

The Orthoptera of the Adriatic coast of Italy (Insecta: Orthoptera)

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SUMMARY

Until now the studies on Orthoptera in Italy have been focussed primarily on high mountains and islands. Based on preliminary distribution maps, we argue that coastal habitats are important for Italian Orthoptera. The focus is the Adriatic coast, where three types of habitat for Orthoptera are present, differing markedly in species composition.

1) Wetlands. A habitat which is not extremely rich in Orthoptera, but with several endemic or very rare species: *Roeseliana brunneri*, *Zeuneriana marmorata*, *Epacromius coeruleipes coeruleipes*, *Epacromius tergestinus tergestinus* and *Chrysochraon dispar giganteus*.

2) Sand dunes. A habitat rich in Orthoptera, with especially thermophilous Acrididae. *Sphingonotus personatus*, *Acrotylus longipes* and *Dirshius uvarovi* belong to the most characteristic species of this community.

3) Rocky coastland. A habitat poor in Orthoptera. The most characteristic species can be found in the subfamily Oedipodinae. The rare cricket *Pseudomogoplistes squamiger* occurs exclusively on rocky and pebbly beaches.

From the Adriatic coast 79 species of Orthoptera are recorded. Four species are endemic to Italy and three of these, *Roeseliana brunneri*, *Zeuneriana marmorata*, *Dirshius uvarovi*, are restricted to coastal habitats. The first two species are known only from brackish wetlands along the Golfo di Venezia. In total 13 of the 79 species are considered to be endangered in Italy. The three endemic species and *Sphingonotus personatus* and *Chrysochraon dispar giganteus*, which are very rare outside Italy, are on the verge of extinction. We propose to include these five taxa in relevant international lists of protected species.

The northern part of the Adriatic coast, especially the Golfo di Venezia, proved to be much richer in characteristic species than the southern part of the Adriatic coast. It is remarkable that some typical mediterranean genera are missing on the Adriatic coast, while present in f.e. the western Italian coast and Greece: *Eyprepocnemis*, *Heteracris*, *Tropidopola*, *Ochrilidia*.

Coastal wetlands and sand dunes are important Orthoptera habitats, with several endemic and rare species. During the last centuries, and especially the last 50 years, these habitats have declined and deteriorated as a result of destruction and pollution. Because of this process the characteristic Orthoptera species are heavily threatened. It will be a great challenge to study and protect the remaining coastal sites.

INTRODUCTION

In this paper we treat the Orthoptera of the Adriatic coast of Italy. The study area is an 800 km stretch of land, mostly not more than a few hundred metres to a few kilometres wide, extending from Muggia (Trieste) in the region of Friuli-Venezia Giulia in the north and Santa Maria di Leuca in Puglia in the south. Along this coast a great variety of habitats can be found. In the south a mosaic of sand dunes, rocky coastland and wetlands occur. More to the north, in the delta of the river Po, large brackish wetlands are situated. In the extreme north-east, near Trieste, steep carsic mountains border the sea. These are the northernmost offshoots of the Dalmatian mountains which reach south along Croatia into Albania. In this paper we will treat the Orthoptera communities of three major habitats: wetlands, sand dunes and rocky coastland.

We have been able to perform this study because recently preliminary distribution maps of all Italian Orthoptera have become available. These maps were compiled during the 'Progetto checklist e distribuzione invertebrati' (1999-2000, organized by the Italian Ministero dell'Ambiente). The data were summarized from many publications and some major and minor collections on Italian Orthoptera (museums of natural history of Verona, Venezia and Trieste and the private collections of M. La Greca, P. Fontana and R. Kleukers). Studying the maps gave us the opportunity to assess the importance of the coastal habitats for Orthoptera more objectively. We must stress however that we did not perform a specific field study on this topic. The habitat choices presented in this paper are the result of the judgement of the authors, based on data from literature and collections and general field experience.

ORTHOPTERA OF THE ADRIATIC COAST

In total 79 species of Orthoptera (about 25% of the Italian species) are recorded from the Adriatic coast: 25 Tettigoniidae, 10 Gryllidae, 1 Oecanthidae, 2 Gryllotalpidae, 4 Tetrigidae, 1 Tridactylidae, 5 Catantopidae and 31 Acrididae (Table 1). Four species (including two subspecies of *Ephippiger appulus*) are endemic to Italy and three of these, *Roeseliana brunneri*, *Zeuneriana marmorata*, *Dirshius uvarovi*, are restricted to coastal habitats. The first two species are known only from the Golfo di Venezia. In Table 2 the chorotypes, as indicated per species in Table 1, are summarized and explained.

ORTHOPTERA HABITATS

Wetlands

Along the Adriatic coast several types of wetlands occur, from fresh water to brackish and from small ponds to extensive lagoons. The system of brackish



Fig. 1 - Wetlands. Italia NE, Porto Caleri (Venezia), 29.VII.1997, photo P. Fontana



Fig. 2 - Sand dunes. Italia NE, Chioggia, Isola Verde (Venezia), V.1997, photo P. Fontana



Fig. 3 - Rocky coastland. Italia NE, Sistiana (Trieste), 1.IV.1999, photo P. Fontana

lagoons along the Golfo di Venezia (Fig. 1) is one of the biggest in the Mediterranean area. Most of these wetlands belong to the Delta of the Po, but also north of Trieste some important wetlands are situated: Lago di Doberdò and Lisert, at the mouth of carsic river Timavo.

Coastal wetlands have undergone many changes in the last centuries. For example, the Laguna di Venezia has been influenced by man from at least the 14th century. The Government of the Repubblica Veneta has performed several drastic hydrological operations, including the diversion of the course of the rivers Brenta, Tagliamento and Po and the extensive reclamation of land (Rallo, 1996). Also around the historic Roman town of Aquilea the landscape has changed drastically. The lagoon around Aquilea has been gradually reclaimed. In the remaining large freshwater swamps mosquito's proliferated and enhanced malaria outbreaks. This seems to be one of the decisive factors in the downfall of this town. Nowadays the wetlands suffer greatly from pollution and eutrophication.

In total 37 Orthoptera species were found in the coastal wetlands. It is the most valuable Orthoptera habitat along the Adriatic coast, mainly because of the populations of the endemic *Roeseliana brunneri* and *Zeuneriana marmorata* and the very rare *Epacromius coerulipes coerulipes*, *Epacromius tergestinus tergestinus* and *Chrysochraon dispar giganteus*.

Roeseliana brunneri (Fig. 4) is a highly characteristic element of brackish lagoons. It lives in typical brackish wetlands (with f.e. *Limonium*) in the



Fig. 4 - *Roeseliana brunneri*, male (hidden in the vegetation). Italia NE, Chioggia, loc. Valli (Venezia), 30.VI.1997, photo P. Fontana



Fig. 5 - *Zeuneriana marmorata*, male. Italia NE, San Giovanni al Timavo (Gorizia), 16.VII.1996, photo P. Fontana

Laguna di Venezia called “barene lagunari”, in reclaimed lands (“casse di colmata”) and along drainage canals. Of this endemic species very few records are known (Fig. 8). It was thought extinct (Nadig, 1961), but it was rediscovered by Canestrelli (1979, 1981). Canestrelli (1981) considered this taxon a subspecies of *Roeseliana fedtschenkoi*. Awaiting further investigations we retain the original view of Ramme, considering it a true species.

The song that the male produces is indispensable in investigating the distribution of this species. Although the sound is loud (it can be heard over more than 25 metres), the animals are difficult to catch. They can hide very cleverly in the thick grasses, rendering them almost invisible.

The situation of *Zeuneriana marmorata* (Fig. 5) is very similar to that of *R. brunneri*. Very few records are known of this species (Fig. 9) and it was thought to be extinct too. Recently a population was discovered at Lisert near Monfalcone (Kleukers et al., 1997). The species proved to be very easy to locate because of the loud song, but the animals, like in *R. brunneri*, were extremely difficult to catch. There are no recent records from the Laguna di Venezia, but this could be caused by the lack of investigations using bioacoustics.

Epacromius coerulipes coerulipes is present in the steppe regions in Siberia and eastern Europe. In Europe the distribution pattern is very patchy, with records from Ukraine, Caucasus, Romania, Bulgaria, Croatia and Italy (Schmidt and Lilge, 1997). The subspecies *E. coerulipes pannonicus* (Karny, 1907) has been found only in Austria, Hungary, Slovakia and Czechia (Schmidt and Lilge, 1997). In Italy *E. coerulipes coerulipes* is known only from the northernmost part of the Adriatic coast (Fig. 10), between Trieste and the southern part of the



Fig. 6 - *Chrysochraon dispar giganteus* male. Italia NE, San Giovanni al Timavo (Gorizia), 16.VII.1996, photo R. Kleukers

Laguna di Venezia. It is a characteristic element of the brackish wetlands (“barene lagunari”). These populations are of special interest as they are the most western, and because they are more or less separated from the other nominate *E. coerulipes* by populations of *E. c. pannonicus*.

Epacromius tergestinus tergestinus has an extensive range, comprising large parts of eastern and central Asia and eastern and southern Europe. In southern Europe only scattered (relict?) populations are known (Schmidt and Lilge, 1997). In Italy the species has been recorded near Trieste (type locality, *tergestinus* meaning: from Trieste), the Laguna di Venezia and Roma (Galvagni, 1948) (Fig. 11). Recent records are only known from the Laguna di Venezia (Canestrelli, 1981). Here it was found in brackish sites with *Salicornia*, *Suaeda* and *Puccinellia*, especially around small pools. The other subspecies, *Epacromius tergestinus ponticus* Karny, 1907, is known from northern Italy (Alta Valle dell’Adige), Germany, Switzerland and Austria.

Chrysochraon dispar giganteus (Fig. 6, 7) is only known from two localities in Albania (Harz, 1975) and two localities in northern Italy. The Italian populations are located in the Laguna di Venezia (Canestrelli, 1986) and near Monfalcone (Galvagni and Fontana, 1993; Kleukers et al., 1997) (Fig. 16). *Chrysochraon dispar giganteus* is much larger than the nominate subspecies, the males of *C. d. giganteus* being almost as big as the females of *C. d. dispar*.

In wetlands many other Orthoptera species can be found. *Parapleurus alliaceus alliaceus* (Fig. 13) has a wide range, but in Italy only very few records are known. We found this species in the wetlands near Monfalcone (Lisert and Lago di



Fig. 7 - *C. dispar giganteus* female. Italia NE, Monfalcone, loc. Val Lisert (Gorizia), 21.VII.1996, photo R. Kleukers

Doberdò). Along the Lago di Doberdò a large population of another rare species in Italy, *Stethophyma grossum*, occurs (Fig. 14). *Paracinema tricolor bisignata* is known from Puglia and the Po delta. Other species characteristic of coastal wetlands are *Conocephalus conocephalus* (Fig. 12), *Trigonidium cicindeloides* (Fig. 20), *Xya variegata* (Fig. 21), *Aiolopus thalassinus*, *Ruspolia nitidula* and *Locusta migratoria cinerascens*. The status and habitats of *Tetrix bolivari* in Italy are as yet unclear. Some species, like *Micropodisma salamandra* (Fig. 15), can be found in coastal wetlands incidentally, but are mainly distributed more inland.

Sand dunes

Coastal sand dunes are present along large parts of the Adriatic coast of Italy, especially south of the Po delta (Fig. 2). Tourism is probably the greatest threat to this internationally important habitat. In many places sand dunes have been reduced to make way for broader beaches, build over with hotels, bungalow parks and villages and covered with litter from tourists. These influences have surely affected the Orthoptera fauna. Our data nevertheless show that sand dunes are still an important habitat for this insect group.

In total 49 of the 79 species are known from sand dunes, but not many are confined to this habitat. Important populations of the endemic *Ephippiger appulus appulus* can be found on coastal sand dunes in Puglia. Species of the grasshopper genera *Sphingonotus* and *Acrotylus* belong to the most typical

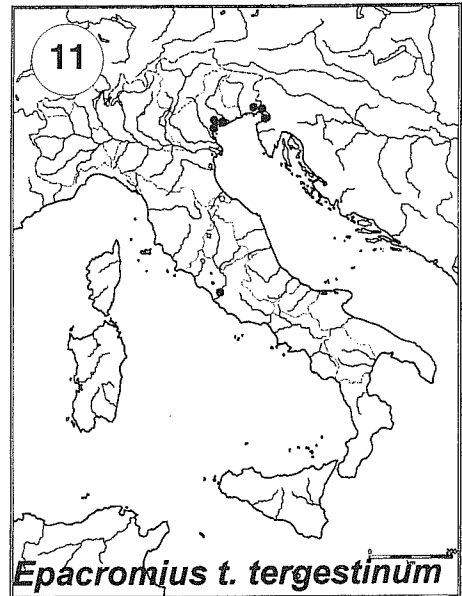
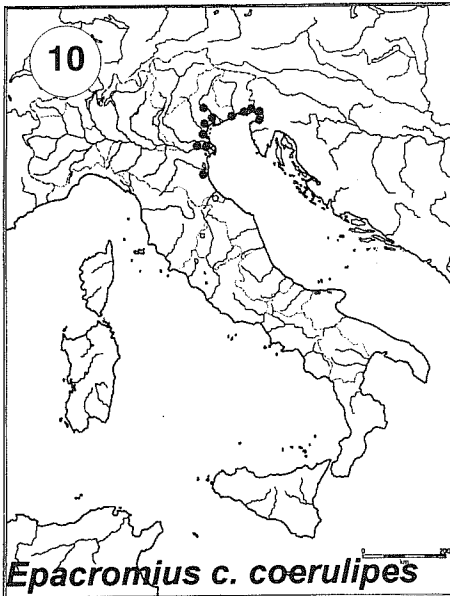
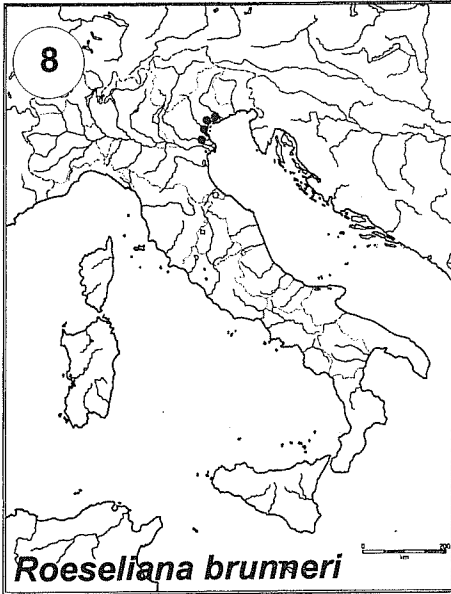


Fig. 8 - Distribution of *R. brunneri*

Fig. 9 - Distribution of *Z. marmorata*

Fig. 10 - Distribution of *Epacromius c. coerulipes*

Fig. 11 - Distribution of *Epacromius t. tergestinum*

inhabitants of sand dunes. *Sphingonotus personatus* can be found exclusively on sand dunes, near the sea. This species, which by some other authors is considered to be a subspecies of *Sphingonotus candidus* (f.e. Schmidt and Lilge, 1996), is known from many places along the Italian coast (Fig. 17). It is recorded from the regions Friuli-Venezia Giulia, Veneto and Puglia. Outside Italy it is only known from Korfu (Willemse, 1984).

Also *Acrotylus longipes longipes* is found almost exclusively in coastal sand dunes. Greece is the center of distribution. In Italy it is rare, only in Sicily it is present in many localities. Along the Adriatic coast only two records from Puglia and one from Veneto are known (Fig. 18). This species shows some adaptations to living in this extreme habitat. The insects can dig themselves in and when



Fig. 12 - *Conocephalus conocephalus*, male. Sardegna, Siniscola (Olbia), 24.VIII.1999, photo P. Fontana

standing on the hot sand they alternately use three of their six legs (Fig. 22). *Acrotylus insubricus* and *A. patruelis* can be found on many sand dunes, but also in other habitats more inland. The same applies to *Dociostaurus genei genei*. In the study area it is present mainly in Puglia, but also in the Laguna di Venezia. Here it can survive in heavily disturbed sandy habitats.

Dirshius uvarovi is an endemic species in Italy, especially associated with the sandy habitats behind the dunes. It is found in only a few places along the Italian coast. The species can be easily confused with a species of the *Glyptobothrus*-group, when only morphological characters are taken in consideration. The song is a very valuable tool in recognising this species.



Fig. 13 - *Parapleurus alliaceus alliaceus*, male. Italia NE, San Giovanni al Timavo (Gorizia), 16.VII.1996, photo P. Fontana

Rocky coastland

Rocky coastlands are present at many places along the Adriatic coast, but especially in the north (near Trieste, Fig. 3) and the south (Marche, Abruzzo, Molise and Puglia). In this study pebble beaches are included in this habitat type.

Near Trieste the northernmost part of the Dalmatian mountains borders the sea. We included only data from the steep slopes and pebble beaches directly bordering the sea. The rest of the Carso Triestino, which is very rich in Orthoptera, we didn't consider in this paper.

The Orthoptera fauna of these habitats is rather poor, probably due to the extreme climatological conditions and lack of food and oviposition substrates for many species. Characteristic on the rocks are representatives of the genera *Oedipoda* and *Sphingonotus*. When patches of vegetation and bare ground are present, several (especially eurytopical) species of Acrididae (f.e. *Glyptobothrus*, *Stenobothrus*, *Euchorthippus*) and Tettigoniidae (f.e. *Tylopsis*, *Platycleis*) can be found.

The most interesting occupants of this habitat can be found in the genus *Pseudomogoplistes* Goročov, 1984. They live directly along the coast, under rocks

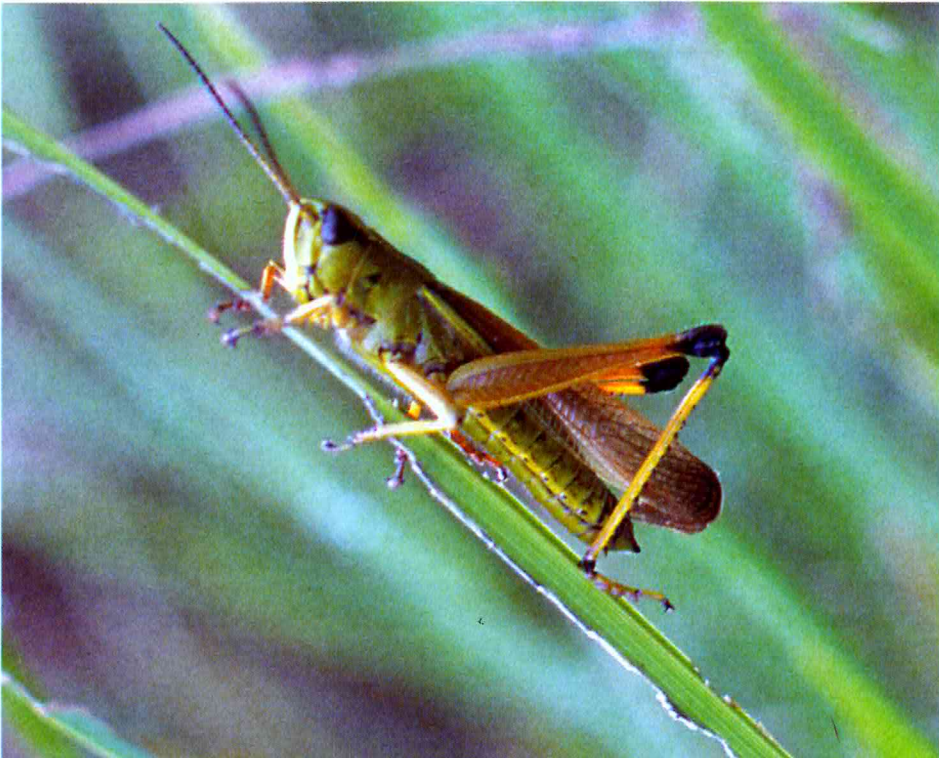


Fig. 14 - *Stethophyma grossum*, male. Italia NE, Lago di Doberdò (Gorizia), 8.VIII.1996, photo P. Fontana

or between stones, surviving frequent flooding. Here they can be found with the earwig *Anisolabis maritima* (Bonelli in Gené, 1832).

Until recently only *Pseudomogoplistes squamiger* was known from this genus, but the last years several species have been described from the European and African coasts: *P. byzantinus* Gorochov, 1995 of the Crimea and Greece, *P. turcicus* Gorochov, 1995 from Anatolia, *P. vicentae vicentae* Gorochov, 1996 of Morocco e Portugal e *P. vicentae septentrionalis* Morère and Livory, 1999 from the English Channel, in France and Great-Britain (Morère and Livory, 1999). From the Adriatic coast only a few records exist: Castro (Puglia), Isola Pianosa, Cefalù (Sicily) and near Trieste (Fig. 19). The first author has examined some of the specimens from Cefalù and from Trieste and they clearly belonged to *P. squamiger* (Fig. 23).

PROTECTION

In the coastal habitats along the Adriatic Sea 13 Orthopterans live which we consider to be endangered in Italy (see Table 1). Some of these are also very rare



Fig. 15 - *Micropodisma salamandra*, male. Italia NE, San Giovanni al Timavo (Gorizia), 16.VII.1996. Photo P. Fontana

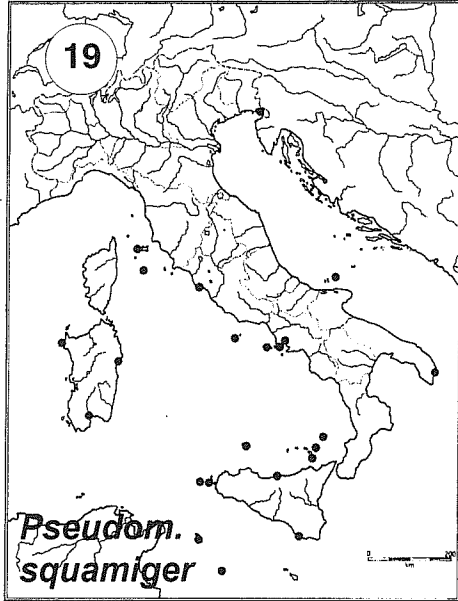
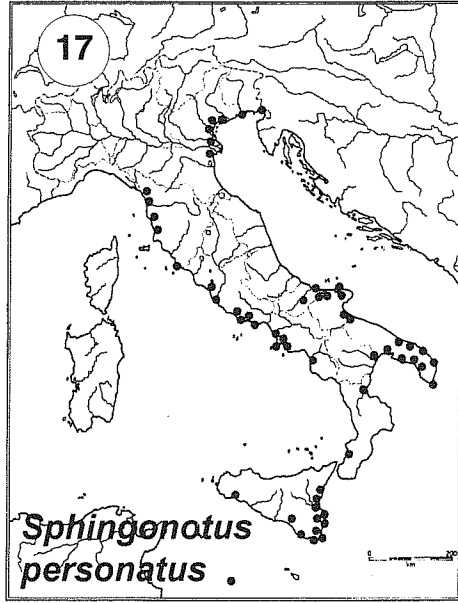
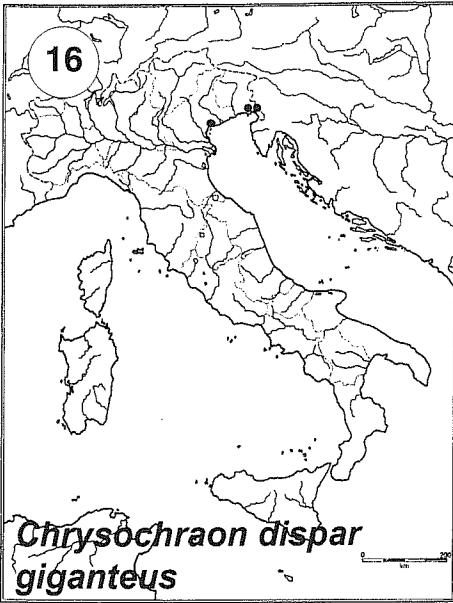


Fig. 16 - Distribution of *Chrysochraon dispar giganteus*

Fig. 17 - Distribution of *Sphingonotus personatus*

Fig. 18 - Distribution of *Acrotylus longipes longipes*

Fig. 19 - Distribution of *Pseudomoglistes squamiger*



Fig. 20 - *Trigonidium cicindeloides*, male. Sardegna, Siniscola (Olbia), 29.VII.1999, photo P. Fontana



Fig. 21 - *Xya variegata*. Italia S, Valsinni (Matera), right bank of the river Sinni, 23.VI.1999, photo P. Fontana



Fig. 22 - *Acrotylus longipes longipes*, male. Albania, Durazzo, VII.1996, photo P. Fontana



Fig. 23 - *Pseudomogoplistes squamiger*, female. Italia NE, Sistiana (Trieste), 1.IV.1999, photo P. Fontana

outside Italy (*Sphingonotus personatus*, *Chrysochraon dispar giganteus*) or are even endemic to Italy (*Roeseliana brunneri*, *Zeuneriana marmorata*, *Dirshius uvarovi*). For these five taxa the Italian populations are of vital importance.

None of the 13 species are present on international lists of protected species (Van Helsdingen, 2000). The five above mentioned orthopterans belong to the most threatened insect species of Europe. It will of the greatest importance that they will be included in the Appendices of the Bern Convention and the Annexes of the Habitats Directive. They deserve special protection to avoid their extinction.

CONCLUSIONS

Along the Adriatic coast 79 species of Orthoptera have been recorded (including one species with two subspecies). This is almost 25% of the Italian Orthoptera fauna.

The composition of the Orthoptera fauna differs markedly between the major habitats. Sand dunes are the richest in species, with *Dirshius uvarovi* as an endemic element. However, the most characteristic species are to be found in wetlands. *Zeuneriana marmorata* and *Roeseliana brunneri* are endemic species of brackish wetlands in the Laguna di Venezia and near Monfalcone. Rocky coastland is quite poor in species. The rare *Pseudomogoplistes squamiger* is characteristic for pebble beaches.

The northern part of the Adriatic coast (especially the brackish wetlands along the Golfo di Venezia and the wetlands north of Trieste) is much richer in endemic and rare species than the southern part.

Some Orthoptera genera, which are characteristic elements of coastal habitats along other parts of the Mediterranean, are remarkably absent along the Adriatic coast in Italy: *Eyprepocnemis*, *Heteracris*, *Tropidopola* and *Ochridia*.

Until now studies on Italian Orthoptera have been focussed primarily on mountain and island fauna. Few papers have been published on coastal habitats. This study shows clearly the importance of coastal habitats, especially sand dunes and wetlands, for Orthoptera. Coastal wetlands belong to the most threatened habitat types in Europe. To begin with coastal wetlands are relatively rare. In the course of the last centuries the total surface of this habitat has been reduced significantly because of urbanization, the tourist industry and reclamation for agricultural use. Remaining wetlands have suffered from eutrophication, pollution by garbage and agricultural chemicals. Together with the habitats the highly characteristic fauna and flora is heavily endangered.

We plead for extensive studies on the Orthoptera fauna of coastal wetlands and sand dunes. More specifically, it would be very valuable to perform a large scale investigation in the brackish wetlands of the northern Adriatic coast (Golfo di

Venezia and north of Trieste). One of the goals should be to map in detail the distribution of the endemic species *Roeseliana brunneri* and *Zeuneriana marmorata*. For this cause it will be indispensable to use the songs of these otherwise cryptic species.

Important wetlands and sand dunes should be protected by law and managed to preserve the characteristic communities of Orthoptera and other fauna and flora. We propose to include *Roeseliana brunneri*, *Zeuneriana marmorata*, *Dirshius uwarovi*, *Sphingonotus personatus* and *Chrysochraon dispar giganteus* in relevant international lists of protected species.

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Tab. 1 - The Orthoptera of the Adriatic coast of Italy with information on chorology and status. Nomenclature according to Failla et al. (1994). Species which are considered to be characteristic for coastal habitats (e.g. which have their main distribution in Italy in a coastal habitat) are put in bold: **wetland** = (brackish) wetlands; **dune** = sand dunes; **rock** = rocky coastland and pebble beaches; **chorotype** = chorotype according to Vigna Taglianti et al. (1992) (for explanation of abbreviations see Table 2); **endangered** = endangered with disappearing in Italy, according to Failla et al. (1994). Based on this study we propose to add *Pseudomogoplistes squamiger*, *Tetrix bolivari*, *Parapleurus alliaceus*, *Stethophyma grossum*, *Chrysochraon dispar giganteus* and *Paracrinema tricolor bisignata* to the list

wetland	dune	rock	species name	author	chorotype	endemic	endangered
	X		<i>Phaneroptera n. nana</i>	Fieber, 1853	TEM		
X	X	X	<i>Tylopsis liliifolia</i>	(Fabricius, 1793)	TEM		
	X	X	<i>Acrometopa italica</i>	Ramme, 1927	WME		
	X		<i>Acrometopa macropoda</i>	(Burmeister, 1838)	EME		
X			<i>Conocephalus conocephalus</i>	(Linnaeus, 1767)	MED		
X			<i>Xiphidion d. discolor</i>	(Thunberg, 1815)	PAL		
X			<i>Xiphidion d. dorsalis</i>	(Latreille, 1804)	SIE		
X			<i>Ruspolia nitidula</i>	(Scopoli, 1786)	WPA		
X	X		<i>Tettigonia viridissima</i>	(Linnaeus, 1758)	ASE		
X	X		<i>Decticus albifrons</i>	(Fabricius, 1775)	PAL		
	X		<i>Platycleis a. affinis</i>	Fieber, 1853	EME		
	X		<i>Platycleis fabx laticauda</i>	Brunner, 1882	MED		X
	X		<i>Platycleis g. grisea</i>	(Fabricius, 1781)	EUR		
	X		<i>Platycleis i. intermedia</i>	(Serville, 1839)	TEM		
	X		<i>Platycleis romana</i>	Ramme, 1927	SEU		
	X		<i>Platycleis sabulosa</i>	Azam, 1901	EME		
	X		<i>Montana stricta</i>	(Zeller, 1849)	SEU		
	X		<i>Tessellana t. tessellata</i>	(Charpentier, 1825)	MED		
X			<i>Roeseliana brunneri</i>	Ramme, 1951	EME	X	X
X			<i>Zeuneriana marmorata</i>	(Fieber, 1853)	EME	X	X
X	X	X	<i>Sepiana septium</i>	(Yersin, 1854)	CEM		
X	X	X	<i>Yersinella raymondi</i>	(Yersin, 1860)	SEU		
	X	X	<i>Rhacocleis germanica</i>	(Herrich-Sch., 1840)	SEU		
	X	X	<i>Rhacocleis n. neglecta</i>	(A. Costa, 1863)	SEU		
	X		<i>Ephippiger a. apulus</i>	(Ramme, 1933)	App.	X	
	X	X	<i>Ephippiger apulus italicus</i>	La Greca, 1959	App.	X	
	X		<i>Gryllus bimaculatus</i>	De Geer, 1773	COS		
X			<i>Acheta gossypii</i>	O.G. Costa, 1855	AFM		
X	X		<i>Melanogryllus d. desertus</i>	(Pallas, 1771)	SIE		
	X		<i>Eumodicogryllus b. burdigalensis</i>	(Latreille, 1804)	EME		
X			<i>Pteronemobius concolor</i>	(Walker, 1871)	PAL		
X			<i>Arachnocephalus vestitus</i>	A. Costa, 1855	TEM		
		X	<i>Mogoplistes brunneus</i>	Serville, 1839	MED		
		X	<i>Pseudomogoplistes squamiger</i>	(Fischer, 1853)	EUR		X
	X		<i>Myrmecophilus myrmecophilus</i>	(Savi, 1819)	SEU		
X			<i>Trigonidium cicindeloides</i>	Rambur, 1839	AIM		
	X	X	<i>Oecanthus p. pellucens</i>	(Scopoli, 1763)	PAL		
X			<i>Gryllotalpa gryllotalpa</i>	(Linnaeus, 1758)	EUR		
X			<i>Gryllotalpa quindecim</i>	Bacc. and Capra, 1978	MED		
X			<i>Paratettix meridionalis</i>	(Rambur, 1838)	AFM		
X			<i>Tetrix bolivari</i>	(Saulcy, 1901)	TUE		X
X			<i>Tetrix ceperoi</i>	(Bolivar, 1887)	EUM		
X			<i>Tetrix subulata</i>	(Linnaeus, 1758)	EUR		
X			<i>Xya variegata</i>	(Latreille, 1809)	PAL		X
X			<i>Micropodisma salamandra</i>	(Fischer, 1853)	SEU		
	X	X	<i>Pezotettix giornai</i>	(Rossi, 1794)	WPA		
	X		<i>Calliptamus b. barbarus</i>	(O.G. Costa, 1836)	MED		
	X		<i>Calliptamus i. italicus</i>	(Linnaeus, 1758)	TUE		

	X		<i>Anacridium aegyptium</i>	(Linnaeus, 1764)	AFM		
X	X	X	<i>Acrida ungarica mediterranea</i>	Dirsh, 1949	SEU		
X	X		<i>Locusta migratoria cinerascens</i>	Fabricius, 1781	TEM		
	X		<i>Oedaleus decorus decorus</i>	(Germar, 1826)	CEM		
	X	X	<i>Oedipoda c. caeruleus</i>	(Linnaeus, 1758)	PAL		
		X	<i>Oedipoda charpentieri</i>	Fieber, 1853	EME		X
		X	<i>Oedipoda germanica</i>	(Latreille, 1804)	TUE		
	X	X	<i>Sphingonotus c. caeruleus</i>	(Linnaeus, 1767)	EUR		
	X	X	<i>Sphingonotus c. exornatus</i>	Nedelkov, 1907	App.		
	X		<i>Sphingonotus personatus</i>	Zanon, 1926	App.		
	X		<i>Acrotylus i. insubricus</i>	(Scopoli, 1786)	TUE		
	X		<i>Acrotylus l. longipes</i>	(Charpentier, 1845)	AIM		
	X		<i>Acrotylus patruelis</i>	(Herrich-Sch., 1838)	TUM		
X	X		<i>Aiolopus s. strepens</i>	(Latreille, 1804)	TEM		
X			<i>Aiolopus t. thalassinus</i>	(Fabricius, 1781)	EUM		
X			<i>Epacromius c. coeruleus</i>	(Ivanov, 1887)	EME		X
X			<i>Epacromius t. tergestinus</i>	(Charpentier, 1825)	SEU		X
X			<i>Parapleurus alliaceus alliaceus</i>	(Germar, 1817)	PAL		X
X			<i>Stetbophyma grossum</i>	(Linnaeus, 1758)	EUR		X
X			<i>Paracinema tricolor bisignata</i>	(Charpentier, 1825)	AIM		
X			<i>Chrysochraon dispar giganteus</i>	Harz, 1975	EME		X
	X		<i>Docostaurus g. genei</i>	(Ocskay, 1832)	TEM		
	X		<i>Omocestus rufipes</i>	(Zetterstedt, 1821)	PAL		
	X		<i>Dirshius petraeus</i>	(Brisout, 1855)	SIE		
	X		<i>Dirshius uvarovi</i>	(Zanon, 1926)	SEU	X	X
X			<i>Chorthippus p. parallelus</i>	(Zetterstedt, 1821)	SIE		
	X	X	<i>Glyptobothrus bornhalmi</i>	(Harz, 1971)	SEU		
	X	X	<i>Glyptobothrus b. brunneus</i>	(Thunberg, 1815)	SIE		
	X		<i>Glyptobothrus mollis ignifer</i>	(Ramme, 1923)	Alpino		
	X		<i>Glyptobothrus v. vagans</i>	(Eversmann, 1848)	EUR		
X	X		<i>Euchorthippus declivis</i>	(Brisout, 1848)	EUR		

Tab. 2 - Chorotypes of the Orthoptera of the Adriatic coast of Italy (see Vigna Taglianti et al., 1992)

abbreviation	corotype	number of species	%
SEU	S-European	11	13,92
EME	E-Mediterranean	9	11,39
EUR	European	8	10,12
PAL	Palaearctic	8	10,12
TEM	Turanic-European-Mediterranean	7	8,86
MED	Mediterranean	6	7,59
SIE	Sibirc-European	5	6,32
TUE	Turanic-European	4	5,06
App.	Appenninic	4	5,06
AFM	Afrotropical-Mediterranean	3	3,79
AIM	Afrotropical-Indian-Mediterranean	3	3,79
WPA	W-Palaearctic	2	2,53
CEM	Centralasiatic-European-Mediterranean	2	2,53
EUM	European-Mediterranean	2	2,53
TUM	Turanic-European-Mediterranean	1	1,26
WME	W-Mediterranean	1	1,26
COS	Cosmopolitan	1	1,26
ASE	Asiatic-European	1	1,26
Alpino	Alpine	1	1,26