

Epacromius tergestinus (CHARPENTIER, 1825) and other interesting Orthoptera in the floodplains of braided rivers of the Alps

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Abstract

Due to river corrections and natural floodplains destruction, the distribution of *Epacromius tergestinus* (CHARPENTIER, 1825) in the Alps has been severely reduced. E. Sardet discovered a new population in July 1998 on the riverside of the Giffre, a tributary of the Arve river (France). From 1998 to 2000, we could find out three large populations in the French Alps. The typical habitats are sandy, damp riverbanks where often the plants *Calamagrostis pseudophragmites* and *Typha minima* live. The species must be considered as strongly threatened in the whole alpine region.

Résumé

La distribution de *Epacromius tergestinus* (CHARPENTIER, 1825) dans les Alpes a fortement régressé suite aux corrections des cours d'eau et à la destruction des zones alluviales. En juillet 1998, une nouvelle population a été découverte par E. Sardet sur le Giffre, un affluent de l'Arve (France). De 1998 à 2000, nous avons pu découvrir trois populations dans les Alpes françaises. L'habitat typique est constitué de rives sableuses humides où poussent souvent les plantes *Calamagrostis pseudophragmites* et *Typha minima*. L'espèce doit être considérée comme fortement menacée dans l'ensemble du massif alpin.

Zusammenfassung

Durch Gewässerkorrekturen und Zerstörung von Auengebieten, ist die Verbreitung von *Epacromius tergestinus* (CHARPENTIER, 1825) im Alpenraum stark zurückgegangen. Im Juli 1998 entdeckte E. Sardet am Giffre (Nebenfluss der Arve, Frankreich) eine neue Population. Zwischen 1998 und 2000 entdeckten wir drei Populationen in den französischen Alpen. Typischer Lebensraum für die Art sind sandig feuchte Ufer, wo oft *Calamagrostis pseudophragmites* und *Typha minima* wachsen. Die Art muss im Alpenraum als stark bedroht betrachtet werden.

Introduction

The main distribution area of *Epacromius tergestinus* (CHARPENTIER, 1825), a medium-sized grasshopper (Acrididae, Fig. 1-4), lies in Central and Eastern Asia (NADIG, 1991). In central Europe the distribution of this species is patchy from Spain to Romania. The nominal subspecies lives on the sandy seashores of the

Atlantic, Mediterranean and Black Sea littorals. The alpine ssp. *ponticus* (KARNY, 1907), which is discussed in this paper, was known from many alpine rivers in all alpine countries, where it occupies (or used to) the sandy river banks in natural floodplains (NADIG, 1991). The distinction of the two subspecies is rejected by some authors (HARZ, 1975).

The distribution area of the alpine *E. tergestinus ponticus* dramatically reduced during the twentieth century because of river corrections and floodplain destruction. In 1988 Stefan Plüss discovered one population in Prato al Stelvio (Haut-Adige, Italian Tirol). During the 90s, this population was supposed to be the last population in the whole Alps. Ten years later, in 1998, E. Sardet discovered a population of the species in the French Alps (SARDET & CARRON, 1999). This same year, G. Carron identified the species on a photograph (of a single observed specimen) taken by a Swiss botanist by the Durance; we then began to think that the species might have been overlooked (at least in the French Alps). We decided to systematically investigate the most potentially suitable alpine rivers to recense the populations, to look at the ecology and evaluate the threats in each site. The aims of this paper are to give an up-to-date view of the present – probably uncompleted - knowledge of the distribution, to illustrate the occupied sites and to focus on the main threats and conservation measures for this species.

Method

The investigations were made in 1998, 1999 and 2000 as follows: i) we made a compilation of the published data, ii) we pointed out on a general map the apparently most natural braided rivers, even if there were no previous data of the species, iii) we looked for the sites where the plant *Typha minima* grows, with the help of botanist colleagues and iv) once on the site we looked for suitable habitats and noted all the Orthoptera species and some indicator plants. We also visited the collections of the Natural History Museums of Geneva and Zürich (Zoologisches Institut).

Results

First, we would like to mention that we could see several green individuals of the form *viridis* KITTARY (Fig. 3-4); this form was mentioned by CHOPARD (1951) only from the seashore areas. We could see such green specimens by the Giffre and Romanche rivers and also in the Geneva Museum (collected in Sierre/Siders, in the Swiss Alps). BELLMANN & LUQUET (1995) also mention the occurrence of green individuals in the *ponticus* subspecies.

Distribution

See the map (Fig. 5) to localize the sites. Sites 1 to 3 (with *) are sites where we could find populations of *Epacromius tergestinus*. Sites 4 to 9 are sites with historical data (recent or ancient extinction). Sites 10 to 14 hold no populations but other interesting species were noted.

The 'other interesting species' we report are only the species more or less strongly bound with floodplains. We only report the species we could observe ourselves (with one exception).

Sites with *Epacromius tergestinus*

Site 1 (Fig. 6-7)

France: Durance river. Large (several thousands of ind.) metapopulations up- and downstream of the Serre-Ponçon dam. The sites are: Réotier (Lg 4.74 Lat 51.38), Saint-Crépin (Lg 4.73 Lat 49.68), Piégut (Lg 4.21 Lat 50.056) and Rochebrunne (Lg 4.25 Lat 49.40), altitude : 625 – 905 m. a.s.l.

Other present interesting species : *Aiolopus strepens*, *Chorthippus pullus*, *Paratettix meridionalis*, *Pteronemobius heydenii*, *Sphingonotus caeruleans*, *Tetrix bolivari*, *T. ceperoi*, *T. tuerki*.

The very large floodplain of the Durance braided river is one of the most beautiful ones in the French Alps. The high diversity of habitats holds a great diversity of Orthoptera bound to floodplains.

Site 2 (fig. 8)

France: Romanche river (Isère basin). One large (several thousands of ind.) metapopulation near Bourg d'Oisans (Lg 4.13 Lat 50.04), altitude : 750 m. a.s.l.

Other present interesting species : *Sphingonotus caeruleans*, *Tetrix tuerki*.

A large, flat zone with wide sandy areas.

Site 3 (fig. 9-10)

France: Giffre river (Arve basin). One metapopulation with rather small subpopulations (20-200 ind) along the Giffre river, on two sections respect. 2.5 and 1.7 km long, between Samoëns and Taninges (Lg 4.80 Lat 51.36), altitude : 625 – 650 m. a.s.l.

Other present interesting species : *Sphingonotus caeruleans*, *Tetrix tuerki*.

A medium-sized river with more or less strong spring flooding.

Sites with only ancient data of *E. tergestinus*

Site 4 (Fig. 11)

France (Arve river) and **Switzerland** (Rhône river) in the Geneva region. In the Maerky collection (Natural History Museum of Geneva), many specimens collected at the beginning of the 20th century from the following localities : Etrembières (F), Gaillard (F), Villette (CH). FRUHSTORFER (1921) mentions also Veyrier (CH) and La Plaine (CH). We could not find *E. tergestinus* in Contamine-sur-Arve, where it was noted until 1970 (KRUSEMAN, 1982). Unfortunately all these sites are now destroyed by river corrections.

Other present interesting species : *Sphingonotus caeruleans*, *Tetrix ceperoi*.

Site 5

France and **Switzerland:** shores of Leman Lake. FRUHSTORFER (1921) reported the species from the following sites : Bouveret (CH), Villeneuve (CH) and Thonon (F).



Fig. 1: *Epacromius tergestinus ponticus*, typical grey male. Durance river, 1999



Fig. 2: *Epacromius tergestinus ponticus*, grey female with a rather distinctive orange medium line on the upperside. Durance river, 1999.



Fig. 3: *Epacromius tergestinus ponticus*, green female of the *viridis* Kittary form. Romanche river, 1999.



Fig. 4: *Epacromius tergestinus ponticus*, very green female of the *viridis* Kittary form. The tibiae are whitish and the elytra appear plain white-greenish. Durance river, 1999.

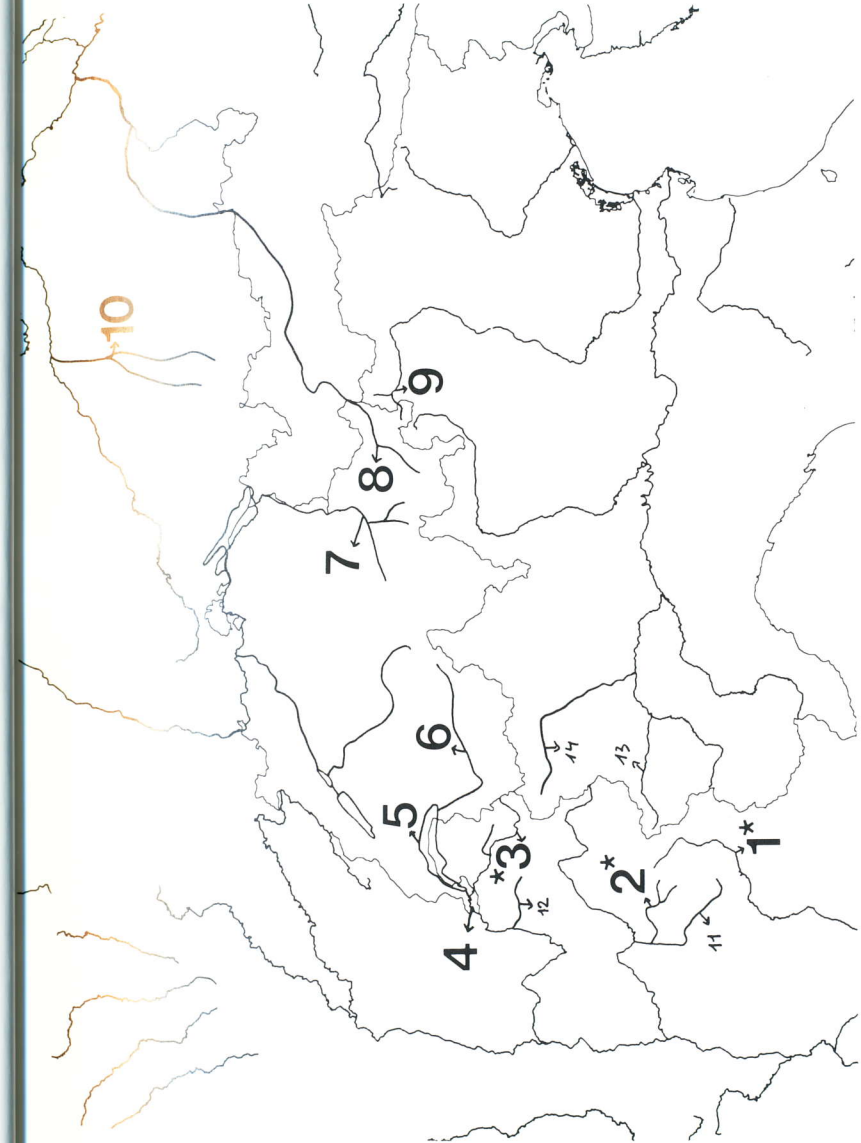


Fig. 5: Map of the alpine rivers we investigated between 1998 and 2000. 1*, 2* and 3* hold populations of *E. tergestinus*. 4-10 used to be occupied by the species. 11-14 were visited but we could not find *Epacromius*.

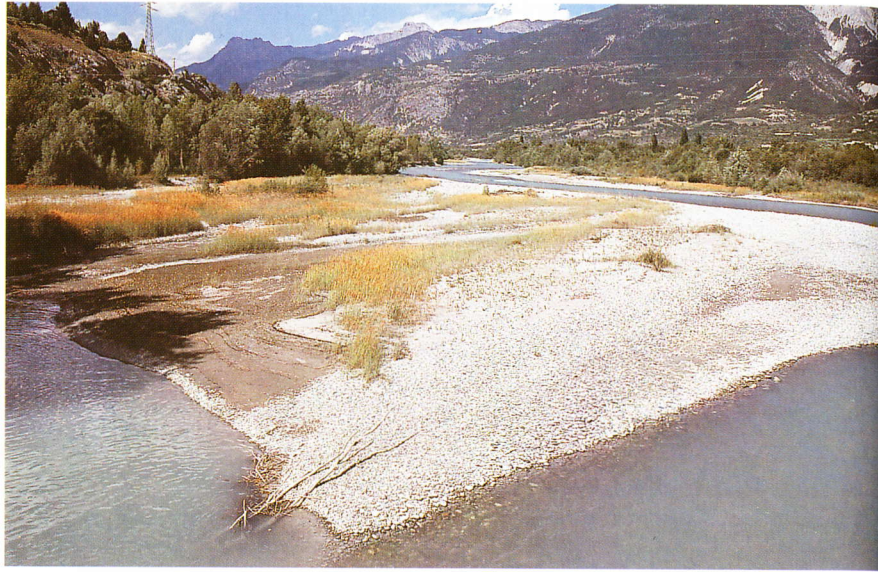


Fig. 6: The beautiful floodplain of the Durance, by Saint-Crépin (France). The light buff-yellowish vegetation on the isles is *Calamagrostis pseudophragmites*. Observed species on the pictured site : *Epacromius tergestinus* (thousands), *Chorthippus pullus*, *Tetrix tuerki*, *Sphingonotus caeruleans*.



Fig. 7: Durance river with lateral channels with *Epacromius tergestinus*. On the right, deep-green stems of *Typha minima*, light buff-yellowish flowers of *Calamagrostis pseudophragmites*



Fig. 8: Romanche river (France), site with *E. tergestinus*, *T. tuerki*. The precise pictured site is not the most favourable (too pioneer) but gives an idea of the surface of a natural braided river !



Fig. 9: Giffre river (France), site with *E. tergestinus*. In the foreground and on the left, deep-green stems of *Typha minima*, on sandy areas. In the middle, bluish-green bushes of *Myricaria germanica*, on gravels.

Site 6 (fig. 12)

Switzerland: Rhône river. The species was present in Visp (FRUHSTORFER, 1921), Siders/Sierre (many obs.) and Martigny (coll. Guy, Geneva Museum). The mention of Sion in THORENS & NADIG (1997) is an error due to a transcription failure (it was Siders = Sierre !). Prof. Dr. Jürg Zettel made the last observation of *E. tergestinus* by the Rhône river in the Finges/Pfyn floodplain in 1989 (ZETTEL, 1997). Since then, 4 years of systematic searching in the area gave no result (CARRON, 1999).

Other present interesting species : *Chorthippus pullus*, *Sphingonotus caeruleus*, *Tetrix tuerki* (in the Pfyn region).

Site 7

Switzerland: Rhein river. NADIG (1991) summarizes the formerly occupied sites along the Rhein in this region.

Site 8

Switzerland and Austria: Inn river. Several former populations in the swiss (Strada) and Austrian (Ried, Tösens) parts of the river (NADIG, 1991). NADIG (1986) could see the last specimens in the 60ys, now the species is extinct. We visited all potential sites between Ardez (CH) and Landeck (A), without success. We did not check the Inn river between Landeck and Innsbruck, the river is severely corrected and there is no potentially suitable site. Even though we discovered very good habitats by the austrian Lech river, in the Forchach region, *Epacromius* could not be found.

Other present interesting species : *Chorthippus pullus* was observed by the members of the Swiss Orthoptera group in 2000, in the Scuol area (CH). We could see *Bryodema tuberculata* and *Chorthippus pullus* in Forchach (A).

Site 9 (Fig. 13)

Switzerland and Italy: Rom (Adigo affluent) and Adigo rivers. Former occupied sites in the Swiss Müstair Valley and in the Italian Venosta Valley (NADIG, 1991). Now extinct in all Swiss and most Italian sites, only one population left, discovered by Stefan Plüss in 1988 (NADIG, 1991) in Prato al Stelvio by the Rom river (Lg 10.33 Lat 46.4), altitude : 920 m a.s.l. We could not find the species in the site in 1999. Thomas Wilhalm (Natural History Museum of Bolzano, pers. com.) told us that only a couple of larvae had been found in 2000. The population of *E. tergestinus* can be considered as almost extinct in this site (and thus in the Italian Alps).

Other present interesting species : Thomas Wilhalm (pers. com.) reports *Tetrix tuerki*, that we did not see.

Site 10

Germany: Lech river. Reported from the Augsburg region between 1936 and 1941 (FISCHER, 1941).

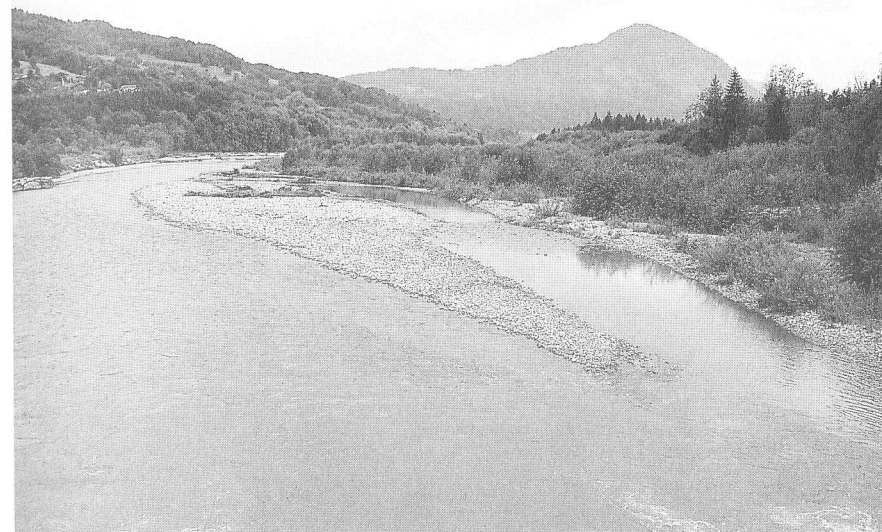


Fig. 10: Giffre river, site with *E. tergestinus*. *Myricaria germanica*, *Alnus incana* and *Salix* spp. on the isles and riverbanks.



Fig. 11: Arve river by Contamine-sur-Arve (France). The former habitats of *E. tergestinus* have been destroyed. The sandy riverbanks are much too narrow.

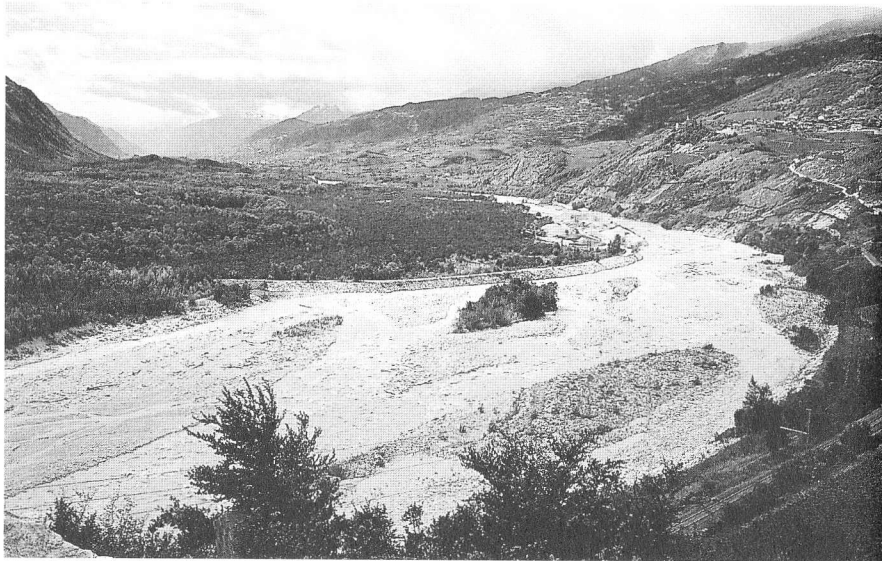


Fig. 12: Rhône river in Finges/Pfyn (Switzerland). *E. tergestinus* is extinct but a few sites hold *T. tuerki* and *C. pullus*. A dam prevents the Rhône to run freely in its natural floodplain, which is now very woody (*Pinus sylvestris*). A management plan of the floodplain is currently made, which foresees to give much space to the river.

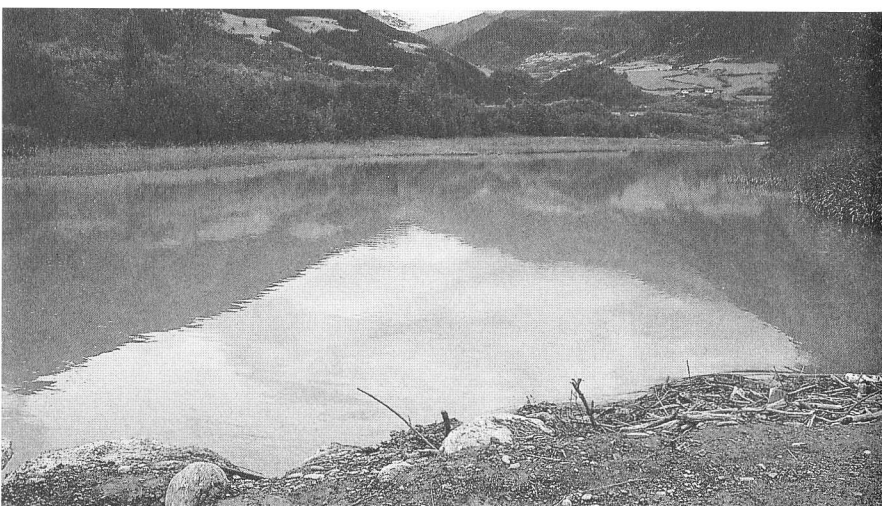


Fig. 13: Prato al Stelvio (Tirol, Italy), site with relictual population of *E. tergestinus*, as it was in August 1999. Picture from the dam of the lake which overflows the *Calamagrostis pseudophragmites* vegetation belt suitable to *E. tergestinus*.

Sites without data of *E. tergestinus*

Site 11 (Fig. 14)

France: Drac river, Bonne river (Isère basin).

Other present interesting species : *Chorthippus pullus*, *Pteronemobius heydenii*, *Sphingonotus caerulans*, *Tetrix tuerki*.

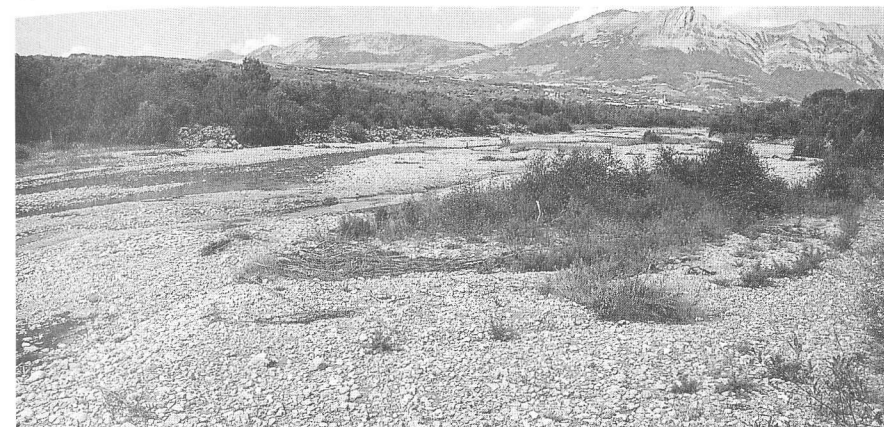


Fig. 14: Drac river (France) : *Myricaria germanica* on gravels, typical *Calamagrostis* vegetation lacking. Too dry in summer to hold *Epacromius* populations, but *Chorthippus pullus* and a few *Tetrix tuerki* can be found there.

Site 12 (Fig. 15)

France: Fier river (Rhône basin).

Other present interesting species : *Sphingonotus caerulans*.



Fig. 15: Fier (France) : corrected, incised river with very dry riverbanks. Mostly xerothermophilic Orthoptera could be found (*Calliptamus italicus*, *Oedipoda caerulescens*...).

Site 13**Italy:** Dora riparia river.

Other present interesting species : none.

Site 14**Italy:** Dora baltea river.Other present interesting species : *Aiolopus strepens*, *Sphingonotus caeruleans*, *Tetrix tuerki*, *Xya variegata*.**Ecology and conservation**Comparing the formerly with the presently occupied sites gave us the opportunity to draw up the habitat requirements of *Epacromius tergestinus*. These are :

1. broad, wide braided rivers with many damp sandy areas and lateral channels
2. constant humidity in the reproduction sites ; a summer drought may prevent the larvae to emerge from the egg-pods and / or to survive
3. large sites with many islands and wide riverbanks (« patches ») to sustain a sufficient number of subpopulations ; depending on the quality of the sites, « large » means minimum 4 km long (optimally 10 – 20 km) and min. 100 m wide (optimally 1 km). Only rivers running in weak slope and in natural major beds are suitable.

The pioneer, sandy, damp habitat is characterized by the presence of *Calamagrostis pseudophragmites* (Poaceae) which often forms large, yellowish, typically uniform covers. The very rare *Typha minima* (Typhaceae) was also typically abundant in this habitat (seen in the Durance and Giffre rivers). We found that these two plants are very good indicators of suitable sites for *E. tergestinus*. The presence of *Myricaria germanica* indicates the presence of water but this typical plant of braided rivers often grows in areas which can dry completely for some months, and we never found *E. tergestinus* in such habitats. So it is a less powerful indicator.

The absence of *E. tergestinus* by the Fier is explained by the stronger slope, the deep incised bed of the river and the absence of damp lateral areas. The extinction in the Swiss Rhône was also explained by the absence of damp sandy areas. The Tirol site was completely overflooded due to a dam construction for truck crossings on the Rom river.

When corrected, the riverbeds are too often overflooded inside the dams, and not enough outside them. The dynamic of the succession does not occur and the habitats with typical pioneer vegetation quickly disappear. Most corrected, sometimes deeply incised rivers (due to incision, effects on fauna see REICH 1991a, 1991b, 1994) have dry banks which are not suitable for *E. tergestinus*.

The presence of *Sphingonotus caeruleans*, *Calliptamus italicus*, or *Oedipoda caerulescens*, which are common in sandy areas, is strictly negatively correlated with the presence of *E. tergestinus*. Only *Tetrix tuerki* and the very widespread *Chorthippus brunneus* are quite regularly observed in the same (micro)habitats as *E. tergestinus*.

Discussion

All actual viable populations of *Epacromius tergestinus* are in the French Alps, by only three braided rivers. It seems possible to find a few other sites in the future, along the rivers of the south-western part of the french Alps. The « classical » population in Tirol is very near to extinction.

E. tergestinus is one of the most endangered Orthoptera of Europe ; the alpine *ponticus* ssp. only exists in three regions of a single country, France.

We have no doubt that the conservation of the sites where *E. tergestinus* still exists will also be useful for many other species of plants and animals such as the following other Orthoptera bound with the floodplain habitats : *Pteronemobius lineolatus* (BRULLÉ, 1825), *Tetrix tuerki* (KRAUSS, 1876), *Tetrix ceperoi* (BOLIVAR, 1887), *Xya variegata* LATREILLE, 1809, *Xya pfaendleri* (HARZ, 1970), *Locusta migratoria cinerascens* (FABRICIUS, 1781), *Bryodemus tuberculata* (FABRICIUS, 1775), *Chorthippus pullus* (PHILIPPI, 1830) and *Aiolopus thalassinus* (FABRICIUS, 1781), which are all considered as threatened in the central Europe countries (DETZEL 1998, NADIG & THORENS in DUELLI, 1994 ; BELLMANN & LUQUET, 1995 ; THORENS & NADIG, 1997 ; NADIG, 1991). An international action plan for the conservation of the most important alpine braided rivers would be of great interest, with priorities based on recent data on some target groups of fauna & flora.

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