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Adresse der Autorin: Corina Schiess-Bühler, Neuhof, Schalchen, CH-8492 Wila

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Some observations on the Liechtenstein insect fauna and its conservation, with particular reference to the Diptera

MARTIN C. D. SPEIGHT 1988

Summary

During the period 1-23 June 1987 selected taxonomic groups of insects were collected from sites of known scientific interest in Liechtenstein. A general account of the results is presented. It is suggested that in the Rhine valley wetland insects are now largely restricted to protected sites and that the alluvial forest/gallery forest fauna has mostly been lost. The insect fauna of the Rieds is identified as being still of exceptional interest. The intensification of farming activity is observed to have caused a significant reduction in the insect fauna of the grasslands, evidenced by the contrastingly rich fauna of the few unimproved grassland sites which remain. The exceptional diversity and richness of the coniferous and deciduous forest faunas is remarked upon, and it is pointed out that at higher altitudes the fauna associated with forest streams appears to be well represented. Unimproved montane pasture within the upper part of the conifer forest zone is also noted as exhibiting an exceptional fauna. Certain species of particular interest are mentioned by name. It is suggested that some results of the comprehensive environmental conservation policy operating in Liechtenstein are already detectable, in that insect species which have already been lost from considerable areas of Europe may still be found in Liechtenstein.

Résumé

Quelques observations de la faune entomologique du Liechtenstein et de sa protection, se référant particulièrement aux diptères.

Entre le 1^{er} et le 23 juin 1987, des groupes d'insectes choisis ont été récoltés au Liechtenstein, dans des lieux présentant un intérêt scientifique particulier. Le présent résumé décrit les résultats d'une manière générale. Il semble que les insectes particuliers aux régions humides sont localisés dans la vallée du Rhin, principalement dans les zones protégées et que la faune des forêts riveraines / forêts galeries a en grande partie disparu. La faune entomologique des roselières est considérée comme étant toujours très intéressante. Un net appauvrissement de la faune entomologique s'observe dans les régions d'agriculture intense par opposition à la riche faune des rares surfaces dont l'exploitation est encore extensive. L'extraordinaire variété et richesse en insectes dans les vieilles forêts résineuses et feuillues est soulignée et il est signalé que la faune liée aux forêts semble être bien représentée en altitude. Les pâturages maigres des alpages dans la partie supérieure de la zone des forêts résineuses se caractérisent par une faune entomologique très particulière. Quelques espèces présentant un grand intérêt scientifique sont citées dans le rapport. Il apparaît que la politique de réserves naturelles mise en œuvre porte ses fruits, si bien que certaines espèces d'insectes qui ont déjà disparu de grandes parties de l'Europe peuvent encore être trouvées au Liechtenstein.

Zusammenfassung

Einige Beobachtungen aus der Insektenfauna Liechtensteins unter deren Schutz, mit spezieller Bezugnahme auf die Zweiflügler (Dipteren).

Vom 1. bis 23. Juni 1987 wurden ausgewählte Insektengruppen an Orten von besonderem wissenschaftlichem Interesse in Liechtenstein gesammelt. Eine allgemeine Zusammenfassung der Resultate wird vorgestellt. Es wird angenommen, dass im Rheintal Insekten, die in Feuchtgebieten vorkommen, weitestgehend auf die geschützten Gebiete beschränkt sind und dass die Tierwelt der Auenwälder / Galeriewälder zum grossen Teil verloren gegangen ist. Die Insektenfauna der Riedgebiete wird immer noch als von ganz besonderem Interesse betrachtet. In Gebieten intensiver Landwirtschaft ist eine bedeutende Verarmung der Insektenfauna zu beobachten, im Gegensatz zur reichen Fauna der wenigen, noch extensiv verbliebenen bewirtschafteten Flächen. Die aussergewöhnliche Mannigfaltig- und Reichhaltigkeit an Insekten in älteren Nadel-/Laubwäldern wird hervorgehoben und es wird darauf hingewiesen, dass in höheren Lagen die Fauna, die an Waldgebiete gebunden ist, auch noch durchgehend gut vertreten zu sein scheint. Magere Alpweiden im oberen Teil der Nadelwaldzone weisen eine ganz besondere Insektenwelt auf. Einige Arten von erhöhtem wissenschaftlichem Interesse werden im Beitrag namentlich aufgeführt. Es wird angenommen, dass die eingeleitete Schutzgebietspolitik bereits einige Resultate gezeitigt hat, so dass gewisse Insektenarten, welche bereits aus grossen Teilen Europas verschwunden sind, in Liechtenstein noch gefunden werden können.

These observations are based on a relatively brief visit to Liechtenstein, in June 1987, when the Spring was retarded by cold and wet weather. However, on nearly every day of my three and a half week stay, I was able to carry out at least some fieldwork. And, thanks to the considerable knowledge and help of Mario Broggi and Felix Näscher I was able to go directly to a series of key localities which, between them, covered a wide range of biotopes. In the Rhine valley, the effectiveness of my activities was also favourably influenced by a series of bicycles, one of which appeared wherever I was staying, providing me with easy access to nearly every locality. My activities were focused primarily upon collection of material belonging to selected families of the two-winged flies, the Diptera, and should be viewed in that context.

I have organised my remarks under a series of broad headings: Rhine valley wetlands, Rhine valley croplands and grasslands, Rhine valley dry woodland, deciduous forest, conifer forest, montane pasture. The geology, topography and land-use of Liechtenstein lend themselves to such a classification of the countryside (KRANZ, 1981). The North-South alluvial plain of the Rhine provides one set of biotopes, differentiated from each other mostly by site drainage and land-use history. Above the plain, the steeply-sloping limestone flanks of the Rhine valley, clothed at lower altitudes by deciduous forest interspersed with farmland and at higher altitudes by forests containing ever more spruce, provides a second set. The high valleys draining into the Saminatal, itself at 1000 m., provide a third set of biotopes, again nearly all on limestone, with wide sweeps of spruce forest and montane pasture giving way to the jumbled rock of bare crags above.

The gentle way in which the hand of man has been applied to much of Liechtenstein, even latterly, when so much of Europe has been devastated

biologically by intensive farming, intensive forestry, road-building and urban development, has enabled Liechtenstein to retain a richness of flora and fauna (well exemplified in SEITTER, 1977 and WILLI & BROGGI, 1983, 1985, 1986) which most Europeans would have to see to believe. My own particular interest, the fly family Syrphidae (Schwebfliegen), is now known to number at least 185 species in Liechtenstein, and this from a total of only one month of field activity. By way of contrast, the syrphid faunas of various western parts of Europe which have been rather thoroughly worked for Syrphidae are as follows:

Ireland: 170 species
Great Britain: 250 species
Denmark: 260 species
Netherlands: 300 species
Belgium: 310 species

If the Liechtenstein syrphid fauna were as well known as that of Belgium, it would not be surprising, on present evidence, to find it totalled in excess of 250 species.

Rhine valley wetlands

The abrupt transition found today along the Rhine, from water to embankment, provides the most glaring example I noticed in Liechtenstein, of man's alteration of natural features. There is now no typical water-margin insect fauna found there. Similarly, the canalisation of most of the streams flowing into the Rhine has largely eradicated their water-margin fauna. Remaining wetland insects are concentrated in the Rieds, or in the vicinity of occasional small water-bodies like the silt-entrapment ponds sited at the foot of mountain torrents, or in the much-modified gallery woodland remnants of previously alluvial forest. Creation of the pond and associated nature reserve at St. Katharinenbrunnen would seem to have been a very timely act, providing habitat for elements of the fauna which would probably otherwise be missing from the country.

Tree felling for fuel, within the remaining gallery woodland, has prevented most trees from growing to old age, resulting in a scarcity there of ancient trees and dead-wood habitats. This is reflected in the insect fauna, because I was unable to find many of the species associated with ancient Salix etc. The trampling and grazing activities of livestock, coupled with the progressive drying-out of the forest caused by flood-control engineering, have conspired to produce a rather uniform terrain in these woodlands. Ground flora I have seen elsewhere on such sites and which supports a very particular assemblage of insects, I could not find at all. Similarly, the associated insect species (see SPEIGHT, 1984) do not seem to be found now in Liechtenstein. Another alluvial forest component, shallow temporary pools with a high concentration of wood debris, is just as scarce, and few of the insects typical of such habitats were encountered. If measures could be taken to re-introduce a winter-flooding regime to

some part of the gallery woodland, this could only be highly advantageous to the insect fauna. At present, the fauna of these woods appears to be degenerating towards that of rather uninteresting secondary woodland: the absent alluvial-forest insects do not seem to have been replaced by others characteristic of different, natural biotopes.

The recently made (1972) pond complex at St. Katharinenbrunnen gives encouragement to the view that certain wetland insects at least can be provided for by re-constructing wetland habitats and managing them appropriately. A well-differentiated fauna of wetland insects has already colonised the reserve, including species like the large soldier-flies *Stratiomys chamaeleon* and *S. potamida*, whose habitats now appear to be extremely rare in Liechtenstein, even if they may have been common in the past. The success of St. Katharinenbrunnen could itself prove an embarrassment though, because it is likely to be rather difficult to manage the reserve in such a way as to ensure the survival there of all the organisms which have established themselves on the site! To judge from experience elsewhere, the character of the wetland communities on the reserve is likely to evolve as the site matures, with some species being replaced by others, unless management intervenes. The present management regime of cutting the reeds etc. every two years may help to retard the rate of change in the site, but careful monitoring may have to be undertaken to establish precisely what faunistic and floristic changes are occurring and to provide a basis for deciding what consequent changes in management may be required. It is a moot point whether the reserve would prove large enough to maintain the insects dependent upon different wetland situations by managing some parts of the reserve in one way and others parts in some different fashion. Such an approach to management would certainly seem more likely to succeed on the Rieds, where the surface area available is more extensive. It is difficult to refer to the insects of the Rieds without resort to use of a series of superlatives. In short, from my brief acquaintance with them, despite their troubled recent history and alarmingly rapid decrease in extent the Rieds still support a fascinating insect fauna. It is a tribute to those who have laboured so hard to ensure the persistence of this ancient man-made biotope, that many of these insects species survive in Liechtenstein today. The particular feature of the Ried fauna which impressed itself upon me is the presence of species which are unusual to find together in unmodified wetlands. For instance, the four hoverfly species of the genus *Chrysogaster* which occur on Ruggeller Ried comprise one (*C. lucida*) which is characteristic of calcareous sites, a second (*C. macquarti*) which is almost entirely confined to acid peatlands, a third (*C. virescens*) which is usually found in deciduous woodland and a fourth (*C. hirtella*) frequent only in Western parts of Europe. Insects which are now becoming very localised in their occurrence in Europe, such as the snail-killing flies *Psacadina zernyi*, *Dictya umbrarum* and *Pherbina intermedia*, are also represented in the Ried fauna. The fact that many of the Ried insects would not usually be found in close proximity to each other emphasises the mosaic nature of the Ried biotope. It could prove difficult to maintain sufficiently large areas of appropriate habitat to ensure the survival there

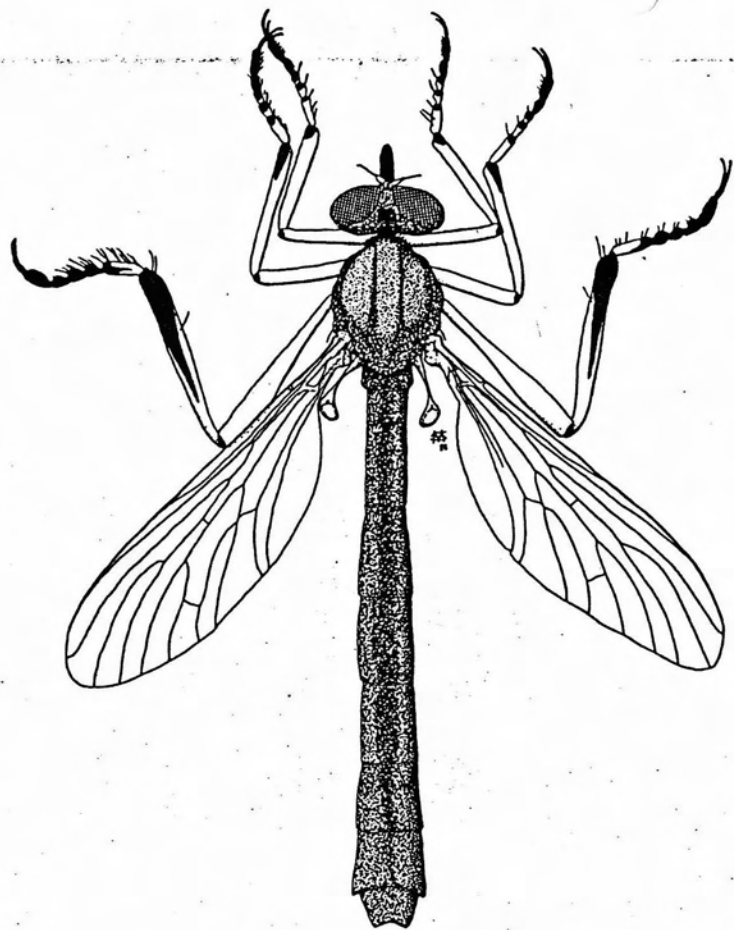
of all these rather diverse components of the Ried fauna and it could be argued that attempts might usefully be made to re-establish wetland conditions on selected areas of adjacent farmland, if the land were to become available for the purpose.

Cropland, meadow and pasture

Given the short time at my disposal I have made no specific attempt to examine the insect fauna of arable land in Liechtenstein. My experiences elsewhere provide no encouragement for the belief that more than perhaps 15 % of the fauna could be conserved on intensively used agricultural land, and the species found there are surprisingly uniform throughout most parts of Europe — veritable «espèces banales». Of more concern are the pastures and meadows. In Western Europe, the traditional character of this sort of countryside has been so savagely attacked by changes in land-use practice that even the field cricket (*Gryllus campestris*), whose trilling is so much part of a Summer evening in Liechtenstein that it goes entirely unremarked, has been eradicated nearly everywhere. This cricket is now on the «Red Lists» of countries such as Great Britain (see SHIRT, 1987). Already, in Liechtenstein, most of the hay meadows have lost the major part of their entomological interest. The contrast between the fauna of a fertilised, re-seeded meadow and that of its unmodified progenitor is quite shocking, when the two can be viewed side by side, as in the vicinity of Balzers. I was frankly amazed to discover how sharp and stark is the boundary between the two faunas. Adjacent strips of modified and unmodified meadow, not separated by hedge or any other physical feature, had faunas noticeably different within one or two metres of the boundary between the different management regimes, even highly mobile organisms apparently staying on their own side of the boundary: A particularly good example is the robber-fly genus *Leptogaster*, which is totally absent from the managed grassland. It would be good to know that the current efforts to conserve the few remaining low altitude fields that are under traditional management have been successful, because it is clear that if these efforts fail a sector of the Liechtenstein fauna will be wiped from the face of the country.

Valley dry woodland

These remarks concern only the few areas of open pine woodland I visited, at Neugrütt (Balzers) and Schneckenäule (Ruggell). Recent management of these areas seems to have reduced these pines to the status of «living fossils», in that apart from these mature trees themselves there is little of woodland character to these sites, and the pines are not regenerating — features reflected in the insect fauna. Nonetheless, the insects found among these stands of trees are of considerable interest, including species like the robber flies *Dioctria cothurnata* and *Neoitamus cothurnatus*, characteristic of the less intensively managed scrubland and open woodland of bygone years. Once again, a traverse from the surrounding pasture or arable land into one of these pine enclaves reveals a change in fauna within the distance of a few metres. It would be difficult to predict whether these



Leptogaster cylindrica (De Geer) (Diptera: Leptogasteridae)

Robber-flies of the genus *Leptogaster* hang motionless on dry grass stems, lying in wait for unsuspecting prey. Their shape and grey-brown coloration renders them well-nigh invisible under these conditions. *L. cylindrica* (body length 10 - 15 mm.) is probably the most common and widespread of European *Leptogaster* species, but it is now suffering from loss of habitat. Frequent only in old, well-drained, unimproved pasture, this insect has been lost from many of its previous haunts by intensification of use of grassland. In particular, fertilisation and re-seeding cause the species to disappear, though whether this is primarily due to resultant changes in soil organism populations (*Leptogaster* larvae live in the surface layers of the soil) or to changes in the structure of the vegetation inhabited by the adult flies, or to both factors, is unknown. *L. cylindrica* has been found in Liechtenstein in old pasture near Balzers and in dry pine woodland at Scheckenäule (Ruggell).

stands of pine trees will prove large enough to support in the long term the fauna associated with them at present, but certainly they are worthy of conservation. If an opportunity arose to enlarge these woodlands, it could be argued that their faunal interest is sufficient to justify such an operation.

Deciduous forest

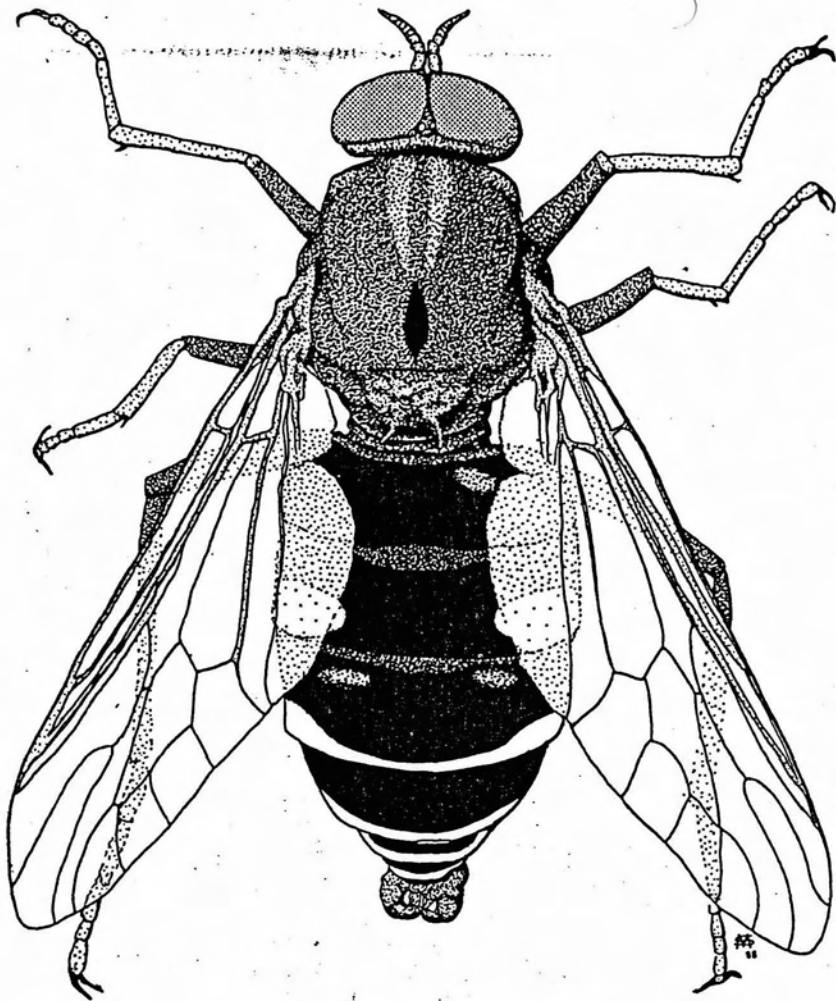
The woodland of beautiful old beeches (*Fagus*) above Balzers could be expected to support some of the ancient-forest insects now becoming rare everywhere in Europe. Unfortunately, I am unable to demonstrate the presence there of insects not also found elsewhere in Liechtenstein. But I encountered some ancient-forest insects associated with beech in most forested parts of the country I visited, showing clearly the value of setting aside, for their conservation interest, some areas where over-mature beech is well-represented. Beech has an ancient-forest fauna of rather special character, diverse and including species which are particular to *Fagus*, rather than shared with a wide range of other tree species. Many of the insects involved are of unusual appearance and also rather beautifully coloured, like the little golden and purple, metallic, lucanid beetle *Platycerus caraboides*, or rather large, like the fearsome-looking, black and horribly-hairy robber-fly *Laphria ephippium*, or both large and beautiful, like the cerambycid beetle *Rosalia alpina*.

The fauna of the mixed woodland above Triesen, in Poskahalde, shows features of considerable interest. Localised woodland insects dependent upon the ground flora occur, together with others which used to be quite frequent in Europe in the vicinity of woodland streams. Overgrazing and trampling by domestic stock, accompanied by drainage, have eradicated such species from much of their previous range. One good example is the large, clumsy-looking fly *Coenomyia ferruginea*, which has all-but disappeared from much of its European range during the present century, to the extent that it now appears on lists of threatened species (see, for example, ANDERSSON et al, 1987).

Scarce insects associated with mature and old trees, coniferous and deciduous, swell the Poskahalde fauna to the point where it shows a complexity and degree of completeness that are now rather unusual in Europe. For instance, it is exceptional today to find together such ancient-forest insects as *Brachypalpus chrysites*, *Clitellaria ephippium*, *Ctenophora pectinicornis*, *Psilota anthracina* and *Temnostoma vespiforme*, all of which occur at Poskahalde. The area would validly be regarded as of national importance for its scientific interest in almost any European country. The mixed woodland of the Schellenberg (Gantenstein) is also of some faunal interest, though perhaps less so than Poskahalde.

Coniferous forests

The forests of spruce and fir which clothe the upper slopes above the Rhine, and much of Saminatal, exhibit a degree of complexity not really amenable to survey during one short visit. Nonetheless, the insects col-

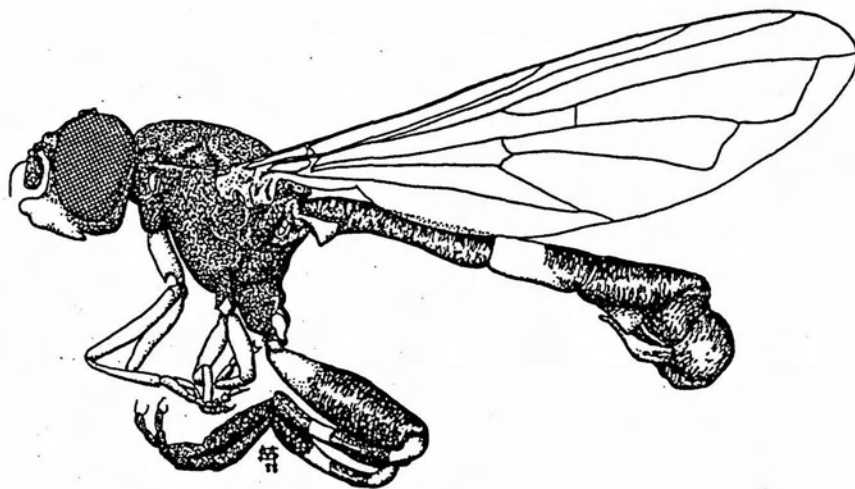


Coenomyia ferruginea (Scopoli) (Diptera: Coenomyiidae)

This large (body length 10 - 15 mm.), brown and yellow, clumsy-looking fly was both widespread and frequent over much of Europe during the 19th. century and is the only representative of its family known from the continent. It is a woodland insect, whose predatory larvae occur in the leaf litter layer of moist soil containing a high concentration of wood debris, such as can be found beside forest streams and pools. The increasingly intensive use of land to which much of Europe has become subject has resulted in the disappearance of *C. ferruginea*. Removal of woodland, cutting down of old trees likely to shed branches, canalisation of streams, ditching of the woodland floor and trampling by domestic animals have combined to make *Coenomyia*'s habitat vanishingly rare. In Liechtenstein, this species still occurs above Triesen and near Balzers.

lected, particularly along the Samina river, suggest the presence of an unusually complete old forest fauna. The practise of not harvesting the trees until they are more than 200 years old must contribute significantly to this situation. If a reasonable area of conifer forest were now set aside for conservation, Liechtenstein would have a better chance of being able to re-establish natural conifer forest conditions than most other European countries. The establishment of some sort of centre for the study of wildlife in these forests would probably greatly accelerate the accumulation of useful data. At present, the relative inaccessibility of the forests of Garselli-Zigerberg perhaps inhibits their study.

The river, streams and seepages occurring within the conifer forest of the Saminatal are also of particular interest, in that they have not been badly damaged by man's activities and retain a characteristic fauna. The water-side insects include species that are both almost confined to the Alps and rather localised within the Alps. One of these is the hoverfly *Sphegina cornifera*.

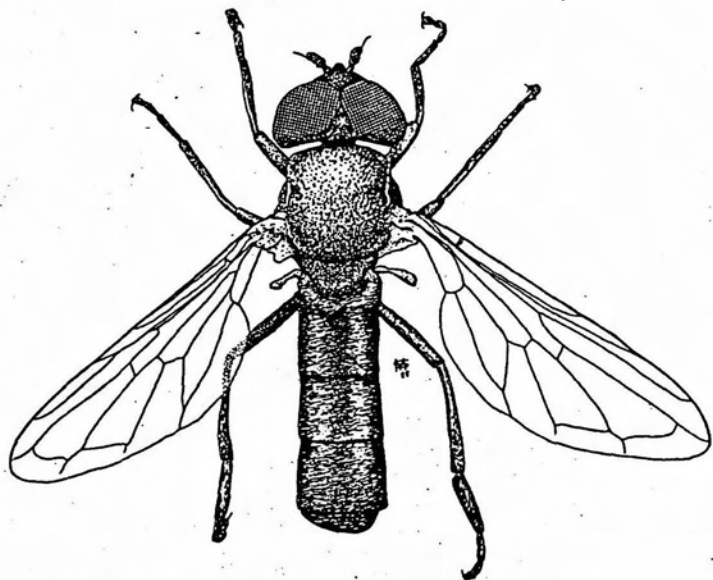


Sphegina cornifera Becker (Diptera: Syrphidae)

This small (body length c.7.5 mm.) hoverfly was described some sixty years ago. It has only rarely been seen and published records are available for only S. and E. Switzerland and W. Austria. The female of the species has not yet been described and its larva remains unknown. The larvae of *Sphegina* species are sub-aquatic and live among wood debris of one sort or another, in various woodland situations. *S. cornifera* occurs in Liechtenstein in Saminatal, where it may be found visiting the flowers of *Myosotis* where streams emerge from within the conifer forests to drain into the Samina river.

Montane pasture

From an altitude of 1000 m. upwards, insects found only in montane grassland, such as the central European hoverfly *Syrphocheilosia claviventris*, become progressively more frequent. But, once again, there is a sharp contrast between the species encountered in «unimproved» montane grasslands and those found where fertiliser and re-seeding have been employed. The fauna of the «improved» grasslands is monotonous and of minimal diversity. Unimproved grasslands support a mosaic of different species, which together provide a much greater overall diversity. This diversity is further augmented by the presence of springs, seepages and streams, which have a characteristic montane fauna at these altitudes.



Syrphocheilosia claviventris (Strobl) (Diptera: Syrphidae)

To a casual observer, *S. claviventris* would be simply an undistinguished, small (body length c. 6 mm.) black fly. Even to specialists it was for many years of no great interest — until the 1980's it had been misclassified as a member of the largest European hoverfly genus, *Cheilosia*, because no-one had bothered to examine it thoroughly! It has now been removed to a different subfamily from *Cheilosia* and placed in its own genus, *Syrphocheilosia*. It is very unlikely that many more *Syrphocheilosia* species will be recognised and *S. claviventris* may be the only *Syrphocheilosia* species in the world. Its closest known relatives all have aphid-eating larvae, but the larva of *S. claviventris* is unknown. This syrphid is a characteristically central-European species, which frequents unimproved montane pastures in the Alps, sometimes occurring in large numbers. It has not been found elsewhere. In Liechtenstein it has been found on the slopes above the Samina river.

General Comment

In the preceeding pages I have deliberately kept to a minimum the use of scientific names of insect species. The text is in this way rendered easier to read, but, perhaps, less convincing! It is intended to publish later the lists of insects upon which these observations are based, as soon as possible.

The unusually late Spring of 1987, coupled with the short duration of my visit, make interpretation of my results difficult, beyond the rather general remarks made already. But some comment on the overall character of the insect fauna, based on the 300 or so insect species I encountered, is perhaps feasible.

In the Rhine valley, the insect fauna gives every appearance of being «out of tune» with current agricultural practice, but the diverse fauna associated with traditional methods of cattle farming does persist in the unmodified hay meadows and rieds which remain. The ried fauna is more typical of Atlantic and cooler parts of Europe than might have been anticipated. The hay meadow fauna is more difficult to classify — the lack of records of hot climate/Southern European species may be more due to the late Spring than to the genuine absence of such insects. The same has to be said of the fauna of the pine woodlands.

The rich deciduous-forest fauna contains elements now rare in Europe. In Western Europe, in particular, many of these insects have become very localised by over-zealous management of forests. Examination of the present-day ranges of such insects gives a false impression of the zoogeography of these species, since it is man's actions, rather than features of their ecology, which today dictate where these insects can be found.

The conifer-forest fauna is essentially central/Northern European in character. There is evidence that N. European conifer-forest insects have been spreading Southwards during the present century (see SPEIGHT, in press). This appears to be as much due to the extensive planting of conifers outside their natural range, as to climatic influences. Some of these recent invaders of central Europe, including the hoverfly *Sphegina sibirica*, are present in Liechtenstein.

There is sharp contrast between the stream-side faunas found at higher and lower altitudes in Liechtenstein. In the conifer zone and montane pastures of the Saminatal characteristic wetland species are present, while at lower altitudes, except above Triesen, the wetland species have largely been lost. The fact that various of the waterside insects occurring within the conifer forest and montane pasture are largely confined to the Alps gives the faunas of these areas an added interest. Others of these species occur at points scattered widely around Europe, but are rarely found together away from the Alps.

The fauna of the unimproved, calcium-rich, montane pastures includes species which has been lost in many parts of Europe due to intensive grassland management. As with the streamside fauna, these pasture faunas include species more or less confined to the Alps.

Inevitably, any attempt to gain an overview from a rather brief survey is

analogous to attempting to put together a jig-saw puzzle from which many of the pieces are missing. A re-survey at some other time of the year would clearly substantially add to the species lists. In particular, the forests of Garselli-Zigerberg require some weeks of concentrated field-work allocated to them, in order to derive satisfactory species lists for the area, and the high-mountain pastures and scree-slopes have not been covered at all in the present account. Intermittent snow falls occurred down to the 2000 m. level almost up to the end of my time in Liechtenstein.

For me, it has been a great privilege to have the opportunity to see such a wide range of the biotopes of a central European state. I doubt it is possible to evaluate, objectively, what one finds «most interesting», and I will not attempt such a thing. But for me the Rieds, with their long history and unusual fauna, proved quite fascinating, and I can only hope that some definitive work can be put together on these unusual areas. Similarly, it was very encouraging to discover that the fauna of the forests of Garselli-Zigerberg remains so diverse and that there is a reasonable chance they will be conserved.

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Adresse des Autors: Dr. M.C.D. Speight, Research Branch, Forest & Wildlife Service, Sidmonton Place, IRL-Bray, Co. Wicklow

Pheromonfallen für Borkenkäfer — «biologischer Waldschutz»?

von KARL ADLBAUER

In den Nadelwaldgebieten und Mischwaldbeständen Liechtensteins sind besonders in der Hangstufe über das ganze Land verteilt Pheromonfallen im Einsatz, im Jahr 1984 waren es 93, die mit einem synthetischen Lockstoff, einem Geschlechtspheromon, versehen sind und die als Gefahr für den Wald angesehenen Borkenkäfer (primär den Buchdrucker, *Ips typographus*) anlocken und fangen sollen. Derartige Borkenkäferfallen sind nicht nur in Liechtenstein aufgestellt, sie werden auch in anderen europäischen Ländern betrieben. In Liechtenstein gibt es sie in zwei Ausführungen, einer flächigen, die schwarz oder weiss sein kann, und einer schwarzen, röhrenförmigen, siehe Abbildungen.

Die angelockten Tiere fliegen diese Fallen an, gelangen über schlitzförmige oder runde Öffnungen in das Innere und fallen in einen dafür vorgesehenen Sammelbehälter.

Sinn und Zweck dieser Fallen soll es sein, einerseits so viel wie möglich der unerwünschten Insekten zu fangen, andererseits bei auftretenden Massenvermehrungen diese zu erkennen. Die Behälter für die darin gefangenen Käfer werden von Zeit zu Zeit untersucht und die darin gefangenen Käfer gezählt.

Im Verlaufe einer Untersuchung an holzbewohnenden Käfern in Liechtenstein wurden von mir auch stichprobenartig solche Pheromonfallen untersucht, die Ergebnisse sind deprimierend: Neben hunderten bis tausenden Borkenkäfern — die Zahl schwankt witterungsbedingt beträchtlich — wurde auch eine Vielzahl anderer, teils nützlicher, teils indifferenter Insektenarten in den Fallen festgestellt, die diese ebenfalls anfliegen und darin gefangen werden. Während zweier Vegetationsperioden wurden neben den erwähnten Borkenkäfern folgende Insekten in den Fallen registriert:

Buntkäfer:

Thanasimus formicarius

Thanasimus pectoralis

Schnellkäfer:

Ampedus sanguineus

Melanotus rufipes

Ampedus pomorum

Athous subfuscus

Ampedus balteatus

Blatthornkäfer:

Aphodius depressus

Phyllopertha horticola

Serica brunnea

Hoplia farinosa