

## V.—THE FLORIDA MUSKRAT (NEOFIBER ALLENI, TRUE).

By FREDERICK W. TRUE.

In the summer of 1884 I made known for the first time the characteristics of a peculiar rodent, a single specimen of which was received from Florida in December of the previous year.\* No additional specimens of the animal have been thus far received, nor any new information regarding its habits and distribution. It is my purpose in this paper simply to describe in detail the superficies and skeleton of the original specimen and to discuss its generic and specific characters.

The type specimen was procured by William Wittfeld, Esq., a correspondent of the Smithsonian Institution, in the vicinity of Georgiana, Brevard County, Florida. Georgiana is situated on Merritt's Island, at the northern extremity of Indian River, nearly opposite Cape Canaveral. The island is about 35 miles in length from north to south, and some 5 or 6 miles in breadth at the widest part. It is separated from the mainland by a strait about 5 miles in breadth.

The collection in which the round-tailed muskrat was found contained representatives of *Mus rattus*, *Hesperomys leucopus*, *Scalops aquaticus*, and a species of *Sorex*.

### NEOFIBER, True.

*Neofiber*, Science, iv, 75, p. 34, July 11, 1884; Proc. U. S. Nat. Mus., vii, p. 170, July 29, 1884.

Form, arvicoline. Tail nearly as long as body, terete, nearly naked. Hind toes in a line with the metatarsals, scarcely webbed. Thumb with a claw.

Anterior cusps of molars rounded interiorly, acute externally. Last lower molar with 4 cusps, re-entrant angles alternating.

Parietals widest in front, but with an angular postero-lateral extension. Interparietal wider than long. Surface of mastoid not deeply concave.

Pelvis and pes not longer than skull. Transverse processes of lum-

\* Science, iv, No. 75, July 11, 1884, p. 34. Proc. U. S. Nat. Mus., vii, 1884, pp. 170-172 (July 29).

bar vertebræ short; those of the caudal vertebræ, except the first four, rudimentary. Vertebræ: C. 7; D. 13; L. 6; S. 4; Ca. 25 = 55.

NEOFIBER ALLENI, True.

*Neofiber Alleni*, True, Science, iv, No. 75, 1884, p. 34; Proc. U. S. Nat. Mus., vii, 1884, p. 170.

A muskrat of less than half the size of *Fiber zibethicus*, but of the same general form. Eyes small and high up on the head. Ears moderate, broad and rounded, hirsute within the conch, the longest hairs extending 0.8<sup>cm</sup> beyond the margin. Border of the conch slightly and unevenly notched. Fore feet as in *F. zibethicus*. Palm black, except the two large posterior tubercles and the base of the thumb. Hind feet moderate, not equaling twice the length of the fore-feet. Soles naked, smooth, black, and 5-tuberculate.

The posterior internal tubercle large and oval in outline. The remaining four, situated respectively at the angle between the 1st and 2d toes, between the 2d and 3d, between the 3d and 4th, and between the 4th and 5th; all small and of equal size. Soles narrow. Toes not inclined laterally at an angle with the sole. Fringe of the toes and sole not extending prominently below the plane of their lower surface.

Toes of the fore and hind feet only slightly webbed. Claws horn-colored. Tail round, about 0.6<sup>cm</sup> in diameter at the base and tapering gradually to the tip. Sparsely clothed with short blackish hairs, between which the tail appears covered with rows of scales, as in *Mus*.

Color of the hair of the body above as in *F. zibethicus*; rich rufous at the upper two-fifths and lead-color at the base. In a small area just behind the shoulders the base of the hairs is white. Color of the head the same as of the body, but darker. Hair of the under surface of the body light rufous at the upper third, lead-color at the base. Chin, throat, and inner side of the fore arms and legs white or but faintly tinged with rufous. Fore and hind feet above clothed with short, dull, brown hairs, which extend to the tips of the toes.\*

Throughout its entire structure the Florida muskrat displays an affinity to *Fiber* on the one side and to *Arvicola* on the other. It is strictly intermediate between the two genera.

In general shape the skull deviates in no manner from that of *Fiber*. The lachrymal pit is less inflated in *Neofiber* and the nicking of the root of the zygoma in front less obvious. The interorbital area is less constricted posteriorly, its sides being nearly parallel. The squamosals are much smaller than in *Fiber*, and do not approach so near the median line anteriorly. The parietals, on the contrary, are large, and, taken together, heart-shaped, the apex turned backward and truncated. There is a small, regularly triangular, postero-lateral extension. The interparietal is broader than long. The zygomatic arches are similar

\* This description is a repetition of that given in the Museum Proceedings (l. c.).

to those of *Fiber*. Between the maxillary and squamosal processes externally the malar is reduced to a mere thread, as in that genus.\*

The strap-shaped process of the squamosal bounding the squamosal fenestra stands nearly vertically, and the constriction of the skull between the fenestræ is less than in *Fiber*. The anterior margin of the *meatus auditorius* is much less prolonged than in that genus. The bullæ are more inflated. The surface of the mastoid is uneven, but not strongly concave; the foramen very small.

The coronoid process of the mandible is not as high as the condyle, but the jaw is not otherwise different from that of *Fiber*.

The anterior upper molar has five cusps, the first not wider than the other, nor compressed. The second molar has four cusps, the anterior largest, acute externally, rounded internally. The posterior molar has four cusps, the anterior like that of the preceding tooth, the second and third equal in size, the last half-halberd-shaped, and almost or quite external to the median line of the series. The anterior lower molar has seven cusps, the first irregularly halberd-shaped, the last almond-shaped, the rounded end internal. The second tooth has five cusps. The last has four cusps, of which the first three are very small and the last rhomboidal.

The skeleton presents a number of peculiarities, aside from proportions, which distinguish it from that of *F. zibethicus*. The inferior lamella of the transverse process of the sixth cervical vertebra is short and broad, and does not extend back under the head of the first rib, as in *F. zibethicus*. The neural spines of the dorsal vertebræ are much higher than those of the lumbar vertebræ, the reverse being true in the case of *Fiber*. Of the six segments of the sternum the fifth is the smallest, being one-half as high as broad. The transverse processes of the lumbar vertebræ are short, and do not extend to the level of the under side of the centra. The processes of the caudal vertebræ, after the fourth, are rudimentary; the vertebræ themselves are much elongated.

The anterior extremity presents no special distinguishing characteristics. In the pelvis the acetabulum is situated at the junction of the third and fourth fifths of its length. There is less difference in the osseous structure of the feet of the two muskrats than one would suppose from an examination of the exterior. The peculiar bending of the toes in *Fiber* appears to be due to muscular and ligamentary antagonism rather than to any peculiarities in the arrangement of the bones of the foot. In *Neofiber* the fifth metatarsal is not more than one-half as long as the second, and the first is but little longer. In *Fiber* the second

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\* Mr. N. P. Scudder (Proc. Biol. Soc. Washington, ii, 1885, p. lxiv) very justly takes exception to Dr. Cones's statement that in *Fiber* the squamosal and maxillary spurs are in contact on the outer side of the zygomatic arch (Monogr. N. A. Rodentia, 1877, p. 253). Such an arrangement of parts appears to exist only in exceptional cases, if at all. Among eleven skulls in the Museum collection there are none in which the two spurs are absolutely in contact, though in one the space between them is exceedingly narrow.

toe is shorter than the third, and the third than the fourth. In *Neofiber* the third is the longest, followed by the second and fourth.

In external appearance the Florida muskrat somewhat resembles *Arvicola amphibius*, but it is easily distinguished by its larger head and feet, longer and less hairy tail, and heavier body. The muzzle is entirely hairy, except the small nasal pads. The eyes are noticeably nearer to the ears than to the nose. The ears are not entirely hidden by the surrounding fur. The fore and hind feet are pilous above and naked below. The palms bear four tubercles, as in *Fiber zibethicus*. They are black, except the two large posterior tubercles and the base of the thumb. The narrow soles are smooth, black, and quinquituberculate. The postero-internal tubercle is large and oval in outline. The remaining four are situated in the intervals between the axils of the five toes. They are all equally small. The toes when flexed do not lie across the sole, as in *Fiber*; the fringe of the toes and sole does not extend noticeably below the plane of their lower surface.

The tail is perfectly terete, and so sparsely clothed with hairs that the scales are distinctly visible.

In general color the Florida muskrat does not differ greatly from *Arvicola amphibius*, but the hair is more like that of *Fiber*. On the upper surfaces it is plainly of two sorts. The under-fur is soft and crenulate, not glossy, and lead-colored, except at the terminal fifth. Mingled with it are numerous stiff, shining hairs, about a half longer, some being dark at the tips and others golden. The dark-tipped hairs prevail on the back, but are outnumbered on the sides by the lighter ones. These long, glossy hairs are sufficiently numerous to give the back a decided sheen, but not such as is seen in winter specimens of *Fiber*. The fringe overhanging the lips is composed of opaque white hairs, but the short hairs on the margin of the lip are dark. The whiskers are dark at the base and lighter at the extremity. None are long enough to reach the ears. The ear-conch is clothed externally and internally with short fur like the under fur of the body. In the median line of the back, just above the insertion of the tail, both the under fur and hair are very long, forming a sort of mane or crest. The hairs of the tail are dark and about one-fourth inch in length; the terminal pencil is very small.

The fur of the under surfaces is short, and at the extremity its color is very light fawn. The extremity of the under jaw alone is darker. The lower two-thirds of the under-fur is lead-colored, the extremity fawn-colored. The stiffer hairs are darker and nearly twice as long. On the exterior of the fore feet the fur is like that of the sides, internally like that of the belly. The long hairs extend down the leg and there is a distinct tuft at the heel. The color of the appressed hair of the feet is that of the stiff hairs of the sides. On the hind feet and legs the color of the hair is the same, but there are fewer long hairs on the legs. The color of the claws is light.



*Measurements of Neofiber Alleni, from the typical alcoholic specimen from Georgiana, Fla.*

|  | Centimeters. |
|--|--------------|
| Length of head and body .....                          | 20.2         |
| Length of head .....                                   | 5.2          |
| Length of tail .....                                   | 12.6         |
| Length of hind foot (without claws) .....              | 3.9          |
| Length of fore foot (without claws) .....              | 2.3          |
| Nose to eye .....                                      | 2.0          |
| Nose to base of ear .....                              | 4.5          |
| Height of ear .....                                    | 1.8          |
| Length of middle toe of fore foot (without claw) ..... | .9           |
| Length of middle toe of hind foot (without claw) ..... | 1.0          |
| Longest claw of fore foot .....                        | .5           |
| Longest claw of hind foot .....                        | .6           |

*Measurements of the skull.*

|  |     |
|--|-----|
| Total length .....   | 4.7 |
| Greatest width .....   | 2.9 |
| Length of nasals .....   | 1.2 |
| Length of tooth-row .....  | 1.1 |
| Front edge of first molar to posterior margin of incisors .....    | 1.6 |
| Greatest width of muzzle .....                                     | .7  |
| Width of interorbital bridge .....                                 | .5  |
| Center of occipital crest to line of hinder margin of orbits ..... | 1.9 |

*Measurements of the skeleton.*

|   |      |
|---|------|
| Total length (along curves) .....   | 32.8 |
| Anterior margin atlas to extremity of post-zygapophysis of last sacral vertebra ..... | 12.9 |
| Extremity of post-zygapophysis of last sacral vertebra to end of tail .....           | 15.2 |
| Length of 7 cervical vertebræ .....   | 1.6  |
| Length of 13 dorsal vertebræ .....  | 5.0  |
| Length of 6 lumbar vertebræ .....   | 3.6  |
| Length of 4 sacral vertebræ .....   | 2.7  |
| Length of 25 caudal vertebræ .....  | 15.2 |
| Length of scapula (glenoid fossa to superior margin) .....                            | 2.4  |
| Length of sternum (without ensiform cartilage) .....                                  | 3.2  |
| Length of humerus .....   | 2.6  |
| Length of ulna .....  | 3.3  |
| Length of manus .....   | 2.1  |
| Length of pelvis .....  | 4.5  |
| Length of femur .....   | 3.3  |
| Length of tibia .....   | 3.8  |
| Length of pes .....   | 4.2  |

The characters which have been employed to separate *Arvicola* and *Fiber* relate to the feet, the tail, and the posterior lower molar. They may be contrasted thus:

*Arvicola.*

Tail terete.  
Hind feet not specially modified for aquatic progression.

Posterior lower molar with three cusps; the re-entrant angles opposite.

*Fiber.*

Tail compressed.  
Hind feet greatly modified.

Posterior lower molar with four or five cusps; the re-entrant angles alternate.

Upon the discovery of a new form having a terete tail, simple feet, and four cusps in the posterior lower molar, the re-entrant angles being alternate, the question at once arises as to the validity of these characters as generic distinctions. In introducing *Neofiber* into the system several plans are open for adoption. The new form might be made a subgenus under *Arvicola* by degrading the characters drawn from the last lower molar to subgeneric rank. On the other hand, it could be introduced as a subgenus, or even species, under *Fiber* by degrading the characters derived from the tail and feet in the same manner to subgeneric or specific rank. Again, the genus *Arvicola* might be enlarged to include *Arvicola*, *Neofiber*, and *Fiber* as subgenera. Finally, the round-tailed muskrat might be made the type of a new genus intermediate between *Arvicola* and *Fiber*.

The last-mentioned course is, to my mind, the most satisfactory, and I have therefore adopted it. With the present absolute incommensurability of genera, I see no especial advantages, except in certain extraordinary cases, in introducing a grade between genus and species. On the other hand, no one probably would seriously consider the proposition of placing *Neofiber* as a species under *Fiber*. One can conceive, however, of the existence of species of the latter genus which should differ from *F. zibethicus* in proportions, quality and color of fur, webbing of the toes, and other similar details of structure.

It is somewhat remarkable that a rodent so large as *Neofiber* should have remained unknown to American naturalists until the present. It is true that exploration has not been so active in Florida as in some other parts of the country, yet the State has been traversed many times by observant naturalists and collectors. One feels convinced that the species must be very rare or is confined strictly to a limited area. The former opinion would appear to be the correct one, since the locality from which the type specimen came is a favorite resort for sportsmen, some one of whom must have recorded the species were it very abundant.

What the habits of the Florida muskrat are can be learned only from future observations. The structure of the animal would lead one to believe that it is not so thoroughly aquatic as *F. zibethicus*.



Florida Muskrat. *Neofiber Alleni*, True. Type.

One half natural size.

PLATE II.

*Nesofiber Alleni*, True.—Type.

- FIG. 1. Skull. View from above,  $\times 1$ .
- FIG. 2. Skull. View from below,  $\times 1$ .
- FIG. 3. Mandible. Right side,  $\times 1$ .
- FIG. 4. Right superior molars,  $\times 4$ .
- FIG. 5. Right inferior molars,  $\times 4$ .
- FIG. 6. Front foot,  $\times 1$ .
- FIG. 7. Hind foot,  $\times 1$ .



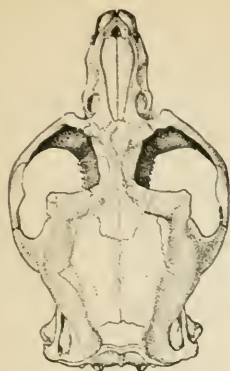


FIG. 1.

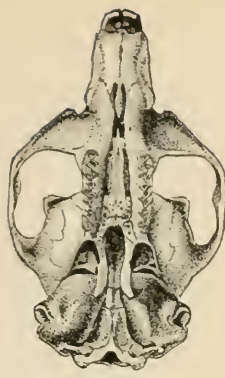


FIG. 2.

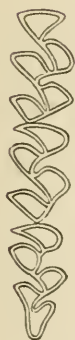


FIG. 4.

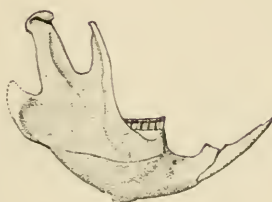


FIG. 3.



FIG. 5.



FIG. 6.



FIG. 7.

PLATE III.

*Fiber zibethicus*, (Linné).

- FIG. 1. Skull. View from above,  $\times 1$ .  
FIG. 2. Skull. View from below,  $\times 1$ .  
FIG. 3. Mandible. Right side,  $\times 1$ .  
FIG. 4. Left superior molars,  $\times 4$ .

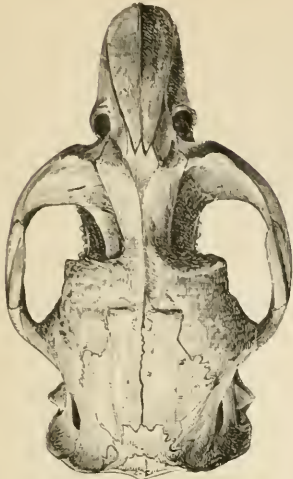


FIG. 1.



FIG. 4.



FIG. 3.

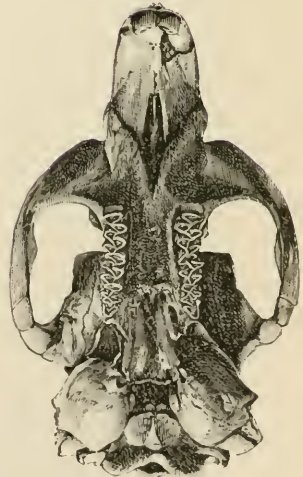


FIG. 2.

*Fiber zibethicus*, (Linné).