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Zusammenfassung

Auf der Suche nach einer neuen Blattwespenart (Bethylidae), welche zuvor in den Französischen Alpen entdeckt wurde, fand im August 2005 eine Expedition auf der Alp Flix statt. Mit Kescher und Handfängen wurden 217 Insekten gefangen, welche ungefähr 90 verschiedenen Arten zugeordnet werden konnten. 45 Arten waren auf der Alp Flix zuvor noch nicht nachgewiesen.

Schlagworte: Insekten, Habitate, Alp Flix, Graubünden

Summary

In August 2005 an expedition was undertaken on Alp Flix to look for a new bethylid species that had been captured before in the French Alps. By net sweeping and hand captures, a total of 217 insects belonging to approx. 90 species were found. 45 species have not been recorded for the Alp Flix before.

1. Introduction

Alp Flix and the facility of *Rhexoza flixella* came as a welcome chance to explore the Swiss Alps. After having compiled a checklist of Bethylidae wasps for Fauna Helvetica I became aware that extensive areas of Switzerland were obviously blank territory where this family was involved.

In 2003 the male of a mysterious new bethylid species had been captured in the French Alpes, so in August 2005 I went to Alp Flix with the intention to discover the unknown female of this species. As I could stay no longer than a week and didn't quite know what to expect at an altitude of 2000 meters. I went without strategy, just a taking sweeping net and a jar. My visit could therefore best be described as an expedition, more so than as scientific research.

Eventually I would return without a single bethylid, but my efforts to capture these carefully hidden wasps exposed many other insects. Just by dragging grasses and shrubs with a sturdy net and catching specimens on sight I managed to find about 90 species of insects. Grasshoppers and dragonflies, which demand elaborate preparation to preserve the colours, appeared to be well studied in the area and I decided not to collect them. Butterflies were also left alone with the Swiss legal restrictions in mind.

2. Agriculture

The main vegetation of the Alp Flix highland plane (2000 m) appeared to have an agricultural character. Hayfields (*Polygono-trisetion*) dominate the central area and Alpine meadows (*Poio alpinae*) cover the adjacent mountain slopes. Hayfields can provide food for dozens of bees and wasps if flowering herbs are tolerated by the farmers, but by the time we arrived the hay was being harvested. Several other vegetation types however were available and proved to be equally interesting.

3. Alpine meadows

Survival of this half-cultivated vegetation type is said to depend on the herding of cows in a traditional way. The small mountain cows with their intelligent expression and big hooves keep these pastures from getting overgrown with less variable vegetation, probably Green Alder bushes. As farming at this altitude doesn't seem to be very profitable, most agricultural activities are heavily subsidized.

The floral richness of the Alpine meadows gave the impression that insects could be found in the same amounts and diversity. Perhaps in the preceding months this could have been the case, but during my stay most of the bright flowers were unattended by arthropod visitors. The worn wings of many collected wasps and the bees indicated that the high season had passed long before. The average life span of a bee or wasp does not exceed more than a several weeks, under exceptional conditions up to a few months. Especially bees often have a relationship with specific families of flowering plants, some even just a single species. Before the flowers of these plants are no longer available, the females must have collected enough pollen and nectar to raise their brood.

Fig. 1: Typical landscape on the Alp Flix consisting of hayfield, meadow and heather.

Not the flowers but the large boulders along the meadows were the favourite location of most wasps on the Alp Flix. In fact all cuckoo wasps (Chrysididae), all spider wasps (Pompilidae) and 80% of the digger wasps (Crabronidae = Sphecidae s.l.) and mason wasps (Vespidae: Eumenidae) were collected on big rocks in, or along the meadows. Mason wasps build nests of clay against stone surfaces which they fill with paralyzed larvae of moths or beetles. The recorded species of cuckoo wasps lay eggs in these nests. The spider wasps obviously were looking for spiders on the surface of the stones.

Ogcodes zonatus, one of the most intriguing flies on the Alp, must have had the same reason as the spider wasps to be on these boulders. Larvae of this species are known to live as parasites in spiders. It was the first time I ever saw these hump-backed flies with their black and white rings around the abdomen, apparently mimicking wasps. The family Acroceridae was never recorded from Alp Flix either.

Monkshood (*Aconitum*) can be frequently found along the banks of small streams that cross the meadows. Remarkably many black bumblebees with red tails visited the dark purple-blue flowers of these plants. Bumblebees are space-consuming animals in collections and take weeks to dry, but luckily I took several specimens home. It turned out that two exact look-alikes had been joining their meals on the monkshood flowers: the common *Bombus lapidarius* and the rare *Bombus wurfleini*. Their males are easy to identify by the unique shapes of their copulation forcipes.

4. Ungrazed parts of the tree line

Above the elevations where the climatic conditions become too harsh for spruce (*Picea*), Green Alder (*Alnus viridis*) still manages to grow. This shrub-like tree in confined to the roughest and steepest slopes of the mountains. Herding becomes risky here and the herbs therefore remain untouched by cows. The open spots on the south sides of cliff formations

Fig. 2: Sedge community along a brook.

are rich on flowers as well as insects, even at this altitude. About 400 m SW of Salategnas, at the southern border of the Alp Flix territory, dozens of large Leaf beetles (Chrysomelidae) were everywhere in the vegetation. Very impressive were the metallic blue-violet-green coloured *Oreina speciosa* and the black, granulated *Galeruca tanaceti*. The mason bee *Osmia inermis* and the Small Heath Bumblebee *Bombus jonellus* visited tufts of hawkweed (*Hieraceum*) hanging from a wind-shielded and sun-warmed vertical cliff surface.

5. Marshy Sedge communities

The banks of the bright turquoise coloured lakes contain, like the brooks of the Alpine meadows, a considerable amount of clay. At the shallowest and least stirred parts of these banks I found some interesting marshy vegetations, consisting of mainly larger sedges (*Magnocaricion*). Distributed over different parts of Alp Flix calcareous fen meadows (*Caricion davallianae*) fill the shallow and wide sections of many brook beddings. The soil mainly consists of thick layers of mosses which makes it unattractive for cows. The grazing or fertilization pressure therefore remains low in these fields, ensuring their untouched and acidulous character. Plants like Purple Moor-grass (*Molinia caerulea*), Cotton-grass (*Eriophorum*) and Grass of Parnassus (*Parnassia palustris*) mark this vulnerable ecosystem, which is endangered throughout Europe.

Extremely rare wingless wasps are known from acidulous marshes, like some Embolemidae, Dryinidae and Bocchinae, but finding them requires long term research with complex equipment. A few simple sweeping actions in some fen meadows (Rlancas, 400 m SW of Tigias, and Lai digl Mestgel, 950 m NE of Sur) and the banks of Lais Blos did however expose some other interesting insects, mostly plant hoppers and bugs (Hemiptera: Heteroptera and Cicadomorpha). Although the area had been thoroughly searched for bugs and jumping plant lice in the past, no records of the closely related plant hoppers appeared to be present in the available lists (GEO 9/2000 Beilage «GEO-Tag der Artenvielfalt» and database Plant Science Centre Zürich-Basel). No wonder that all seven plant hopper species could be listed

as new for Alp Flix. With the acceptance of the single Delphacidae species collected in the *Calluna* vegetation of Son Roc (400 m. W of Tigias), all plant hoppers (Cercopidae and Cicadellidae) came from marshy Sedge vegetations. A similar distribution can be detected for the bugs: specimens came either from heathlands or marshes.

6. Acidophilus scrublands

A vegetation type very much related to fen-meadows are the dwarf shrub heathland communities (*Juniperion nanae*) that cover the rough, stony parts of the area. Both need acidulous soils and avoid nitrates. Often no sharp boundaries can be drawn between the two. The heathland patches on the Alp Flix showed a surprising similarity to the heathlands (*Calluno-Genistion pilosae*) of northwest Europe. Scotch Heather (*Calluna vulgaris*) dominates this vegetation, now and than accompanied by an Alpine dwarf subspecies of Juniper (*Juniperus communis* ssp. *alpina*). Bilberry (*Vaccinium myrtillus*) manages to flourish without the shade of trees that it needs in the Dutch lowland heaths that I am familiar with.

The heather vegetation seems to profit from it's overall dark colour, which enables it to absorb every bit of sunlight and render still some warmth in late summer. This is perhaps the reason that still many aculeate wasps and bees were active in August, when snow could be expected again. Bumblebees like *Bombus lucorum*, *Bombus pratorum* and *Bombus terrestris*, which were all present together at Plang Grond (600 m. SW of Tigias), are very common in the lowland heaths of the Atlantic temperate climate zone.

Yellow composites like hawkweed (*Hieraceum*) prefer the open, sandy spots of heathlands and are very much in favour by smaller bees. At Son Roc both the relatively common solitary bee *Lasioglossum albipes* and the rare *Dufourea alpina* were collected on composite flowers.

The environment of the Lais Blos lakes combines heather vegetation and open sand with impressive boulders and rocky peaks. The wide variety of flowers make the area irresistible for solitary bees. Species like *Lasioglossum bavaricum*, *Lasioglossum fratellum*, *Halictus rubicundus*, *Hoplitis villosa* and *Panurginus montanus* were all present here, obviously nesting in the soil near the big rocks.

Some sweeping on the heather-overgrown hills west of Lais Blos lakes resulted in the capture of the extremely rare ant *Myrmica lobulicornis*, but also of *Ectobius sylvestris*, one of the most common cockroaches in the northwest of Europe. At Son Roc the small parasitic wasp *Brachygaster minuta* turned up, a well known ectoparasite of this species.

7. Pine-forests

The pine-forests of Alp Flix consist mainly of Norway spruce (*Picea abies*), a tree that has quite little to offer for wasps and bees. Only ants seem to feel comfortable on the rather sterile needle-covered ground, and the large hills of wood ants were present in several pine-groves. Workers taken from different locations all appeared to be identical. The species resembled the wide spread *Formica lugubris*, but may actually be the rare Alpine species *Formica paralugubris*. Europe's foremost ant specialist Dr. Bernhard Seifert (Görlitz, Germany) identified the workers as belonging to this species complex but needed more material to be sure.

Sun-exposed open spaces in forests may still attract at least some aculeates, providing that food and nesting facilities are available. The large black, aphid hunting wasp *Pemphredon rugifer* for instance was taken on Kidney Vetch (*Anthyllis vulneraria* ssp. *alpestris*) along the road from Sur to Alp Flix. This species makes mines in dead wood to store paralyzed plant lice for the offspring.

8. Collected material

The highest hills of The Netherlands reach no more than 300 meters and Dutch specialists rarely have to deal with Alpine species. Identification of the material collected at Alp Flix therefore took a while, but surprisingly many specimens could be matched with the right names. One German and Nine Dutch specialists performed the identifications on mostly unpreparated specimens, handed to them in paper envelopes with labels. Most of the specimens were left at their disposal afterwards.

Among the 217 collected specimens about 90 species could be distinguished, belonging to 9 different insect orders. No less than 45 species had not been recorded from Alp Flix before.

One of the most interesting results of this collecting expedition for me was to find that both specialized Alpine species and common European lowland species appear to live in mutual ecosystems at an elevation of 2000 m. Adaptation and flexibility of species are a field that requires special attention, certainly with the effects of global warming in mind.

With special thanks to the next experts:
Dr. B. Aukema – Hemiptera: Heteroptera
R. Beenen – Coleoptera: Chrysomelidae
Dr. L. Botosaneanu – Trichoptera
B.J.H. Brugge – Diptera: Acroceridae, Asilidae, Bombyliidae and Syrphidae
W.R.B. Heitmans – Dictyoptera: Blattellidae
W. Hogenes – Mecoptera: Panorpidae
R. Neumeyer – Hymenoptera: Formicidae
Dr. P. Oosterbroek – Diptera: Tipulidae
C.A. Schulz – Hemiptera: Cicadomorpha, Sternorrhyncha
Dr. B. Seifert – Hymenoptera: Formicidae
Dr. O.F.J. Vorst – Coleoptera: Staphylinidae

9. Species list

Expedition 4.–9. August 2005
Species marked with an asterisk are new to Alp Flix, in comparison with the list of the «GEO – Tag der Artenvielfalt» (GEO 9/2000).

Coleoptera
Chrysomelidae
Cryptocephalus aureolus Suffrian 1847 Sal1
* *Cryptocephalus hypochaeridis* (Linnaeus 1758) Sal1
* *Galeruca tanaceti* (Linnaeus 1758) Sal1, Sal3
Neocrepidodera peirolerii (Kutschera 1860) [=Asiorestia] LdM, SRc
Oreina speciosa (Linnaeus 1767) Sal3

Staphylinidae
* *Anthophagus* sp. LdM, Rla1

Dictyoptera
Blattellidae
Ectobius sylvestris (Poda 1761) LBl3

Diptera
Brachycera
Tipulidae
* *Tipula mikiana* Bergroth 1888 Sal1
Tipula neurotica Mannheims 1966 Sal1

Nematocera
Acroceridae
* *Ogcodes zonatus* Erichson 1840 Sal2

Asilidae
Leptarthrus brevirostris (Meigen 1804) SRc

Bombyliidae
* *Anthrax trifasciata* Meigen 1804 LBl3

Muscidae
unidentified spec. SRc

Phoridae
unidentified spec. SRc

Sepsidae
unidentified spec. SRc

Syrphidae
* *Arctophila bombiforme* (Fallén 1810) Tru, Sal1
* *Volucella bombylans* (Linnaeus 1758) var. *plumata* Sal1
* *Baccha* spec. Rla1
Eristalis spec. 1 LBl2
Eristalis spec. 2 Sal1
Eristalis spec. 3 Tig
* *Leucozona lucorum* (Linnaeus 1758) Sal3
Rhyngia spec. Sal1
unidentified spec. 1 SRc
unidentified spec. 2 Sal3

Tephritidae
unidentified spec. 1 LdM
unidentified spec. 2 Rla1

Hemiptera
Cicadomorpha
Cercopidae
* *Neophilaenus exclamationis* (Thunberg 1784) ssp. *alpicola* LdM, Rla1, SRc

Cicadellidae
* *Anacertagallia venosa* (Fourcroy 1785) SRc
* *Deltocephalus pulicaris* (Fallén 1806) SRc
* *Ebarrius cognatus* (Fieber 1869) LBl4
* *Psammotettix cephalotes* (Herrich-Schäffer 1834) LdM, Rla1
* *Verdanus abdominalis* (Fabricius 1803) LdM, LBl4

Delphacidae
* *Dicranotropis divergens* Kirschbaum 1868 SRc

Heteroptera
Alydidae
* *Alydus calcaratus* (Linnaeus 1758) SRc

Lygaeidae
* *Ligyrocoris sylvestris* (Linnaeus 1758) LdM
Nithecus jacobaeae (Schilling 1829) LdM, LBl4, Rla1, SRc

Miridae
* *Chlamydatus pulicarius* (Fallén 1807) SRc
* *Cremnocephalus alpestris* Wagner 1941 LdM

Nabidae
Nabis flavomarginatus Scholtz 1847 LBl4

Pentatomidae
Dolycoris baccarum (Linnaeus 1758) SRc

Sternorrhyncha
Psyllidae
Aphalara longicaudata Wagner & Franz 1961 SRc

Hymenoptera
Apoidea
Apidae
Apis mellifera Linnaeus 1758 Sal3
* *Bombus jonellus* (Kirby 1802) Sal3
* *Bombus lapidarius* (Linnaeus 1758) Sur1

	Bombus lucorum (Linnaeus 1761)	PGr1, Rla2
*	*Bombus mucidus* Gerstaecker 1869	Sal1, Tru
*	*Bombus pratorum* (Linnaeus 1761)	PGr1, Sur1
*	*Bombus terrestris* (Linnaeus 1758)	PGr1
	Bombus wurfleini Radoszkowski 1859	Sal1, Tru
*	*Dufourea alpina* Morawitz 1865	SRc
	Halictus rubicundus (Christ 1791)	LBl1
*	*Hoplitis villosa* (Schenck 1853)	LBl2
	Hylaeus nivalis (Morawitz 1867)	Sal1
	Lasioglossum albipes (Fabricius 1781)	SRc
*	*Lasioglossum bavaricum* (Blüthgen 1930)	LBl1, Sal1
	Lasioglossum fratellum (Pérez 1903)	LBl1
	Osmia inermis (Zetterstedt 1838)	Sal3
*	*Osmia laevifrons* (Morawitz 1872)	Sal1
*	*Panurginus montanus* Giraud 1861	LBl3
	Chrysididae	
	Chrysis ignita (Linnaeus 1758)	Sal1
	Chrysis ruddii Shuckard 1836	Sal1
	Crabronidae (Sphecidae s.l.)	
*	*Diodontus handlirschi* Kohl 1888	Sal1
*	*Dryudella femoralis* (Mocsáry 1877)	Sal1
*	*Pemphredon rugifer* (Dahlbom 1844) var. *wesmaeli*	Sur2
*	*Trypoxylon medium* De Beaumont 1945	Sal1
	Formicidae	
*	*Formica exsecta* Nylander 1846	Tig
	Formica lemani Bondroit 1917	Sal1
	Formica lugubris Zetterstedt 1838/ *paralugubris* Seifert 1999	LBl1, PGr2, Sal1
	Leptothorax acervorum (Fabricius 1793)	Sal1, Sur2
	Manica rubida (Latreille 1802)	LBl1, Sal2
*	*Myrmica lobulicornis* Nylander 1857 (female uncertain)	LBl3
	Pompilidae	
*	*Agenioideus cinctellus* (Spinola 1808)	Sal1
	Anoplius tenuicornis (Tournier 1889)	Sal1
	Vespidae	
*	*Ancistrocerus scoticus* (Curtis 1826)	Sal1
	Odynerus alpinus Von Schulthess 1897	Tig
	Polistes biglumis (Linnaeus 1758) ssp. *bimaculatus*	Sal1
*	*Stenodynerus laticinctus* (Von Schulthess 1897)	Sal1
*	*Vespula rufa* (Linnaeus 1758)	SRc
	Chalcidoidea	
	unidentified spec.	SRc
	Cynipoidea	
	Cynipidae	
*	unidentified spec.	SRc
	Evanioidea	
	Evaniidae	
*	*Brachigaster minuta* (Olivier 1791)	SRc
	Ichneumonoidea	
	several unidentified spec.	LdM, SRc, Rla1, Sal4
	Proctotrupoidea	
	Proctotrupidae	
*	unidentified spec.	LdM
	Symphyta	
	Tenthredinidae	
	unidentified spec.	Sal1
	Mecoptera	
	Panorpidae	
	Panorpa germanica Linnaeus 1758	Sal1
	Plecoptera	
	unidentified spec.	Rla1
	Trichoptera	
	Limnephilidae	
	Drusus discolor (Rambur 1842)	Sal2
	Philopotamidae	
*	*Philopotamus montanus* (Donovan 1813)	Sal2

Abbreviations:

LBl1	Lais Blos NW	Rocky peak at bank of lake
LBl2	Lais Blos S	Road side near lake
LBl3	Lais Blos SW	Rocky, heath-covered hill
LBl4	Lais Blos W	Marshy bank of lake (*Magnocarion*)
LdM	Lai digl Mestgel (950 m. NE Sur)	Fen meadow (*Caricion davallianae*)
PGr1	Plang Grond (600 m. SW Tigias)	Small valley with Heather (*Juniperion nanae*)
PGr2	Plang Grond (700 m. SW Tigias)	Pine forest (*Picea abies*)
Rla1	Rlancas (400 m SW Tigias)	Fen meadow (*Caricion davallianae*)
Rla2	Rlancas (500 m W Tigias)	Heath-covered top of sandy hill (*Juniperion nanae*)
Sal1	Salategnas, 100 m W	Meadow in valley along brook (*Poio alpinae*)
Sal2	Salategnas, 20 m E	Rocky bedding of brook
Sal3	Salategnas, 400 m SW	Bushy mountain slope (*Alnus viridis*)
Sal4	Salategnas, village	Wooden fence
SRc	Son Roc (400 m W Tigias)	Sandy heathland plane (*Juniperion nanae*)
Sur1	Sur, 200 m E	Mountain slope meadow (*Poio alpinae*)
Sur2	Sur, 200 m E	Road side in pine forest (*Picea*)
Tig	Tigias, 300 m S	Road side in hayfield (*Polygono-trisetion*)
Tru	Truaschinga (500 m E Sur)	Mountain slope meadow (*Poio alpinae*)