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FIVE NEW SHREWS FROM EUROPE.\*

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Among the extensive series of European shrews collected for the United States National Museum during the past three years there are five forms that have not been hitherto described. Two of these were taken in Sicily by Mr. Dane Coolidge, two in the foothills of the Pyrenees by Mr. Robert T. Young, and one in Switzerland by Mr. J. Alden Loring.

*Crocidura sicula* sp. nov.

*Type*.—Adult male (skin and skull) No. 103,301 United States National Museum. Collected at Palermo, Sicily, June 20, 1900, by Dane Coolidge. Original No. 1332.

*Characters*.—Smaller than *Crocidura russula* from central Europe (total length about 105 instead of 120; hind foot, 13 instead of 15); color, both above and below, lighter than in the continental animal.

*Color*.—Dorsal surface drab (a trifle paler than Ridgway's pl. III, fig. 18) faintly clouded with broccoli-brown, many of the hairs showing silvery tips in certain lights. Underparts pale smoke-gray approaching white. Along sides the transition from drab to gray is much more abrupt than in *C. russula* in corresponding coat. Tail dull drab, faintly paler below. Feet an indefinite gray intermediate between color of tail and belly. The fur is everywhere gray (Ridgeway pl. II, fig. 7) at base.

*Skull and teeth*.—The skull and teeth are uniformly and noticeably

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smaller than in *Crocidura russula*, but otherwise they show no peculiarities.

*Measurements.*—External measurements of type: total length, 100; head and body, 68; tail, 32; hind foot, 13 (12). Measurements of an adult female from the type locality: total length, 110; head and body, 75; tail, 35; hind foot, 13 (12).

Cranial measurements of type: greatest length (exclusive of incisors), 17.6 (19);\* greatest postorbital breadth, 8.8 (9.6); greatest antorbital breadth, 6.2 (6.8); mandible, 9 (10); entire maxillary toothrow, 8.4 (9); entire mandibular toothrow, 8 (8.6).

*Specimens examined.*—Two, both from the type locality.

*Remarks.*—*Crocidura sicula* differs from *C. russula* in the characters that would be expected from the known peculiarities of other members of the Sicilian fauna.

### *Crocidura caudata* sp. nov.

*Type.*—Young adult female (in alcohol) No. 103,302 United States National Museum. Collected at Palermo Sicily, June 21, 1900, by Dane Coolidge. Original number, 1365.

*Characters.*—Somewhat larger than *Crocidura sicula* (total length about 115, hind foot about 15) and differing from this as well as from other European species in the size and great length of the tail, which when laid forward over back reaches to middle of ear.

*Tail.*—The tail forms about 42 per cent of the total length and at middle is 3 mm. in diameter. Near base it is distinctly four-sided, but beyond middle becomes sub-cylindric. The tip is flattened laterally for about 13 mm. evidently as the result of an accident. Scales arranged in indistinct rings, of which there are about 7 to the millimeter at middle. The rings are partly obscured by fine short hairs; and the longer bristles with which the tail is sprinkled are more abundant than in *Crocidura russula* and *C. sicula*.

*Color.*—Color after six months immersion in alcohol essentially as in *Crocidura sicula* but fur both above and below with a dull slaty cast, and transition from drab of back to gray of underparts less abrupt.

*Skull and teeth.*—The skull is so injured that the details of its form cannot be seen, but apparently the rostrum is relatively shorter and the interorbital region broader than in either *Crocidura russula* or *C. sicula*. Teeth as in the related species except that the first upper unicuspid is larger and the second and third are so crowded that the third is tightly wedged into the concavity on the inner side of the large premolar. It is thus partly hidden by the small anterior cusp of the large tooth, while in the related species it is so far removed from the latter that a distinct break in the toothrow is usually seen when skull is viewed from the outer side. How far these characters may be constant cannot be

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\*Measurements in parenthesis are those of an adult male *Crocidura russula* from Waremmé, Belgium.

determined from a single specimen; but I find no close approach to them among a considerable number of specimens of *Crocidura russula* from continental Europe.

*Measurements.*—External measurements of type: total length, 115; head and body, 63; tail, 52; hind foot, 15 (14).

*Specimen examined.*—One, the type.

*Remarks.*—Although represented by a single individual only this species appears to be remarkably well characterized.

### ***Sorex araneus alticola* subsp. nov.**

*Type.*—Adult female (skin and skull) No. 85,930 United States National Museum. Collected near Meiringen, Switzerland (altitude 2100 m.), October 17, 1898, by J. Alden Loring. Original number 5781.

*Characters.*—Larger than true *Sorex araneus* and with relatively longer tail. Teeth more heavily pigmented than in the typical form.

*Color.*—Summer pelage (type specimen): fur short harsh and dull. Entire dorsal surface rather pale sepia. Sides broccoli-brown faintly tinged with drab. Underparts light gray strongly washed with Isabella color. Though there is no sharp line of demarkation between the color of back and sides, and only slightly more between that of latter and underparts, the transition is sufficiently abrupt to render the animal as a whole distinctly tricolored. Tail sharply bicolor, seal-brown above and at tip, broccoli-brown below. Feet glistening broccoli-brown. Winter pelage: fur long soft and lustrous. Elements of color essentially the same as in summer, but sepia of dorsal surface darkened until it approaches black, and gray of under parts scarcely tinged with Isabella color. Sides as in summer. The tricolored pattern is thus more noticeable than in the other pelage, particularly in the sharp contrast between back and sides.

*Skull and teeth.*—Though the skull and teeth agree with those of typical *Sorex araneus* in size and form, the teeth are readily distinguishable by their more extensive and darker pigmentation. The differences are most readily seen upon comparison of the small cusps on the lingual side of the upper molars and large premolar, that is, the protocone of the posterior molar and the hypocone of each of the other teeth. Seventy-five topotypes of *Sorex araneus araneus* and twenty-two specimens of *S. araneus alticola* from the neighborhood of the type locality give the following results:

	<i>S. araneus.</i>	<i>S. alticola.</i>
Large premolar with pigment on hypocone .....	0%	45.4%
First molar with pigment on hypocone .....	22.6%	90.9%
Second molar with pigment on hypocone .....	21.2%	90.9%
Third molar with pigment on hypocone .. . . . .	45.3%	100%
None of the small cusps pigmented .....	54.6%	0%
All of the small cusps pigmented .. . . . .	0%	45.4%

*Measurements.*—External measurements of type specimen: total length, 131; head and body, 76; tail vertebræ, 55; hind foot, 16 (14). Average and extremes of ten specimens from the type locality: total length, 123 (118-131); tail vertebræ, 52.5 (47-57); hind foot, 14.8 (14-16); hind foot without claws, 13.3 (13-14).

*Specimens examined.*—Seventy-five, from the following localities in Switzerland: Andermatt, 48; Brünig, 9; Meiringen, 18.

*Remarks.*—On comparing the series of Swiss shrews with a somewhat greater number of true *Sorex araneus* from Upsala, Sweden, taken by the same collector, the differences between the two races are so apparent as to call for no special comparisons beyond those already given.

Twenty shrews from eastern Norway collected by Miss Thora Stejneger, mostly in the vicinity of Bergen, represent a large animal quite distinct from the *Sorex araneus araneus* of southeastern Sweden, and much resembling *S. araneus alticola*. Ten specimens give the following averages: total length, 127 (116)\*; tail vertebræ, 49 (39); hind foot, 16.2 (14); hind foot without claws, — (12.7). It will be seen that the Norwegian shrew exceeds both true *araneus* and *alticola* in length of hind foot, but that the tail, while longer than in the Swedish animal, is not quite equal to that of the Swiss form. Unfortunately the Norwegian specimens are all in the summer coat, and all are so old that the teeth are too much worn to show the pigmentation. The status of the animal therefore cannot be satisfactorily determined.

#### ***Sorex araneus euronotus* subsp. nov.**

*Type.*—Adult male (skin and skull) No. 101,321 United States National Museum. Collected at Montréjeau, Hautes Pyrenees, France (in foothills of Pyrenees), July 8, 1899, by Robert T. Young. Original number, 642.

*Characters.*—Size slightly less than that of true *Sorex araneus*; color (in summer pelage), more brown, particularly on underparts.

*Color.*—The colors are essentially as in the summer pelage of *Sorex araneus araneus* and *S. araneus alticola* except that the browns are darker and the belly is heavily washed with wood-brown. The tricolored pattern though visible is less distinct than in the other races.

*Skull and teeth.*—Skull as in *Sorex araneus araneus*, but slightly though constantly smaller, and with less inflated braincase. Teeth as in the typical form but smaller and somewhat more heavily pigmented.

*Measurements.*—External measurements of type: total length, 122; head and body, 78; tail vertebræ, 44; hind foot, 13.5 (12.5). Average and extremes of nine specimens from the type locality: total length, 114 (107-117); tail vertebræ, 42 (37-44); hind foot, 13.8 (13.5-15); hind foot without claws, 12.8 (12.5-14).

*Specimens examined.*—Nine, all from the type locality.

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\*Measurements in parenthesis are those of a corresponding number of *Sorex araneus* from Upsala, taken at random from the large number at hand.

**Neomys fodiens minor** subsp. nov.

*Type*.—Adult male (skin and skull) No. 101,311 United States National Museum. Collected at Montréjeau, Hautes Pyrenées, France (in foothills of Pyrenees) July 8, 1899, by Robert T. Young. Original number, 641.

*Characters*.—Smaller than *Crossopus fodiens* from Sweden, Germany, Switzerland, and Belgium, (tail 50-60 instead of 65-75, hind foot with claws, 17-19 instead of 19-22), but incisor teeth noticeably larger. Color not distinctive.

*Skull and teeth*.—While the skull is of about the same size as in true *Crossopus fodiens* the braincase is somewhat narrower, and the rostrum consequently appears more massive. Teeth similar to those of typical *C. fodiens* in form, but anterior incisors and first and second unicuspid distantly larger.

*Measurements*.—External measurements of type: total length, 136; head and body, 82; tail vertebræ, 50; hind foot, 17 (16). Two other adult males from the type locality measure respectively: total length, 137 and 151; head and body, 82 and 85; tail vertebræ, 53 and 60; hind foot, 18.5 (17.5) and 19 (18).

*Specimens examined*.—Three, all from the type locality.