

INSECT ECOLOGY

Hemiptera Heteroptera collected from an active raised bog in the Rhaetian Alps

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Abstract

Research on the order Hemiptera Heteroptera was conducted in the 0.80-hectare active raised bog and its surrounding areas within the Paluaccio di Oga Nature Reserve. Thirty-four species were found in this area, five of which were strictly associated with bog vegetation. It is worth mentioning the rare species *Sciocoris umbrinus* (Wolff), which is typical of clearings at medium and high altitudes, as well as the Mediterranean species *Oxycarenus lavaterae* (F.).

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Introduction

The “Paluaccio di Oga” nature reserve contains an active raised bog thought to be formed between 7500 and 7600 B.C. The active raised bog has an area of 0.80 ha and is surrounded by a wooded peat bog of 1.95 ha, with stone pine, larch, spruce, birch, and alder, located at 1710 m asl in Lombardy (Scherini & Parolo, 2010). The flora of the reserve is of a boreal-alpine character and is represented largely by elements that are typical of peat bogs. The vegetation is composed of *Molinia caerulea* (L.) Moench, *Deschampsia caespitosa* (L.) P. Beauv., *Eriophorum angustifolium* Honck., *Juncus alpinoarticulatus* Chaix, *Trichoforum caespitosum* L. and *T. alpinum* (L.) Pers. Important species include *Primula farinosa* L., *Viola palustris* L., *Pinguicula vulgaris* L. and *Bartsia alpina* L., several orchids, and the glacial relics *Vaccinium microcarpum* (Turcz. ex Rupr.) Schmalh., *Andromeda polifolia* L., *Empetrum nigrum* L., *Eriophorum vaginatum* L., and *Carex pauciflora* Lightf.

As the reserve has a peculiar flora, Hemiptera Heteroptera were collected from the active raised bog and surrounding areas, as they show considerable dietary differentiation and can be a good measure of biodiversity (Duelli & Obrist, 1998).

Materials and Methods

The survey was carried out in Paluaccio di Oga (Sondrio, Lombardy) (Figure 1), which is one of the sites of community importance for the Alpine biogeographical region in Italy. The site covers an area of 28 ha (E 10 20 N 46 28). A qualitative survey of the raised bog (0.80 ha) and surrounding area was carried out from June to September in 2019 and 2020, collecting insects only where identification was necessary to minimize impact on the reserve.

The collected material was classified using the book of Lupoli & Dusoulier (2015) and “Faune de France”. Accurate checks were conducted through direct comparison with the biological collections of the Museum of Natural History of Milan and of one of the authors (P.D.). The names of the species and the chorological analysis were provided by using the online edition of the Catalogue of the Heteroptera of the Palaearctic Region (Aukema & Rieger, 1999). The chorotypes, or chorological categories, have been identified on the basis of the criteria proposed by Vigna Taglianti *et al.* (1992).

Results and Discussion

In the Paluaccio di Oga nature reserve, 34 Heteroptera species belonging to 6 families were collected (Table 1). The mirid

Stenodema holsata (F.), which frequents *Molinia caerulea* habitats, and the common species *Lygocoris pabulinus* (L.), which is found on grass and trees, were present in all areas of the reserve surveyed.

Five species have been exclusively recorded in bog vegetation: *Rhyarochromus pini* (L.), which colonizes *Calluna vulgaris* (L.) Hull; *Ligyrocorys sylvestris* (L.), which is typical of wet grassland; *Halticus major* (Wagner), which colonizes *Dorycnium pentaphyllum* Scop., *Erica carnea* L. and *Anthyllis* sp. (Tamanini, 1981); *Monalocorys filicis* (L.) (22.IX.2019), which feeds on ferns, mainly on the sporangia of *Dryopteris filix-mas mas* Swartz and *Eupteris aquilina* L., is recorded all over Italy and can be found in damp wood, with one generation per year and adults emerging from June to July; the polyphagous *Carpocorys purpureipennis* (De Geer); and *Gastrodes grossipes* (De Geer), which usually feeds on pine tree seeds.

From bog vegetation, woods, and clearings, the detritivorous *Sciocorys umbrinus* (Wolff), a rare species typical of the clearings under trees and bushes at medium and high altitudes, was collected. According to Servadei (1967), it would be present in almost all the northern and central regions of Italy, as well as in Campania and Sicily. However, Derjanski & Péricart (2006) considered the data relating to old bibliographical citations to be unreliable, due to the possible confusion with *S. microphthalmus* and *S. cursitans*. It is more prevalent in mountainous regions than in hilly areas, where it is primarily associated with *Thymus*, *Peucedanum*, and Ericaceae (Derjanski & Péricart, 2006). *Carpocorys melanocerus* juv. (Mulsant & Rey, 1852) was recorded in the same habitat on 4 September 2019. This phytophage feeds on *Senecio*, *Verbascum*, *Rhinanthus*, and *Achillea* (Tamanini in Stichel, 1959). It can be clearly distinguished from *Carpocorys purpureipennis* in that it has a wider abdomen than the pronotum. Also the following species are worth mentioning in woodlands and clearings: *Cremnocephalus alpestris* (Wagner, 1941) (29.VII.2019), which

has only been recorded in a few Italian regions on *Picea* in the mountains; the adults are phytophagous and predatory (Wagner & Weber, 1964); and *Eremocorys plebejus* (Fallén, 1807) (June 2020), which is granivorous and feeds on Poaceae, Ericaceae, Vaccinaceae, Pinaceae and Cupressaceae, as well as occasionally feeding on birch and hornbeam. *Pilophorus perplexus* (Douglas & Scott, 1875) (12.VIII.2019) is aphidophagous, mainly on Lachnini; it also feeds on the larvae of microlepidoptera and phytoparasitic mites on *Alnus*, *Prunus*, and *Juniperus* (Dioli, 1997), as well as various broad-leaved trees in forests, such as *Fraxinus*, *Tilia*, *Acer*, *Quercus*, and *Salix*, and cultivated plants, including *Malus* (Wagner, 1970-75). The eggs are laid in the young wood of the host plants and hatch between May and June. The adults are found from July to October (Southwood & Leston, 1959).

Three species were only found in the vegetable debris. *Oxycarenus lavaterae* (Fabricius, 1787) (12/VIII/2019) is present in all Italian regions and on the major islands. This species is phytophagous and mainly feeds on lime trees (*Tilia cordata*); it is corticolous in winter. It often lives in large, gregarious colonies on host plants, where it can sometimes be harmful (Péricart, 1998). This species, which has Mediterranean origins, is gradually colonizing Central and Northern Europe, having reached countries such as Great Britain and Finland, although these are accidental and not yet established introductions (Aukema, 2024). In the province of Sondrio, it has also been found on some snowfields (according to Salvetti, personal communication), which confirms the presence of the specimen found at Paluaccio, which can be traced back to dispersal from a larger colony in the area. *Hallodapus rufescens* (Burmeister, 1835) (17/VIII/2019): it is present in both northern and southern Italy, but not on the major islands. It lives on the ground, sharing its habitat with ants, especially in dry, warm areas with tufts of grass (Wagner & Weber, 1964). *Clorochroa juniperina* (Linnaeus, 1758) (VI.2020) has been



Figure 1. Paluaccio di Oga Nature Reserve.

reported in northern Italy but is rarer in southern Italy and Sardinia. Sporadic records have been found in the Alps, and the last citations from southern Italy date back to the mid-twentieth century (Servadei, 1967). It lives almost exclusively on *Juniperus communis*. It is considered a species in strong regression in northern Europe and Great Britain, where it is practically extinct (Lupoli & Dusoulier, 2015).

Nithecus jacobaeae (Schilling, 1829) was recorded in the vicinity of the pond and in vegetable debris (29/VII/2019; 12/VIII/2019). The species has a Sibero-European (SIE) chorotype and a disjunct boreal-alpine distribution. It is present in northern Italy, Tuscany, and Puglia (Servadei, 1967). It is polyphagous, and its host plants belong to the families Brassicaceae, Caryophyllaceae, and Asteraceae, with a predilection for *Senecio jacobaea* (Péricart, 1998). It is typical of very diverse biotopes. In the mountains, it is

characteristic of alpine meadows and is considered a diplostenoeicum that penetrates the bog despite being alien to it. It colonises the dried tops of sphagnum piles occupied by chamaephytes (Rampazzi & Dethier, 1997).

Close to the pond were collected different species, of which are worth mentioning *Bryocoris pteridis* (Fallén, 1807) (21.VIII.2019), present in Italy only in the Alpine regions on ferns, mainly *Pteridium aquilinum* (Wagner & Weber, 1964), and *Calocoris alpestris* (Meyer-Dur 1843) (1.VII.2019), recorded in Italy in the North and in Sicily on herbaceous plants (*Urtica*, *Stachys*, *Cacalia*) (Wagner & Weber 1964).

Three species are new records for Lombardy. *Ligyrocorys sylvestris* (L.), collected also in Valmalenco and Val Grosina by Dioli, is reported for the first time. This species inhabits cotton grass in high alpine peat bogs in southern Europe, but it also

Table 1. Hemiptera Heteroptera collected in the different areas of the Nature Reserve Paluaccio di Oga in 2019-2020 (the roman numeral indicates the month), and their chorotype.

Families and species	Bog vegetation	Pond andsides	Wood and clearings	Vegetable debris	Chorotype
Acanthosomatidae					
<i>Elasmucha grisea</i> (L.)			IX		SIE
Gerridae					
<i>Gerris costae</i> (H.S.)		VII, IX			EUR
Lygaeidae s.l.					
<i>Oxycarenus lavatae</i> (F.)				VIII	MED
<i>Nithecus jacobaeae</i> (Schilling)		VII		VIII	SIE
<i>Rhyparochromus pini</i> (L.)	VII				ASE
<i>Ligyrocorys sylvestris</i> (L.)*	VIII				OLA
<i>Eremocoris plebejus</i> De Geer			VI		ASE
<i>Gastrodes grossipes</i> (DeGeer)	VIII				SIE
Miridae					
<i>Hallodapus rufescens</i> (Burmeister)*				VIII	SIE
<i>Cremnocephalus alpestris</i> Wagner			VII		EUR
<i>Stenodema holsata</i> (F.)	VII, VIII, IX	VIII	VII, VIII, IX		PAL
<i>Pilophorus perplexus</i> Doug. & Scott			VIII		OLA
<i>Calocoris alpestris</i> Meyer-Dur		VII			EUR
<i>Closterotomus biclavatus</i> (H.S.)			VII		PAL
<i>Grypocoris sexguttatus</i> (F.)		VII			EUR
<i>Leptopterna dolabrata</i> (L.)		VII			OLA
<i>Blepharidopterus angulatus</i> (Fallén)			VII, VIII, IX		SIE
<i>Neolygus viridis</i> (Fallén)		VII	VII, VIII		ASE
<i>Neolygus contaminatus</i> (Fallén)	VIII		VII, VIII		SIE
<i>Lygocoris pabulinus</i> (L.)	VIII	VII	VII		EUR
<i>Lygus punctatus</i> (Zetterstedt)			VIII		ASE
<i>Psallus ambiguus</i> (Fallén)			VIII		EUR
<i>Briocoris pteridis</i> (Fallén)		VIII			SIE
<i>Camptozygum pumilio</i> Reuter*			VIII		EUR
<i>Halticus major</i> (Wagner)	VIII				EUR
<i>Heterocapillus tigris</i> (Muls. & Rey)		VII			CEU
<i>Atractotomus magnicornis</i> (Fallén)			VII		OLA
<i>Monalocoris filicis</i> (L.)	IX				SIE
Pentatomidae					
<i>Sciocoris umbrinus</i> (Wolff)			VIII		SIE
<i>Pentatoma rufipes</i> (L.)			VIII		ASE
<i>Carpocoris melanocerus</i> (Muls. & Rey)	IX		IX		TEM
<i>Carpocoris purpureipennis</i> (De Geer)	VIII				EUR
<i>Clorochroa juniperina</i> (L.)				VI	SIE
Rhopalidae					
<i>Myrmus miriformis</i> (Fallén)	VIII		VII, VIII		ASE
Number of species	11	10	18	4	

OLA, Holarctic; PAL, Palearctic; SIE, Sibero-European; CEU, central-European; ASE, Asiatic-European; TEM, Turanic-European-Mediterranean; EUR, European; MED, Mediterranean. *New records for Lombardy.



Figure 2. *Camptozygum pumilio* Reuter.

colonises low-altitude forests in northern Europe (Péricart, 1999). However, it was not found in the Piangembro Peat Bog Reserve (Montagna *et al.*, 2008), most likely due to its lower altitude compared to the Paluaccio di Oga, where *Eriophorum* also grows. *Halodapus rufescens* (Burmeister) is found in only a few regions of Italy. It is more widespread in the Alps, but has not yet been found in Lombardy (Servadei, 1967). The third species is *Camptozygum pumilio* Reuter, which was previously known only from Trentino-Alto Adige in Italy (Servadei, 1967). This species deserves a special mention because it is only found in a few central European countries: Austria, Germany, Italy, Slovenia, and Switzerland. The specimens from Paluaccio (Figure 2) represent the second record of the species in the Italian Alps. Tamanini (1982) reports several locations in South Tyrol and cites *Pinus mugo* Turra, which is abundant in its prostrate form at Paluaccio, as the host plant. This species was originally found on *Pinus pumilio* and is only found in mountainous regions (Wagner & Weber, 1964). Morphologically, *C. pumilio* is characterised by strong punctuation on the pronotum and scutellum, distinguishing it from the similar *Camptozygum aequale* (Villers, 1789).

The species chorotype cited in Table 1 is shown in Figure 3. The most common chorotype is the SIE (29%), followed by the European (26%), the Asiatic-European (18%), and the Holarctic (12%). The Palearctic, central European, Mediterranean and Turanic-European-Mediterranean chorotypes are less represented (Figure 3).

Conclusions

Despite its small size, the Paluaccio di Oga Nature Reserve is home to a significant number of species characteristic of this biotope, as research has shown.

While the abundance of heteropterans associated with anthropophilous plants such as *Stenodema holsata* was expected, the association of juniper and mountain pine with heteropteran species of considerable biogeographical interest, such as *Camptozygum*

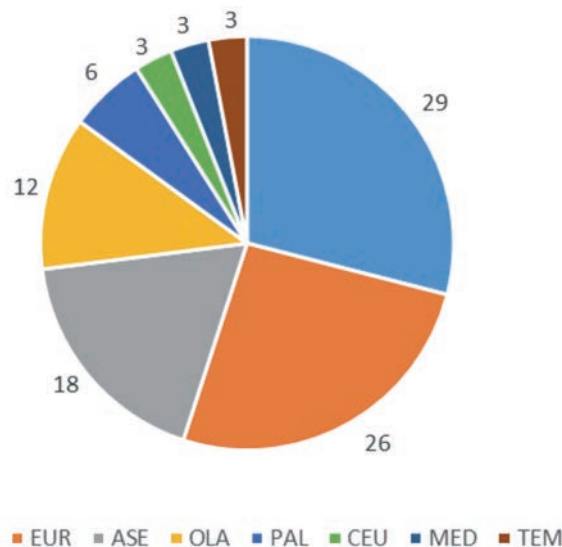


Figure 3. The chorological distribution (%) of Hemiptera Heteroptera species collected in Paluaccio di Oga Nature Reserve. SIE, Sibero-European; EUR, European; ASE, Asiatic-European; OLA, Holarctic; PAL, Palearctic; CEU, central European; MED, Mediterranean; TEM, Turanic-European-Mediterranean.

pumilio and *Ligyrocoris sylvestris*, which are found in the high alpine zone, proved to be of great interest. Finally, *Oxycarenus lavatae*, the sole Mediterranean species, represents a recent case of adaptation to the alpine environment at altitudes above 1500 meters.

The presence of cotton grass in the plant association that characterises peat bogs also provided significant evidence of species typical of the area, which are not found in carefully investigated lower-elevation peat bogs (*e.g.*, Pian di Gembro) (Montagna *et al.*, 2008). Therefore, the research carried out so far suggests that further investigation in Paluaccio and similar areas of the nearby Stelvio National Park would be worthwhile.

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