

scanty support, with no prospect of producing for the public advantage any part of that mass of information on practical applications of Geology, which the experience of fifty years has accumulated,—information which, it may be safely asserted, no other man can give to the world.

ART. III.—*Monograph of the Genus Sciurus, with Descriptions of New Species and their Varieties.* By J. BACHMAN, D.D., President of the Literary and Philosophical Society, Charlestown, South Carolina, &c.

(Continued from Page 162).

7. NORTHERN GREY AND BLACK SQUIRREL. *Sciurus leucotis*.

Grey Squirrel; Pennant's Arctic Zool., vol. i., p. 135; Hist. Quad. No. 272.

Sci. Carolinensis; Godman, non Gmel.

Sciurus leucotis; Gapper, Zool. Journ. vol. v. p. 206. published about 1830.

ESSENT. CHAR.—Larger than the Carolina Grey Squirrel; tail much longer than the body; smaller than the Cat Squirrel; subject to many varieties in colour.

This sprightly and very common species, existing in the northern and middle states, has hitherto been united with the Carolina grey squirrel; the name having been first appropriated to the latter, and the present species being, as I shall endeavour, in this and the succeeding article, to prove, specifically distinct, I have proposed for it the above name.

This squirrel seems to have permanently twenty-two teeth; among a large number procured in different seasons of the year, and some of them, from the manner in which their teeth were worn, appearing to be old animals, all presented the small front molars in the upper jaw, except a single specimen, and even in this instance, these teeth may have accidentally dropped out. This permanency in teeth that have been usually regarded as deciduous, would seem to require an enlargement of the characters given to this genus; it will moreover be seen that the majority of our species are similar to this in their dental arrangements.

The incisors are strong and compressed, a little smaller than those of the cat squirrel, convex, and of a deep orange colour anteriorly; the upper ones have a sharp cutting edge, and are chisel-shaped; the lower are much longer and thinner. The anterior grinder, although round and small, is as long as the second; the remaining four grinders are consider-

ably more excavated than those of the cat squirrel, presenting two transverse ridges of enamel. The lower grinders corresponding to those above, have also elevated crowns. The hair is a little softer than that of the cat squirrel, being coarser on the forehead.

Form.—Nose rather obtuse; forehead arched; whiskers as long as the head; ears sharply rounded, concave; both sides of the ear covered with hair; that which clothes the outside being much the longest. In winter the fur projects upwards, about three lines beyond the margin.

Colour.—Although this species exists under many varieties there appear to be two very permanent ones, which I shall attempt to describe.

1. *Grey variety.*—The nose, cheek, around the eyes extending to the insertion of the neck, the upper surface of the fore, and hind feet, and a stripe along the sides, yellowish brown; the ears on their posterior surface are a soiled white, edged with brown; on the back from the shoulder there is an obscure stripe of brown, broadest at its commencement, and running down to a point at the insertion of the tail; in a few specimens this stripe is wanting. On the neck, sides, and hips the colour is light grey; the hairs separately are for one half their length dark cinereous, then light umber, then a narrow mark of black, and tipped with white; a considerable number of black hairs are interspersed, giving it above a grey colour; the hairs in the tail are light yellowish brown from the roots, with three stripes of black, the outer one being widest, and broadly tipped with white; the whole under surface is white.

There are other specimens in which the yellowish markings on the sides and feet are altogether wanting. Dr. Godman (vol. ii. p. 133) asserts that the golden colour on the hind feet is a very permanent mark. The specimens from Pennsylvania in my possession have generally this peculiarity, but many of those from New York and New England have grey feet, without the slightest mixture of yellow.

2. *Black variety.*—This variety I have, on several occasions, seen taken from the same nest with the grey squirrel. They breed and rear their young together, and the observations made with regard to the fox squirrel will also apply to these. This is of the size and form of the grey variety; it is a dark brownish black on the whole of the upper surface, a little lighter beneath. In summer its colour is less black than in winter. The hairs of the back and sides of the body and tail are obscurely annulated with yellow. There is here and there a white hair interspersed among the fur of the body, but no tuft of white as in *Sciurus niger*.

DIMENSIONS.

	IN.	LIN.
Length of head and body	11	9
Ditto of tail (<i>vertebræ</i>).....	10	0
Ditto to the tip.....	13	0
Height of ear	„	7
Ditto to the end of fur.....	„	9
Palm to end of middle claw	1	10
Heel to end of middle nail.....	2	6
Length of fur on the back	„	7
Breadth of tail with hairs extended	4	2

Geographical Distribution.—The northern limits of this species is not determined; it however exists as far as Hudson's Bay, was formerly very common in the New England states, and in the less cultivated portions is still frequently met with. It is abundant in New York, and in the mountainous portions of Pennsylvania. I have observed it on the northern mountains of Virginia. It probably extends still farther south; in the lower parts of North and South Carolina however it is replaced by a smaller species. The black variety is more abundant in upper Canada, in the western part of New York, and in the states of Ohio and Indiana.—It does not exist in Georgia, Florida, or Alabama; and among the specimens sent from Louisiana, stated to be of all the species existing in that state, I discovered that this squirrel was not of the number.

Habits.—This appears to be the most active and sprightly species existing in our Atlantic states. It rises with the sun, and continues industriously engaged in search of food during four or five hours in the morning, scratching among leaves, running over fallen logs, ascending trees, and playfully coursing from limb to limb,—often making almost incredible leaps from the higher branches of one tree to another. In the middle of the day it retires for a few hours to its nest, resuming its active labours and amusements in the afternoon, and continuing without intermission till the setting of the sun. During the warm weather of spring and summer it prepares itself a summer house on a tree, but not often at its summit. In constructing this nest, it does not descend to the earth in search of materials, but finds them ready at hand on the tree where it intends to take up its temporary residence. It first breaks off dried sticks, if they can be procured, to make a superstructure; if however such materials are not within reach, it commences gnawing off the green branches of the size of a thumb, and lays them in the crutch of the tree, or of some large branch. It then proceeds to the extremities of the branches, and breaks off those portions that contain tufts of

leaves, with which a compact nest is constructed, which, in the inner side, is sometimes lined with such mosses as are found on the bark of trees. In the preparation of this nest a pair is usually engaged, for an hour in the morning, during several successive days; and the noise they make in cutting the branches, and dragging them with their leaves to the nests, can be heard at a great distance. In winter they reside altogether in holes of trees, where their young, in most instances, are brought forth. Although a family to the number of five or six, probably the produce of a pair from the preceding season, may occupy the same nest during winter, yet they all pair off in spring, when each couple seems to occupy a separate nest, in order to engage in the duties of reproduction. The young, in number from four to six, are, in the northern states, brought forth in May; they are of quick growth, and sufficiently advanced in a few weeks to leave the nest: at such times they are seen clinging around the tree which contains their domicile, and as soon as alarmed they run to the hole, when one of them usually returns, and, protruding his head out of the hole, watches the movements of the intruder. In this stage of growth they are easily captured; their hole is stopped up, another opening is made beneath, and they are taken out by the hand protected by a glove. They soon become tolerably gentle, and are frequently kept in cages with a wheel attached, in which, as in the interior of a tread-mill, they amuse themselves in playing for hours together. Sometimes two are placed together, and they soon learn to accommodate themselves to the wheel, and move together with great regularity. However gentle they may become in confinement, no instance has come to my knowledge of their having produced young in a state of domestication; although in a suitable cage such a result would in all probability be produced. A tame squirrel is, however, a troublesome pet; it is always ready to use its teeth on the fingers of every intruder on its cage, and does not always spare even its feeder; and when permitted to have the freedom of the house, it soon incurs the displeasure of the prudent housewife by its habit of gnawing chairs, tables, and books.

During the breeding season the males, like those of deer and other species, engage in frequent contests, and often bite and wound each other severely. The story of their emasculating each other on these occasions has been so often repeated, that it has become a matter of history, and it would now be somewhat dangerous to set it down as a vulgar error. It might however be advanced, on the other hand, that the admission of such skill and refinement in cruelty would be as-

cribing to the squirrel a higher degree of physical and surgical knowledge than is possessed by any other quadruped.—From the observations I have been enabled to make, I have been led to believe that the error has originated from the fact that those parts in the male which in one season are greatly enlarged, are in the other equally diminished, and that in young males especially, they are drawn into the *pelvis* by the contraction of the muscle. As a proof of this, a friend, who was a strenuous believer in this spiteful propensity ascribed to the squirrel, was induced to test the inquiry by an examination of a suitable number of specimens. He obtained in a few weeks upwards of thirty males;—in none of these had this mutilation taken place. Two however out of this number were triumphantly brought forward as evidences of the truth of the doctrine; on examination it appeared that these were young animals, with the organs perfect, but concealed in the manner above stated.

It is generally believed that this species lays up a great hoard of food as a winter supply; it may however be reasonably doubted whether they are so provident in this respect. The trees in which they conceal themselves in winter are frequently cut down, and no supply of provisions is ever found in their nests. In following their tracks in the snow they cannot be traced to any hoards buried in the ground. I have moreover observed them during a warm day in winter coming from great distances into the open fields, in search of a few dry hickory nuts which were still left suspended on the trees; if provisions had been laid up nearer home, they would hardly have undertaken these long journeys, or exposed themselves to so much danger in procuring a precarious supply. In fact this species, in cold climates, seldom leaves its nest in winter, except in a warm sunny day; and in this state of inactivity and partial torpidity, it requires but little food.

This squirrel feeds upon the various nuts, seeds, and grain which are periodically sought for by all the species of this genus, but it seems to prefer the shell-bark (*Carya alba*) and the several species of hickory, to any other kind of food.—Even when the nuts are so green as to afford scarcely any nourishment, the northern grey squirrel is seen gnawing off the thick epidermis, which drops to the ground like rain, and then, with its lower incisors, makes a small linear opening in the thinnest part of the shell, immediately over the kernel.—When this part has been extracted it proceeds to another, till in an incredibly short space of time, the nut is cut longitudinally on its four sides, and the whole kernel secured, leaving the portions of the hard shell untouched. Were, however,

this species to confine its depredations to the hickory, chestnut, beech, oak, and maple, it would be less obnoxious to the farmer; but unfortunately for the peace of both, it is fond of the green corn and young wheat, to which the rightful owner imagines himself to have a prior claim. A war of extermination consequently ensues, and various inducements are held out to tempt the gunner to destroy them. In Pennsylvania an ancient law existed, offering threepence a head for every squirrel destroyed, and in one year (1749) the enormous sum of £8000. was paid out of the treasury, in premiums for the destruction of these depredators. In several of the northern and western states the inhabitants, on an appointed day, are in the habit of turning out on what is called a squirrel-hunt. They arrange themselves under opposite leaders, each party being stimulated by the ambition of victory, and of fastening on the other the expense of a bountiful supper. The hunters range the forest in every direction, and the accounts given us of the number of squirrels brought together at the evening rendezvous, are almost incredible.

In addition to the usual enemies of this species in the northern states, such as the weasel, fox, lynx, &c., the red-tailed hawk seems to regard it as his natural and lawful prey. It is amusing to see the skill and dexterity exercised by both in the attack and defence. When the hawk is unaccompanied by his mate, he finds it no easy matter to secure the squirrel; unless the latter be unconsciously pounced upon whilst on the ground, he is enabled, by his dodgings and twistings round the limb of a tree, to evade the attacks of the hawk for hours, and frequently worries him into a reluctant retreat.—But the red-tail, like other robbers, has learnt by experience that he is most certain of his prey when hunting in couples. He is frequently accompanied by his mate, especially in the breeding season, and in this case the contest is soon decided. They course rapidly, in opposite directions, above and below the limb; the attention of the squirrel is thus divided and distracted, and before he is aware of it, the talons of the hawk are in his back, and with a shriek of triumph the latter bears him off, either to the aery of his young, or to some low limb of a tree, or to a sheltered situation on the ground, where, with a suspicious glance towards each other, and an occasional hissing and growling for the choice parts, the hawks devour their prey.

This species of squirrel has occasionally excited the wonder of the populace by its wandering habits, and its singular and long migrations. Like the lemming (*Lemmus Norvegicus*) of the eastern continent, it is stimulated, either

from a scarcity of food, or from some other inexplicable instinct, to leave its native haunts, and seek for adventures or for food in some distant and, to him, unexplored portion of our land. The newspapers from the west contain frequent details of these migrations; they appear to have been more frequent in former years than at the present time. The farmers in the western wilds regard them with sensations which may be compared to the anxious apprehensions of the eastern nations at the flight of the devouring locust. At such periods, which usually occur in autumn, the squirrels congregate in different districts of the far north-west, and, in irregular troops, bend their way instinctively in an eastern direction. Mountains and cleared fields,—the head waters of lakes and broad rivers,—present no unconquerable impediments.—Onward they come, devouring on their way everything that is suited to a squirrel's taste,—laying waste the corn and wheat fields of the farmer; and as their numbers are thinned by the gun, the dog and the club, others are ready to fall in the rear and fill up the ranks, till they occasion infinite mischief and call forth no empty threats of revenge. It is often enquired how these little creatures that, on common occasions, have such an instinctive dread of water, are enabled to cross broad and rapid rivers, like the Ohio and Hudson for instance. It is usually asserted, and believed by many, that they carry to the shore a suitable piece of bark, and seizing the opportunity of a favourable breeze, seat themselves upon this substitute for a boat, hoist their broad tails as a sail, and float safely to the opposite shore. This, together with many other traits of intelligence ascribed to this species, I suspect to be apocryphal. That they do migrate at irregular, and occasionally at distant periods, is a fact sufficiently established; but in the only instance in which I had an opportunity of witnessing the migrations of the squirrel, it appeared to me that he was not only an unskilful sailor, but a clumsy swimmer. It was (as far as my recollection serves me of the period of early life) in the autumn of 1808 or 9; troops of squirrels suddenly and unexpectedly made their appearance in the neighbourhood, but among the grey ones were varieties not previously seen in those parts; some were broadly striped with yellow on the sides, and a few with a black stripe on each side, bordered with yellow or brown, resembling the stripes of the little chipmunk squirrel (*Tamias Lysteri*). They swam the Hudson in various places between Waterford and Saratoga; those which I observed crossing the river were swimming deep and awkwardly, their bodies and tails wholly submerged; several that had been drowned were carried downward by the stream, and

those which were so fortunate as to reach the opposite bank were so wet and fatigued, that the boys stationed there with clubs found no difficulty in securing them alive or in killing them. Their migrations on that occasion did not, as far as I could learn, extend farther eastwardly than the mountains of Vermont; many remained in the county of Rensselaer, and it was remarked that for several years afterwards the squirrels were far more numerous than before. It is doubtful whether any ever return westwardly, but finding forests and food suited to their taste and habits, they take up their permanent residence in their newly-explored country; there they remain and propagate their species, until they are gradually thinned off by the effects of improvement, and the dexterity of the sportsmen around them.

(To be continued.)

ART. IV.—*Notices of Irish Entozoa.* By JAMES L. DRUMMOND, M.D., Professor of Anatomy in the Royal Belfast Institution, President of the Belfast Natural History Society.

(Continued from p. 71.)

ANTHOCEPHALUS rudicornis, Drum.

WHEN about to send a communication to the 'Magazine of Natural History,' relating to some more of the *Echinorhynchi*, a fish, which in this part of the world is of rare occurrence, appeared in the Belfast market; namely, a halibut, (*Hippoglossus vulgaris*), which weighed 120 lbs. My indefatigable friend, Wm. Thompson, Esq., secured the viscera, attached to which I found a great number of tumors containing *Entozoa*; and, as much of this field of Helminthology remains to be explored, while every fact pertaining to it is of importance, I have thought it better to put on record the few observations I could make on the present species, than forward the remarks I had to offer respecting others already well known.

In the alimentary tube there was not an *Entozoon* of any description, but ample amends were made for this by the luxuriant crop on its external surface. The stomach, liver, spleen, mesentery, and intestines were everywhere studded with almost innumerable white or cream-coloured tumors, from the size of a large pea down to that of a grain of clover seed; while, at the same time were seen, under the transparent peritoneal coat of these viscera, numerous *Nematoidea* coiled up in spires.