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The Orthoptera of the Trentino: ecological and biogeographic considerations

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SUMMARY

The Authors have researched into Orthoptera (Insecta, Orthoptera) of Trentino, based on data in literature and also on several collections carried out by the authors themselves in the past years; furthermore the collections of the Museums of Trento, Verona and Berlin have been examined. The Orthoptera fauna up to today counts 104 species and its numerical substance has been compared to the one of the bordering areas (Bolzano, Sondrio, Bergamo, Verona, Vicenza, Belluno and Treviso), basing the comparison also on the territorial extension and altitude excursion. The same provinces have also been compared applying the Sorensen’s indexes, from which similarity matrices of the different provinces have been obtained, elaborated afterwards by the statistics program R-win and by the CANOCO 4.0 software, in order to obtain cluster dendograms illustrating the distances between the various elements examined. This analysis has pointed out that Trentino is border area between west and east Orthoptera fauna. The same statistical analysis has been done on the altitude zones. The following species are particularly interesting in biogeography: Barbitistes vicetinus, Anacronus italoaustriacus, Pseudophryma baldei, Podisma pedestris nudig, Glyptothorax aliticola, Antacis differmns, Saga pedo, Ephippiger vielveti e Chorthopodisma cobellii. From the data thus obtained it was also possible to single out the rare or threatened species and to write down a first red list for Trentino, also acknowledging the environments most sensitive to environmental modifications. The most threatened or vulnerable species in Trentino are therefore: Raspolia nitidula, Xiphion discolor, Tettigonia cantans, Tettigonia caudata, Prionemobius h. heydenii, Saga pedo, Calliptamus italicus, Anacridium aegyptium, Locusta migratoria cinereascend, Plophus stridulans, Oedaleus decorus, Oedipoda germanica, Sphingonotus c. caerulans, Aiolopus s. strepens, Stethophyma grossum, Purepleurus alliaceus, Arcyptera f. fusc.

INTRODUCTION

The study of the Orthoptera fauna of the Trentino region is particularly interesting, given its geographical position, intermediate between the Alpine
and the Pre-Alpine regions, allowing the population of fauna of different origins and characterized by various environmental needs. Trentino is also characterized by remarkable climate, fauna and flora differences in the North-South direction. The particular orology of the territory and the complex articulation of the valleys enhance these differences, allowing the presence of numerous micro-climatic situations that favour the fauna differentiation and the processes of isolation and speciessing.

MATERIALS AND METHODS

The Authors have researched into Orthoptera of Trentino, based on data in litterature and also on several collections carried out by the Authors themselves in the past years; furthermore the collections of the Museums of Trento, Verona and Berlin have been examined. The Orthoptera fauna of the Trentino has been compared to the one of the bordering areas (Bolzano, Sondrio, Bergamo, Verona, Vicenza, Belluno and Treviso), basing the comparison also on the territorial extension and altitude excursion. The same provinces have also been compared applying the Sørensen's indexes, from which similarity matrixes of the different provinces have been obtained, elaborated afterwards by the statistics program R-win 7.0 (Becker, Chambers and Wilks, 2003) and by the CANOCO 4.0 (Cajo J.F. Ter Braak, 1998) software, in order to obtain cluster dendograms illustrating the distances between the various elements examined and a Canonical Corrispondence Analysis to study the enviromental variables.

RESULTS

Orthoptera Check-list of Trentino

From 1800 until today the knowledge of the Orthoptera fauna in Trentino has remarkably increased: at about the end of the XIX century 78 species were known (Cobelli, 1886), between 1900 and 1950 the number went up to 92 (Galvagni, 1947), up to the 104 known today with a new quotation by the Authors for the Barbitistes vicetinum (Galvagni and Fontana, 1993) for the area Borghetto all’Adige (South of Trentino). The 104 species of the Trentino are listed in Tab. I (the 73 underlined species are the ones found during the 2002-2003 sampling campaigns). The area of study is shown in the Fig. 1, the points represent the sampling localities. In Italy 11 Orthoptera Families are known (Heller et al., 1998), 9 of which are represented in Trentino (Tab. II).
Tab. I - Check-list of the Orthoptera of Trentino

Superfam. TETTIGONIOIDEA
Fam. TETTIGONIIDAE
Subfam. Phaneropterinae
Gen. Barbitistes Charp., 1825
1. B. servicauda (Fab., 1794)
2. B. obtusus Tang. & Tosa., 1881
3. B. vicetini Galvagni & Fontana, 1993
Gen. Tyloptis Fieb., 1839
4. T. liliiolata (Fab., 1793)
Gen. Lepidophloia Fieb., 1853
5. L. albivittata (Kollar, 1833)
6. L. laticauda (Privaldysky, 1867)
7. L. bosci Brunner, 1878
Gen. Polyacrus Fieb., 1853
8. P. dentiscutata (Charp., 1825)
Gen. Psilacrisomus Fischer, 1854
9. P. ornatus (Schmidt, 1850)
Gen. Isophyta Brunner, 1878
10. I. pyrenaeus (Serv., 1839)
11. I. m. medesior Brunner 1882
Subfam. Commenatinae
Gen. Meconema Serv., 1831
12. M. thalassum (De Geer, 1773)
13. M. meridionale A. Costa, 1860
Gen. Phaneroptera Serv., 1839
14. P. falcata (Poda, 1761)
15. P. n. marna Fieb., 1853
Subfam. Conocephalinae
Gen. Xiphidium Serv., 1831
16. X. dorsalis (Latre., 1804)
17. X. discolor (Thunberg, 1815)
Gen. Rupolis Schulze, 1898
18. R. nitidula (Scopoli, 1786)
Subfam. Tettigoninae Oete, 1997
Gen. Tettigonia L., 1758
19. T. viridissima L., 1758
20. T. cantensis (Fuessly, 1775)
21. T. caudata (Charp., 1845)
Gen. Anomonomus Camerano, 1878
22. A. australis (Nadig, 1897)
Subfam. Deciscinae
Gen. Deciscus Serv., 1831
23. D. n. verrucirostris (L., 1758)
Gen. Metrioptera Wesmael, 1838
24. M. brachyptera (L., 1761)
Gen. Bicolorana Zerene, F.E., 1941
25. B. b. bicolor (Philippi, 1830)
Gen. Pholidoptera Wesmael, 1838
26. P. griseaoptera (De Geer, 1773)
27. P. a. apera (Fab., 1793)
28. P. paludalis (Fischer, 1854)
29. P. l. littoralis Fieb. 1835
Gen. Platycerus Fieb., 1852
30. P. g. grisea (Fab., 1791)
31. P. intermedia (Serv., 1839)
Gen. Antaeus B. von Watt., 1882
32. A. difficilis (B. von Watt., 1861)
Gen. Versinelle Ramme, 1933
33. Y. raymaudi (Yersin, 1850)
Gen. Pachytrachia Uvarov, 1940
34. P. gracili (Brunner, 1861)
35. P. stridulatias (Fieb., 1853)
Gen. Roeseliana Zeuner, 1941
36. R. roeselii (Hagenbach, 1822)
37. R. feldschenkei Saus., 1874
Gen. Chopardius Harz, 1969
38. C. p. pestalis (Fab., 1787)
Subfam. Ephippigerinae
Gen. Ephippiger Berthold, 1827
39. E. vicheri Harz, 1996
40. E. ephippiger Fieb., 1784
Subfam. Saginae B. von Watt, 1882
Gen. Saga Charp., 1825
41. S. pedo (Pallas, 1771)
Fam. RHAPHIDOPHORINAE
Subfam. Troglophilinae
Gen. Troglophilus Krauss, 1879
42. T. caucica (Kollar, 1833)
43. T. n. nigricus Krauss, 1879
Fam. GRYLLOTALPIDAE
Gen. Gryllotalpa L., 1802
44. G. gryllotalpa (L., 1758)
Fam. GRYLLIDAE
Subfam. Gryllinae
Gen. Gryllus L., 1758
45. G. campestris L., 1758
Gen. Acrida L., 1758
46. A. domesticus L., 1758
Gen. Melanogryllus Chopard, 1961
47. M. d. desertus Pallas, 1771
Gen. Gryllonomapha Fieb., 1853
48. G. dalmatina (Okssy, 1832)
Gen. Eumodicogyllus Chopard, 1961
49. E. burchi leginis (Latre., 1804)
Subfam. Nemobiniinae
Gen. Nemobius Serv., 1839
50. N. sylvestris (Bosc, 1792)
Gen. Preromogyllus Jacobson & Bianchi, 1904
51. P. h. heydeniensis (Fisher, 1853)
52. P. concolor Walk, 1871
Fam. OECANTHIDAE
Subfam. Oecanthinae
Gen. Oecanthus Serv., 1831
53. O. pellucidus (Scopoli, 1763)
Superfam. ACRIDOIDEA
Fam. TETRIGIDAE
Gen. Acrida L., 1758
54. A. ungarica mediterranea Dirshius, 1949
Gen. Tettix L., 1802
55. T. bipuncatus (L., 1758)
56. T. subulatus (L., 1758)
57. T. turki (Krauss, 1876)
Characterization of the sampling environments

The distribution of the Orthoptera is not only dependent on the environmental characteristics but also on the micro-climatic conditions. During the sampling campaigns we have singled out some characteristic habitats, which have been difficult to classify due to the variety of vegetable associations found. According to Odasso (2002) we have schematized the main floristic group of the Trentino (Tab. III):
Tab. II - Families, genuses and species of the Orthoptera of Italy and Trentino

<table>
<thead>
<tr>
<th>Family</th>
<th>Italy</th>
<th>Trentino</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetrigoniidae</td>
<td>44</td>
<td>24</td>
</tr>
<tr>
<td>Rhaphidophoridae</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Gryllidae</td>
<td>21</td>
<td>7</td>
</tr>
<tr>
<td>Oecanthidae</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Gryllotalpidae</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Tettigidae</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Tridactyliidae</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Pamphagidae</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Pygmorophidae</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Catantopidae</td>
<td>18</td>
<td>7</td>
</tr>
<tr>
<td>Acridiidae</td>
<td>36</td>
<td>26</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>136</td>
<td>69</td>
</tr>
</tbody>
</table>

Tab. III - Main type of vegetation

<table>
<thead>
<tr>
<th>Zone</th>
<th>Type of vegetation</th>
<th>Main tree species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plain (0-200 m)</td>
<td>Woods of ilex, manna-ash, oaks, and hoarnbeam</td>
<td>British oak, ilex, ash-tree, hornbeam, sorb, bay oak and hazel</td>
</tr>
<tr>
<td>Sub mountainous</td>
<td>Woods of ilex, manna-ash, oaks, and hoarnbeam</td>
<td>British oak, bay oak, hazel, ash-tree and hornbeam</td>
</tr>
<tr>
<td>Lower mountain</td>
<td>Beech-wood and mixed woods of conifers and braadleafs</td>
<td>Norway spurce, beech, ilex, Scotch fir and alder</td>
</tr>
<tr>
<td>Upper mountain</td>
<td>Woods of conifers and Norway spurce wood</td>
<td>Norway spurce, silver fir and ilex</td>
</tr>
<tr>
<td>Sub alpine</td>
<td>Sub alpine Norway spurce wood</td>
<td>Norway spurce, ilex and Pinus cembra</td>
</tr>
<tr>
<td>Alpine</td>
<td>Alpen prairie and moor</td>
<td>Bushes of rhododendron, juniper and bilberry</td>
</tr>
</tbody>
</table>

Orthopteric associations

Regarding the Orthopteric associations we referred to La Greca and Messina’s pattern (1982); the 52% of the Orthoptera belong to «grassland field» association, another 13% belong to «shrub grassland» association and another 16% to the «shrub woodland» association (Fig. 2).

Altitudinal distribution

The plain zone is undoubtedly less representative of the Trentino territory, limited to narrow zones near the Adige river and Garda lake. The Orthoptera
species are distributed in the different environments as follows, in the altitude zones; the number of species for each level is reported in brackets:

**Plain 0-200 m (10 species)**

**Sub mountainous 201-800 m (48 species)**
- Dry fields: *Decticus v. verrucivorus*, *Ephippiger vicheti*, *Platycleis g. grisea*, *Ruspolia nitidula*, *Gryllus campestris*, *Anacridium aegyptium*, *Stenobothrus lineatus*, *Oedipoda caerulescens*, *Chorthippus p. parallelus*, *Chorthippus d. dorsatus*, *Dirshius b. haemorrhoidalis*, *Omocestus viridulus*, *Omocestus rufipes*, *Glyptothorbus b. brunneus*. Cool fields: *Tylopus liliifolia*, *Gryllomorpha dalmatina*, *Gryllus campe-

Lower mountain 801-1300 m (54 species)

Platycleis g. grisea, Pholidoptera griseoaptera, Phaneroptera n. nana, Chopardius p. pedestris, Nemobius sylvestris, Calliptamus i. italicus, Aiolopus s. strepens, Psophus stridulus, Omocestus rufipes, Glyptotobrus mollis ignifer, Glyptobothrus v. vagans, Chorthippus d. dorsatus, Chorthippus p. parallelus, Dirshius b. haemorrhoidalis, Dirshius petraeus. Wet fields: Ruspolia nitidula, Platycleis g. grisea, Phaneroptera falcata, Pholidoptera griseoaptera, Pholidoptera fallax, Yersinella raymondi, Pachytrachis gracilis, Pachytrachis striolatus, Dirshius h. haemorrhoidalis, Dirshius petraeus, Oedipoda coerulescens, Calliptamus i. italicus, Omocestus rufipes, Omocestus viridulus, Chorthippus d. dorsatus, Chorthippus p. parallelus, Euchorthippus declivus, Euthystria brachyptera, Tetrix b. bipunctata, Glyptotobrus mollis ignifer, Xiphidion discolor. In very humid and shady zones: (besides: Chorthippus d. dorsatus, Chorthippus p. parallelus, Platycleis g. grisea), are to be added: Roseliana roeselii, Stauroderus scalaris, Stenobothrus lineatus; in the bushes: Metrioptera brachyptera, Tettigonia viridissima, Tettigonia caudata, Chopardius p. pedestris, Poecilinom ornatus, Polysarcus denticauda. Sandy environments: Sphingonotus c. caerulans, Oedipoda caerulescens, Dirshius petraeus. Vegetation on rocks and debris: Glyptobothrus v. vagans, Oedipoda germanica, Oedipoda caerulescens.

Upper mountain 1301-2000 m (59 species)

Mixed woods: on trees: Meconema meridionale, Phaneroptera n. nana; in the bushes of the underwoods: Barbitistes serricauda, Barbitistes obtusus, Pholidoptera fallax, Pholidoptera griseoaptera Pholidoptera a. aptera, Pachytrachis striolatus, Yersinella raymondi, Leptophyes boscii, Platycleis g. grisea; clearing: Bicolorana b. bicolor, Yersinella raymondi, Calliptamus siciliae, Psophus stridulus, Gomphocerus rufus, Glyptobothrus v. vagans; on litter: Nemobius sylvestris. Dry fields: Platycleis g. grisea, Tettigonia cantans, Pholidoptera griseoaptera, Chopardius p. pedestris, Gryllus campestris, Tetrix bipunctata, Euthystria brachyptera, Stenobothrus lineatus, Calliptamus siciliae; on the driest and most sun-exposed slopes: Euchorthippus declivus, Dirshius b. haemorrhoidalis, Dirshius petraeus, Glyptobothrus eisenrauthi, Glyptobothrus mollis ignifer, Glyptobothrus v. vagans, Stenobothrodes rubicundulus, Stauroderus scalaris; in dry grazing lands with surfacing rocks that increase the presence of: Calliptamus i. italicus, Oedipoda coerulescens, Stenobothrodes rubicundulus, Psophus stridulus, Platycleis g. grisea, Omocestus viridulus, Omocestus rufipes, Glyptobothrus mollis ignifer, Stenobothrus lineatus, Stauroderus scalaris, Aeropus s. sibiricus, Stenobothrodes rubicundulus, Podisma p. pedestris, Melanoplus f. frigidus, Kisella ireda; in the bushes: Tettigonia cantans, Tettigonia viridissima, Metrioptera brachyptera, Chopardius p.

Sub alpine 2001-2200 m (25 species)


Alpine 2201-3700 m (15 species)

Alpine praries: Decticus v. verrucivorus, Aeropus s. sibiricus, Stenobothrus lineatus, Chorthippus d. dorsatus, Omocestus viridulus, Omocestus rufipes, Chorthippus p. parallelus, Glyptobothrus b. biguttulus, Glyptobothrus mollis ignifer. In the most humid zones: Metrioptera brachyptera; higher altitudes are reached by: Podisma p. pedestris, Melanoplus f. frigidus, Kisella irena, Aeropus s. sibiricus, Omocestus viridulus and occasionally Gryllus campestris. Reach the 2650 m only Aeropus s. sibiricus and the 2700 m only Aeropedellus v. variegatus.

Most species are concentrated between the sub-mountainous and lower mountain zones, the number of species gradually decreases in the upper mountain zone and is drastically reduced in the Alpine zone where only few species can adapt to the extreme environment of the Alpine praries and high altitude moorlands (Fig. 3).

Corological Categories

Analysing the bio-geographical distribution of the species in Trentino, their Corological Categories are as follows (Fig. 4): the 22% of the species has an Euro-Sibiric distribution, the 18% a Palearctic distribution and another 16% an European distribution. The endemic species of the Alpine Arch as: Chorthopodisma cobellii, Pseudoprunna baldensis, Podisma pedestris nadigi, Glyptobothrus alticola, Antaxius diformis, Ehippiger vicheti and Anonconotus italostriacus are also of a great biogeographic interest; Podisma pedestris nadigi is known only in the Alps Giudicarie (the Alps between Lombardia and Trentino), Pseudoprunna baldensis in the M. Baldo (South Trentino), Glyptobothrus alticola in the locality
of Dosso dei Morti in the Alps Giudicarie (West Trentino); the species *Chopardius p. pedestrus* is endemic of the Center-South Europe.

**Canonical Corresponding Analysis and similarity matrixes**

Using the data related to the various sampling campaigns, in order to single out the environmental factors that better characterize the distribution of Orthoptera on the studied territory, we have carried out a statistical type of investigation considering as environmental variables, the altitude, the slope and the type of environment; the data has been elaborated by the CANOCO 4.0 software; from the CCA (Fig. 5) what emerges is that the main factors are altitude and humidity ratio in the environment of capture. The abscissa divides the wet-
environments from the dry-environments; the ordinate divides the grassland-environments from the bushes-environments; the expositions were chosen like "dummy variables"; the environmental variables are represented like arrows which length gives some information about its correlation with the principal axes of the CCA; the species are represented by points that are the centroids of their distributions, according with the variable most important for the distribution of that species. For some species such as Podisma p. pedestris and Kisella irena, the prevailing factor is altitude, whereas for other species such as Psophus stridulus and Glyptothrus mollis ignifer the environmental xericity and exposure are determining. Some other species like Tettigonia cantans and Chorthopodisma cobellii are strictly linked to the cool and humid grassland.
We have therefore analysed the specific composition of each altitude zone, identifying the species in common between zones, obtaining a square and symmetrical matrix to which the Sørensen's indexes have been applied (Tab. IV); thus it was possible to obtain a rate of similitude between different altitude levels. The elaboration of this matrix by the R-win software, has produced the dendogramm shown in Fig. 6. The algorithm used to calculate the distances on
the matrixes is Ward (square Euclidean distances). The sub mountain flat land and the plain present a specific composition distinctly different from the subalpine and alpine flat lands, where as the lower and upper mountain flat lands are more similar to each other.

Finally we have followed the same procedure for the Provinces at the borders of Trentino (Tab. V). The dendogram obtained is the following (Fig. 7). It is
clear that Trentino, as far as specific composition is concerned, in an intermediate situation between the East and West Alp regions and the major dominance of the Provinces of Veneto and Friuli on one side and the Provinces of Bolzano and Lombardia on the other side.

**Rare and threatened species**

This study has underlined, as it has already been said, that the most abundant species are undoubtedly the prairie species, the typical species of prairie and grazing land environments and of wood clearings, the less abundant are present in ecotone environments in marshland, of the gravely-sandy biotops on river banks and of the river vegetation, as well as the high levels typical of the Alpine prairies. The presence of typical species of dry and steppe zones or that live on stoney slopes is increasing. It is possible to suppose that this remarkable increase of the species adapted to drier environments is due to the gradual distribution of the humid environments. The ecotone environments and the humid zones are particularly threatened by the environmental modifications and studying the present data in litterature referring to the previous century, it has been possible to notice a decrease in the findings of some species, once abundant and easily traceable, and today considered rare, and even in danger and threatened. A first list of the threatened species, or however very rare in Trentino is shown in the following chart (Tab. VI).

<table>
<thead>
<tr>
<th>Superfam.</th>
<th>TETTIGONIOIDEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fam.</td>
<td>TETTIGONIIDAE</td>
</tr>
<tr>
<td>Subfam.</td>
<td>Conocephalinae</td>
</tr>
<tr>
<td>Gen.</td>
<td>Ruspilia Schultess, 1898</td>
</tr>
<tr>
<td></td>
<td>R. nitidula (Scopoli, 1786)</td>
</tr>
<tr>
<td></td>
<td>Gen. Xiphidion Serv., 1831</td>
</tr>
<tr>
<td></td>
<td>X. discolor (Th., 1815)</td>
</tr>
<tr>
<td>Subfam.</td>
<td>Tettigoniinae Otte, 1997</td>
</tr>
<tr>
<td>Gen.</td>
<td>Tettigonia L., 1758</td>
</tr>
<tr>
<td></td>
<td>T. cantans (Fuessly, 1775)</td>
</tr>
<tr>
<td></td>
<td>T. caudata (Charp., 1845)</td>
</tr>
<tr>
<td>Subfam.</td>
<td>Saginae B. von Watt, 1882</td>
</tr>
<tr>
<td>Gen.</td>
<td>Saga Charp., 1825</td>
</tr>
<tr>
<td></td>
<td>S. pedo (Pallas, 1771)</td>
</tr>
<tr>
<td>Fam.</td>
<td>GRYLLIDAE</td>
</tr>
<tr>
<td>Subfam.</td>
<td>Nemobiinae</td>
</tr>
<tr>
<td>Gen.</td>
<td>Pieronemobius J. &amp; B., 1904</td>
</tr>
<tr>
<td></td>
<td>P. h. heylennii (Fisher, 1853)</td>
</tr>
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<td>Fam.</td>
<td>CATANTOPIDAE</td>
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<td>Subfam.</td>
<td>Callipitaminae</td>
</tr>
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<td>Gen.</td>
<td>Calliptamus Serv., 1831</td>
</tr>
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<td>C. i. italicus L., 1758</td>
</tr>
<tr>
<td>Subfam.</td>
<td>Cyl tractacanthacridinae</td>
</tr>
<tr>
<td>Gen.</td>
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<tr>
<td></td>
<td>A. aegyptium (L., 1764)</td>
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<tr>
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<td>ACRIDIDAE</td>
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<td>Subfam.</td>
<td>Locustinae (Oedipodinae)</td>
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<td>Gen. Locusta L., 1758</td>
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<tr>
<td></td>
<td>L. migratoria cinerascens Fab. 1781</td>
</tr>
<tr>
<td></td>
<td>Gen. Prophur Fieb., 1853</td>
</tr>
<tr>
<td></td>
<td>P. stridulus (L., 1758)</td>
</tr>
<tr>
<td></td>
<td>Gen. Terrix Latr., 1802</td>
</tr>
<tr>
<td></td>
<td>T. turki (Krauss, 1876)</td>
</tr>
<tr>
<td></td>
<td>Gen. Oedaleus Fieb., 1891</td>
</tr>
<tr>
<td></td>
<td>O. decorus (G., 1826)</td>
</tr>
<tr>
<td></td>
<td>Gen. Oedipoda Serv., 1831</td>
</tr>
<tr>
<td></td>
<td>O. germanica (Lat., 1804)</td>
</tr>
<tr>
<td></td>
<td>Gen. Sphingonotus Fieb., 1852</td>
</tr>
<tr>
<td></td>
<td>S. c. caterulans (L., 1767)</td>
</tr>
<tr>
<td></td>
<td>Gen. Aiolopus Fieb., 1853</td>
</tr>
<tr>
<td></td>
<td>A. streperus (Latr., 1804)</td>
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<tr>
<td></td>
<td>Gen. Stethophyma Fieb., 1853</td>
</tr>
<tr>
<td></td>
<td>S. grossum (L., 1758)</td>
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<tr>
<td></td>
<td>Gen. Parapleurae Fisch., 1854</td>
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<tr>
<td></td>
<td>P. allaceus (G., 1817)</td>
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<tr>
<td>Subfam.</td>
<td>Gomphocerinae</td>
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<td>Gen.</td>
<td>Acropyera Serv., 1839</td>
</tr>
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<td>A. f. fusca (P., 1773)</td>
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Tab. VI - List of the rare species of the Trentino region
CONCLUSIONS

The investigation carried out on the Orthoptera fauna of the territory of Trentino has underlined some very important ecological characteristics: the upper mountain flat land stations are those with a greater abundance of species and with the greatest diversity of environments, however a considerable number of species, basically of Euro-Siberian distribution, can also reach higher levels. As far as the threatened, or however rare species are concerned it is probable to suppose that their drastic decrease is due to the systematic disappearance of their natural habitat. In fact they are species linked to humid environments such as the peat-bogs or the marshlands and ecotone environments; the abandoning of the fields and their incipient bushing has favoured the expansion of shrub-prairie species or basically xero-thermophilic as Chorthippus p. parallelus, Omocestus viridulus and Decticus v. verrucivorus that are particularly abundant and present in all the gathering stations; on the other hand it is particularly relevant the presence of interesting species from a bio-geographical and eco-fauna point of view. Pobsarcus denticauda that prefers non degraded grazing fields and indicates good environmental conditions. Podisma p. pedestrís orophilic species of Euro-Siberian distribution, prefers environments characterized by scarce vegetation also on surfacing matrix. Melanoplus f. frigidus it is a boreo-alpine fauna element, present in Italy only along the Alps and is one of the most orophilic species. Chortopodisma cobellii endemic of the North-East Alps. Calliptamus siciliae species especially linked to xeric and sun exposed environments. Sphingonotus c. caerulans found in only one station along the Vanoi stream in Val Sugana (South-East Trentino), it prefers sandy environments of river banks, but it is very sensitive to environmental modifications. Barbitistes obtusus shrub species endemic of the Alps and North Appennines. Barbitistes vicetinus shrub species endemic of Vicentino (North-East Italy), now quoted for Trentino. Antaxius difformis species ecologically linked to high level bushes, where the juniper prevails, it is endemic of the East Alps. Saga pedo thermophilic species and linked to the xero thermal oasises, its first mention is due to Galvani and Prosser, 2004.

The statistical investigation (CCA and Cluster Analysis) have underlined how the kind of habitat and the altitude decidedly influences the distribution of Orthoptera species and the Cluster Analysis has identified Trentino as natural corridor for the diffusion of the species between the East and West Alps.

BIBLIOGRAPHY


