

Remarks on the composition of the Auchenorrhyncha fauna in some moist areas in Southern Apulia (Italy)

Adalgisa Guglielmino^{1*} & Christoph Bückle²

¹Department of Agriculture, Forests, Nature and Energy, University of Tuscia, Viterbo, Italy

²Neckarhalde 48, D-72070 Tübingen, Germany

*Corresponding author, e-mail: guglielm@unitus.it

ABSTRACT

A list of 84 Auchenorrhyncha species collected from field excursions in the province of Lecce (Southern Apulia) in June 2011 and April 2012 is given. Prevalently three areas were studied: the Regional Natural Park “Bosco e Paludi di Rauccio”, the Protected Oasis “Laghi Alimini” and the State Natural Reserve “Le Cesine”. Four species (*Delphax meridionalis* (Haupt, 1924), *Delphacodes capnodes* (Scott, 1870), *Parapotes reticulatus* (Horváth, 1897) and *Calamotettix taeniatus* (Horváth, 1911) are recorded for the first time for Italy, five (*Stenokelisia angusta* Ribaut, 1934, *Euides basilinea* (Germar, 1821), *Chloriona glaucescens* Fieber, 1866, *Hecalus storai* (Lindberg, 1936) and *Melillaia desbrochersi* (Lethierry, 1899) are new records for the Apennine Peninsula (“S” in the checklist of the Italian fauna) and 26 new for Apulia. For some species of special interest their ecology and distribution is discussed. The investigated areas are of high relevance for nature conservation as they constitute small relics of formerly vastly extended coastal marshes, where several stenotopic Auchenorrhyncha species occur, associated particularly with moist vegetation. Interesting is a group of taxa that are known only from the Balkan region and South Italy. Possibly the isolated occurrence of some other Auchenorrhyncha taxa in Apulia is connected rather with the Balkan Peninsula than with Central Europe.

KEY WORDS

Faunistics; Ecology; Biogeography.

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INTRODUCTION

As the knowledge on the distribution of many species of Auchenorrhyncha in Italy is still rather fragmentary, and recent data for the southern regions of the peninsula are almost completely lacking, it may be useful to publish some data deriving from two sampling trips in June 2011 and April 2012, respectively, in some moist areas in the province of Lecce in Southern Apulia (Fig. 1).

Especially three zones of notable naturalistic importance were investigated: the Regional Natural Park “Bosco e Paludi di Rauccio”, the State Natural

Reserve “Le Cesine” and the Protected Oasis “Laghi Alimini”.

The Regional Natural Park “Bosco e Paludi di Rauccio” (Figs. 2–5) comprises many different habitats: forest of *Quercus ilex* L. (residue of the “Foresta di Lecce”, a forest area that in the Middle Ages extended between Lecce, the Adriatic coast, Otranto and Brindisi), a swampy area named Specchia della Milogna, small ponds and moist areas, two coastal basins (Idume and Fetida), sandy seashore, some zones of Mediterranean maquis and garigue, ruderal areas and pastures. The State Natural Reserve “Le Cesine” (Figs. 6, 7) is an area of extreme environmental value. Even if prevalently a

humid area, it includes in addition a large variety of habitats and transitional zones, which create a vast ecological mosaic. A part from extended reed areas, numerous canals, swamps and marshes and the basins of Pantano Grande and Salapi, there are many other habitats as pine forest, Mediterranean maquis, *Quercus ilex* forest and ruderal areas. The reserve includes 620 ha, defined as “moist zone of international value” (RAMSAR convention, 1971); out of these 620 ha, 348 are “natural reserve of animal repopulation” administrated by the WWF-Italy. The Alimini lakes (Fig. 8) consist of two basins: Alimini Grande and Alimini Piccolo, named also Fontanelle, with the former being a salt water, the latter a fresh water lake. The oasis includes valuable areas of Mediterranean maquis and costal retrodunal lagoons of great naturalistic interest. The protected area is one of the most important natural sites of the Salento region, with an ecosystem rich of plant and animal species. It constitutes a “Zone of Special Protection” (ZPS), proposed as Site of European Community Importance (pSIC). The protected Oasis of Alimini lakes is a very important place where birds can rest and winter.

MATERIAL AND METHODS

The samplings were carried out in June 2011 and April 2012 at 18 localities (two of them sampled twice).

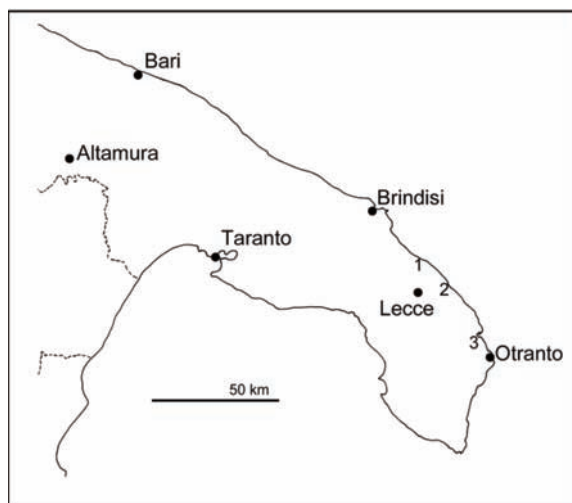


Figure 1. Map of the investigated areas in South Apulia. 1 = Bosco e Paludi di Rauccio; 2 = Le Cesine; 3 = Laghi Alimini.

We applied two collection methods: a) by entomological net and aspirator, b) directly by sight of single specimens by means of the aspirator.

List of collecting sites

In order to facilitate the comparison of data in our different papers on the Italian Auchenorrhyncha fauna we maintain the number system of collecting localities applied already in other publications.

- St. 552: Torre Chianca, Bosco di Rauccio; N40°27'52.4" E18°10'00.4"; 3 m; 19/06/2011; ruderal area with shrubs of *Pistacia lentiscus* L. and *Phillyrea* L. (Fig. 2).

- St. 553: Torre Chianca, Bosco di Rauccio; N40°28'11.8" E18°10'10.7"; 2 m; 20/06/2011; *Phragmites australis* (Cav.) Trin. on the margin of a field and moist areas with *Juncus* L., *Bolboschoenus maritimus* (L.) Palla, Cyperaceae (Fig. 3).

- St. 554: Torre Chianca, Bosco di Rauccio; N40°28'02.0" E18°10'19.8"; 6 m; 20/06/2011; margin of *Quercus ilex*-forest, *Pistacia lentiscus*, *Phillyrea* and open areas.

- St. 555: Torre Chianca, south of Bosco di Rauccio; N40°27'09.0" E18°11'57.6"; 3 m; 20/06/2011; moist area with *Carex* L., *Juncus*, Cyperaceae, Poaceae (Fig. 4).

- St. 556: Torre Chianca, Bosco di Rauccio; Specchia della Milogna; N40°28'09.6" E18°10'29.9"; 3 m; 21/06/2011; moist area with *Bolboschoenus* (Asch.) Palla in Hallier & Brand, *Carex*, *Tamarix* L., *Phragmites* Adans, *Juncus*, and dry ruderal area.

- St. 557: Torre Chianca, Bosco di Rauccio; N40°27'56.5" E18°10'07.8"; 7 m; 21/06/2011; forest of *Quercus ilex* with *Pistacia lentiscus*, *Phillyrea*, *Clematis* L., *Hedera* L. etc.

- St. 558: Torre Chianca, Bacino Idume; N40°28'08.0" E18°11'21.8"; 5 m; 21/06/2011; vegetation near the sea and the basin with *Elymus* L., *Phragmites*, etc.

- St. 559: Laghi Alimini, north of Lago Grande; N40°12'31.6" E18°25'41.4"; 10 m; 22/06/2011; moist area with *Juncus*, *Phragmites*, *Cyperus* L.

- St. 560: Laghi Alimini, Lago Piccolo; N40°10'50.9" E18°27'04.7"; 4 m; 22/06/2011; moist area with *Carex* (Fig. 8).

- St. 561: Torre Chianca, south of Bosco di Rauccio; N40°27'08.9" E18°11'57.4"; 6 m;



Figure 2. Bosco e Paludi di Rauccio: St. 552. Figure 3. Bosco e Paludi di Rauccio: St. 553. Figure 4. South of Bosco e Paludi di Rauccio: St. 555. Figure 5. South of Bosco e Paludi di Rauccio: St. 561. Figure 6. Le Cesine: St. 563. Figure 7. Le Cesine: St. 562. Figure 8. Laghi Alimini: St. 560. Figure 9. Porto Badisco: St. 564.

22/06/2011; open dry stony area, *Phillyrea*, Poaceae, *Carex*, *Rubus* L., thistles (Fig. 5).

- St. 562: Natural Reserve "Le Cesine"; N40°21'16.7" E18°20'26.2"; 4 m; 23/06/2011; shore of lagoon, *Phragmites*, *Bolboschoenus*, *Carex*, *Tamarix* (Fig. 6).

- St. 563: Natural Reserve "Le Cesine"; N40°21'03.9" E18°21'05.4"; sea level; 23/06/2011; shore of lagoon, *Bolboschoenus*, *Carex*, Cyperaceae (Fig. 7).

- St. 564: between Porto Badisco and Santa Cesarea; N40°04'08.0" E18°28'44.8"; 45 m; 24/06/2011; dry rocky area and small pine forest with *Brachypodium* P. Beauv., *Carex*, Poaceae (Fig. 9).

- St. 622: Natural Reserve "Le Cesine"; sea level; 17/04/2012; forest, shore of lagoon, shrubs, herbaceous vegetation.

- St. 623: West of Natural Reserve "Le Cesine"; N40°20'50.3" E18°19'33.8"; 20 m; 17/04/2012; olive grove, herbaceous vegetation with prevalently Fabaceae, Poaceae.

- St. 624: road S. Cataldo - Frigole; N40°23'38.6" E18°15'23.4"; 20 m; 17/04/2012; open dry area with Poaceae and maquis vegetation.

- St. 625: Torre Chianca, Bosco di Rauccio; N40°27'23.6" E18°10'00.7"; 6 m; 18/04/2012; meadow, herbaceous vegetation.

- St. 626: Torre Chianca, Bosco di Rauccio; N40°27'56.5" E18°10'07.8"; 7 m; 18/04/2012; forest of *Quercus ilex* with *Pistacia lentiscus*, *Phillyrea*, *Clematis*, *Hedera* etc.

- St. 627: Torre Chianca, south of Bosco di Rauccio; N40°27'09.0" E18°11'57.6"; 3 m; 18/04/2012; moist area with *Mentha* L., *Carex*, *Juncus*, Cyperaceae, Poaceae.

- St. 628: coast between Frigole and Torre Chianca; N40°27'33.8" E18°12'50.9"; 2 m; 18/04/2012; open area near seashore with Poaceae, *Carex*, herbaceous vegetation.

In the "List of collected specimens" are indicated for each species: the collection locality and in parentheses the number of males, females and (if present) nymphs, separated by semicolon, respectively. For some species brachypterous (b) and macropterous (m) specimens are listed separately; if both forms were present they are divided by comma. New records for Italy are indicated by NI, new records for peninsular Italy ("S" in D'Urso, 1995a) by NPI, and new records for Apulia by NRA.

RESULTS

List of collected specimens

Familia CIXIIDAE

Pentastiridius suezensis (Matsumura, 1910)
555 (1; 0) 558 (1; 0) 562 (26; 13) 563 (1; 1)

Familia DELPHACIDAE

Asiraca clavicornis (Fabricius, 1794)
552 (0; 1) 627 (0; 1)

Kelisia guttula (Germar, 1818)
556 (1; 1)

Kelisia guttulifera (Kirschbaum, 1868)
552 (1; 0) - NRA

Kelisia gr. *ribauti* Wagner, 1938
559 (2; 3) 628 (1; 0) - NPI

Stenocranus fuscovittatus (Stål, 1858)
556 (1; 1) - NRA

Stenokelisia angusta Ribaut, 1934
554 (1; 0) 555 (7; 3; 9) 556 (0; 1) 560 (6; 0; 2)

Eurysanoides rubripes (Matsumura, 1910)
624 (3b; 5b) - NRA

Delphax inermis Ribaut, 1934
555 (0; 1b) - NRA

Delphax meridionalis (Haupt, 1924)
556 (1; 0) - NI

Euides basilinea (Germar, 1821)
562 (1m; 0) - NPI

Chloriona glaucescens Fieber, 1866
558 (2m; 0) 562 (3m; 1m) - NPI

Chloriona sicula Matsumura, 1910
553 (8m; 3b, 4m) 554 (4m; 2b) 555 (14m; 4b, 2m; 1) 558 (1m; 0) 559 (11m; 2m) 627 (12m; 2b) - NRA

Laodelphax striatella (Fallén, 1826)
552 (0; 2m) 553 (1m; 0) 559 (2m; 3m) - NRA

Delphacodes capnodes (Scott, 1870)

555 (1m; 0) - NI

Muirodelphax aubei (Perris, 1857)

556 (2b, 1m; 1b, 2m), 558 (7b; 3b; 2) 624 (0; 1b) 628 (0; 1b)

Florodelphax leptosoma (Flor, 1861)

556 (0; 1b) 559 (4b, 2m; 4b, 2m) - NRA

Toya obtusangula (Linnavuori, 1957)

553 (1m; 1m)

Toya propinqua (Fieber, 1866)

552 (1m; 1m) 559 (3m; 2m) 564 (3m; 0) 623 (1m; 0) - NRA

Flastena fumipennis (Fieber, 1866)

559 (1b; 1b) - NRA

Familia TROPIDUCHIDAE

Trypetimorpha sp.

556 (0; 0; 1) - NRA

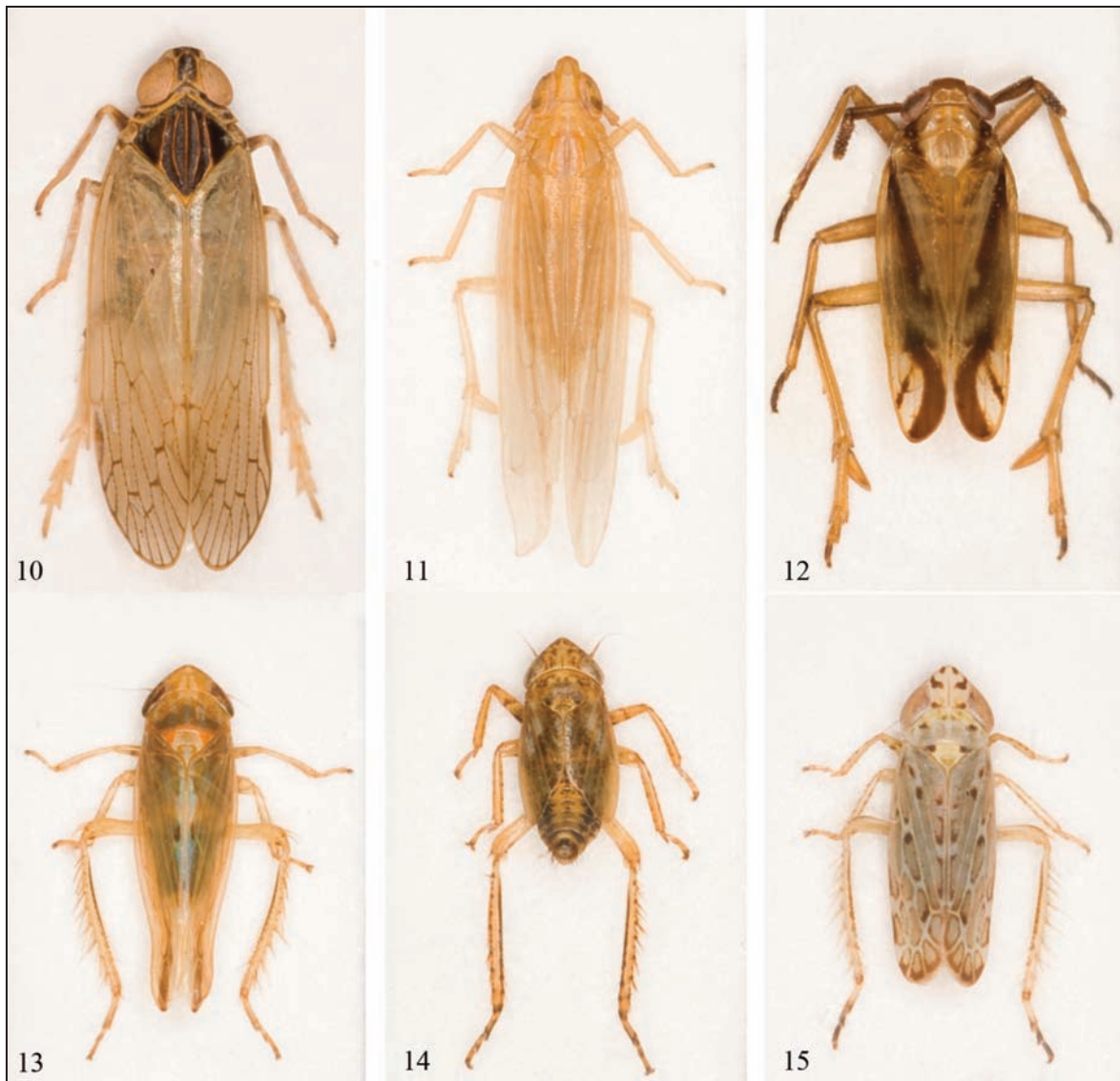


Figure 10. *Pentastiridius suezensis*. Figure 11. *Stenokelisia angusta*. Figure 12. *Delphax meridionalis*. Figure 13. *Mocdyiopsis oranensis*. Figure 14. *Melillaia desbrochersi*. Figure 15. *Adarrus reductus*. Photos by Massimo Vollaro.

Familia CALISCELIDAE

Caliscelis bonellii (Latreille, 1807)

561 (1; 0)

Homocnemia albovittata A. Costa, 1857

556 (0; 0; 1)

Peltonotellus quadrivittatus (Fieber, 1876)

564 (0; 1)

Ommatidiotus dissimilis (Fallén, 1806)

556 (0; 0; 1) 628 (0; 0; 2) - NRA

Familia ISSIDAE

Agalmatium bilobum (Fieber, 1877)

552 (1; 0)

Agalmatium flavescens (Olivier, 1791)

552 (2; 1) 561 (1; 0)

Issus lauri Ahrens, 1818

552 (0; 1) 554 (6; 1) 557 (2; 4) 622 (2; 0; 2)

Latissus dilatatus (Fourcroy, 1785)

557 (2; 1)

Familia CERCOPIIDAE

Cercopis sanguinolenta (Scopoli, 1763)

624 (2; 0) 625 (3; 1)

Familia APHROPHORIDAE

Lepyronia coleoprata (Linnaeus, 1758)

553 (1; 1) 554 (2; 0) 555 (0; 1) 556 (1; 0) 562 (2; 0)

Neophilaenus campestris (Fallén, 1805)

552 (0; 1) 557 (0; 1) 564 (1; 1)

Neophilaenus lineatus (Linnaeus, 1758)

559 (9; 1) 561 (5; 1) 564 (1; 0) 622 (0; 1)

Philaenus spumarius (Linnaeus, 1758)

552 (0; 2) 554 (1; 0) 557 (1; 0) 624 (0; 1) 625 (2; 3)

Familia CICADELLIDAE

Agallia consobrina Curtis, 1833

552 (0; 1) 557 (3; 13)

Anaceratagallia laevis (Ribaut, 1935)

552 (2; 2) 556 (3; 4) 559 (3; 0) 562 (3; 0) 564 (2; 2)

Austroagallia sinuata (Mulsant et Rey, 1855)

552 (0; 2) 553 (1; 1) 558 (8; 3) 564 (0; 5) 625 (0; 2)

Bugraia ocularis (Mulsant et Rey, 1855)

552 (1; 1) 554 (1; 2) 557 (2; 2; 1) 622 (2; 13) 626 (0; 7)

Hecalus storai (Lindberg, 1936)

561 (2; 0) - NPI

Stegelytra cf. *erythroneura* Haupt, 1924

557 (0; 0; 1) - NRA

Empoasca alsiosa Ribaut, 1933

628 (1; 2) - NRA

Lindbergina (Youngiada) sp.

557 (0; 9) - NRA

Ribautiana tenerrima (Herrich-Schäffer, 1834)

554 (0; 1) - NRA

Eupteryx thoulessi Edwards, 1926

622 (1; 0) - NRA

Eupteryx zelleri (Kirschbaum, 1868)

564 (1; 6) 622 (0; 1) 624 (1; 0)

Zyginidia adamezewskii Dworakowska, 1970

564 (2; 0) - NRA

Zyginidia gr. *ribauti* Dworakowska, 1970

552 (20; 18) 553 (2; 4) 554 (2; 2) 556 (1; 2) 561 (0; 1)

559 (7; 13) 562 (2; 1) 564 (9; 0) 624 (1; 1) 628 (7; 3)

Arboridia parvula (Boheman, 1845)

552 (1; 1)

Grypotes staurus Ivanoff, 1885

557 (3; 4; 2)

Opsius lethierryi Wagner, 1942

556 (3; 0) 562 (1; 3)

Opsius stactogalus Fieber, 1866

555 (1; 5) 556 (2; 0)

Neoliturus fenestratus (Herrich-Schäffer, 1834)

552 (0; 1) 553 (0; 1) 556 (1; 0) 559 (0; 2)

Circulifer sp.

552 (0; 1)

Balclutha nicolasi (Lethierry, 1876)

559 (6; 10; 1) - NRA

Balclutha rosea (Scott, 1876)

553 (0; 1) 562 (0; 1) - NRA

Macrosteles ossiannilssoni Lindberg, 1954
555 (1; 3) - NRA

Macrosteles quadripunctulatus (Kirschbaum, 1868)
623 (2; 1)

Maiestas sp.
557 (0; 2) 559 (0; 1)

Varta rubrostriata (Horváth, 1907)
554 (7; 4) - NRA

Doratura gr. *paludosa* Melichar, 1897
556 (1; 2) 564 (2; 1; 1)

Fieberiella florii (Stål, 1864)
552 (0; 1) 554 (0; 1) 557 (1; 0; 1)

Synophropsis lauri (Horváth, 1897)
557 (1; 0) - NRA

Anoplotettix sp.
552 (0; 1)

Selenocephalus stenopterus Signoret, 1880
561 (1; 0)

Cicadula lineatopunctata (Matsumura, 1908)
559 (4; 7) - NRA

Mocydia crocea (Herrich-Schäffer, 1837)
627 (0; 1)

Mocydiopsis oranensis (Matsumura, 1908)
561 (4; 4)

Thamnotettix diluitor (Kirschbaum, 1868)
557 (1; 0)

Thamnotettix zelleri (Kirschbaum, 1868)
623 (7; 8; 7)

Conosanus obsoletus (Kirschbaum, 1858)
552 (1;0) 553 (2;5) 555 (2;4) 556 (2;3) 559 (0;2)

Euscelis alsius Ribaut, 1952
553 (1; 0) - NRA

Euscelis lineolatus Brullé, 1832
552 (10; 10) 553 (5; 0) 554 (2; 4) 555 (1; 0) 556 (1; 2)
557 (5; 6) 559 (7; 5) 564 (3; 1)

Streptanus josifovi Dlabola, 1957
624 (5; 11) 626 (2; 2)

Artianus manderstjernii (Kirschbaum, 1868)
556 (2; 0)

Melillaia desbrochersi (Lethierry, 1889)
623 (32; 17) 624 (0; 1) 626 (1; 5) - NPI

Paramesus obtusifrons (Stål, 1853)
553 (9; 3) 555 (1; 2) 556 (2; 3) 562 (8; 2; 1) 563 (5; 2)

Parapotes reticulatus (Horváth, 1897)
563 (10; 3) - NI

Paralimnus phragmitis (Boheman, 1847)
555 (1;2) 556 (1;2) 562 (2;14) - NRA

Psammotettix alienus (Dahlbom, 1850)
552 (6; 6) 553 (2; 9) 554 (0; 7) 556 (0; 2) 558 (2; 3) 559
(11; 0) 562 (2; 0) 564 (7; 8) 622 (7; 7) 623 (5; 2) 624 (3;
2) 625 (3; 1) 627 (1; 0) 628 (18; 18; 18)

Psammotettix confinis (Dahlbom, 1850)
559 (4; 0)

Adarrus reductus (Melichar, 1897)
561 (25; 22) 564 (17; 9) 627 (0; 1)

Jassargus latinus (Wagner, 1942)
624 (0; 1)

Arthaldeus striifrons (Kirschbaum, 1868)
556 (0; 3) - NRA

Calamotettix taeniatus (Horváth, 1911)
562 (2; 14) - NI

The investigated areas

1. Bosco di Rauccio and adjacent areas (St. 552-558, 561, 625-627) (Figs. 2-5): 67 taxa collected.

The high number of collected species is due to the major collecting intensity in relation to the other two investigated areas. Ten localities with different ecological features were studied, two of them in two different seasons. Particular importance have the reed areas with six species of *Phragmites* feeders, among them *Pentastiridius suezensis*, *Chloriona glaucescens*, *Delphax inermis* and *D. meridionalis*.

In other moist areas, characterized by Cyperaceae and Juncaceae, further interesting species were discovered: *Stenokelisia angusta*, *Delphacodes capnodes*, *Ommatidiotus dissimilis* (all on *Carex* spp.), *Florodelphax leptosoma* (on *Juncus*), *Toya*

obtusangula (on Poaceae?) and *Eupteryx thoulessi* (on *Mentha aquatica* L.). *Varta rubrostriata* lives on tussocks of a tall Poaceae species (probable *Erianthus ravennae*) which is present on field margins west of Specchia della Milogna. In the central forest area nine (unfortunately female) specimens of an interesting Typhlocybinae species, *Lindbergina (Youngiada)* sp., were collected on *Quercus ilex*, and the brachypterous Deltocephalinae *Melillaia desbrochersi* on the low vegetation of small clearings. The dry areas south of the Natural Reserve with a garigue like vegetation furnished very interesting results as well. Among other species there were found *Adarrus reductus*, *Hecalus storai* and *Mocysiopsis oranensis*.

2. Le Cesine and adjacent areas (St. 562, 563, 622, 623) (Figs. 6, 7): 22 taxa collected.

Only four localities in this area were investigated. Again, the reed areas along the lagoons are particularly rich of interesting Auchenorrhyncha: on *Phragmites* the following species were collected: *Pentastiridius suezensis*, *Euides basilinea*, *Chloriona glaucescens*, *Paralimnus phragmitis* and *Calamotettix taeniatus*. *Parapotes reticulatus* was found not far from the *Phragmites* sites on *Schoenoplectus lacustris*, *Eupteryx thoulessi* on *Mentha aquatica*. A rich population of *Melillaia desbrochersi* was collected in spring on the herbaceous vegetation of an olive grove.

3. Laghi Alimini (St. 559, 560) (Fig. 8): 18 taxa collected.

Only two sites were studied in this area. A rich population of *Stenokelisia angusta* was observed on tall sedges near the reed belt around Lago Piccolo. *Kelisia* gr. *ribauti* (on *Carex* sp.), *Florodelphax leptosoma* (on *Juncus*), *Flastena fumipennis* and *Balclutha nicolasi* (on *Cyperus*) were collected in a moist area with different small Cyperaceae and Juncaceae.

Observations on some taxa of special interest

Pentastiridius suezensis (Matsumura, 1910)
(St. 555, 558, 562, 563) (Fig. 10)

All *Pentastiridius* specimens collected in 2011/2012 in Apulia (and a population found some years before in northern Apulia, province of Foggia, Lago di Lesina) belong to this taxon. Their aedeagus

shape corresponds to the figures given by Van Stalle (1991), and by Wagner (1954), who probably had seen the type material. The species shares apparently the ecological preferences with *P. leporinus* (Linnaeus, 1761) and was found in abundance on *Phragmites australis* in coastal lagoon areas and similar habitats.

In D'Urso (1995a) the presence of this species in Italy is regarded as doubtful with records of *Oliarus pallens* (Germar, 1821) possibly referring to *P. suezensis*. All *Pentastiridius* Kirschbaum, 1868 specimens we collected in other parts of Italy including Sardinia and all *Pentastiridius* specimens in the Servadei collection under the name *Oliarus leporinus* L. and *O. pallens*, which were checked by the authors, belong to *P. leporinus*. Thus, it seems that *P. suezensis* is present only in a part of southeastern Italy, where it replaces *P. leporinus*, which is present and common in all other regions of peninsular Italy. *P. suezensis* is described from Egypt, and has a wide distribution primarily in many parts of southern, southeastern and eastern Europe, but also in Africa and Asia until India and Philippines (Van Stalle, 1991).

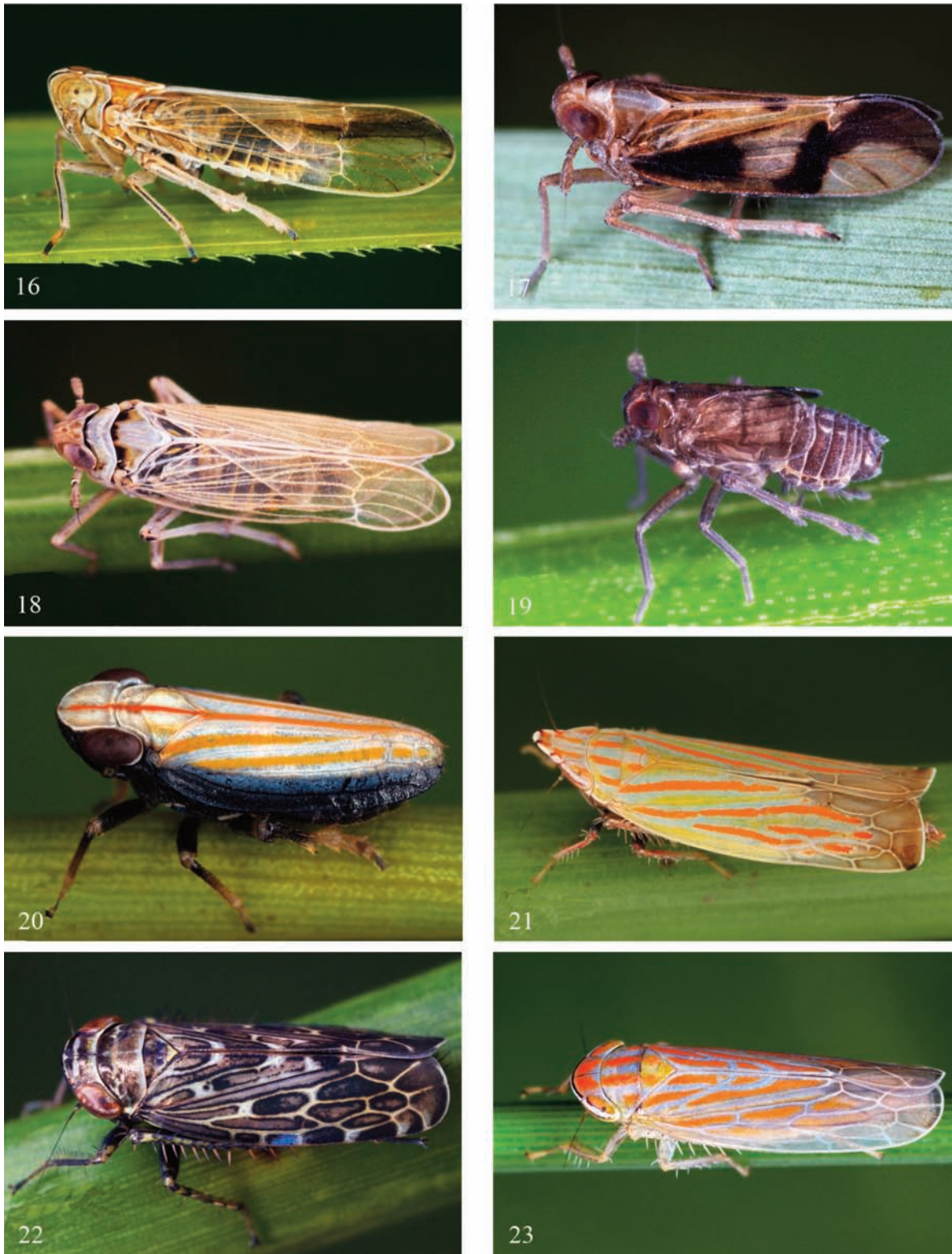
Until now, there are unresolved taxonomical problems in this species group (see Holzinger et al., 2003, Webb et al., 2013).

Kelisia* gr. *ribauti Wagner, 1938
(St. 559, 628)

There are some doubts about the identity of *Kelisia ribauti* in Central Europe and the populations in the Mediterranean regions (see Guglielmino et al., 2005). Italian populations of this species group were found in many different habitats from localities near the seashore until moderately high mountain areas, always in moist environments on different small *Carex* species. At least at low altitude they hibernate in the adult stage.

Stenocranus fuscovittatus (Stål, 1858)
(St. 556) (Fig. 16) - NRA

Species widely distributed in the Palaearctic region. In Italy it is recorded from Trentino Alto Adige (Servadei, 1967), Veneto (Minelli & Mannucci, 1979), Lazio (Castellani, 1953). The record for Lazio is doubtful and may refer rather to *S. major* (Kirschbaum, 1868). In Apulia the species is found in marshes on tall sedges. This is in congruence with the observations in Nickel (2003).



Stenokelisia angusta Ribaut, 1934
(St. 554, 555, 556, 560) (Fig. 11) - NPI

The species is recorded from Sicily (Asche, 1985) and Sardinia (Guglielmino et al., 2000). It is indicated in Della Giustina & Remane (1991) as thermo-xerophilous and feeding possibly on *Carex flacca* Schieber. Habitat and host plant of the populations found in Apulia do not coincide with this characterization. The host plant in Apulia is a tall sedge like *Carex acutiformis* Ehrh., the habitats are moist areas in marshes. In Sardinia the species was found in a spring fen at an altitude of about 1000 m.

Delphax inermis Ribaut, 1934
(St. 555) - NRA

The species is widely distributed in the Mediterranean area. In Italy it seems to be rather rare and is recorded only from Lazio and Sicily (Servadei, 1968; D'Urso, 1995a). The record for Lazio should be confirmed. The host plant is *Phragmites australis*.

Delphax meridionalis (Haupt, 1924)
(St. 556) (Fig. 12) - NI

This species is recorded until now only from Greece. In Italy it is replaced apparently by the close related *D. ribautianus* Asche et Drosopoulos, 1982. The new record for Italy represents one of several examples in which taxa present on the Balkan Peninsula occur also in southern or south-eastern Italy. The specimen in Apulia was collected on *Phragmites australis* in a marsh area.

Euides basilinea (Germar, 1821)
(St. 562) (Fig. 17) - NPI

Also this species is a *Phragmites* feeder. In Italy it was recorded until now only from Trentino Alto Adige (Servadei, 1968) and Veneto-Lombardia (Osella, Pagliano-Osella, 1989). The specimen from Apulia was found on the shore of a lagoon together with *Pentastiridius suzensis*, *Chloriona glaucescens* and *Calamotettix taeniatus*.

Chloriona glaucescens Fieber, 1866
(St. 558, 562) (Fig. 18) - NPI

The species is distributed in Europe (except for the Iberian Peninsula) and in Central Asia. In Italy it is recorded by Servadei (1967) from Trentino Alto Adige. This record is dubious in view of the preference of this *Chloriona* Fieber, 1866 species for

brackish habitats. The habitats in Apulia were reeds on the seashore or along the shore of lagoons. Host plant is *Phragmites australis*.

Delphacodes capnodes (Scott, 1870)
(St. 555) (Fig. 19) - NI

The species is widely distributed in central and southeastern Europe. Tall sedges are recorded as host plants. This coincides with our observations in Apulia.

Trypetimorpha sp.
(St. 556) - NRA

Only one nymph was collected from this genus, the identification of which at species level is at present impossible. In the past there was some nomenclatural confusion in this genus (see Huang & Bourgoïn, 1993; Guglielmino et al., 2005). In Italy, two *Trypetimorpha* Costa 1862 species are present: *T. occidentalis* Huang et Bourgoïn, 1993 widespread and common in Central Italy, and *T. fenestrata* Costa, 1862 described from Campania and recorded also from Basilicata by Servadei (1967; as *T. pilosa* Horváth, 1907 now a synonym of *T. fenestrata*). We checked the specimens from Basilicata in the Servadei-collection and confirmed the identification as *T. fenestrata*.

Ommatidiotus dissimilis (Fallén, 1806)
(St. 556, 628) (Fig. 20) - NRA

The species is widespread in the Palaearctic region. In the past it was considered tyrophilous and monophagous on *Eriophorum vaginatum* L. (Nickel, 2003). However, in the meantime it was found also on other *Eriophorum* L. taxa and on several *Carex* species in quite diverse habitats. In Italy it is recorded from Trentino Alto Adige and Veneto (Servadei, 1967), Toscana (Mazzoni, 2005), Abruzzo and Lazio (Guglielmino et al., 2005). Host plants in Apulia are small sedges in moist areas near the coast. This coincides with the habitats in Lazio. In Abruzzo, however, the species was found on dry mountain pastures at an altitude of 1900 m (on *Carex* cf. *kitaibeliana* Degen ex Bech.). No morphological differences were observed between these different populations.

Hecalus storai (Lindberg, 1936)
(St. 561) - NPI

The species is described from the Canary Islands and recorded also from France. Our identi-

fication is based on Ribaut's description and figures. In Italy there is only a record from Sicily (Pantelleria) (D'Urso & Guglielmino, 1995). *Hecalus* Stål, 1864 species may be rather variable in size and vertex shape, whereas there are only slight differences in the genital morphology. Therefore it is difficult to define specific characters. Linnavuori (1975) made an important contribution to the knowledge of the genus, but many problems are left. The specimens in Apulia were found in a dry and stony habitat south of Bosco di Rauccio.

***Stegelytra* cf. *erythroneura* Haupt, 1924**
(St. 557) - NRA

Until now this genus was not recorded for Apulia. We found only one nymph (on *Quercus ilex*). The authors collected in central and Southern Italy (and Sardinia) only *S. erythroneura* (on *Quercus ilex* and *Q. cerris* L.). Probably also the nymph from Bosco di Rauccio belongs to this taxon. The other *Stegelytra* Ghauri 1972 taxon present in Italy, *S. putoni* (Mulsant et Rey, 1875), was collected by the authors in Liguria (on *Q. ilex*) (Guglielmino & Bückle, 2007), and was later recorded by Mazzoni (2005) from Toscana.

***Lindbergina* (*Youngiada*) sp.**
(St. 557) - NRA

No species of *Youngiada* Dlabola, 1959 was recorded before from Apulia. We collected only females, an identification of which on species level is not possible. They present the same colouration as a female collected in Southern Lazio (Guglielmino et al., 2005) and were found like the specimen from Lazio on *Quercus ilex*. In Italy until now two species of this subgenus are recorded: *Lindbergina loewi* (Lethierry, 1884), a doubtful record from Friuli Venezia Giulia, (see D'Urso, 1995a) and *L. chobauti* (Ribaut, 1952) (Vidano & Arzone, 1987; Mazzoni, 2005).

***Zyginidia adamczewskii* Dworakowska, 1970**
(St. 564) - NRA

The species is described from Croatia and recorded also from Greece (Drosopoulos et al., 1986). The first and only record in Italy is from Campania (Vidano, 1982). Vidano (1982) indicates *Cynodon dactylon* (L.) Pers., *Agropyron repens* (L.) P. Beauv. and other Poaceae as host plants. The specimens in Apulia were collected in a dry rocky garigue like habitat.

***Zyginidia* gr. *ribauti* Dworakowska, 1970**
(St. 552–554, 556, 5559, 561, 562, 564, 624, 628)

Very common taxon throughout peninsular Italy; it is replaced in Sardinia by *Z. scutellaris* (Herrich-Schäffer, 1838), and in Northern Italy partly by *Z. pullula* (Boheman, 1845). The relationships between *Z. ribauti*, *Z. serpentina* (Matsumura, 1908) and *Z. italica* (Ribaut, 1947) should be clarified (see also Guglielmino et al., 2005). *Z. gr. ribauti* displays a remarkable variability in its aedeagus morphology, not only between different populations, but also within the same population.

***Circulifer* sp.**
(St. 552)

Only one female of this genus was collected in a maquis like area of Bosco di Rauccio. The genus (often inserted in *Neotaliturus* Distant, 1918) is very problematic in respect of species discrimination. Italian populations are quite diverse in colouration and size. However, no distinct differences in the genital morphology of males and females were observed. In males, the shape of the genital plates corresponds to that given by Ribaut (1952) for *C. haematoceps* (Mulsant et Rey, 1855). The habitats are generally dry places in low and median altitude, also sandy seashores. The host plants are in some cases apparently *Cistus* sp., in others Chenopodiaceae. In Germany *Circulifer* cf. *haematoceps* was found on *Sedum* L. (Crassulaceae) (Nickel, pers. comm.).

***Maiestas* sp.**
(St. 557, 559)

The females of this genus found during our study in Apulia belong with great probability to *M. schmidtgeni* (Wagner, 1939), which is very widespread and common in dry ruderal lowland places in peninsular Italy.

***Varta rubrostriata* (Horváth, 1907)**
(St. 554) (Fig. 21) - NRA

After the revision of the *Varta-Stymphalus* generic complex (Viraktamath, 2004) the distribution of *V. rubrostriata* should be checked. In Italy it is recorded from Lazio and Basilicata (Servadei, 1967). The presence in both regions was confirmed by the authors. The host plants in Italy are apparently *Erianthus ravennae* (L.) P. Beauv. and *Imperata cylindrica* (L.) P. Beauv., in Bulgaria and Greece it occurs also on *Sorghum halepense* (L.) Pers.

Doratura gr. *paludosa* Melichar, 1897
(St. 556, 564)

The group of species close to *D. paludosa* is in need of revision. A paper on the topic is in preparation. The *Doratura* J. Sahlberg, 1871 populations found in southern Apulia belong to the same species that is found in other Adriatic parts of peninsular Italy. In the past those populations were recorded sometimes as *D. paludosa*, sometimes as *D. veneta* Dlabola, 1959.

Mocydiopsis oranensis (Matsumura, 1908)
(St. 561) (Fig. 13)

Westmediterranean species, in Italy recorded only from Apulia (Gargano) and Sicily (Guglielmino, 1993). A small localized population was found during the recent study in Apulia in a dry and stony garigue like habitat together with *Adarrus reductus* (Melichar, 1897).

Melillaia desbrochersi (Lethierry, 1889)
(St. 623, 624, 626) (Fig. 14) - NPI

Mediterranean species, in Italy recorded only from Sicily (D'Urso, 1995b). In Apulia, we collected it only in spring. It was found in a olive grove near the Natural Reserve "Le Cesine", and in the Natural Park "Bosco e Paludi di Rauccio" in a ruderal place and on some small clearings. Probably the species is widespread and not uncommon in southern Italy, but until now it was never found because of its particular life cycle: adults occur only in the early (and late?) parts of the year.

Parapotes reticulatus (Horváth, 1897)
(St. 563) (Fig. 22) - NI

The discovery of this species in Apulia was quite unexpected. It is distributed in several countries of central, northern and southeastern Europe, including Ex-Yugoslavia. As host plants are recorded *Schoenoplectus lacustris* (L.) Palla and possibly *S. tabernaemontani* (Gmel.) Palla (Nickel, 2003). A quite abundant population of this species was found in the lagoon area of the Natural Reserve "Le Cesine", on *Schoenoplectus lacustris*.

Adarrus reductus (Melichar, 1897)
(St. 561, 564, 627) (Fig. 15)

The species is described from Croatia. In Italy it is recorded only from Apulia (Servadei, 1967). It was collected in two very dry stony garigue like sites (south of Bosco di Rauccio and near Porto Badisco).

Calamotettix taeniatus (Horváth, 1911)
(St. 562) (Fig. 23) - NI

The species is recorded from central and eastern Europe. In Apulia, it was found on the shore of the Pantano Grande in the Natural Reserve "Le Cesine" on its host plant, *Phragmites australis*, in moderately high abundance.

CONCLUSIONS

During our research in Apulia 84 Auchenorrhyncha species were found on the whole. Four species (*Delphax meridionalis*, *Delphacodes capnodes*, *Parapotes reticulatus* and *Calamotettix taeniatus*) are recorded for the first time for Italy, five (*Stenokelisia angusta*, *Euides basilinea*, *Chloriona glaucescens*, *Hecalus storai* and *Melillaia desbrochersi*) are new records for the Apennine Peninsula ("S" in the checklist of the Italian fauna), and 26 are new records for Apulia (*Kelisia guttulifera*, *Stenocranus fuscovittatus*, *Eurysanoides rubripes*, *Delphax inermis*, *Chloriona sicula*, *Laodelphax striatella*, *Florodelphax leptosoma*, *Toya propinqua*, *Flastena fumipennis*, *Trypetimorpha* sp., *Ommatidiotus dissimilis*, *Stegelytra* cf. *erythroneura*, *Empoasca alsiosa*, *Lindbergina (Youngiada)* sp., *Ribautiana tenerrima*, *Eupteryx thoulessi*, *Zyginidia adamczewskii*, *Balclutha nicolasi*, *B. rosea*, *Macrosteles ossianilssoni*, *Varta rubrostriata*, *Synophropsis lauri*, *Cicadula lineatopunctata*, *Euscelis alsius*, *Paralimnus phragmitis*, *Arthaldeus striifrons*).

The high number of new records for Apulia, and the fact that some of these records regard species that are widespread and quite common throughout Italy, show that the knowledge on this region is presently very scarce. In addition to the here presented data, many further research is necessary to achieve to a sufficient understanding of the Auchenorrhyncha fauna in southeastern Italy.

Even if the three studied areas furnished very important results, we are far from an approximately complete knowledge on the Auchenorrhyncha of these areas. Additional investigations should include more localities, biotopes and collecting seasons.

The distribution of some taxa collected during our recent study in Apulia is particularly interesting: Apparently these species are present only in the Balkan region and in South Italy. *Delphax meridionalis* was considered an endemic species of

Greece before it was discovered in Apulia; *Adarrus reductus* is recorded only from Croatia and Apulia; and *Zyginidia adamczewskii* is known from Croatia, Greece and South Italy (Campania, Apulia). In contrast to these three cases, other taxa display a wide distribution in Europe. In Italy, however, they were found until now only in Apulia and not in the central and northern parts of this country. This group includes *Pentastiridius suezensis*, *Calamotettix taeniatus*, *Parapotes reticulatus* and *Delphacodes capnodes*. We may add *Chloriona glaucescens* as well, a halophilous species, the record of which from Trentino Alto Adige (Servadei, 1967) is probably erroneous. A molecular study of these species in order to clarify the relationships between populations from central Europe, southern Italy and the Balkan region would be very interesting.

Unlike most other regions of Italy, a great part of Apulia consists of plains and low hills, which nowadays are almost completely cultivated. Thus, moist habitats (freshwater lakes or springs and brackish lagoons), and the dry maquis and garigue areas, have become extremely rare and harbour the last relics of a flora and fauna, which in former times were typical for the whole region, but are now nearly extinct. The protection at least of the few natural sites left is therefore of particular importance. Each of the three investigated areas has its own special characteristics, each is unique but fragile and vulnerable.

In the case of the Natural Park of "Bosco e Paludi di Rauccio" we observed some negative impact of agricultural activity on the protected area. Whereas the central *Quercus ilex* forest and the Specchia della Milogna area in the northeastern sector of the reserve display more or less safe conditions, there are other zones around the forest and above all in the southwestern part of the Natural Park that seem to be conspicuously compromised. Apparently, the main problem consists in frequent arsons of vast extension, easily visible in recently burnt *Carex* meadows, but also in green areas where a glance at the soil between the fresh grasses revealed everywhere the black charred remnants of the plants burnt in the years before. The almost completely black colouration of populations of *Lepyronia coleoptrata* specimens in these areas may be interpreted as adaptive character to these particular conditions (a similar case is documented in *Philaenus spumarius* from Great Britain (Wilson, pers. comm.).

Finally we point out the interesting area south of Bosco di Rauccio, off the Natural Park (St. 555, 561, 627). This site, consisting of quite extended wet meadows and reeds along a central channel and adjacent dry garigues, has a great value for plants, birds and insects. We think it very important to warrant the conservation of this habitat as a highly valuable addition to the nearby located Natural Park.

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REFERENCES

- Asche M., 1985. Zur Phylogenie der Delphacidae Leach, 1815 (Homoptera Cicadina Fulgoromorpha). Marburger Entomologische Publikationen, 2: 1–910.
- Castellani O., 1953. Contributo alla conoscenza della fauna emitterologica d'Italia. Hemiptera Homoptera. Bollettino della Associazione romana di entomologia, 7: 15–16.
- Della Giustina W. & Remane R., 1991. La Faune de France des Delphacidae (Homoptera Auchenorrhyncha). I. Récoltes d'août 1989. Cahiers des Naturalistes, Bulletin des Naturalistes Parisiens, 47: 33–44.
- Drosopoulos S., Asche M. & Hoch H., 1986. A preliminary list and some notes on the Cicadomorpha (Homoptera - Auchenorrhyncha) collected in Greece. Proceedings of the 2nd International Congress Concerning the Rhynchota fauna of Balkan and adjacent Regions, pp. 8–13.
- D'Urso V., 1995a. Homoptera Auchenorrhyncha. In: Minelli, A., Ruffo, S. & La Posta, S. (Eds.), Checklist delle specie della fauna italiana, 42: 1–35.
- D'Urso V., 1995b. Contributo alla conoscenza della distribuzione in Italia di alcune specie di Auchenorrhynchi (Insecta Rhynchota: Homoptera). Naturalista siciliano, ser. IV, 19: 99–104.
- D'Urso V. & Guglielmino A., 1995. Arthropoda di Lampedusa, Linosa e Pantelleria (Canale di Sicilia, Mar Mediterraneo). Homoptera Auchenorrhyncha. Naturalista siciliano, 19 (Suppl.): 279–301.

- Guglielmino A., 1993. I Cicadellidi dell'Etna. Studio tassonomico e note ecologiche e biogeografiche (Homoptera Auchenorrhyncha). *Memorie della Società Entomologica Italiana*, 72: 49–162.
- Guglielmino A. & Bückle C., 2007. Contributo alla conoscenza della fauna ad Auchenorrhyncha (Hemiptera, Fulgoromorpha et Cicadomorpha) di Liguria e dell'Italia meridionale. *Frustula Entomologica*, n.s. 30: 149–159.
- Guglielmino A., Bückle C. & Remane R., 2005. Contribution to the knowledge of the Auchenorrhyncha fauna of Central Italy (Hemiptera, Fulgoromorpha et Cicadomorpha). *Marburger Entomologische Publikationen*, 3: 13–98.
- Guglielmino A., D'Urso V. & Alma A., 2000. Contribution to the knowledge of Auchenorrhyncha (Insecta Homoptera) from Sardinia (Italy). *Deutsche Entomologische Zeitschrift*, 47: 161–172.
- Holzinger W., Kammerlander I., Nickel H., 2003. The Auchenorrhyncha of Central Europe. I. Fulgoromorpha, Cicadomorpha excl. Cicadellidae. Brill Leiden Boston 2003, 673 pp.
- Huang J. & Bourgoïn T., 1993. The planthopper genus *Trypetimorpha*: Systematics and phylogenetic relationships (Hemiptera: Fulgoromorpha: Tropiduchidae). *Journal of Natural History*, 27: 609–629.
- Linnavuori R., 1975. Revision of the Cicadellidae (Homoptera) of the Ethiopian Region III. Deltoccephalinae, Hecalini. *Acta Zoologica Fennica*, 143: 1–37.
- Mazzoni V., 2005. Contribution to the knowledge of the Auchenorrhyncha (Hemiptera Fulgoromorpha and Cicadomorpha) of Tuscany (Italy). *Redia*, 88: 85–102.
- Minelli A. & Mannucci M.P., 1979. Studi sul popolamento animale dell'Alto Trevigiano. I. Faunistica e sinecologia di alcune cenosi riparie dei Laghi di Revine. *Lavori della Società Veneziana di Storia Naturale*, 4, 48–60.
- Nickel H., 2003. The Leafhoppers and Planthoppers of Germany (Hemiptera, Auchenorrhyncha): Patterns and strategies in a highly diverse group of phytophagous insects. Pensoft, Sofia, 460 pp.
- Osella G. & Pagliano-Osella M., 1989. Studi sulla palude del Busatello (Veneto-Lombardia) 9. Gli Omotteri Auchenorrhynchi. *Memorie del Museo Civico di Storia Naturale*, 7: 89–97.
- Ribaut H., 1952. Homoptères Auchénorhinques. II. (Jassidae). *Faune de France*. Paris, 57, 474 pp.
- Servadei A., 1967. Rhynchota (Heteroptera, Homoptera Auchenorrhyncha). *Fauna d'Italia*, volume IX, Calderini Editore, Bologna, 851 pp.
- Servadei A., 1968. Contributo alla corologia dei Rhynchota Homoptera Auchenorrhyncha d'Italia. *Annali Museo Civico di Storia Naturale "Giacomo Doria"*, 77: 138–183.
- Van Stalle J., 1991. Taxonomy of Indo-Malayan Pentastirini (Homoptera, Cixiidae). *Bulletin de l'Institut Royal des Sciences Naturelles de Belgique, Entomologie*, 61: 5–101.
- Vidano C., 1982. Contributo alla conoscenza delle Zyginidia d'Italia. *Memorie della Società Entomologica Italiana*, 60: 343–355.
- Vidano C. & Arzone A., 1987. Typhlocybinae of broadleaved trees and shrubs in Italy. 4. Fagaceae. *Redia*, 70: 171–189.
- Viraktamath C.A., 2004. A revision of the Varta-Stymphalus generic complex of the leafhopper tribe Scaphytopiini (Hemiptera: Cicadellidae) from the Old World. *Zootaxa*, 713: 1–47.
- Wagner W., 1954. Die Fulgoroidea der Omer-Cooper-Expedition in die Lybische Wüste (Hemiptera Homoptera). *Bulletin de la Société Fouad Ier d'Entomologie*, 38: 211–219.
- Webb M., Ramsay A.J. & Lemaître V.A., 2013. Revealing the identity of some early described European Cixiidae (Hemiptera: Auchenorrhyncha) - a case of 'forensic' taxonomy; two new combinations and a name change for *Reptalus panzeri* in Britain. *Acta Musei Moraviae, Scientiae biologicae*, 98: 57–95.