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The use of fur colour characters to distinguish the sibling species *Sorex araneus* and *Sorex coronatus* (Insectivora, Soricidae): a field test in a zone of parapatric contact

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In their description of *Sorex coronatus* Millet, 1828, Meylan and Hausser (1978) showed that this species, previously named *S. gemellus* by Ott (1968), is distinguished from the closely related sibling species *Sorex araneus* on the basis of its karyotype (see Hausser 1990; Hausser et al. 1990, for a detailed review of the literature on these two species). Although very clear differences in mandible morphology have been found between *S. araneus* and *S. coronatus* (e.g. Hausser and Jammot 1974; Handwerk 1987) and although several biochemical characters may be used to separate many of the chromosomal races of *S. araneus* from the unique chromosomal race of *S. coronatus* (Catzeflis et al. 1982; Catzeflis 1984; Hausser and Zuber 1983; Neet and Hausser 1989, 1991), the only absolute difference between these sibling species that permits to distinguish them throughout their whole biogeographical range remains the karyotype.

However, for field identifications, morphological characters are necessary. Some possible characters such as tail and hindfoot lengths have been discussed by Ott (1968), Ott and Olert (1970) and Handwerk (1987), but these characters are not clearcut enough to provide a useful field identification criterion.

Differences in fur colour patterns of *S. araneus* and *S. coronatus* were first noticed by von Lehmann (1955) and Olert (1969). A consistent description of these patterns was given by Ott and Olert (1970) and Olert (1973a, b), who defined *S. araneus* as a darker species with a broad dark back band, while *S. coronatus* has a narrow dark back band, with lighter flanks and a tricolorous aspect. Olert used techniques such as optic densitometry to demonstrate that these fur colour differences can be quantified (Olert 1973a). Differences were actually quite obvious in some localities, enabling Ott and Olert (1970) to obtain 100 % correct identifications with n = 8 individuals sampled from the Swiss Alps. Nevertheless, Meylan and Hausser (1978) have considered that fur colour characters are probably too variable to be of any general value to discriminate *S. araneus* from *S. coronatus*. Our own observations have shown that when one gains some experience and practice in identifying these two species frequently by use of karyological or biochemical techniques, fur differences can be observed and some individuals appear to be clearly identifiable, especially when dealing with typically tricolorous *S. coronatus* specimens.

In order to assess to what extent fur colour characters can be considered to be reliable for field identifications, we undertook a test in a zone of parapatric contact between the two species during the summer 1987. The contact zone is situated on the border of the lake of Neuchâtel (Switzerland) and has been described by Neet and Hausser (1990). The test

Percentages of individuals of *Sorex araneus* and *S. coronatus* correctly identified during field tests using fur colour characters, and tests of the deviation of the numbers of correctly (I_c) and erroneously (I_w) identified individuals from a null hypothesis of randomness

Field test period	% of correct identifications	n_a	n_c	I_c	I_w	χ^2	p
15.–16. 9. 1987	84.6	36	16	44	8	14.16	0.0002 ***
22.–23. 9. 1987	66.7	8	10	12	6	1.03	0.31 N.S.
28.–29. 9. 1987	73.2	27	14	30	11	4.65	0.03 *
Mean	74.8						

n_a = number of *S. araneus* in the test, n_c = number of *S. coronatus* in the test, N.S. = nonsignificant, * = $p < 0.05$, *** = $p < 0.001$.

simply consisted of identifying individuals at night, during trap controls, with a torch lamp. The tests were carried out in trapping areas that had not been visited more than once before the onset of testing and thus, there was no particular knowledge of the individuals encoutered. The fur colour characters mentioned above were used for these identifications. As individuals were systematically marked and identified by serum albumin electrophoresis (Neet and Hausser 1989), the field identifications could be controlled *a posteriori*. As shown in the Table, a mean correct identification rate of about 75 % was obtained over three independent tests. This rate indicates that differences are detected in field conditions since the mean correct identification rate clearly exceeds the 50 % level that would be expected under a random rate of species attribution. However, results in the Table also show that only two out of three tests gave significant deviations from a null hypothesis of random species attribution, and the maximal proportion of correct identifications obtained still left 15 % erroneously identified specimens.

Thus, we conclude that fur colour characters are not very efficient and are only of limited value to distinguish *S. araneus* and *S. coronatus* under usual field conditions.

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