Introduction

Heteroptera fauna of Catalonia has been the subject of increasing interest from the second half of the twentieth century, revealing the diversity of this group of insects in our country. As a result, a catalogue (Ribes et al., 2004) and a checklist (Goula et al., 2010) were published, informing about the 1064 species recorded until present in Catalonia.

The Heteroptera, or true bugs, gathered as a group can be qualified as euricoic, though there are some families, genera and species that live only in very particular habitats (Henry, 2009). True bugs can be found in fresh water ecosystems as well as in terrestrial ones. They have a large range of diet regime that can be based on plant eating, pollen consumption, spores, and predation, or even be haematophagous like sundry species of assassin bugs of the Reduviidae family, that can transmit the Chagas Disease.

The role of Heteroptera in the ecosystems can be beneficial, harmful or even indifferent for the interests of people. Indeed there are species that feed on damaging species, that pollinate plants, or even they can be pests by its own by attacking plants, domestic animals or humans (Dolling, 1991). Due to the facility at collection, as well as the diversity of species and the easy separation and conservation of the material, cataloguing the Heteropterans is a relatively manageable task. This makes true bugs a good study group to understand and give a better view of the environmental state. Its frequently close relation to the vegetation makes them good candidates to be used as bioindicators, as shown in Ribes et al. (2000, 2001) related to Collserola Park. Also Gessé & Goula (2006) characterized the Heteropteran biocenoses inhabiting four Mediterranean plant associations: dry grassland, calcicolous rosemary scrub, kermes oak scrub and evergreen oak forest.

Environmental education has largely gained a place in modern society, as a must to give the general public tools to understand nature’s role in everyday life. Vertebrates, mainly birds and mammals, are the most common subject of study, as they have strong empathising feelings among human beings. Concerning terrestrial invertebrates, butterflies and sometimes beetles are the most preferred study groups. True bugs, with some species directly related to human welfare, have been usually neglected. However, true bugs living in terrestrial habitats fit most of the requirements to be useful in environmental education: easy to handle sized specimens, medium to moderate species richness, abundance in variety of ecological niches in which they play different roles and identification feasibility. Some special traits like aposematism, mimetism, myrmecomorphism or chemical defences, add interest to choose Heteroptera as study group.

The objectives of this article is to contribute to the general knowledge on Heteroptera in the Collserola Park, and to encourage these insects as model group for environmental education subject providing for the first time information on the biodiversity of true bugs in Can Coll.
Material and Methods

The Serra de Collserola Natural Park has more than 8,000 ha of green area, adjacent to Barcelona metropolitan region (fig. 1). Its dimensions are 17 km long by 6 km large, and it is enclosed by the rivers Llobregat on the south and Besòs on the north, the city of Barcelona on the west and the Vallès Plain on the east (Cañas & Franquesa, 1989). The highest point is the Tibidabo Mountain (512 m a.s.l.) and its geographical situation permits a variation on the climates due to the presence of sunny and shady zones, with typical Mediterranean pine forests and diverse types of oaks. As placed in the middle of a very crowded territory, roughly inhabited by ca. 4 million people, the Park has a central role in the leisure activities in green areas and in environmental education and sensitization of general public. Human activity may be developed in harmony with conservation goals planned by the Park management in the frame of Catalonia rules.

The proximity of the Park to many research institutions enhances it to be an accessible investigating area, also because of having a good access from the urban spaces. Many research groups have already made biodiversity and environmental studies in the Park, either on vertebrates or invertebrates. Concerning the latter two articles published on Heteropteran biocenoses of four different vegetation communities (Ribes et al., 2000, Ribes et al., 2001) and a compilation list of the Heteroptera species in the Park was published (Ribes & Ribes, 2001).

The fieldwork was conducted in the surroundings of Can Coll Environmental Education Center (UTM 31T 426 885/4591735), an old traditional Catalan farmhouse with labored areas, nowadays converted in a school of nature. It is mainly ringed by Mediterranean type forest with holm oak (Quercus ilex) and Aleppo pine (Pinus halepensis), and bushy plant Mediterranean associations (Mederos et al., 2009). The once human laboured farmland now abandoned near Can Coll makes the area an appropriate place for the study of Heteropterans.

Two days of prospecting were done in the meadows of Can Coll during a course on Heteroptera addressed to motivated general public in the frame of the School of Nature activities. Collections took place on 25th of May 2010 and 5th of June 2010. Samples were taken in the natural surrounding vegetation and in abandoned agricultural land, by means of a sweeping net 30cm diameter. Specimens were preserved in 70º ethanol, and studied under the binocular microscope for identification (Nikon SMZ-1).


Results and Discussion

The checklist of true bugs found in Can Coll consists of 43 species distributed by families as follows: Tingidae, 2; Miridae, 15; Nabidae, 1; Anthocoridae, 1; Berytidae, 1; Lygaeidae, 6; Coreidae, 5; Alydidae, 1; Rhopalidae, 1; Cydnidae, 1; Pentatomidae, 9; with Miridae as the most abundant taxon, just like it is the proportion in the case of whole Catalonia checklist (Goula et al., 2010).

Collections are attributed to Luis Mata and Marta Goula, conducting the Heteroptera course, in the name of all course attendants. Species identification was performed by the authors.

<table>
<thead>
<tr>
<th>Infraorden CIMICOMORPHA Leston, Pendergrast &amp; Southwood, 1954</th>
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<tbody>
<tr>
<td>Family Tingidae Laporte, 1832</td>
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<td>Subfamily Tinginae Laporte, 1832</td>
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<tr>
<td>1. Dictyla echii (Schrank, 1782)</td>
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<td>2. Tingis (Tingis) auriculata (A. Costa, 1847)</td>
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<tr>
<td>Family Miridae Hahn, 1833</td>
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<tr>
<td>Subfamily Deraeocorinae Douglas &amp; Scott, 1865</td>
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<td>3. Deraeocoris (Deraeocoris) ruber (Linnaeus, 1758)</td>
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<td>4. Deraeocoris (Deraeocoris) schach (Fabricius, 1781)</td>
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<td>5. Alloetomus germanicus Wagner, 1939</td>
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<tr>
<td>Subfamily Mirinae Hahn, 1833</td>
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<tr>
<td>6. Adelphocoris lineolatus (Goze, 1778)</td>
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<tr>
<td>7. Closterotomus norvegicus (Gmelin, 1790)</td>
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<tr>
<td>8. Closterotomus trivialis (A. Costa, 1853)</td>
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<tr>
<td>9. Cyphodema instabilis (Lucas, 1849)</td>
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</table>
Subfamily Orthotylinae Van Duzee, 1916 (1865)

10. *Heterotoma planicornis* (Pallas, 1772)
11. *Pachytomella passerinii* (A. Costa, 1842)
12. *Strongylocoris atrocoeruleus* (Fieber, 1864)

Subfamily Phylinae Douglas & Scott, 1865

13. *Amblytylus brevicollis* Fieber, 1858
14. *Lepidargyrus ancorifer* (Fieber, 1858)
15. *Macrotylus (Alloeonycha) solitarius* (Meyer-Dür, 1843)
16. *Pachyxyphus lineellus* (Mulsant, 1852)
17. *Psallus (Psallus) aurora* (Mulsant & Rey, 1852)

Family Nabidae A. Costa, 1853

Subfamily Nabinae A. Costa, 1853

18. *Himacerus (Aptus) mirmicoides* (O. Costa, 1834)

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Family Anthocoridae Fieber, 1836

Subfamily Anthocorinae Fieber, 1836

19. *Anthocoris nemoralis* (Fabricius, 1794)

Infraorden PENTATOMORPHA Leston, Pendergrast & Southwood, 1954

Family Berytidae Fieber 1851

Subfamily Berytinae Fieber, 1851

20. *Berytinus (Lizinus) montivagus* (Meyer-Dür, 1841)

Family Lygaeidae Schilling, 1829 (sensu Péricart, 1999)

Subfamily Lygaeinae Schilling, 1829

21. *Spilostethus pandarus* (Scopoli, 1763)
The habitus of the species is shown in figure 2. The largest
references in Catalonia, both in the city of Barcelona and
31.
30.
28.
27.
Subfamily Geocorinae Dahlbom, 1851
22. Geocoris (Pliocoris) erythrocephalus (Lepeltier & Serville, 1825)
Subfamily Heterogastrinae Stål, 1872
23. Platycoris inermis (Rambur, 1839)
24. Macroplus fasciata fasciata (Herrich-Schaeffer, 1835)
25. Oxyacarus (Oxyacarus) lavatavere (Fabricius, 1787)
Subfamily Rhypharochrominae Amyot & Serville, 1843
26. Drymus (Drymus) pilipes Fieber, 1861
Family Coreidae Leach, 1815
Subfamily CoreinaeLeach, 1815
27. Gonocerus insidiosus (Fabricius, 1787)
28. Haploprocta saulicornis (Fabricius, 1794)
Subfamily Pseudophloeinae Stål, 1872
29. Coriomeris affinis (Herrich-Schaeffer, 1839)
30. Loxocemis dentator (Fabricius, 1794)
31. Strobilotoma typhaceicornis (Fabricius, 1803)
Family Alydidae Amyot & Serville, 1843
Subfamily Micreltyrinae Stål, 1872
32. Micreltyra fousularum (Rossi, 1790)
Family Rhopalidae Amyot & Serville, 1843
Subfamily Rhopalinae Amyot & Serville, 1843
33. Brachycarenus tigrinus (Schilling, 1829)
Family Cydnidae Billberg, 1820
Subfamily Cydninae Billberg, 1820
34. Geotomus elongatus (Herrich-Schaeffer, 1840)
Family Pentatomidae Leach, 1815
Subfamily Podopinae Amyot & Serville, 1843
35. Graphosoma italicum (Müller, 1766)
Subfamily Pentatominae Leach, 1815
36. Dyroderes umbraculatus (Fabricius, 1775)
37. Eurydema (Eurydema) oleracea (Linnaeus, 1758)
38. Eysarcoris aeneus (Scopoli, 1763)
39. Neottiglossa lineolata (Mulsant & Rey, 1852)
40. Nezara viridula (Linnaeus, 1758)
41. Scioecoris (Neosciocoris) maculatus Fieber 1851
42. Scioecoris (Scioecoris) sulcatus Fieber, 1851
43. Scioecoris (Scioecoris) umbrinus (Wolff, 1804)

From this list, the following four species deserve to be
highlighted, as they have been very scarcely recorded from
Catalonia:
1. Deraeocoris (Deraeocoris) schach has only two find-
ing references in Catalonia, both in the city of Barcelona and
its surroundings (Ribes et al., 2008; Goula & Mata, 2011).
The habitus of the species is shown in figure 2. The largest
fraction of this terrestrial bug was captured on Spartium jun-
ceanum (Ribes et al., 2008), a Mediterranean host plant very
commonly found in all Catalonia. Therefore, the distribution
in Catalan territories could be greater than expected for this
Euromediterranean species.
2. Macrovelus (Alloeonycha) solitarius has two previous
bibliographic references in Catalonia, based on only one
locality (Ribes et al., 2004). Its distribution is not well defi-
ned, but it is an apparently European bug, frequently related
to the Stachys recta mint (Ribes, 1992).
3. Scioecoris (Neosciocoris) maculatus (fig. 3), recorded
thrice in Catalonia (Ribes et al., 2004). It is a Mediterranean
species, which extends to Turkestan. It has been captured on
different vegetal communities, and specially on Thymus vul-
garis (Gessè & Goula, 2006).
4. Scioecoris (Scioecoris) umbrinus, with a Eurosiberian
distribution, has only three previous finding references in
Berguedà and Maresme counties (Ribes et al., 2004).

A checklist of 427 true bugs in Serra de Collserola Nat-
ural Park (formerly named Collserola Park) was published by
Ribes & Ribes (2001). Lindberg (1933) stated Adelphocoris
lineolatus in “Tibidabo begiüt” (V. 1927, Eingr. Nr. 105,1927),
but the citation was not included in Ribes & Ribes (2001).
Deraeocoris (Knightopus) tutescens (Schilling, 1837) and
Strongylocoris cicadinus A. Costa, 1853 are recorded under
“Spanien, Barcelona” (Lindberg, 1933). Lack of more precise
locality information does not allow including those Lind-
berg’s reports in the Natural Park true bugs checklist, al-
though both species are listed by Ribes & Ribes (2001).

Ribes et al. (2008) cited two species collected within the
Park enlarging the checklist: the coreid alien true bug
Leptoglossus occidentalis Heidemann, 1910 and the mirid
Phytocoris (Compsocercoros) sanctipetri Carapezza, 1985.
In the present work, we add five new species records to that
checklist: the mirid Macrovelus (A.) solitarius, Alloeonomus
germanicus and Amblytulus brevicollis, and the pentatomids
Scioecoris (S.) umbrinus and Eysarcoris aeneus. The Serra de
Collserola Natural Park includes at present 434 Heteropteran
species, which represents about 40% of true bug Catalan
fauna (1064 species stated in the checklist by Goula et al.
2010).

Conclusion
The study is based on a relatively non-in-depth sampling,
consisting of only two days of fieldwork. But, despite of that
limitation, it has been possible to contribute with valuable
material to the characterization of local fauna. Assessing the
results of this work, we can affirm that the area of Can Coll,
and by extension the Collserola Natural Park, may be con-
dered an interesting site for its bug species richness. The fact
of the near location to Barcelona consolidates the entire Park
as one remarkable green area in the metropolitan conurbation
context.

The relevance of Heteroptera in nature deserves them
to be known and appreciated by the general public, and
implemented in environmental education activities. Several
pioneer experiences as the course on Heteroptera in Can
Coll during which the samples examined in this paper were
collected, or biodiversity observation activities promoted by
Barcelona municipality addressed to the general public,
have proved that Heteroptera can successfully be used for
educational purposes.

We firmly encourage to research on true bugs all over
the country, having promising prospects to enlarge the knowl-
dge about this interesting group of insects.

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