ENTOMOLOGY

Heteroptera collected in Valsesia, Northern Italy

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Abstract

The survey of Heteroptera carried out in 2016 along the nature path "Bosco dei Tigli" (Lime Trees Wood) in Piode (Piedmont, 900 m a.s.l.), highlighted 74 species, belonging to 68 genera in total. The number of species of each family well represents the Italian Heteroptera composition, with the prevalence of Miridae and Pentatomidae. The Miridae *Criocoris nigripes* var. *apicalis* (Fieber, 1861), a new record in the Alps, and *Dicyphus flavoviridis* (Tamanini, 1949), an Italian endemic taxon, were collected. *Atractotomus parvulus* (Reuter, 1878) and *Orthotylus viridinervis* (Kirschbaum, 1856) were recorded for the first time in Piedmont. Piode is the most Northern area, with Sondrio, where the Mediterranean Lygaeidae *Oxycarenus lavaterae* (Fabricius, 1784) was found.

Introduction

The historical and nature-oriented importance of natural trails and of the surrounding habitat has received more attention recently, in order to enhance and protect the environment. Researches on biodiversity highlighted the great variety of animal and plant species that inhabit these areas (IPLA, 1989; Regione Piemonte, 2004, 2013).

Hemiptera Heteroptera presents a high number of species in Italy, more than 1500, inhabiting all trophic niches. This taxon was the object of this research as it is a good indicator of the ecosystem's health. In fact, the Heteroptera species recorded in a biotope give information on the characteristics of the environment. Samples were collected in 2016 in Valsesia along the path "Il Bosco dei Tigli", recovered with funding from Piedmont Region and the European Community. The trail is in Piode Municipality (Vercelli Province), located 900 m a.s.l.

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Materials and Methods

The species of Heteroptera were collected along the trail "Il Bosco dei Tigli" from May to November 2016.

The first sampling area (1), close to the village, was characterized by sessile oak (*Quercus petraea* (Matt) Liebl.), and linden (*Tilia cordata* Mill.). The contiguous area (2) was a meadow/pasture at 900 m a.s.l, with the prevalence of *Phyteuma betonicifolium* Vill., *Ranunculus acris* L., *Gentiana kochiana* E.P.Perrier & Songeon, *Fragaria vesca* L., *Salvia glutinosa* L., and *Primula vulgaris* Huds. The third sampling area (3) was a deciduous forest composed by *Populus tremula* L., *T. cordata*, *Q. petraea*, *Castanea sativa* Mill., *Betula pendula* Roth, *Corylus avellana* L., *Sorbus aucuparia* L., and *Laburnum alpinum* (Mill.) Bercht & J. Presl. The last sampling area (4) was close to a waterfall with *Festuca scabriculmis* (Hack.) K.Richt., typical of Valsesia, *Phyteuma scheuchzeri* All., *Saxifraga cuneifolia* L., *Saponaria ocymoides* L., *Primula hirsuta* All., *Calluna vulgaris* (L.) Hull, *Cytisus scoparius* L., and *Crataegus monogyna* Jacq.

Species were identified using the main dichotomous keys of Heteroptera (Wagner &Weber, 1964; Péricart 1972, 1987, 1998; Moulet 1995) and verified by comparison with the specimen in the collection of the Museum of Natural Science in Milan (P. Dioli).

Results

The species collected in the four sampling areas along the trail are reported in Table 1.

Table 1. Hemiptera Heteroptera collected in the four areas along the trail "Il Bosco dei Tigli". The roman numerals provide the month. Corotypes (COR) according to Vigna Taglianti *et al.* (1999).

Taxa	1	2	3	4	COR
Anthocoridae					
Anthocoris nemoralis (Fabricius, 1794)			VII		ASE
Dufouriellus ater (Dufour, 1833)		VII			EUM
Orius (Heterorius) laticollis (Reuter, 1884)		VII	VIII		EUR
Orius (Orius) niger (Wolff, 1811)		VIII			TEM
Nabidae					
Himacerus (Aptus) mirmicoides (O. Costa, 1834)	VIII	V,VI,VII,VIII	VII,VIII, IX	IX	EUM
Himacerus (Himacerus) apterus (Fabricius, 1798)			VII, VIII		ASE
Nabis (Nabis) rugosus (Linnaeus, 1758)		VI, VII, VIII, IX	VIII	VI, VIII, IX	SIE
Miridae					
Adelphocoris lineolatus (Goeze, 1778)			VIII		OLA
Adelphocoris seticornis (Fabricius, 1775)		VIII			SIE
Atractotomus parvulus Reuter, 1878		VII			CEU
Blepharidopterus angulatus (Fallen, 1807)			VII		SIE
Bryocoris pteridis (Fallen, 1807)			VIII		SIE
Capsus ater (Linnaeus, 1758)		VI			EUM
Charagochilus (Charagochilus) weberi Wagner, 1953			VII		EUR
Closterotomus norwegicus (Gmelin, 1790)			VIII		SEM
Criocoris nigripes Fieber, 1861 (var. *apicalis*, Fieber, 1864)		VI			CEU
Deraeocoris (Deraeocoris) ruber (Linnaeus, 1758)		VII, VIII			OLA
Deraeocoris (Camptobrochis) serenus (Douglas & Scott, 1868)		VIII	VII, IX		TEM
Dicyphus (Dicyphus) flavoviridis Tamanini, 1949		V, VIII	V, IX		END
Halticus apterus (Linnaeus, 1758)		VII			TEM
Harpocera thoracica (Fallen, 1807)			VI		TEM
Heterocordylus (Heterocordylus) tibialis (Hahn, 1833)			V		EUR
Lepidargyrus ancorifer (Fieber, 1858)		VI			MED
Liocoris tripustulatus (Fabricius, 1781)		VII			PAL
Lygus gemellatus (Herrich-Schäffer, 1835)				VI	MED
Monalocoris (Monalocoris) filicis (Linnaeus, 1758)				VI	SIE
Neolygus contaminatus (Fallen, 1807)		VII			SIE
Orthotylus (Orthotylus) viridinervis (Kirschbaum, 1856)		VII			EUR
Phylus (Phylus) coryli (Linnaeus, 1758)			VIII		EUR
Phytocoris (Ktenocoris) austriacus Wagner, 1954			VIII	VIII	CEU
Pinalitus cervinus (Herrich-Schäffer, 1841)			VII		CEM
Plagiognathus (Plagiognathus) arbustorum (Fabricius, 1794)		VI			PAL
Plagiognathus (Plagiognathus) chrysanthemi (Wolff, 1804)			VI		PAL
Stenodema (Stenodema) holsata (Fabricius, 1787)		V, VI, VII, IX	VI		PAL
Stenodema (Stenodema) laevigata (Linnaeus, 1758)		V, VI, VII, VIII	V, VII, VIII	V	PAL
Stenodema (Stenodema) sericans (Fieber, 1861)		V	VIII, IX	VIII	EUR
Stenodema (Stenodema) virens (Linnaeus, 1767)		IV			OLA
Stenotus binotatus (Fabricius, 1794)			VIII		OLA
Tingidae					
Corythucha arcuata (Say, 1832)	VIII	V, VIII	V, VIII	V, VII	OLA
Dictyla echii (Schrank, 1782)			VIII		PAL
Physatocheila dumetorum (Herrich-Schäffer, 1838)			VII		CEM
Alydidae					
Alydus calcaratus (Linnaeus, 1758)			VIII		OLA
Coreidae					
Ceraleptus gracilicornis (Herrich-Schäffer, 1835)		VI			TEM
Coreus marginatus (Linnaeus, 1758)		IX			ASE

To be continued on next page

The survey showed differences among the four areas sampled, underlining the ecological characteristics of the *Heteroptera* species collected.

The first area, the closest to the village, was characterized by species widespread in Italy, namely *Himacerus* (*Aptus) mirmicoides* (O. Costa, 1834), *Aphanus rolandri* (Linnaeus, 1758), and *Pyrrhocoris apterus* (Linnaeus, 1758). Also, the Nearctic *Corythucha arcuata* (Say, 1832), since its introduction in Europe, is common on oak in North Italy, while *Tritomegas rotundipennis* (Dohrn, 1862) is recorded locally in Italy, Spain, France, Germany, Austria, and Slovenia.

Meadows and pastures of area 2 presented the highest number of species (Figure 1). The abundance of plant species favored the presence of *Pentatomidae* and *Scutelleridae*, mainly collected in this part of the trail. Particularly noteworthy were *Myrmus miriformis* (Fallen, 1807), *Lygaeosoma sardeum* Spinola, 1837, and *Macroplax preyssleri* (Fieber, 1837), typical of dry meadows. A predator endemic species, *Dicyphus (Dicyphus) flavoviridis* Tamanini 1949 was collected on *Salvia glutinosa* L. in May and August.

In the undergrowth of the third sampling area, *A. mirmicoides*, *Oxycarenus (Oxycarenus) lavaterae* (Fabricius, 1787), and *Palomena prasina* (Linnaeus, 1761) were collected on *Cytisus scoparius* L. and *Avenella flexuosa* (L.) Drejer. *Drymus (Sylvadrymus)*

Table 1. Continued from previous page.

Coriomeris denticulatus (Scopoli, 1763)		IX			SEM
Syromastus rhombeus (Linnaeus, 1767)		VI			TEM
Rhopalidae					
Corizus hyoscyami (Linnaeus, 1758)			VI		ASE
Myrmus miriformis (Fallen, 1807)		VIII			ASE
Rhopalus (Rhopalus) subrufus (Gmelin, 1790)			VII		COS
Stictopleurus punctatonervosus (Goeze, 1778)		VIII			EUR
Lygaeidae					
Aphanus rolandri (Linnaeus, 1758)	VII				TUM
Drymus (Sylvadrymus) ryeii Douglas & Scott, 1865			VI		EUR
Kleidocerys resedae (Panzer, 1797)		VIII	V, VII, VIII		SIE
Lygaeosoma sardeum Spinola, 1837		VIII			TEM
Macroplax preyssleri (Fieber, 1837)		VII			EUR
Oxycarenus (Oxycarenus) lavaterae (Fabricius, 1787)		VI, VII, VIII	VII	VII	MED
Rhyparochromus pini (Linnaeus, 1758)		VIII			ASE
Scolopostethus thomsoni Reuter, 1875		VII			OLA
Spilostethus saxatilis (Scopoli, 1763)			VI		TEM
Acanthosomatidae					
Elasmucha grisea (Linnaeus, 1758)			VI		SIE
Cydnidae					
Tritomegas rotundipennis (Dohrn, 1862)	VIII				EUM
Pentatomidae					
Aelia acuminata (Linnaeus, 1758)				V	SEM
Carpocoris (Carpocoris) purpureipennis (De Geer, 1773)		VI			EUR
Dolycoris baccarum (Linnaeus, 1758)		VI			EUR
Eurydema (Eurydema) oleracea (Linnaeus, 1758)		VI			PAL
Eysarcoris ventralis (Westwood, 1837)		VIII			PAL
Graphosoma italicum italicum (O.F. Müller, 1766)		VI			EUM
Palomena prasina (Linnaeus, 1761)		VI, VII, VIII	IV, V,VII, VIII, IX	VII, VIII	SEM
Pentatoma (Pentatoma) rufipes (Linnaeus, 1758)			VI		ASE
Picromerus bidens (Linnaeus, 1758)				IX	OLA
Piezodorus lituratus (Fabricius, 1794)			VIII		TEM
Staria lunata (Hahn, 1835)		VIII			TUM
Scutelleridae					
Eurygaster testudinaria (Geoffroy, 1785)		VI			PAL
Pyrrhocorridae					
Pyrrhocoris apterus (Linnaeus, 1758)	IV, V, VII, VIII	V, VI, VIII	IV, V, VII	IV, VII	OLA

ryeii Douglas & Scott, 1865 and *Stenodema (Stenodema) laevigata* (Linnaeus, 1758) were characteristic of the wet undergrowth. *Elasmucha grisea* (Linnaeus, 1758) in June and *Kleidocerys resedae* (Panzer, 1797) from May to August were recorded on birch and heather. *Corythucha arcuata* (Say, 1832) was the predominant species on the crown of the tree, together with *Himacerus (Himacerus) apterus* (Fabricius, 1798), an important predator of microarthropods.

Around the waterfall in the fourth sampling area two predators were collected, *Nabis rugosus* (Linnaeus, 1758), on Ericaceae, and *Picromerus bidens* (Linnaeus, 1758), which preys on moths' larvae.

Pyrrhocoris apterus (Linnaeus, 1758) was recorded in foliar debris in all the sampling area.

Family Miridae was the most represented, including 42% of the species collected, which was 31 species out of 74 Heteroptera species. Pentatomidae and Lygeidae species constituted 15% and 12% respectively. Considering the diet of the species, 77% were phytophagous, 13% predatory, 7% omnivorous, and 3% granivorous.

The following species are worth mentioning for their significance in the considered area.

Orius laticollis (Reuter, 1884). Species recorded in Italy in the Northern and Southern Regions and in Sicily, in the wet areas and the edge of streams, where it predates mainly on *Salix* and, to a lesser extent on *Alnus* Mill., *Populus* L., *Ulmus* L., *Quercus* (L.) and *Sorbus* L. (Pericart 1972).

Atractotomus parvulus (Reuter, 1878). The first record in Piedmont, it was previously generically cited for the Northern regions of Italy (Kerzhner & Josifov 1999). Monovoltine, it occurs on conifers (*Pinus* L., *Abies* Mill.), and overwinters as an egg (Wagner & Weber 1964). This species is very close to *Atractotomus marcoi* (Carapezza, 1982) recorded in Sicily and Russia (Carapezza, 1982), recognizable by the smaller size, the shorter second antennal segment, and the structure of the male genitalia, especially the vesica. The female of *A. parvulus* from Valsesia has the second antennal segment longer than the width of the head, more strongly inflated and fusiform. Moreover, the basal part of exocorium is clear. The distribution of these two species must be better clarified on the basis of a series of specimens, as they may have been confused one with the other in the past (Stonedahl, 1990).

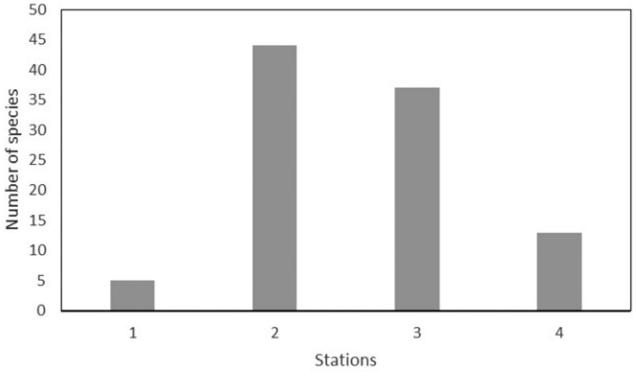

Figure 1. Number of species of Heteroptera collected in the four sampling areas along the natural path in Valsesia (NO).

Criocoris nigripes* var. *apicalis Fieber, 1864. The variety and the nominal form were recorded in Friuli, Trentino (Servadei 1967), and Piedmont (Dioli 1980). The specimen collected in Valsesia was the first in the Alpine area of Piedmont. In fact, previously, one adult was recorded in spring in Rovasenda (Novara) moorland, therefore two generations per year are assumed (Dioli, 1980). The species overwinters as an egg, and it colonizes *Galium* L. Adults are active in June-July (Wagner & Weber, 1964). C. *nigripes* var. *apicalis* is a new combination, previously associated with *C. crassicornis* (Hahn, 1834).

Orthotylus viridinervis (Kirschbaum, 1856). Sporadically recorded in Northern and Southern Italy, this is the first report in Piedmont. The species overwinters as an egg, thrives on *Fraxinus ornus* L., seldom on other plants. Adults are active from July to August (Wagner & Weber 1964).

Corythucha arcuata (Say, 1832). Nearctic species, recorded in the Alps and in the plain in Northern Italy, since 2000 (Bernardinelli and Zandigiacomo, 2000), later in Switzerland, Bulgaria, Turkey, and Iran. Spontaneous and planted oaks host this species (Dioli *et al.*, 2007).

Drymus ryeii (Douglas & Scott, 1865). Infrequent in Italy, recorded North of Po River in broadleaves residues and under stones (Dioli, 1974).

Oxycarenus lavaterae (Fabricius, 1787). Mediterranean species, the presence in the alpine and sub-alpine areas is considered occasional. Overwintering adults caused alarm several times as they aggregate on the bark of broadleaved plants (Capra 1961; Perini & Tamanini, 1961; Tamanini 1961; Ciampolini & Trematerra, 1986-1987).

Conclusions

In the survey, carried out along the nature path "Bosco dei Tigli" (Lime Tree Wood) at 900 m a.s.l. in Valsesia (Piedmont), 74 species of Heteroptera, belonging to 68 genera and 13 families, were collected in total. The number of species for each family represented the composition of the Italian Heteroptera, with the predominance of Miridae and Pentatomidae.

The chorology showed that 50% of the species collected are Euro-Asiatic *sensu lato*. Palearctic and European species constituted 25% and 17%, respectively. Cosmopolitan species were insignificant, 1.1% and only one endemic species was recorded, *Dicyphus (Dicyphus) flavoviridis*.

The ubiquitous or pest species *Dolycoris baccarum* (L.), *Stenodema (Stenodema) sericans* (Fieber), *S. (S.) virens* (L.), *S. (S.) laevigata* (L.), and *Coriomeris denticulatus* (Scopoli) were mainly detected in the wide meadow areas, once cultivated, characterized by Poaceae, Fabaceae, and Asteraceae. The presence of phytophagous species was balanced with predator species.

The only allochthonous species *Corythuca arcuata* (Say), incidentally introduced in Italy in 2000 (Bernardinelli and Zandigiacomo, 2000), was collected in all the sampling areas.

In the area considered, of particular note were the first record in Piedmont of *Atractotomus parvulus* (Reuter), the second record in Piedmont and the first in the Alpine area of *Criocoris nigripes* (Fieber), the new in Piedmont and second record in northern Italy of *Orthotylus viridinervis* (Kirschbaum), and the record of *Oxycarenus lavaterae* (F.) as Piode is the most norther-

ly locality in Italy, together with Sondrio, where the species was recently collected also at considerable height (M. Salvetti communication).

The species collected were mainly typical of the Alps, but Mediterranean species were also collected in the sunny area, in the meadows or on *Cytisus scoparius* L., while European and Siberian species were common in linden, hazelnut, oak, and chestnut sciophilous forest.

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