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Distribution of the Pygmy Shrew *Sorex minutus* Linnaeus, 1766 along the Eastern Adriatic Coast

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Abstract. Fifty-five localities of the pygmy shrew *Sorex minutus* are mapped along the eastern Adriatic coast and in the Dinaric Alps. The species populates a belt of continental forests while it is absent from the area of Mediterranean vegetation communities. Isolated populations found in Dalmatia and the coastal region of Montenegro are limited to mountains higher than 1000 m. In the Dinaric Alps the lowest altitude populated by the pygmy shrew increases in the direction north-west to south-east.

Key words. Mammalia, Soricidae, *Sorex minutus*, eastern Adriatic coast, distribution.

Introduction

The pygmy shrew *Sorex minutus* Linnaeus, 1766 is the most widely distributed species of the genus *Sorex* in Europe (cf. Niethammer & Krapp 1990). Although its distribution area is known quite well, certain gaps in our knowledge prevent us from completing the southern border of its distribution. Such an area is also the eastern coast of the Adriatic Sea with the Dinaric Alps (Hutterer 1990). The purpose of this article is to combine the known, i. e. published, records with recent findings, thus filling the lacuna in knowledge of the distribution of the pygmy shrew in the area between the Sava river and the Adriatic coast.

Results and Discussion

The pygmy shrew has been collected in 55 localities as listed below. The name of a larger locality or a locality in a broader sense (e. g. a mountain chain) is given first. Whenever known the altitude is duly reported. Reference numbers of localities correspond to Fig. 1 and Fig. 2.

List of localities:
1 — Bohinj, Hotel "Zlatorog", 530 m; 2 — Tolmin, Polog, 420 m; 3 — Udine, Cialla di Prepoto, 225 m; 4 — Dražgoše, 815 m; 5 — Ratitovec, 1665 m; 6 — Škofja Loka; 7 — Gorenja vas, Todraž, 440 m; 8 — Nova Gorica, Jelenk, 700 m; 9 — Kobjeglava, 320 m; 10 — Hotedršica, Ravnik, 600 m; 11 — Ig, Kremenica, 290—300 m; 12 — Predjama, 503 m; 13 — Križna jama, 650 m; 14 — Snežnik Mt., Leskova dolina, 850 m; 15 — Gorjanci Mts., Miklavž, 960 m; 16 — Kočevski Rog, Trnovec, 670 m; 17 — Dol ob Kolpi, 240 m; 18 — Carso Triestino; 19a — Argila; 19b — Momjan; 20 — Truške; 21 — Sočerga; 22 — Kubed, 260 m; 23 — Podgorje, 600 m; 24 — Podgrad, 680 m; 25 — Čičarija Mt., Lanišče; 26 — Učka Mt., 1075 m; 27 — Risnjak Mt., Lazac, 1065 m; 28a — Risnjak Mt., Markov Brlog, 1100 m; 28b — Risnjak Mt., Crni Lug, 690 m; 28c — Risnjak Mt., Bela voda, 690 m; 29 — Velika Kapela Mt., Sunger, 800 m; 30 — Velika Kapela Mt., Bijele Stijene, 1300 m; 31 — Razvala, 850 m; 32a — Velebit Mts., Vučjak, 1590 m; 32b — Velebit Mts., Žive vodice, 1270 m; 32c — Velebit Mts., Vukušić livade, 960 m; 32d — Velebit Mts., Babrovača, 925 m; 33 — Mala Kapela, Vrhovine, Beli Vrh; 34 — Mala Kapela Mt., Babin potok, Metla; 35 — Plitvička jezera; 36 — Korenička

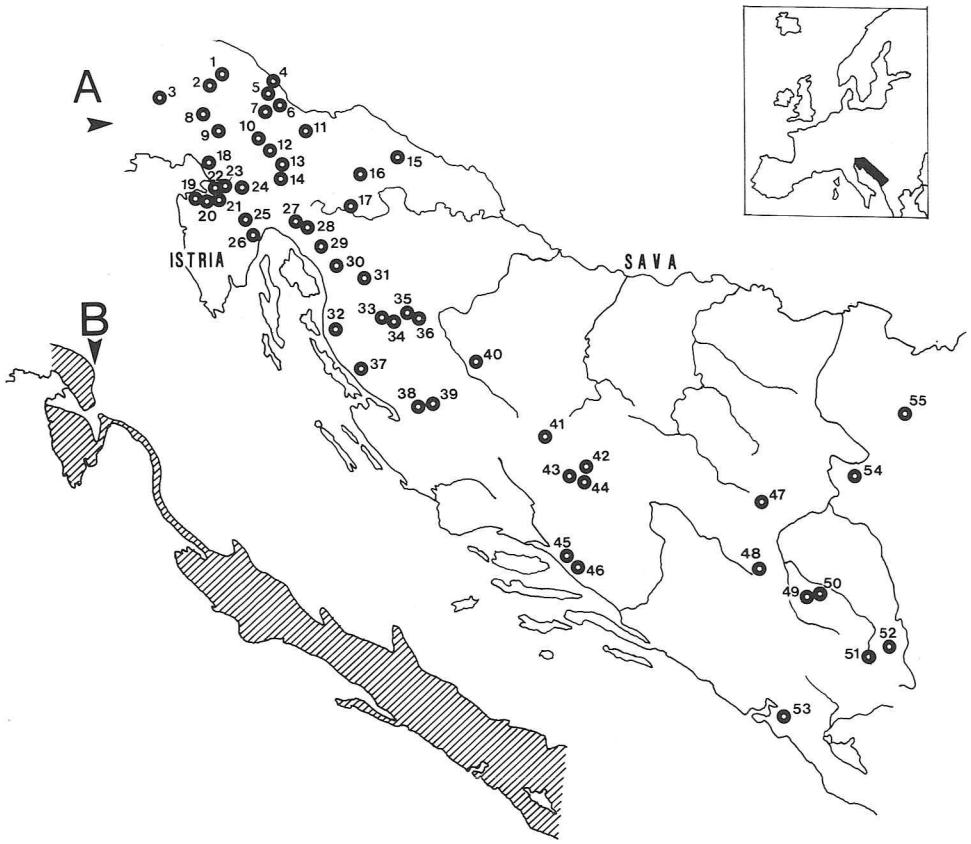

Fig. 1: (A) Distribution of the pygmy shrew *Sorex minutus* along the eastern coast of the Adriatic Sea. See text for identifying numbers. (B) Distribution of forests of the Mediterranean vegetational zone (simplified after Jovanović et al. 1986).

Kapela, 750 m; 37 — Velebit Mts., Baške Oštarije, 925 m; 38 — Velebit Mts., Prezid, 800 m; 39 — Velebit Mts., Cerovac, 530 m; 40 — Osječenica Mt. near Bosanski Petrovac, 1500 m; 41 — Šator Mt., Babina Greda, 1620 m; 42 — Kupreško polje, Občevina, 1134 m; 43 — Cincar Mt., Čejića ravne, 1420 m; 44 — Gornji Malovan, 1140 m; 45 — Biokovo Mt., Lipi Dočić, 1540 m; 46 — Biokovo Mt., Silnji gozd, 1400 m; 47 — Gola Jahorina; 48 — Zelengora Mt., Orlovac, 1650 m; 49 — Durmitor Mt., Duži, 1050 m; 50a — Durmitor Mt., Crno jezero, 1450 m; 50b — Durmitor Mt., Crvena Greda, 1600 m; 51 — Kolašin, approx. 1000 m; 52 — Bjelasica Mt., Jelovica, 1350—1500 m; 53 — Lovčen Mt., Jezerski vrh, 1400 m; 54 — Tara Mt., 55 — Valjevo, Kamenica, 370 m.

Corresponding references:
(1, 2, 4, 5, 7, 10—17, 22—24) — Kryštufek 1983; (6, 32a, 35, 39, 47) — Djulić & Kovačić 1989; (18) — Gerdol et al. 1982; (19—21, 25) — Lipej 1988; (26) — Djulić & Vidinić 1964; (28b, 33, 34) — Djulić 1971; (41—44) — Kryštufek & Tvrtković 1988; (50a, b) — Mirić 1987; (51) — Gligić et al. 1989; (52) — Kryštufek 1979; (54) — Hutterer 1990.

The line which connects points 3, 18, 19—21, 25—30, 32, 37, 38, 43, 44, 48, 49, and 51 should be regarded as the south-western border of a continuous distribution area of the pygmy shrew in the study area (Fig. 1). On the whole, the species is absent from the regions under the Mediterranean influence and from the islands. On the coastal regions of the eastern Adriatic, starting with southern Istria in the north, the pygmy shrew is already evidently absent from the submediterranean forests of Quer-co-Carpinetum orientalis and Ostryo-Quercetum pubescentis types. These forests are characteristic of transitional Mediterranean regions with warm and dry summers (mean annual temperature between 12.7 and 15 °C) and mild winters. They grow from the coast up to an elevation of 600 m (Jovanović et al. 1986).

In northern Istria and the adjacent regions the pygmy shrew was found also in lowlands close to the sea (Fig. 2), in several cases even syntopycally with *Suncus etruscus* (e. g. points 19—21 in Fig. 1). However, the distribution area corresponds well with the distribution of the continental forest communities as defined by Šugar (1984). The situation is more complicated on the adjacent Trieste Carst (Carso

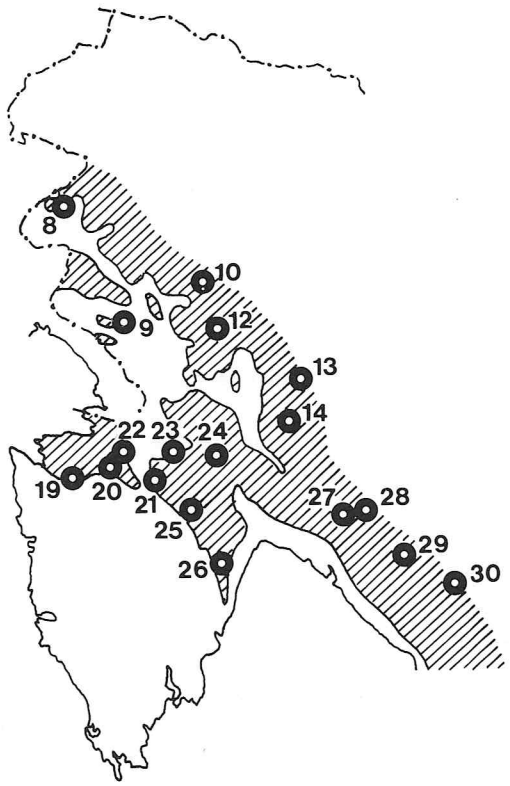

Fig. 2: Records of the pygmy shrew in Istria and adjecent regions. Shading shows the corresponding distribution of continental vegetation according to Šugar (1984). See text for identifying numbers.

Triestino) where the mesophilic continental forests vary mosaically with thermophilic submediterranean forests of the Ostryo-Quercetum pubescentis type. Mesophilic forests are limited mainly to sink holes so they have a spotty distribution (Poldini 1989). The same distributional pattern is shared also by the pygmy shrews.

Between points 19—5 the transect in Slovenia reveals the vertical distribution of the pygmy shrew between approx. 200 m and 1665 m. On the Velebit Mts. (points 32, 37, 38) the pygmy shrew was found at elevations between 800 and 1590 m on the littoral slope, while the lowest localities on the continental side were slightly lower, 530—600 m above sea level (cf. Tvrtković 1984). The records in the transect from central Dalmatia to western Bosnia (from the coast as far as points 41—44, Fig. 1) cover a range between 1134 and 1540 m. Such a narrow vertical range might also be ascribed to the lack of field research on the littoral slopes of these mountains. In eastern Herzegovina and the continental parts of Montenegro (points 48—52) the pygmy shrew was found between approx. 1000 and 1650 m above sea level. In the north-west south-east direction the lowest altitudes still populated by the pygmy shrew obviously grew higher. This phenomenon can be parallelled with the shifting of the vegetational belts at higher altitudes in the same direction.

The only records of the pygmy shrew from the belt of the Mediterranean vegetation zone (points 45—46 and 53 in Fig. 1) are from the mountains with forests of the Fagetum type (Jovanović et al. 1986). The recorded heights were 1400 and 1540 m on Biokovo Mts. and 1400 m on Lovčen Mt. These two populations are isolated. The islands of beech forests are to be found also in some other mountains that are well within the Mediterranean vegetational zone (i. e. Promina, Svilaja, Mosor, Viduša, Orjen, and Rumija). Consequently, it seems highly probable that the pygmy shrew is also living on other mountains along the southern part of the Adriatic coast.

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Zusammenfassung

Die Verbreitung der Zwergspitzmaus *Sorex minutus* Linnaeus, 1766 entlang der östlichen Adriaküste wird anhand von 55 Fundorten aufgezeigt. Die Art besiedelt den Bereich der Kontinentalwälder, sie fehlt aber im mediterranen Vegetationsbereich. Isolierte Populationen findet man in Dalmatien und im Küstenstreifen von Montenegro in Bergen über 1000 m. Die niedrigste Meereshöhe, welche die Zwergspitzmaus noch besiedelt, verschiebt sich entlang der östlichen Adriaküste in nordwest-südöstlicher Richtung nach oben.

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