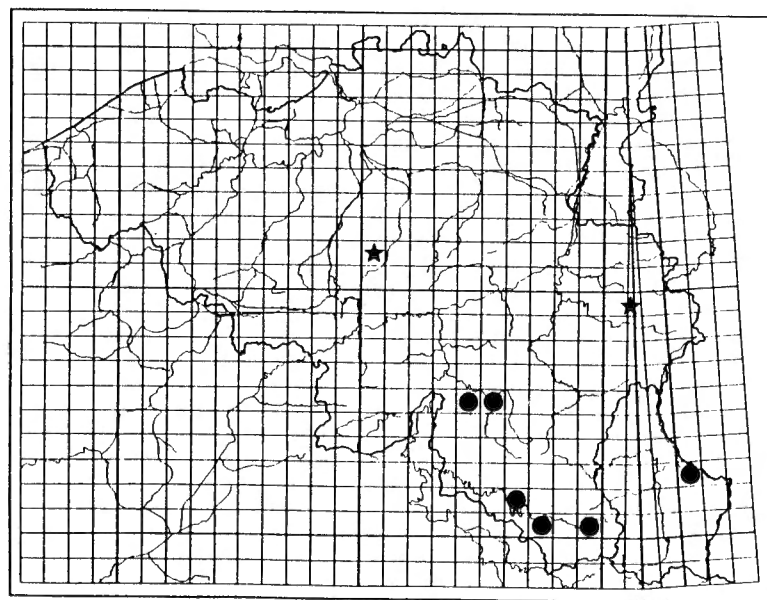
85. *Chrysotoxum latilimbatum*



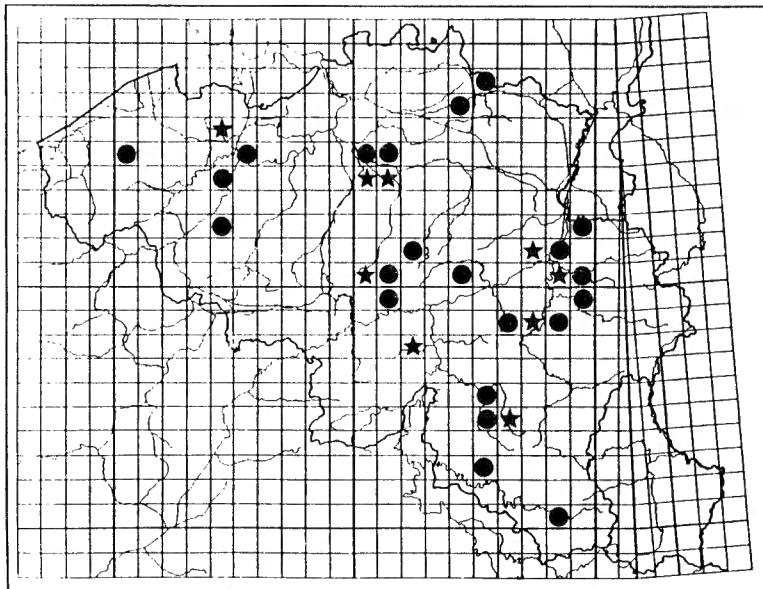
86. *Chrysotoxum octomaculatum*



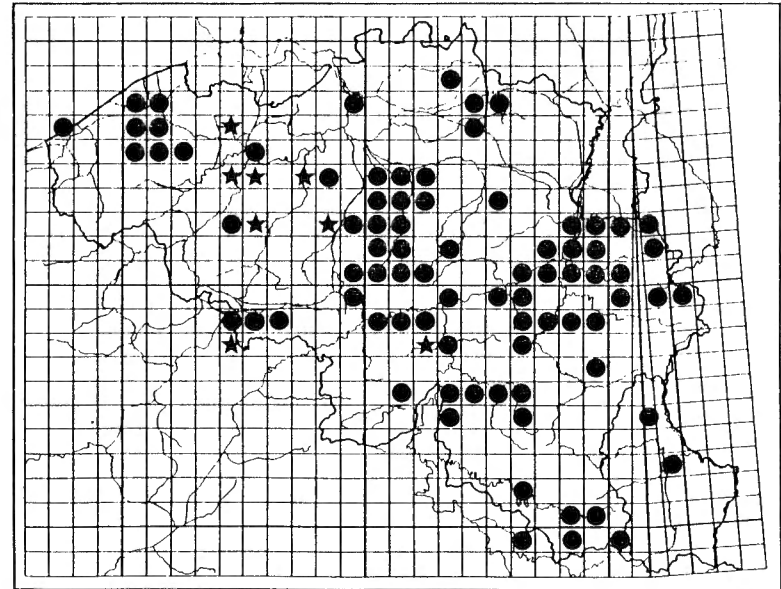
87. *Chrysotoxum vernale*



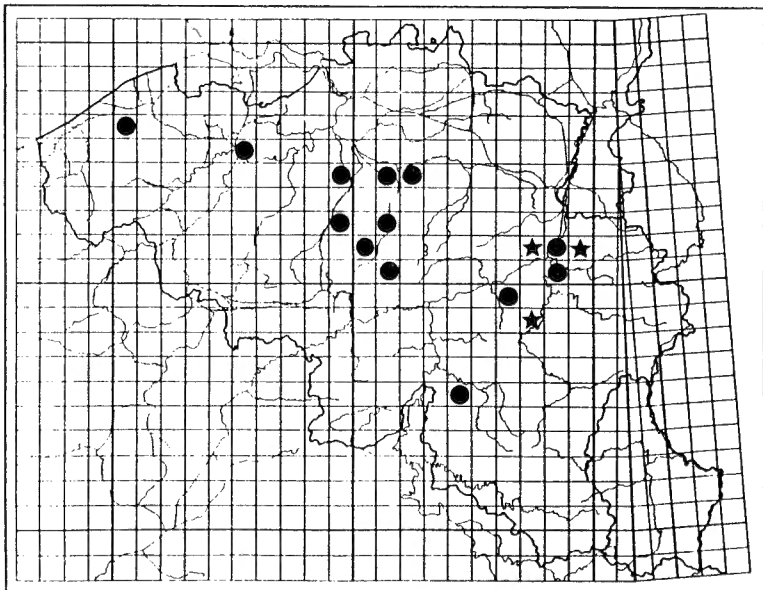
88. *Chrysotoxum verralli*



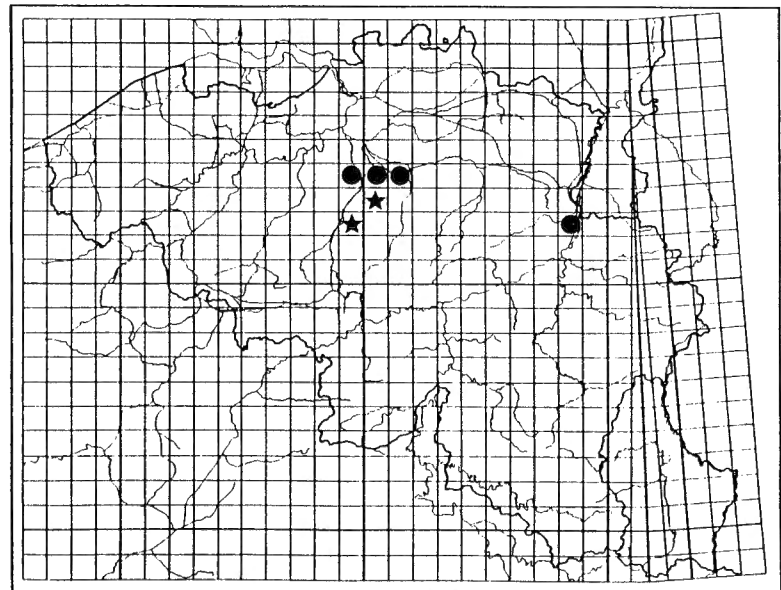
89. *Criorhina asilica*



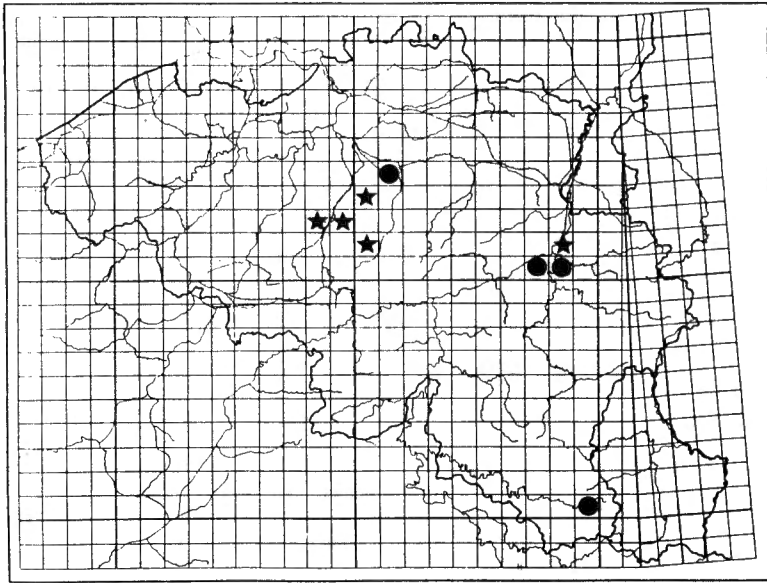
90. *Criorhina berberina*



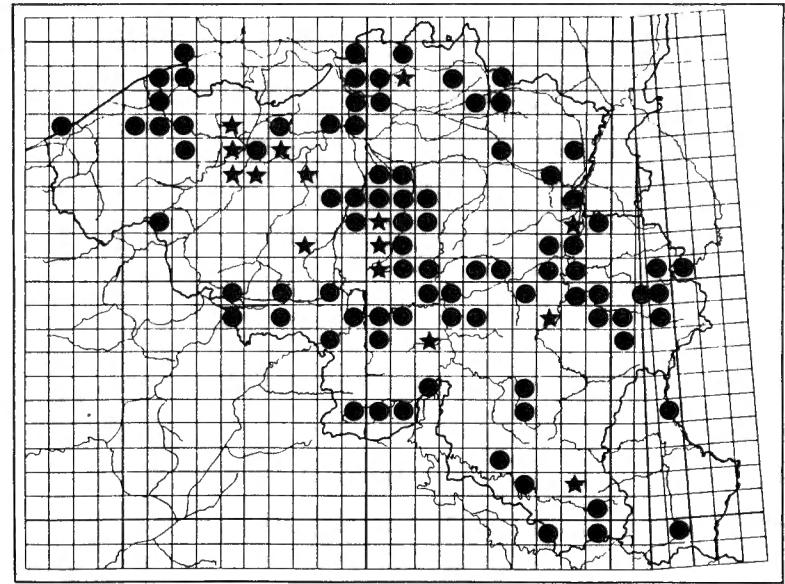
91. *Criorhina floccosa*



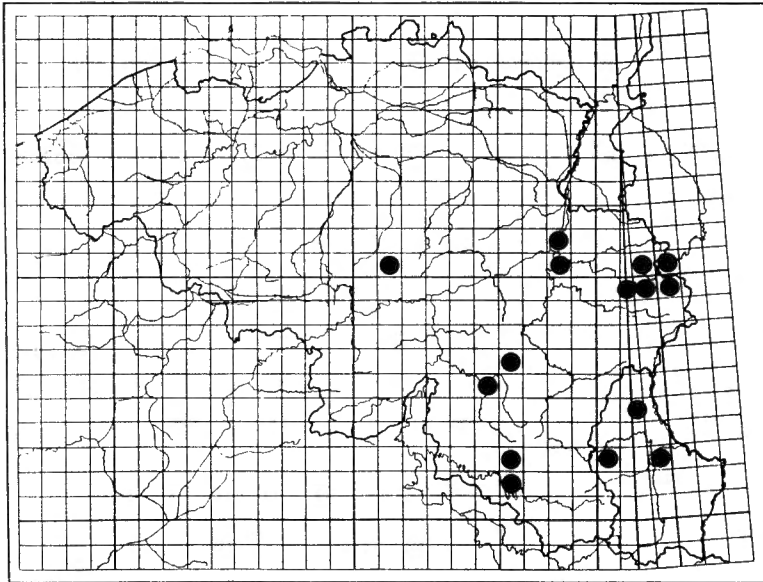
92. *Criorhina pachymera*



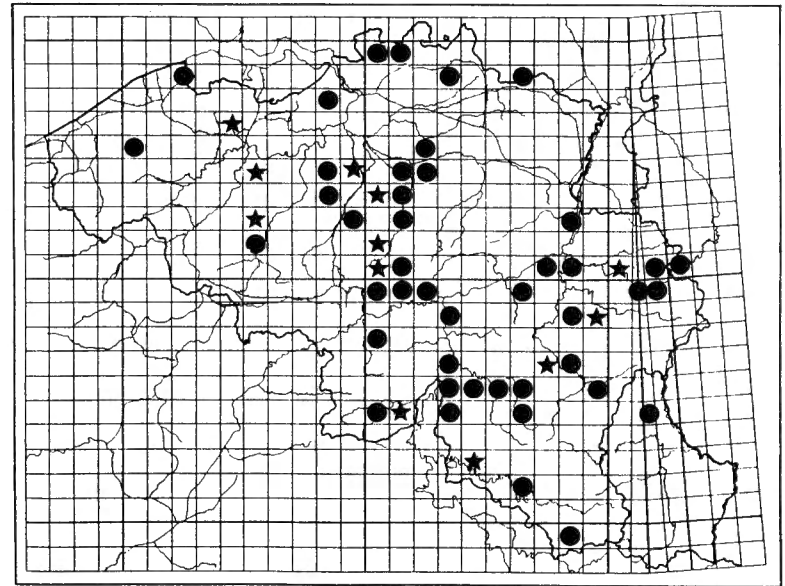
93. *Criorhina ranunculis*



94. *Dasysyrphus albostriatus*

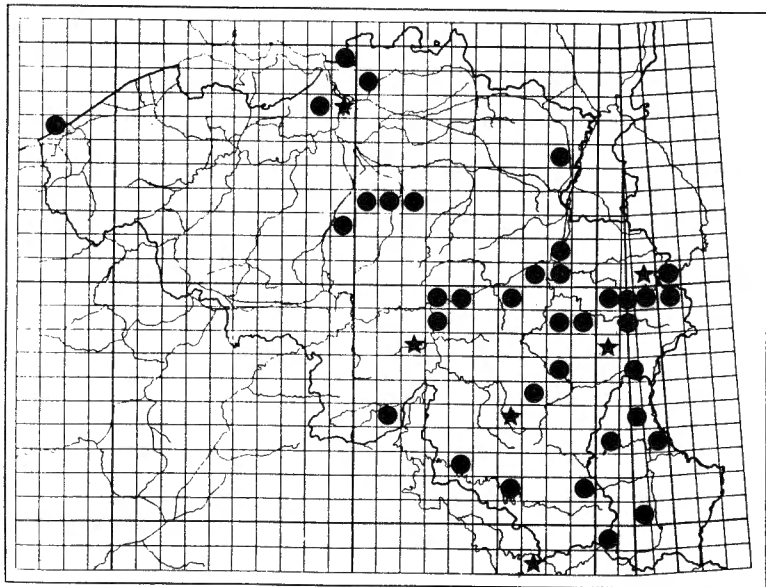


95. *Dasysyrphus friuliensis*

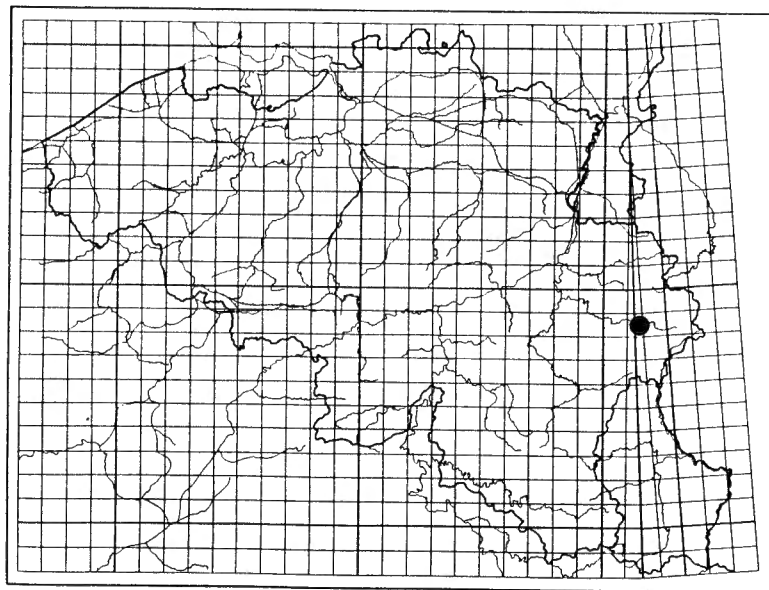


96. *Dasysyrphus hilaris*

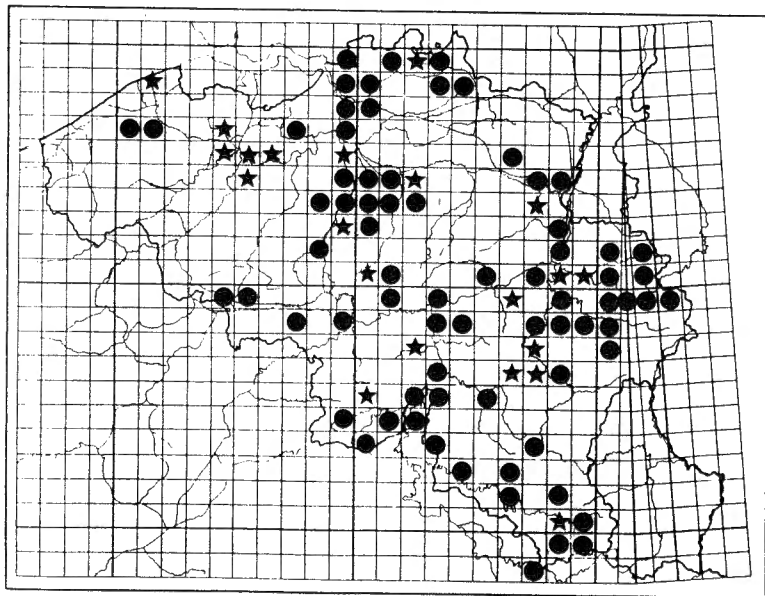




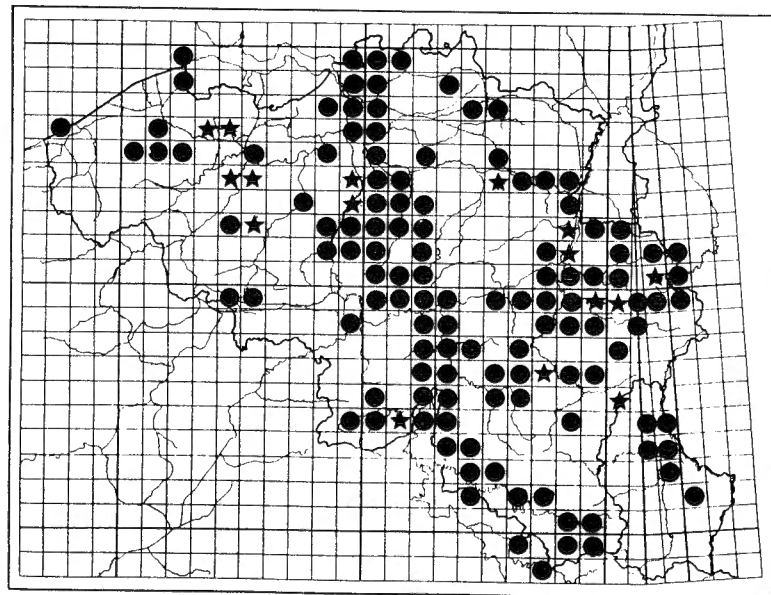
97. *Dasysyrphus lunulatus*



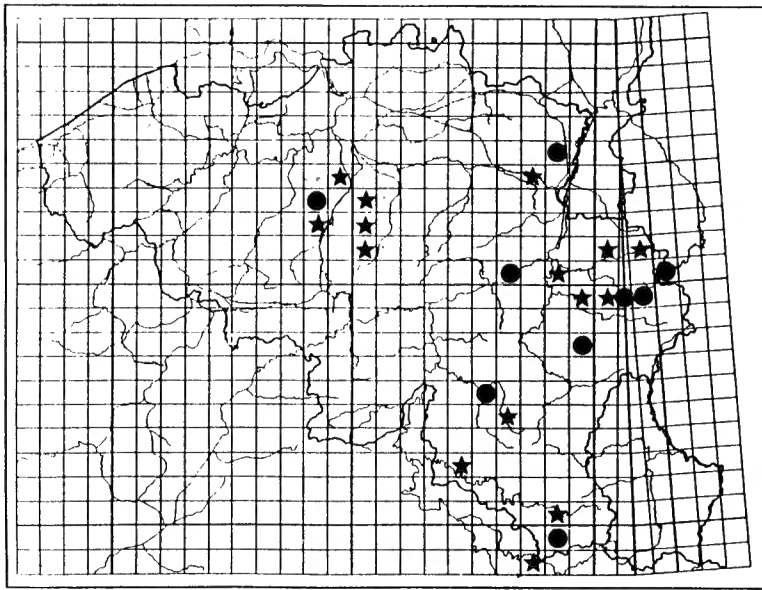
98. *Dasysyrphus nigricornis*



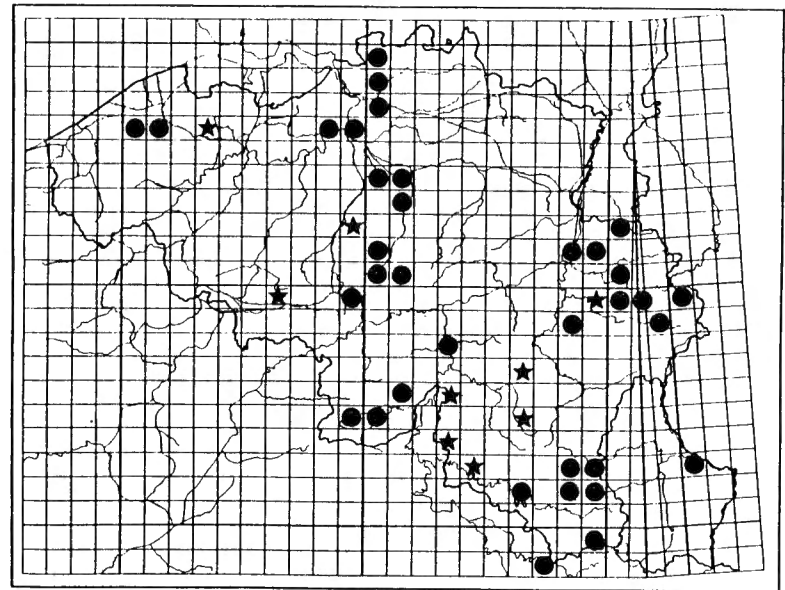
99. *Dasysyrphus tricinctus*



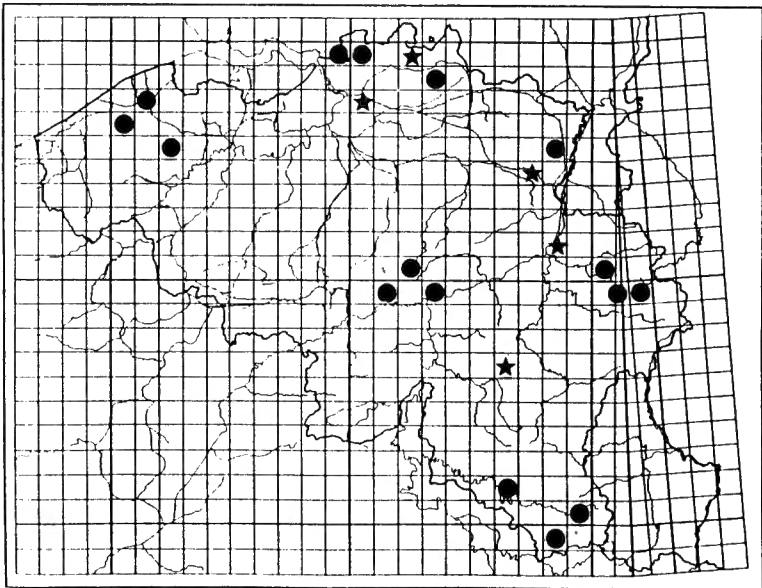
100. *Dasysyrphus venustus*



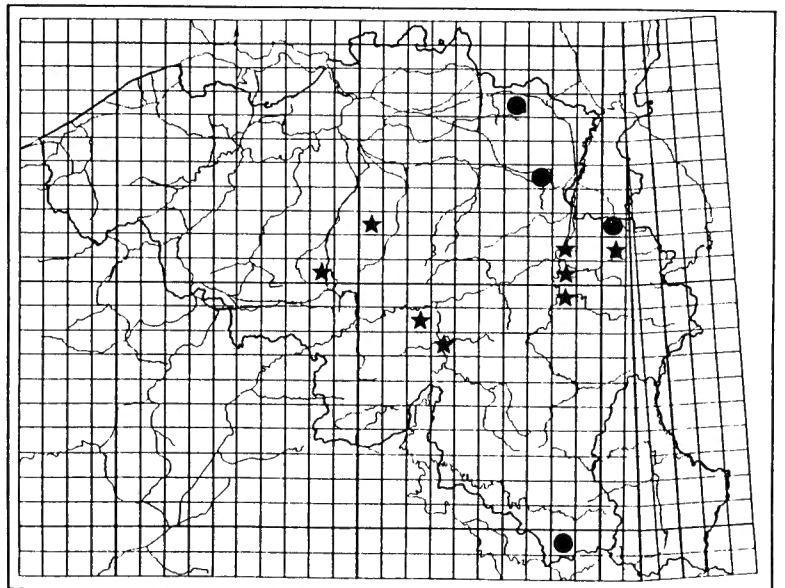
101. *Didea alneti*



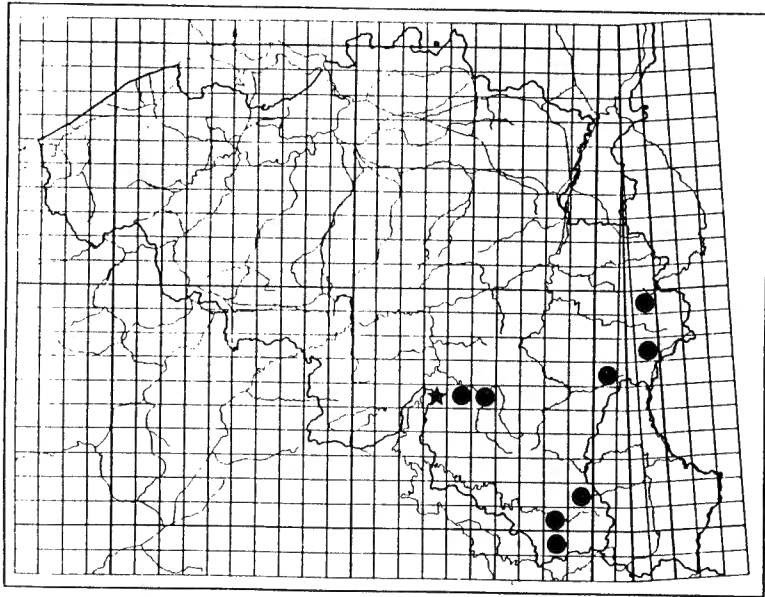
102. *Didea fasciata*



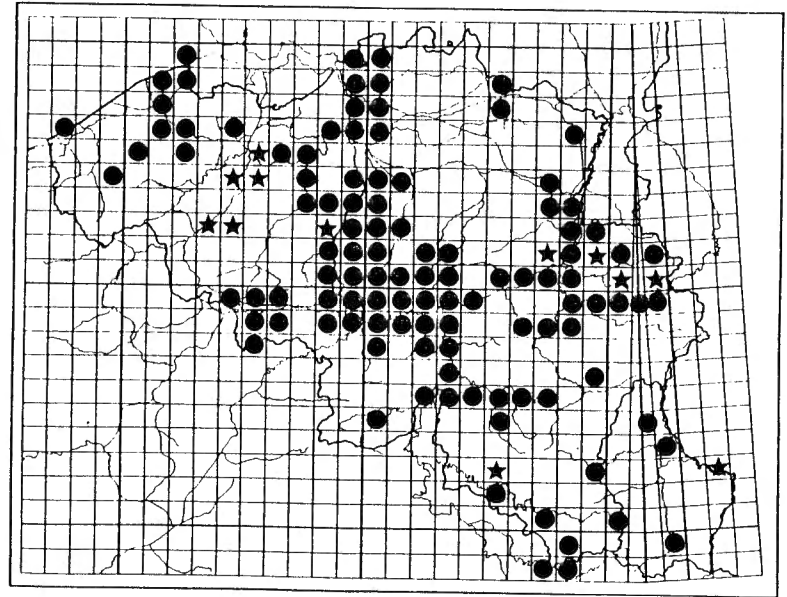
103. *Didea intermedia*



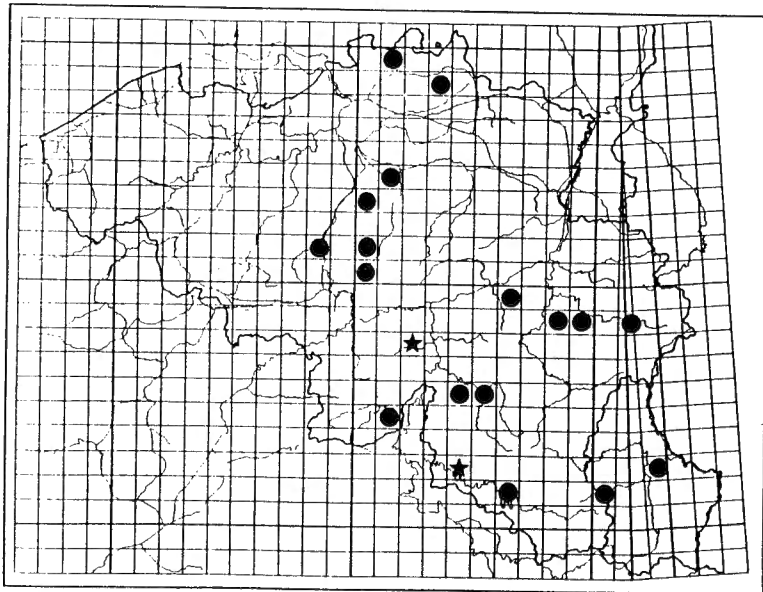
104. *Doros conopseus*



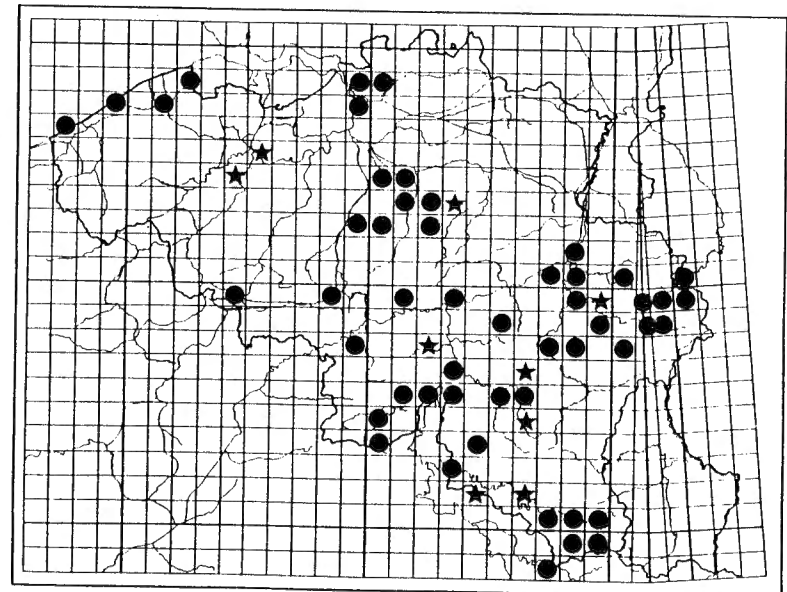
105. *Epistrophe diaphana*



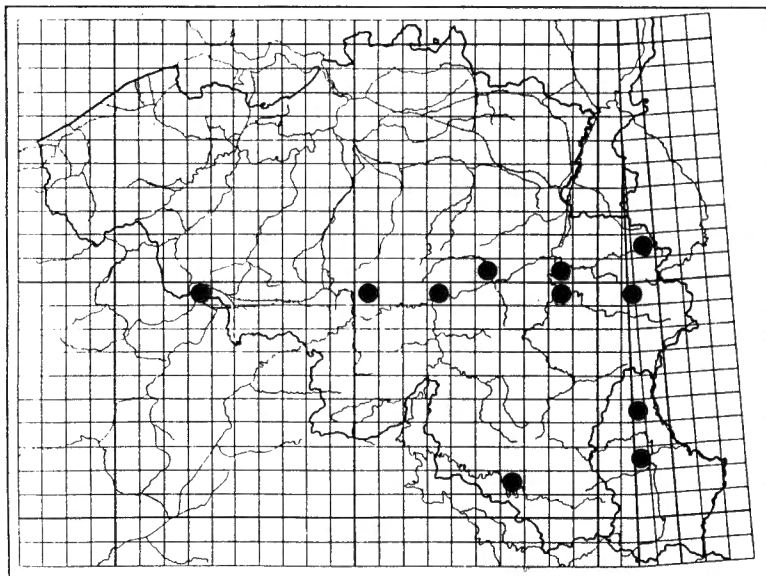
106. *Epistrophe eligans*



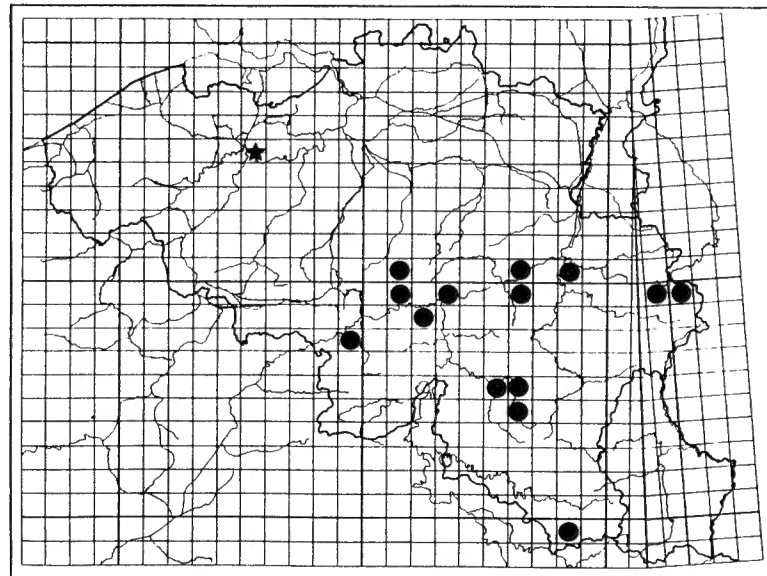
107. *Epistrophe euchroma*



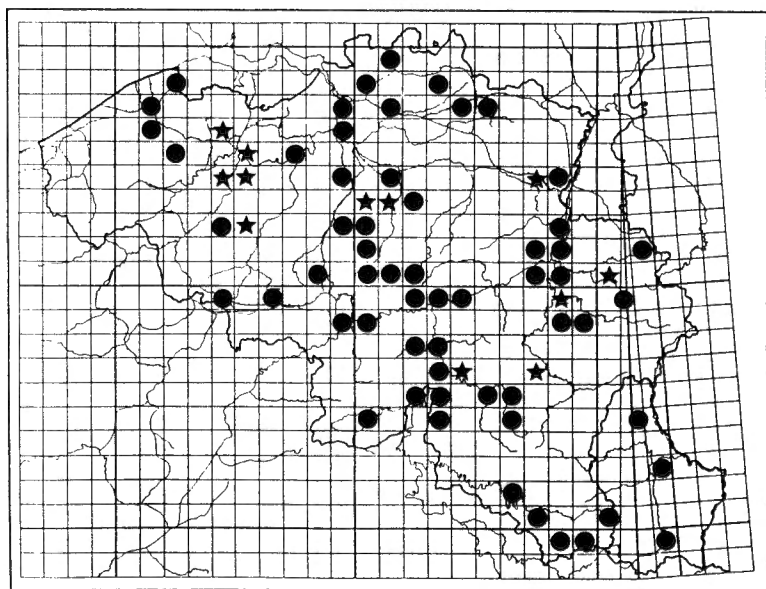
108. *Epistrophe grossulariae*



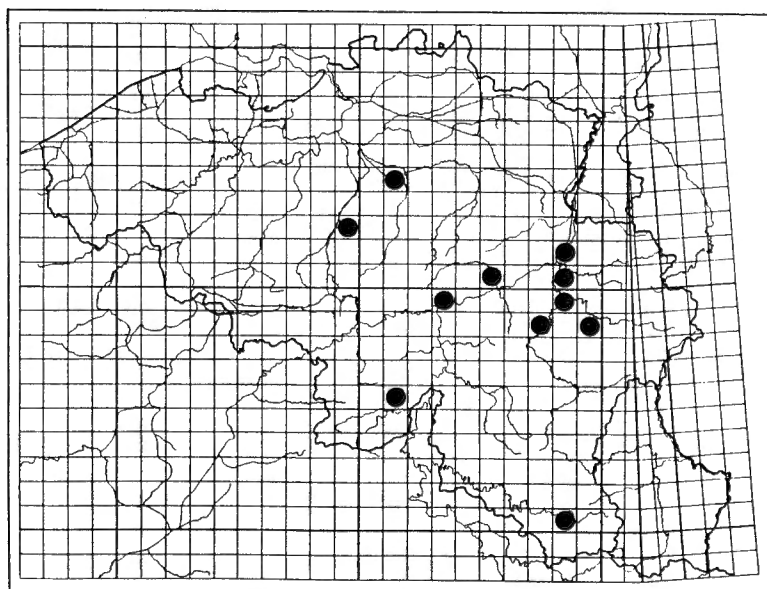
109. *Epistrophe melanostoma*



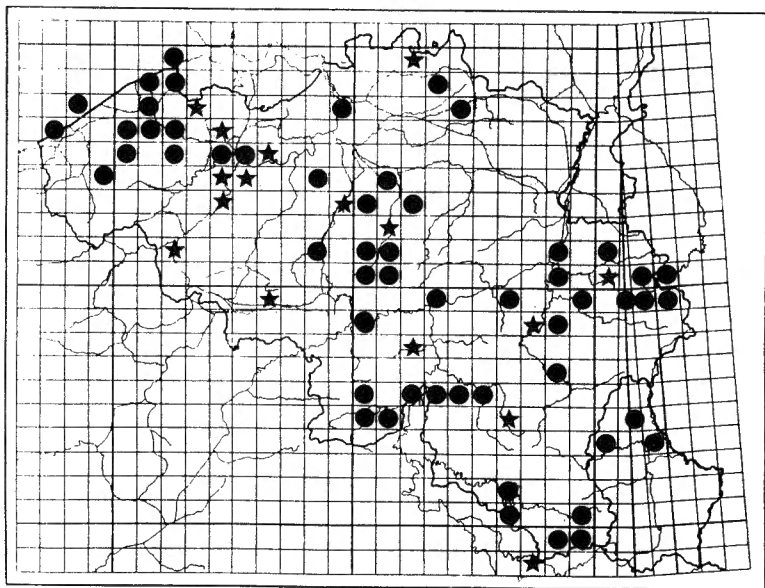
110. *Epistrophe melanostomoides*



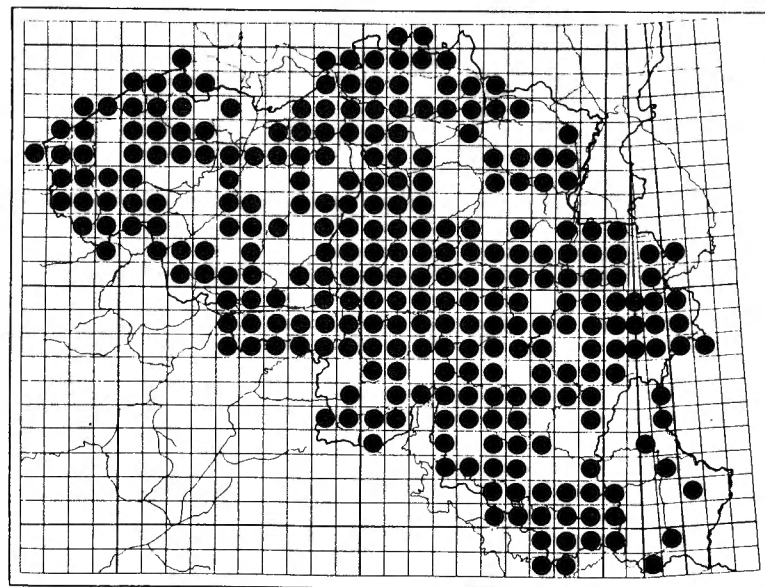
111. *Epistrophe nitidicollis*



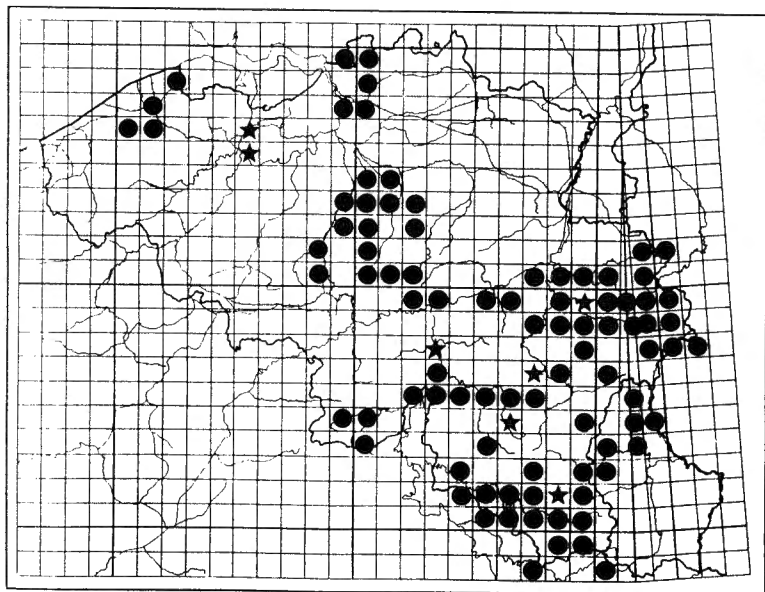
112. *Epistrophe ochrostoma*



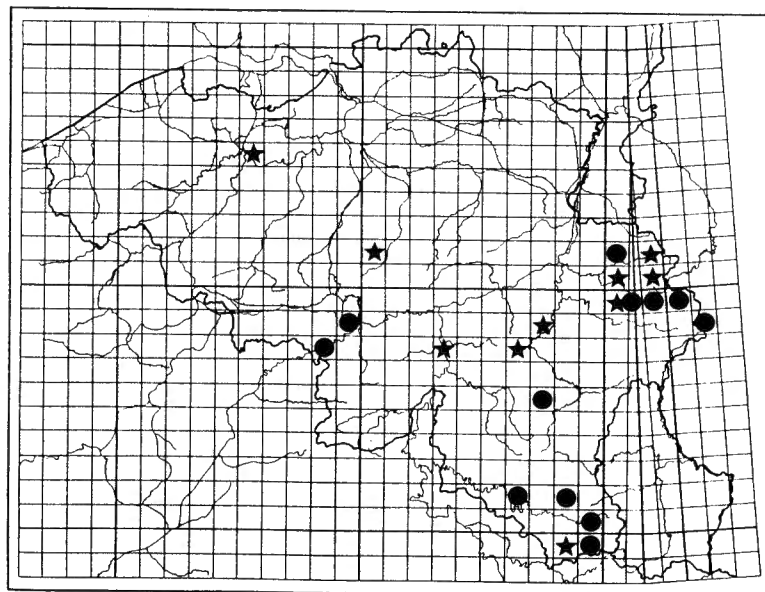
113. *Episyrrhus auricollis*



114. *Episyrrhus balteatus*

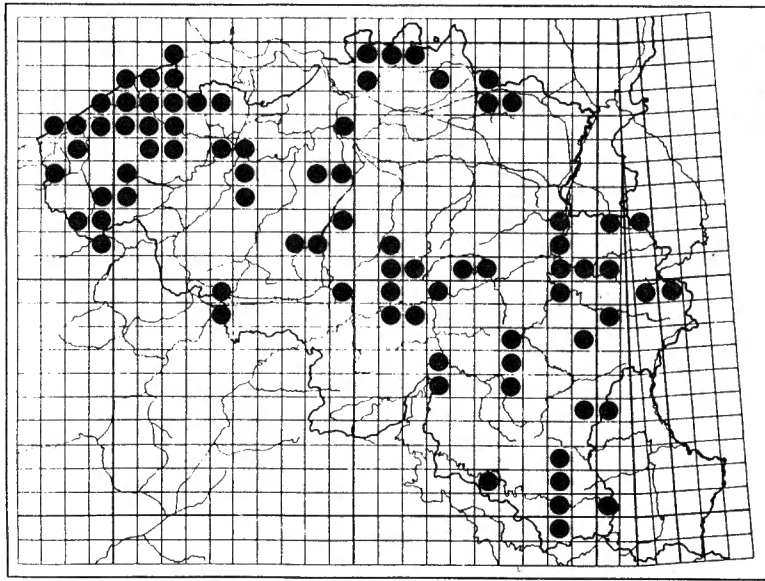


115. *Episyrrhus cinctellus*

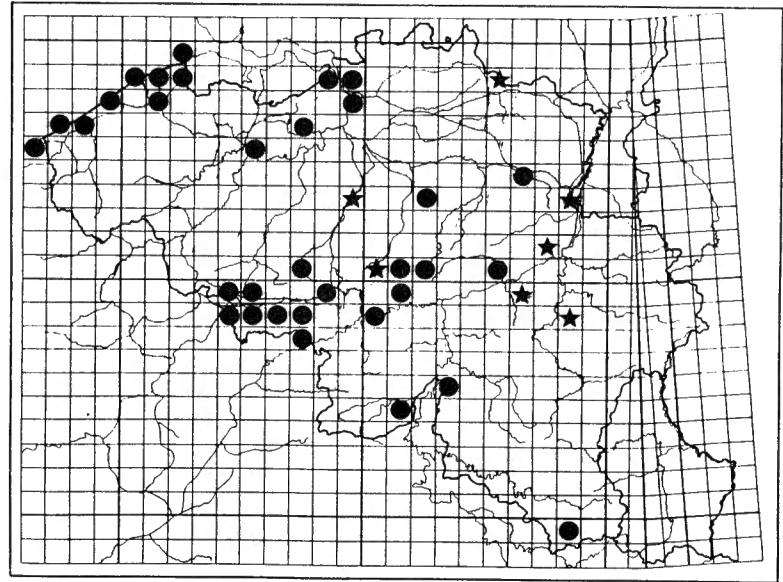


116. *Eriozona syrphoides*

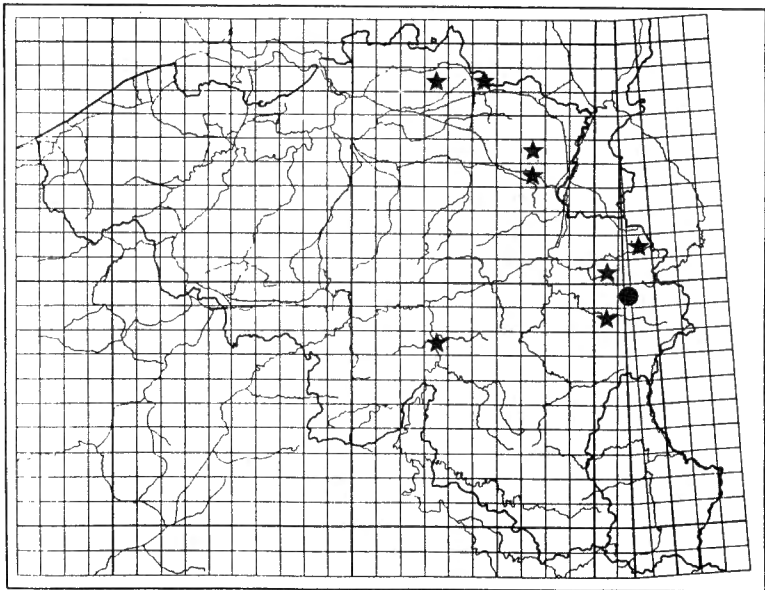




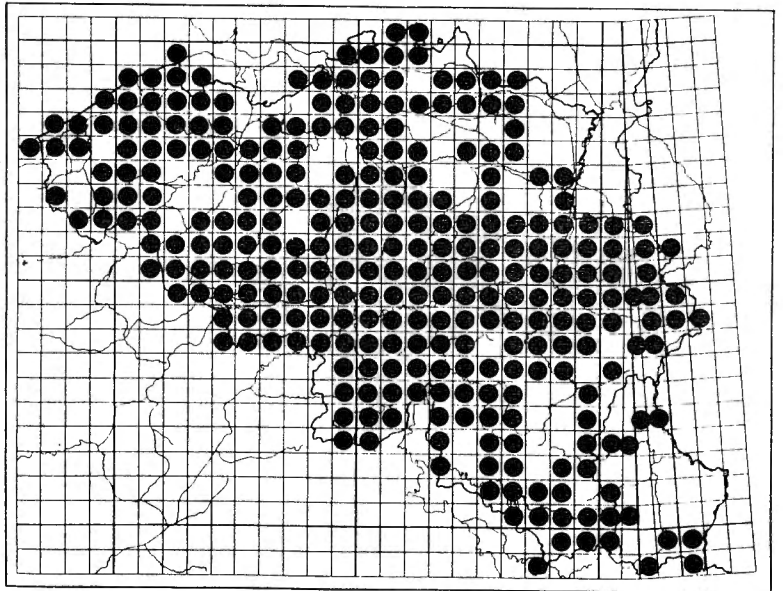
117. *Eristalis abusivus*



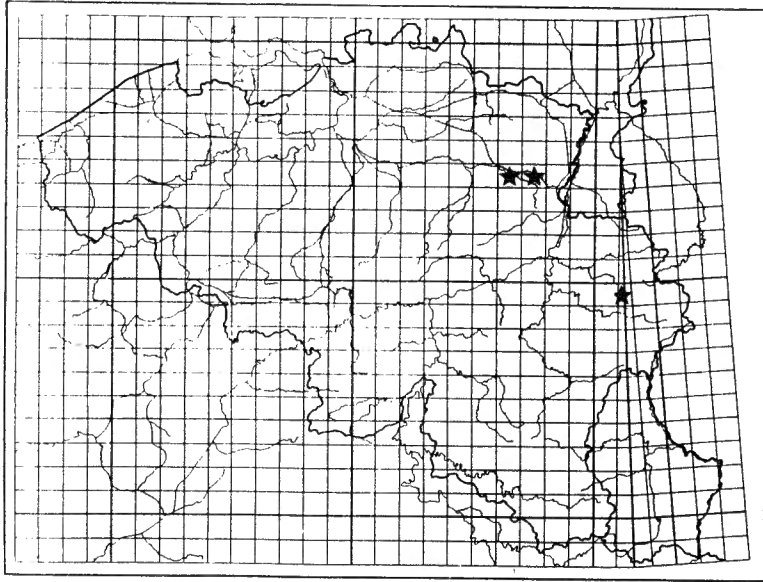
118. *Eristalis aeneus*



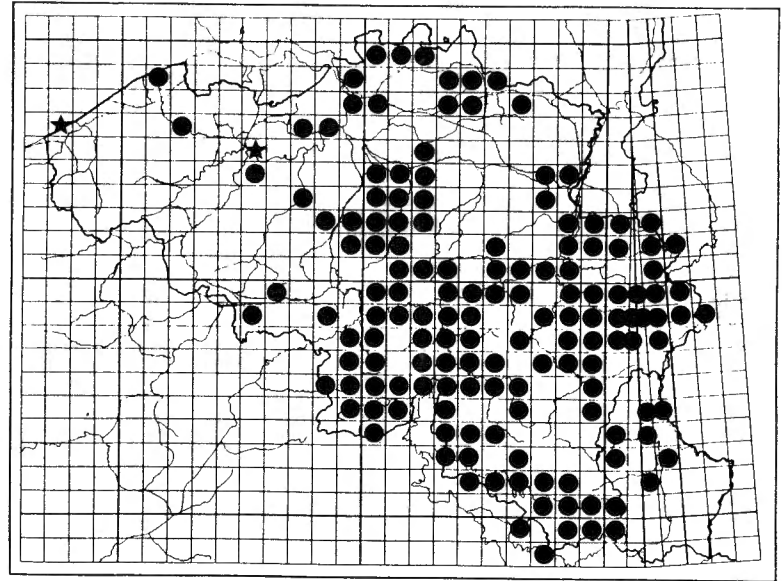
119. *Eristalis alpinus*



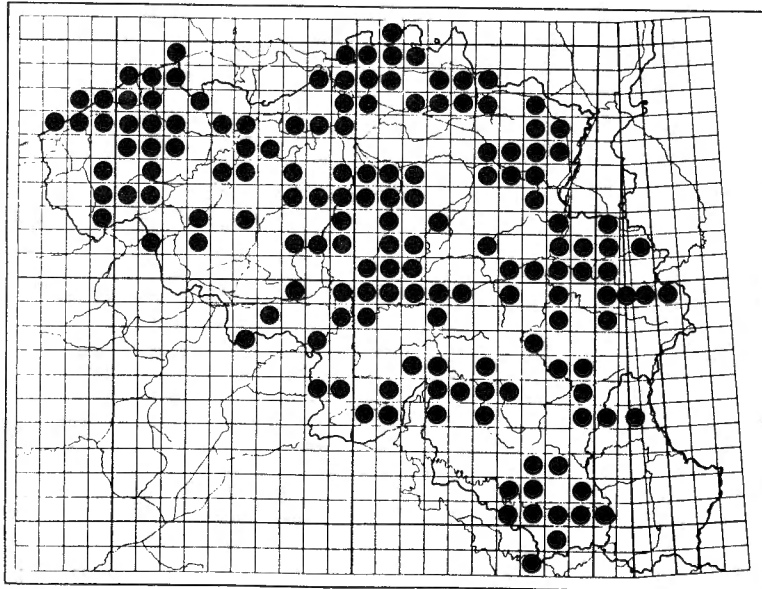
120. *Eristalis arbustorum*



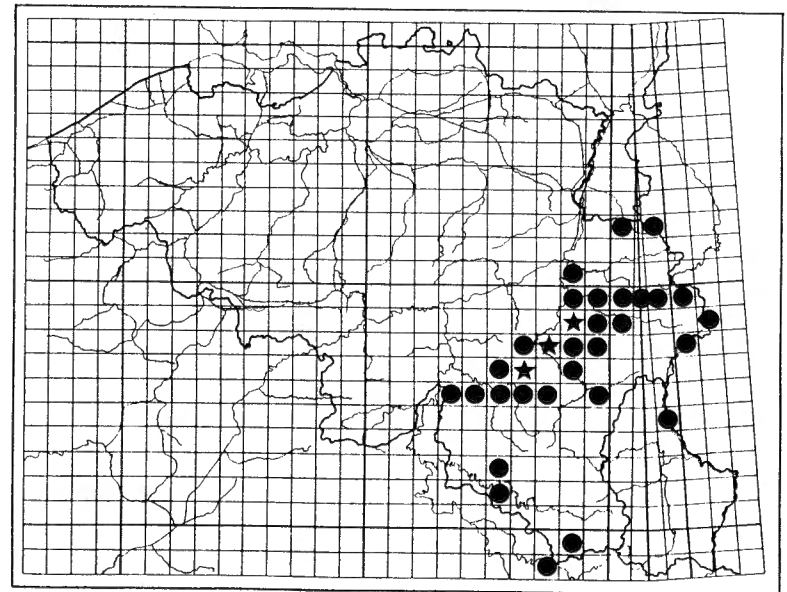
121. *Eristalis cryptarum*



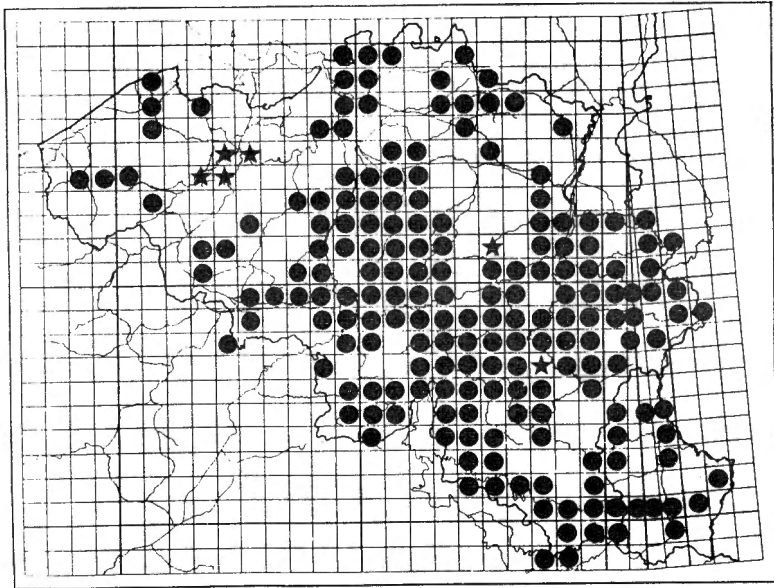
122. *Eristalis horticola*



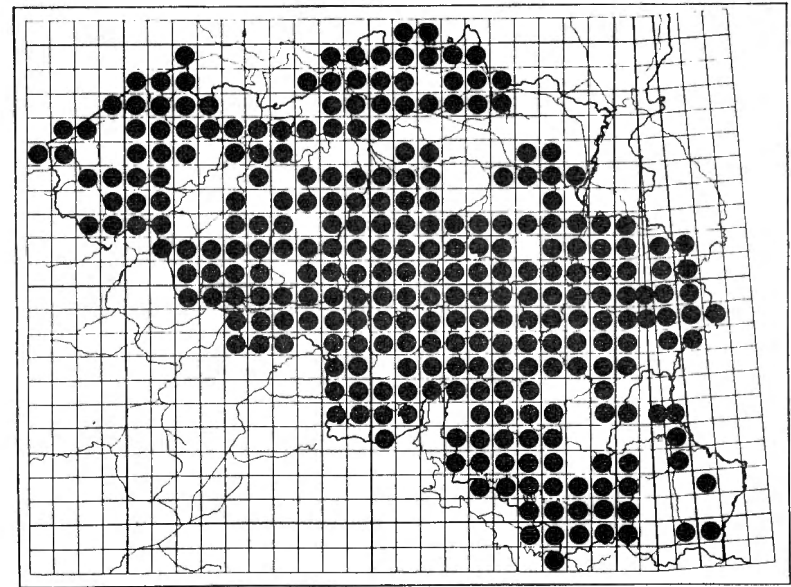
122. *Eristalis intricarius*



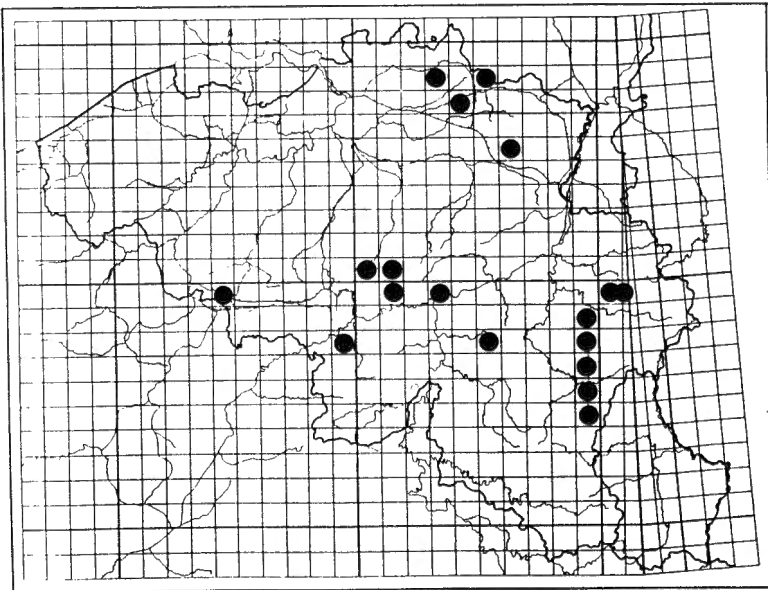
124. *Eristalis jugorum*



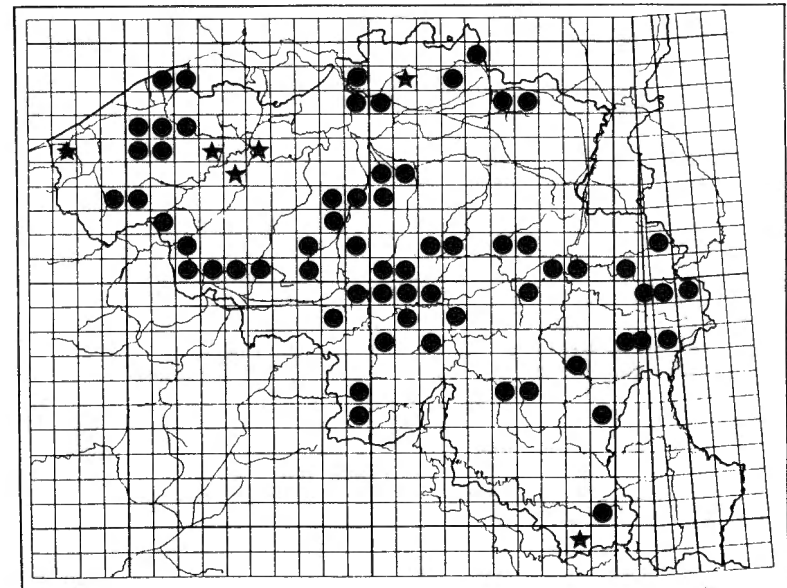
125. *Eristalis nemorum*



126. *Eristalis pertinax*

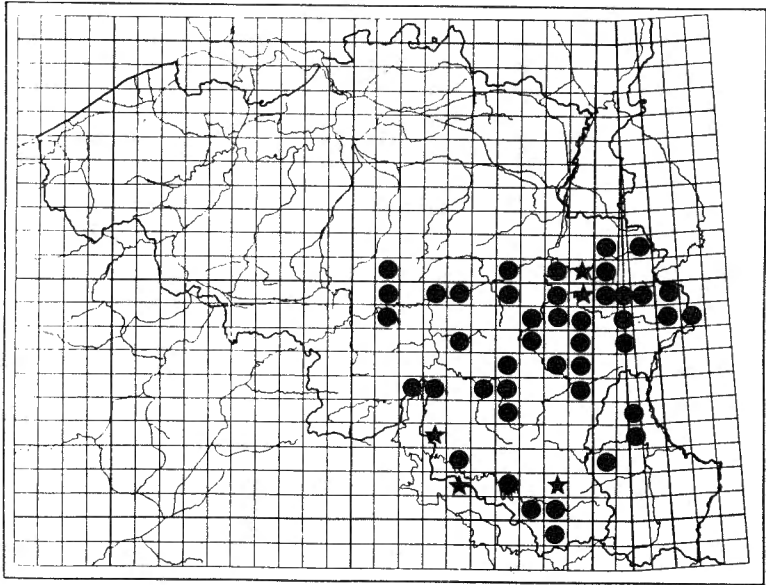


127. *Eristalis ?piceus*

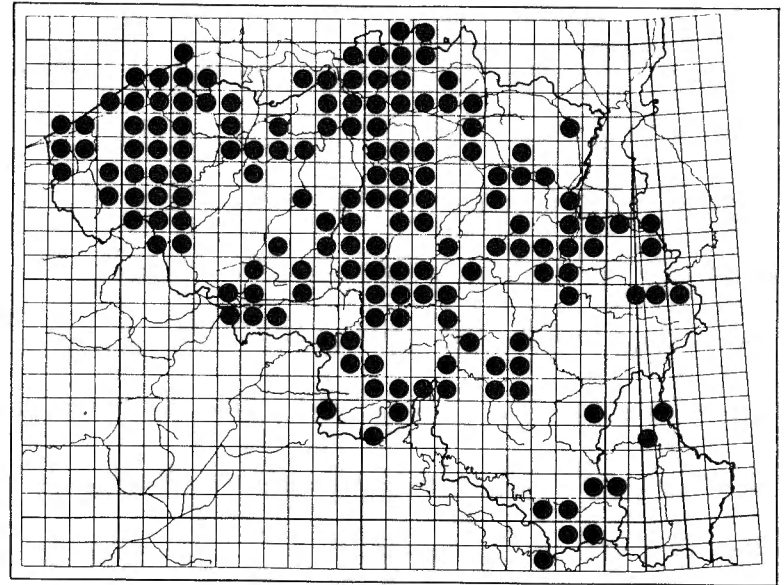


128. *Eristalis pratorum*

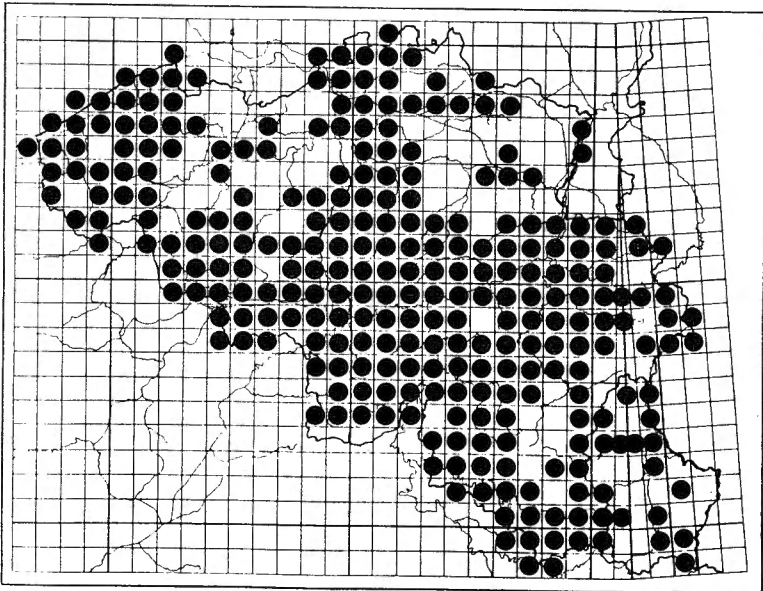




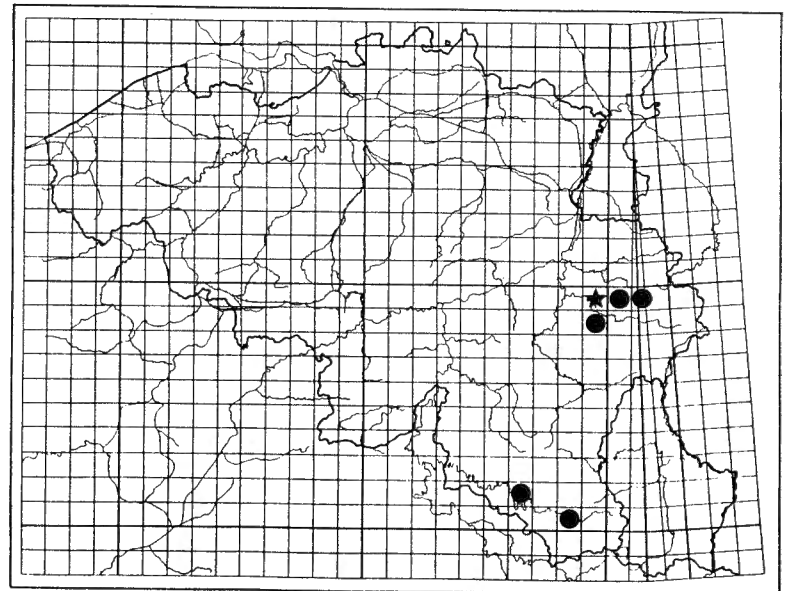
129. *Eristalis rupium*



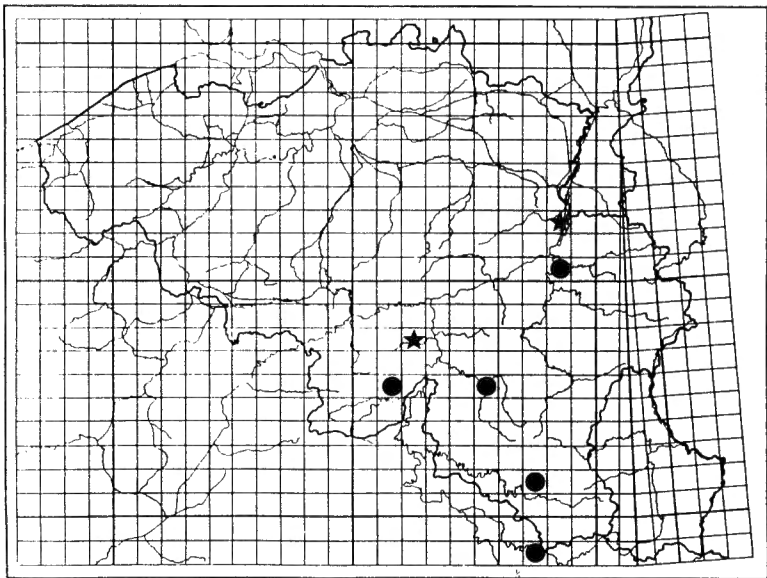
130. *Eristalis sepulcralis*



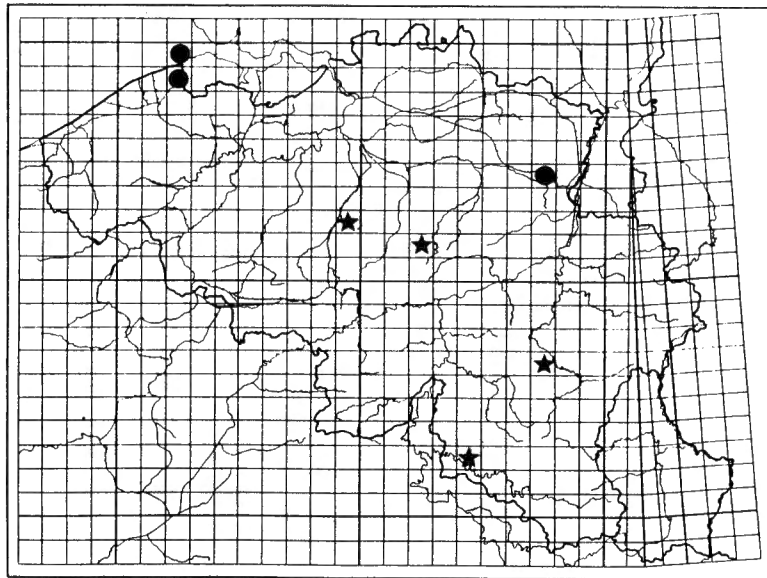
131. *Eristalis tenax*



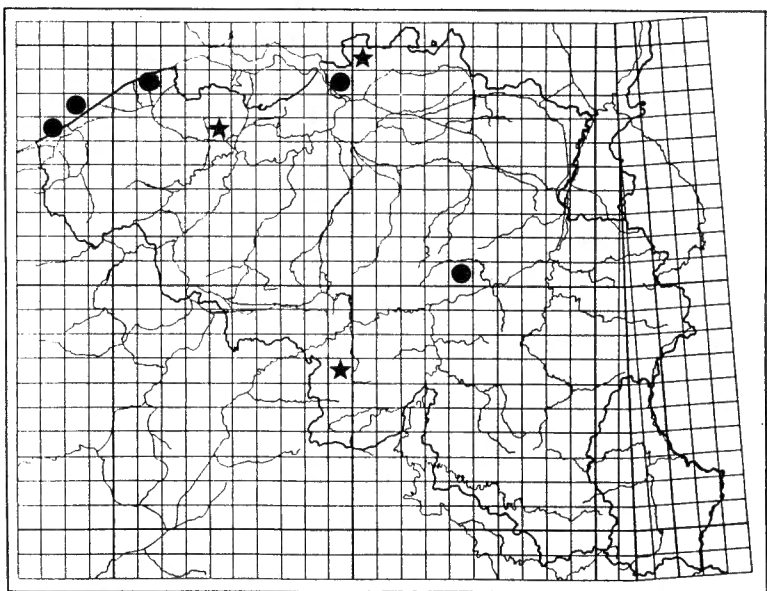
132. *Eumerus flavitarsis*



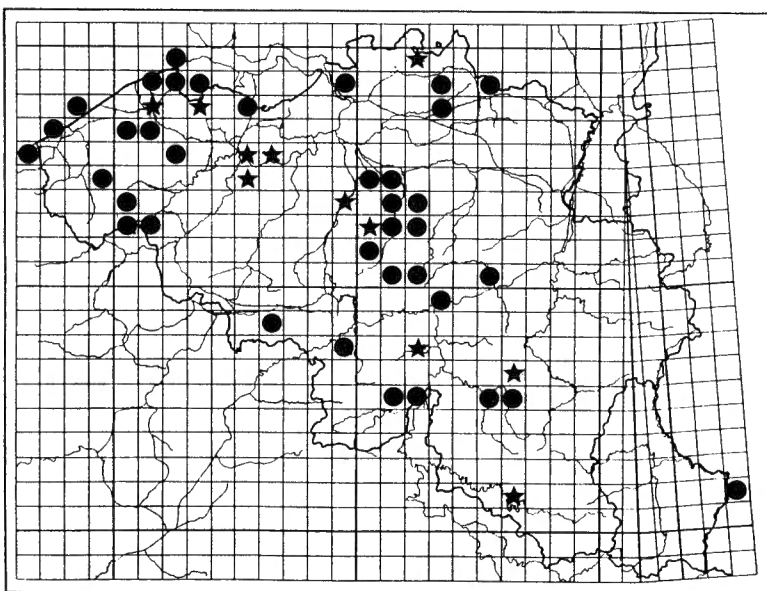
133. *Eumerus ornatus*



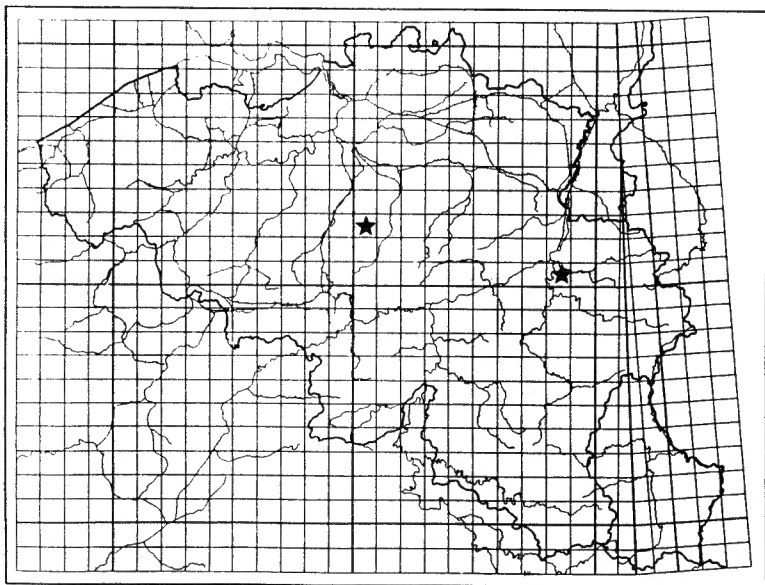
134. *Eumerus sabulorum*



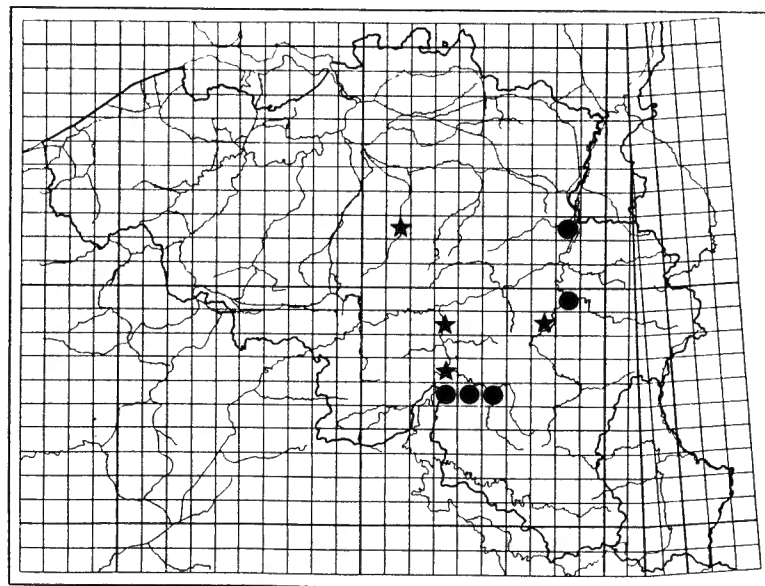
135. *Eumerus sogdianus*



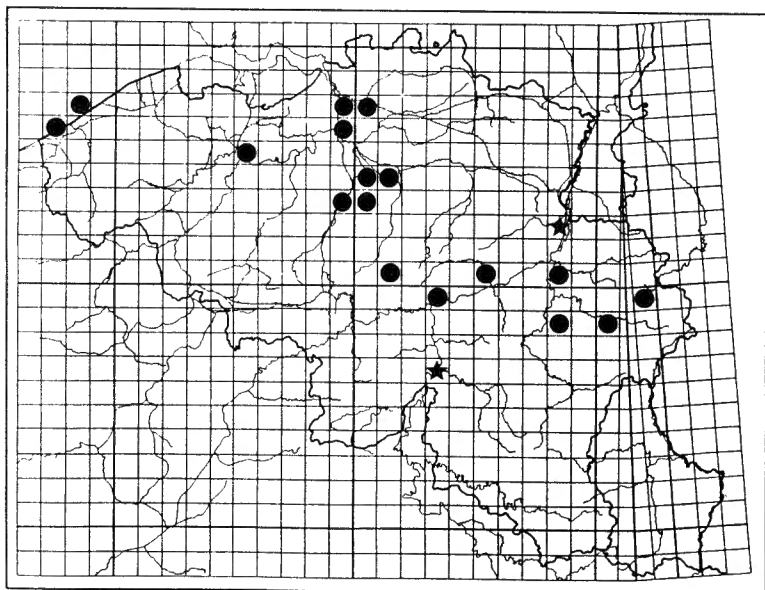
136. *Eumerus strigatus*



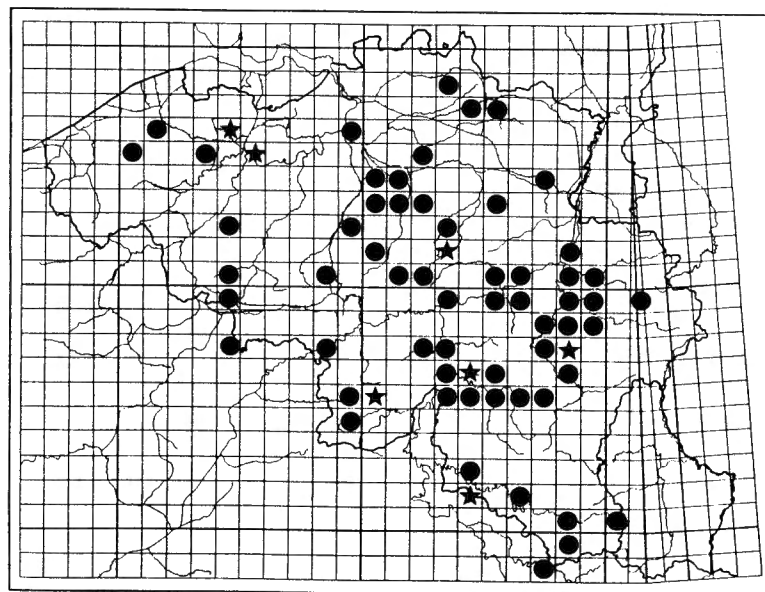
137. *Eumerus tarsalis*



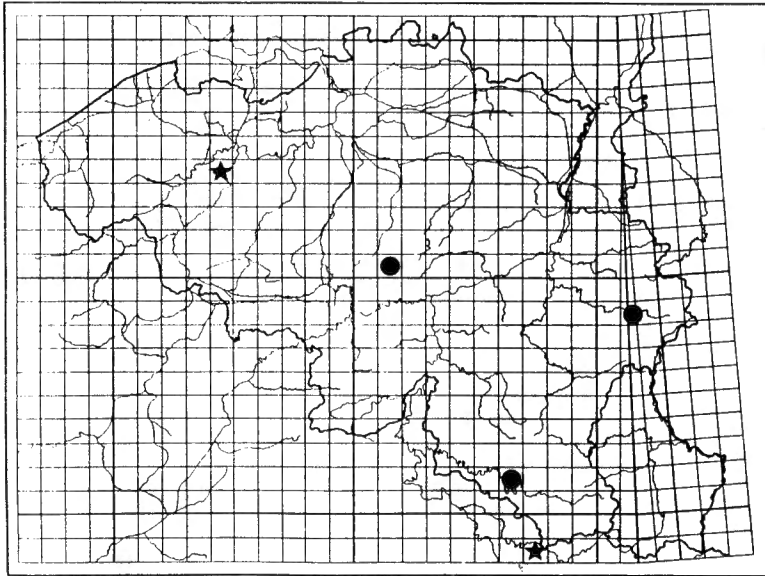
138. *Eumerus tricolor*



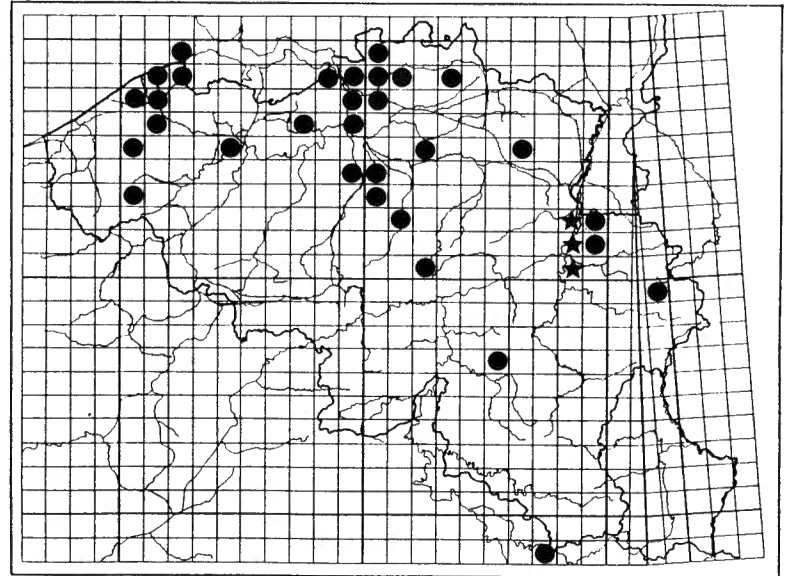
139. *Eumerus tuberculatus*



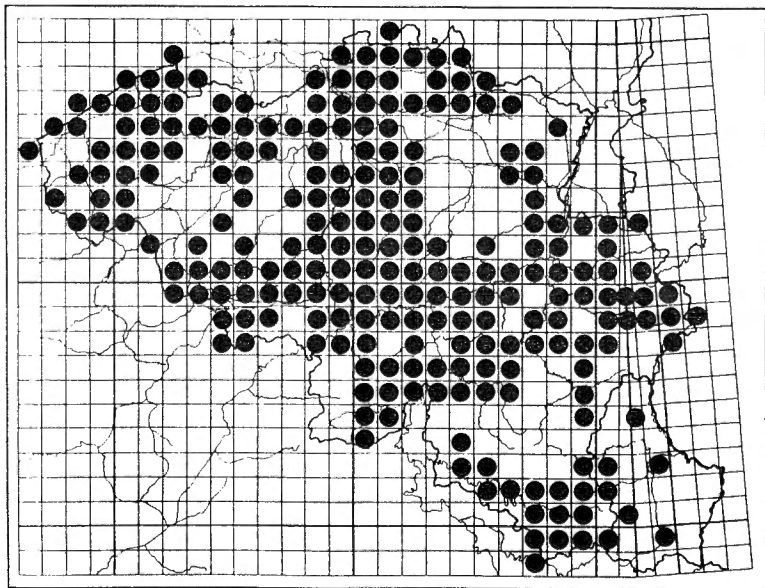
140. *Ferdinandea cuprea*



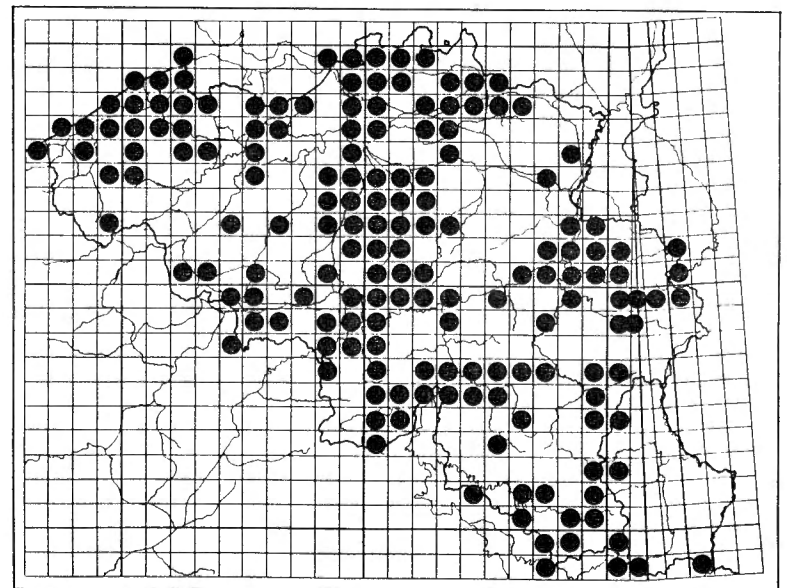
141. *Ferdinandea ruficornis*



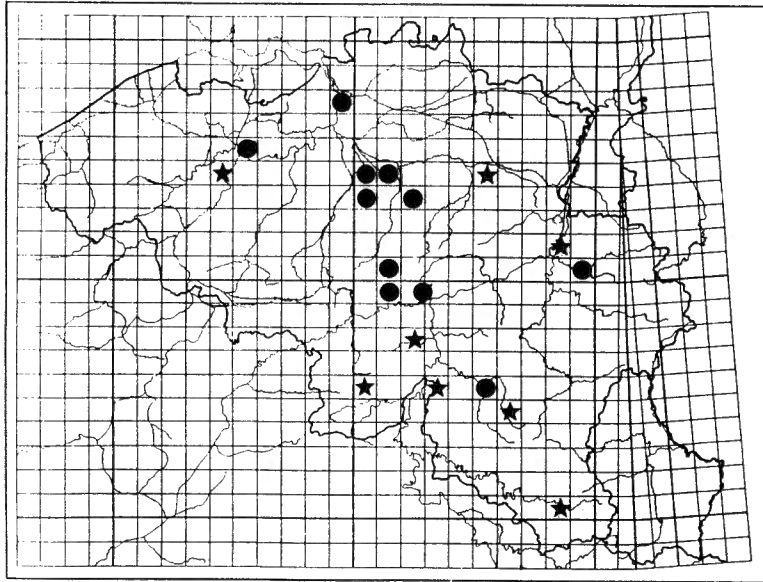
142. *Helophilus hybridus*



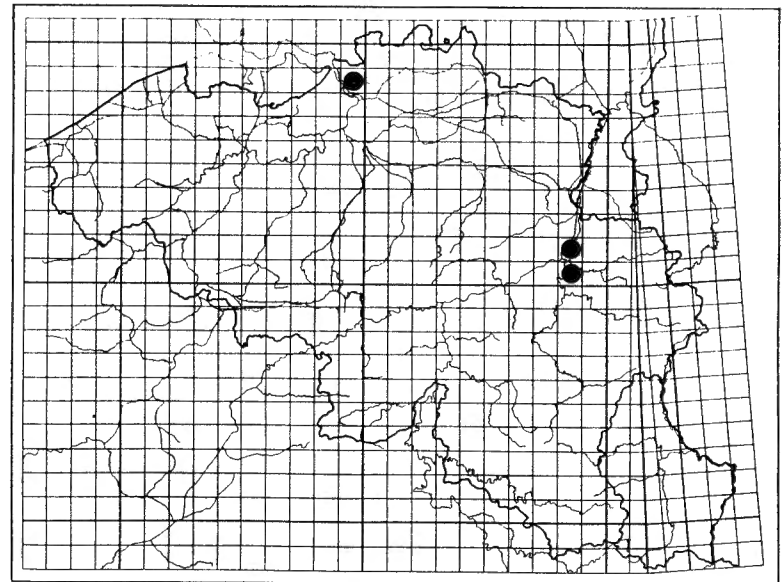
143. *Helophilus pendulus*



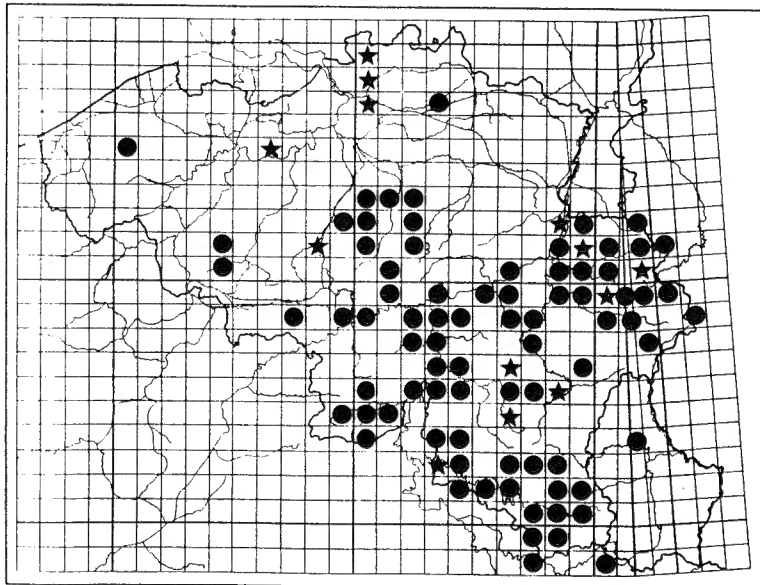
144. *Helophilus trivittatus*



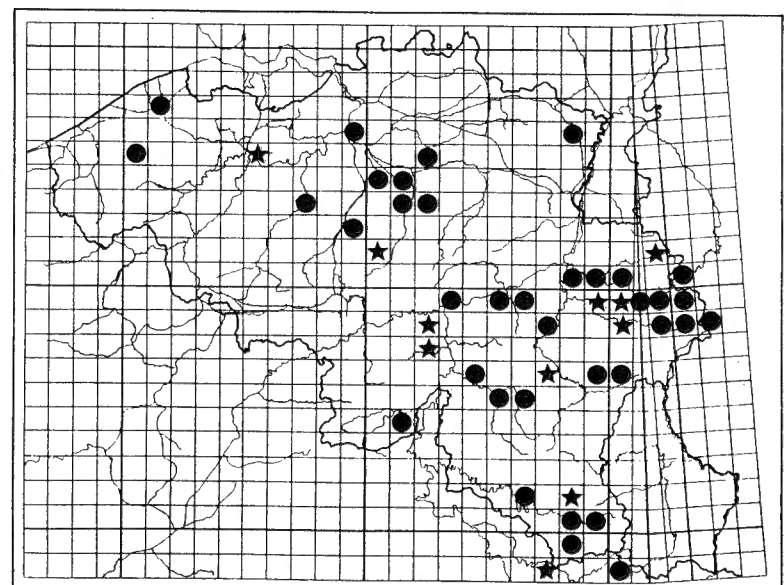
145. *Heringia heringi*



146. *Heringia senilis*

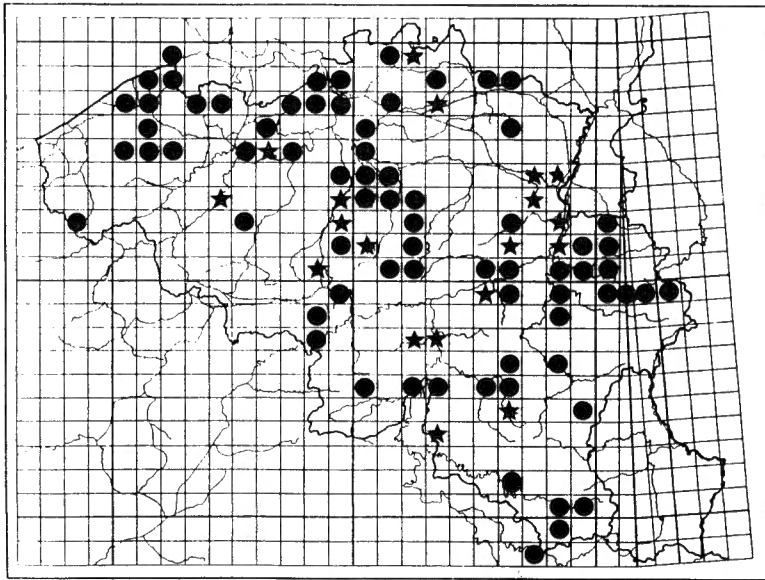


147. *Ischyrosyrphus glaucius*

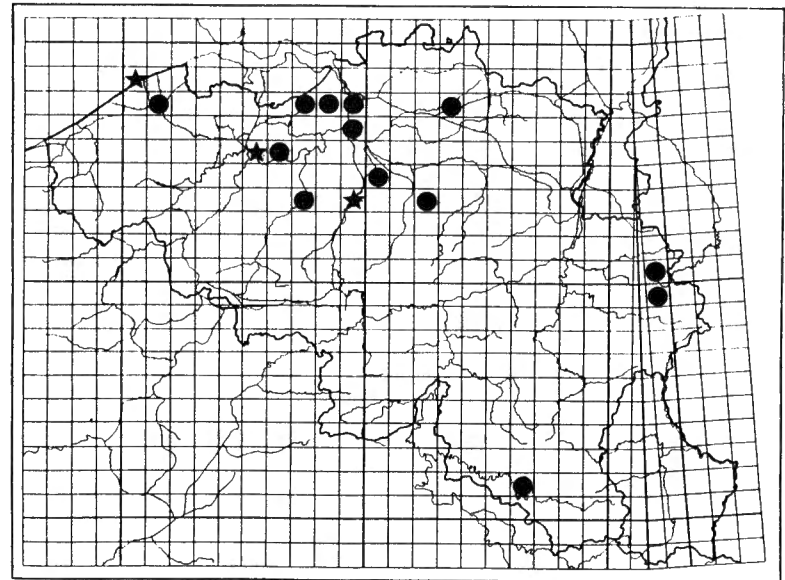


148. *Ischyrosyrphus laternarius*

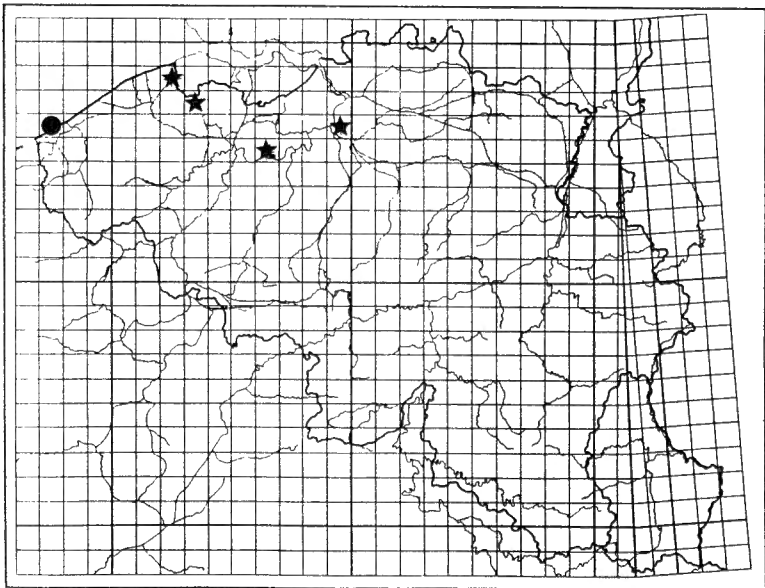




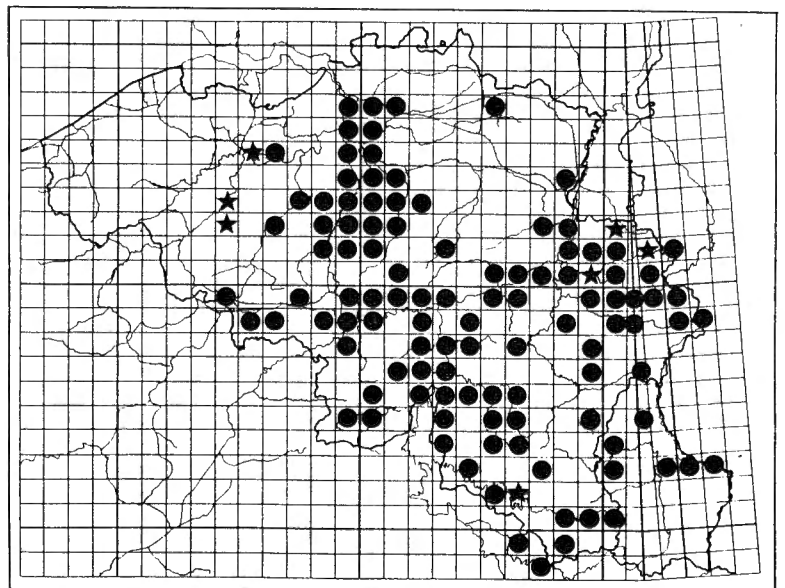
149. *Lejogaster metallina*



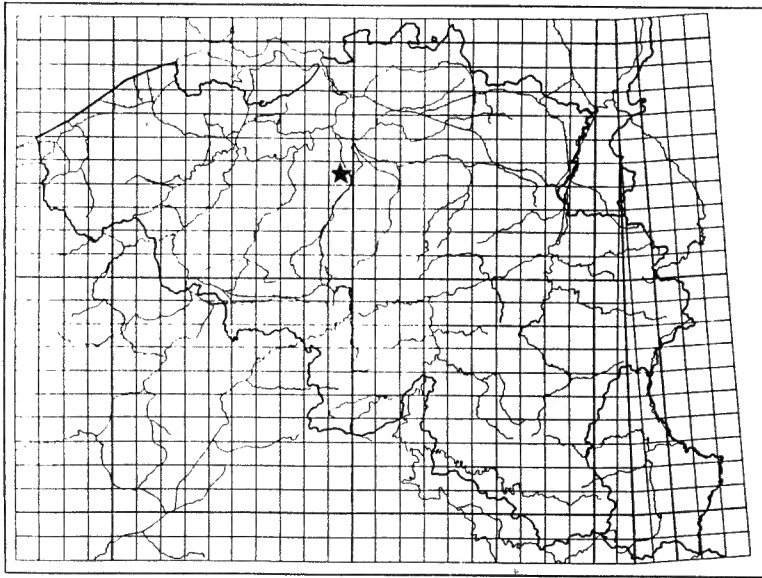
150. *Lejogaster splendida*



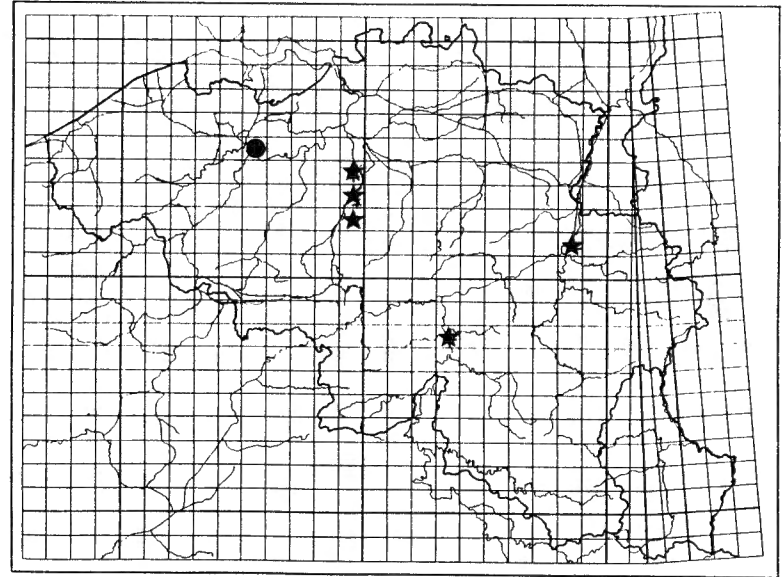
151. *Lejops vittata*



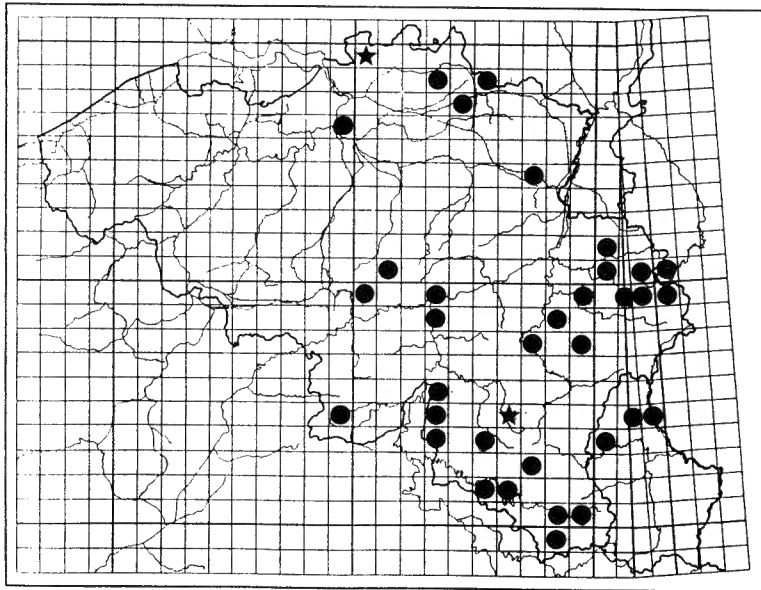
152. *Leucozona lucorum*



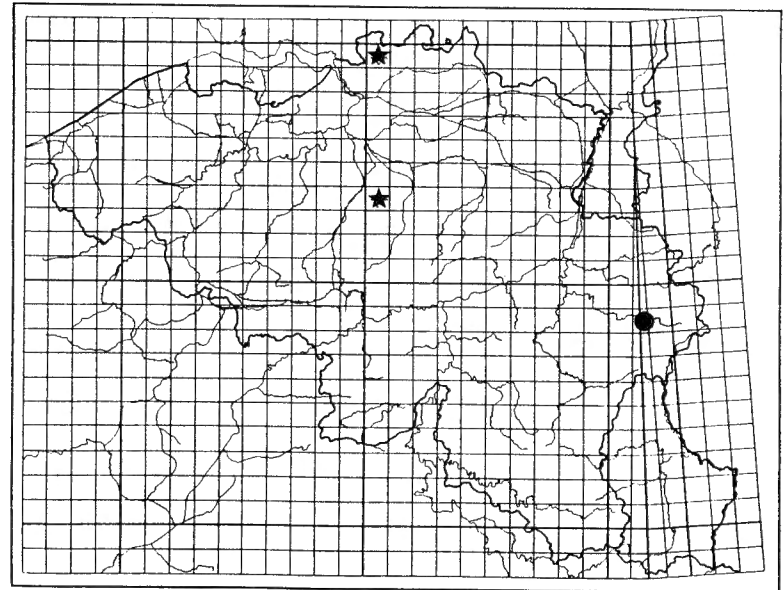
153. *Mallota cimbiciformis*



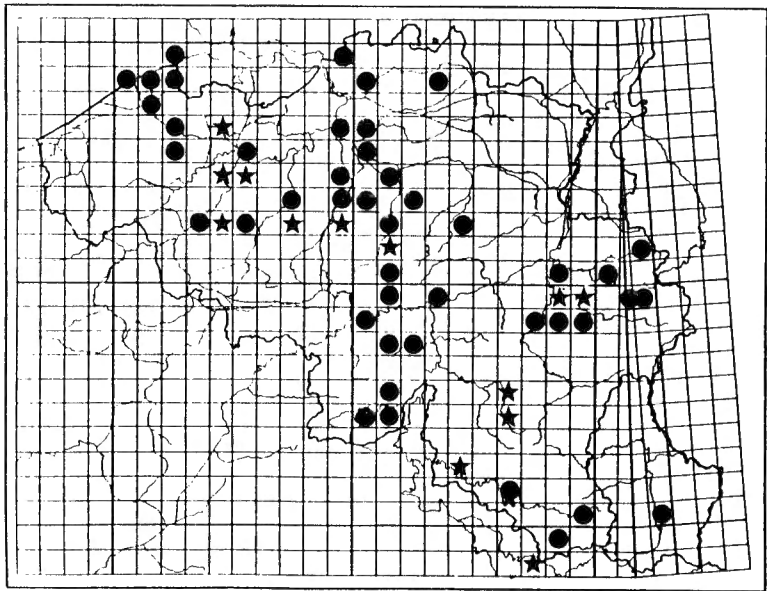
154. *Mallota fuciformis*



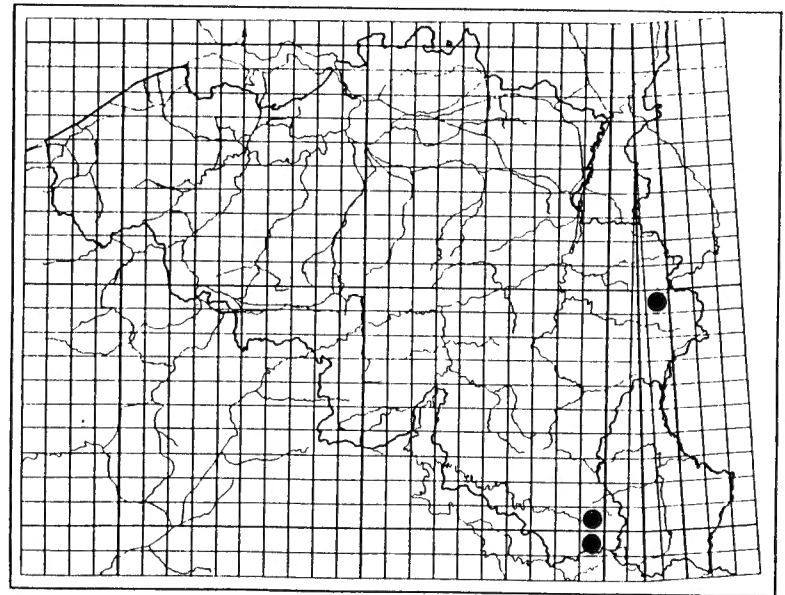
155. *Megasyrphus annulipes*



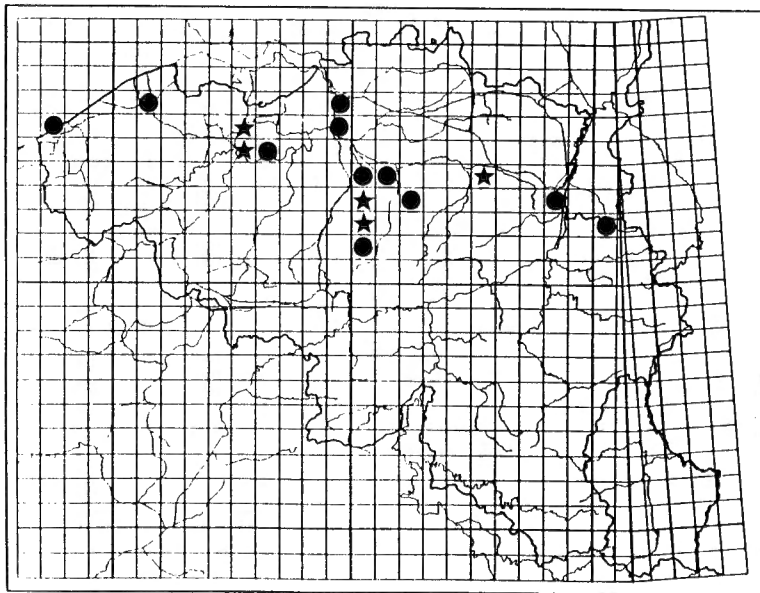
156. *Melangyna barbifrons*



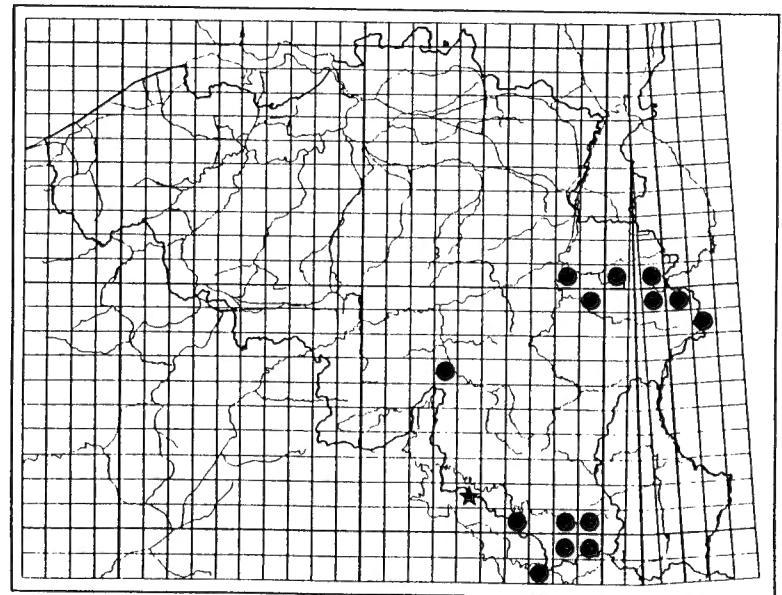
157. *Melangyna cincta*



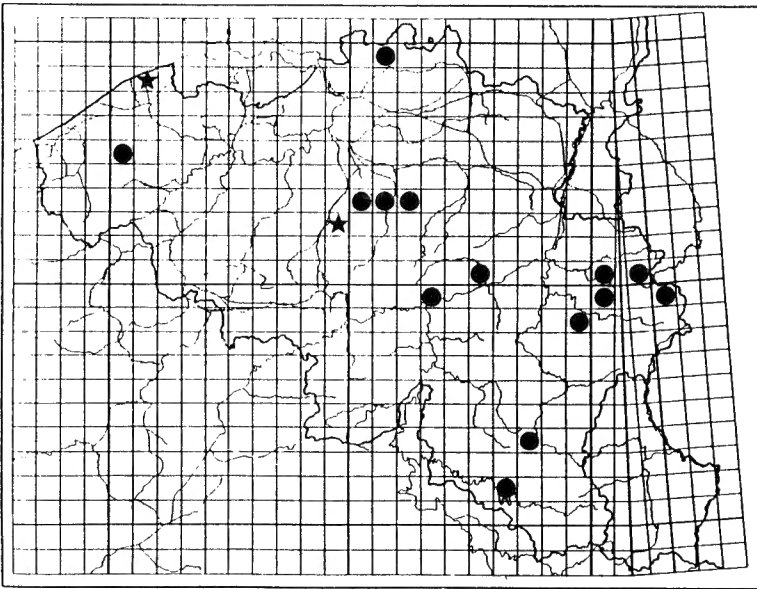
158. *Melangyna compositarum*



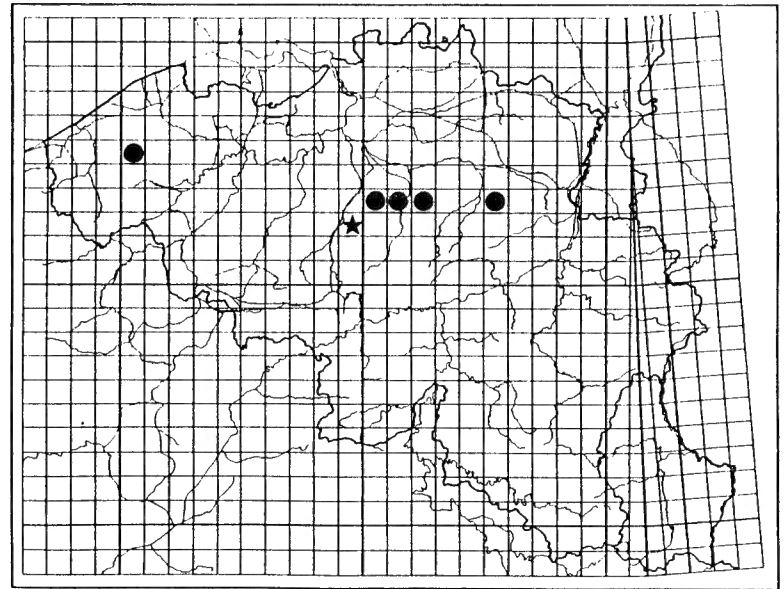
159. *Melangyna guttata*



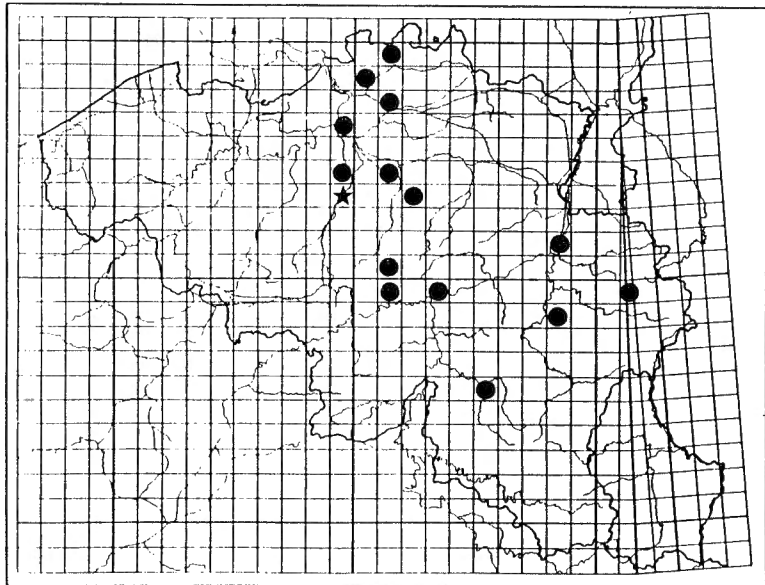
160. *Melangyna labiatarum*



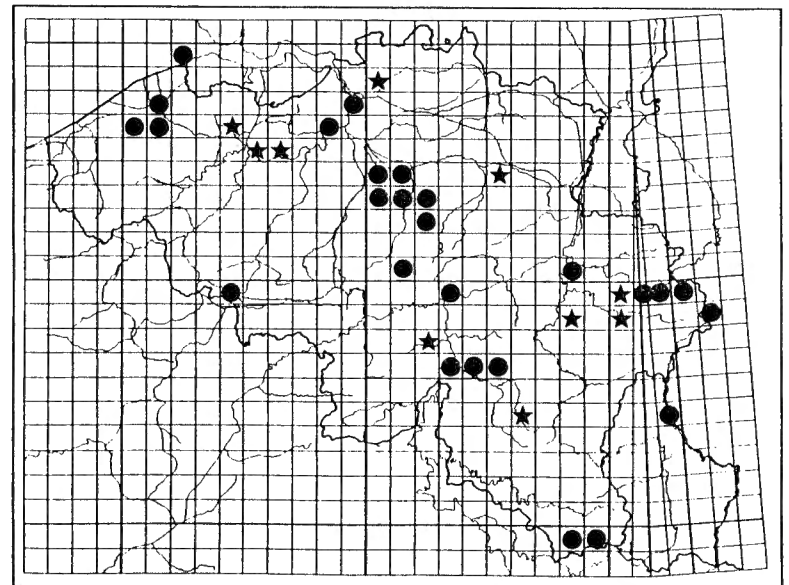
161. *Melangyna lasiophthalma*



162. *Melangyna quadrimaculata*



163. *Melangyna triangulifera*



164. *Melangyna umbellatarum*