SCIENCE

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THE FLORIDA LAND TORTOISE-GOPHER, GOPHERUS POLYPHEMUS.

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IT seems very strange that so little has been known, or at least has been published about the habits of this very common animal. Winter visitors to Florida and the Gulf States often observe their burrows on the sandy ridges, each with its yawning entrance and scattered mound of subsoil, and are not unlikely to mistake them for the woodchuck holes with which they are familiar at the north. It is the permanent resident, however, that is most likely to have some acquaintance with the animal itself; for only in the hottest weather and at noonday does the gopher leave its burrow to feed upon the surrounding grass and herbage.

In summer, when the thermometer is in the nineties, the animal comes forth daily, some time between the hours of eleven A.M. and two P.M., and takes a careful look around to assure itself that no danger threatens. Then, if no ominous sounds disturb the stillness of the sultry air, it raises itself high on its ungainly legs and starts briskly off for the nearest patch of grass or cultivated field.

For about an hour the gopher wanders about with its long neck outstretched and plucks ravenously at every green vegetable within its reach. Often, indeed, in its eagerness it cracks up and swallows dead twigs and dry leaves together with the more succulent food, until its ravenous appetite is appeased. It then retires to the bottom of its burrow in the moist, cool sand, there to remain until the morrow or, if the season be rainy, until the next dry, hot day.

The gopher is a very timid and alert animal, and although it feeds with great gusto and apparent abandon, it is seldom so absorbed in its work that it fails to hear the sound of approaching footsteps. The near approach of any large amimal sends it scurrying back to its hole. It requires lively work to head off its retreat, but if surprised and captured at a distance from its hole, like other turtles, it retires into its shell, and, drawing its plethoric and scaly fore paws like double doors over the front of its shell, it resigns itself supinely to its fate, and never under any circumstances attempts to bite or otherwise defend itself.

In winter the gopher very rarely quits its burrow, and comes forth to feed only on the very hottest days at noon. In the warm Florida soil it is never torpid, but remains quiescent at the end of its gallery awaiting the return of dog-day weather.

A well grown gopher measures 10 inches in length by 7½ inches in width and 4½ inches in thickness, and weighs about 6 pounds. Individuals are sometimes found measuring 12 × 9¼ × 5 inches, and weighing 9 or 10 pounds.

They are sold in the markets of many towns at high prices, and are eaten by the negroes and lower classes everywhere in the south. The flesh is excellent in quality, very tender, of a rich red color and has the appearance, flavor and odor of beef. But the supply of meat obtainable even from individuals of the largest size is scanty, the greater part of the body cavity being occupied by the enormous gut crammed with grass and the long intestines filled with wads of fibrous dung. The flesh is greatly relished by all carnivorous animals, but a gopher of average size has little to fear from their attacks. The largest dogs are unable to bring their canine teeth to bear upon any vulnerable part unless the specimen is young and small enough to be taken into their mouths.

In May or June the female deposits in the sand outside of her burrow from one dozen to twenty eggs. The eggs are perfectly spherical, pure white in color and have a diameter of 1⅝ inches. More beautiful objects can hardly be found to grace an oölogical cabinet.

The burrows of the gopher are excavated by the aid of a remarkable spade-shaped projection on the front of the under shell, assisted by the powerful fossorial front legs, which are armed for this purpose with strong blunt claws.

In the sandy uplands of Florida the galleries descend at an angle of about 35°, and reach a vertical depth of seven to nine feet from the surface of the ground. They follow a straight course unless deflected by a root or some other obstruction and usually terminate in a layer of indurated soil. The length of the gallery varies from twelve to eighteen feet. The temperature at the lower end does not vary greatly throughout the year, and will generally not fall below 74° in winter nor rise above 79° in summer. The conditions as to moisture are probably equally constant. At Crescent City, Fla., where these observations were made, the permanent water table lies at an average depth of eighteen feet. The burrow of a gopher once completed becomes its permanent residence, and it is with extreme difficulty that the animal can be compelled to vacate and excavate a new home.

It is inhabited by the same individual for long periods of time, and if the popular belief in the great age attained by turtles in general and the land tortoise in particular is well founded, some of these reptilian domiciles may have antedated the present century, and even rival in antiquity the dwellings of man. Certain burrows in this vicinity are pointed out as having been in existence twenty-four years ago, when the oldest orange groves were planted. This necessarily implies a continuous occupancy by the same individual tortoise during that period, since if the galleries are abandoned they shortly become filled up and obliterated in our shifting sand.

Every naturalist will appreciate under the above showing what unusually favorable conditions here exist for the preservation of animal life, and will not be surprised to learn that these little sand caves, with their equable climate, permanent and abundant moisture, perpetually and hospitably open to the outer air, afford an asylum and a domicile to a most interesting assemblage of animals. The list of these, when it shall have been completed, bids fair to become a long one.

Not only the Florida burrowing owl, the rattlesnake, the rabbit, the raccoon and the opossum find in them a temporary shelter, but another vertebrate also, a frog, here takes up its permanent abode and lives on terms of perfect friendship with the gopher. This frog is the sub-species *Rana areolata æsopus*, a beautiful form, with soft subterranean coloration and crepuscular, toad-like habits.[1]

It is not at all rare, nearly every gopher hole harbors one or several specimens. They may be seen at evening sitting just outside the entrance of the burrow, and frequently in the morning or on cloudy days their softly radiant eyes may be detected gleaming out of the shadows a few feet back from the entrance. It is not easy to capture them, except with a baited hook and line, for at the slightest alarm they leap quickly down the yawning throat of the gallery and disappear from view. Specimens of this frog have been seen which would weigh more than a pound, and individuals of colossal proportions are reported to exist.

In January and during July of the present year more than a dozen species of articulates have been discovered living in the gopher holes. The majority are undescribed and new to science.

[1] Mr. Fred'k C. Test, of the National Museum, who kindly determined the species, writes: "Only one specimen, the type, is in the museum collection or presumably in any other." The type specimen came from Micanopy, Fla., probably without notes of habits, etc.

Two only are parasitic upon the gopher: (1) a large tick, which fastens itself upon the skin of the animal or to the sutures of the shell; (2) a gigantic acarus, a quarter of an inch in length, which does not remain upon the body of the gopher but attacks it within the nest, which, like the bed-bug, it never quits. Some of the burrows are infested with these blood-sucking mites and others appear to be entirely free from them.

The dung of the gopher furnishes food to five beetles and one interesting caterpillar of a moth. All of these are new and peculiar forms, presenting characters that indicate subterranean habits of life. A large wingless cave cricket, apparently a *Phalangopsis*, swarms in all the burrows.

Three predatory beetles, one of which, a new species of *Anthicus*, may prove to be a prowler from without, have been found within the galleries.

A very large specimen of the whip-tail scorpion (*Telephonus*) was found in one of the burrows. It was living in a short gallery of its own, which opened into the nest of the gopher at the lowest level. A minute *Pseudo-scorpion* is also found at the lower end of some of the burrows.

A flea of undetermined species, of which a single specimen was found in one of the holes, may prove to be an intruder, left behind possibly by some mammalian visitor.

The following is a review of the animal parasites and messmates of the gopher:

Vertebrate.

1. The gopher frog, *Rana areolata œsopus.*

Articulates.

1. *Copris*, new sp. Feeding upon dung of gopher.
2. *Onthophagus*, sp. Feeding upon dung of gopher.
3. *Saprinus*, new sp. Feeding upon dung of gopher.
4. *Saprinus*, sp. Feeding upon dung of gopher.
5. *Aphodius*, new sp. Feeding upon dung of gopher.
6. *Staphylinide*, probably a Philonthus. Predatory.
7. *Trichopteryx*, sp. A species found also outside.
8. *Anthicus*, new sp. One specimen only.
9. Pyralid moth. Caterpillars feeding upon dung.
10. Cave cricket (undetermined).
11. Acaride parasite of the gopher (undetermined).
12. Gopher tick (undetermined).
13. Pseudo-scorpion (undetermined).
14. Whip-tail scorpion. Predatory intruder.
15. Flea, probably a mammalian parasite.

Most of the insects have been submitted to Mr. E. A. Schwarz, of the Department of Agriculture, Washington, D. C., and to him I am indebted for the determinations given above.

NEW METHODS OF TREATING THE SICK.

BY WILLIAM C. KRAUSS, M.D., BUFFALO, N.Y.

ON June 1, 1889, Professor Brown-Séquard presented a communication to the Société de Biologie of Paris on a new method of therapeutics. It seems that Brown-Séquard had been at work on this project for many years, for, in 1869, he expressed a belief that if it were possible to inject spermatic fluid into the veins of old men they would experience a rejuvenation, sexually, mentally, and physically. After repeated experiments upon rabbits, dogs, and guinea-pigs, he, in a true scientific spirit, injected some of the testicular fluid into his system, and his experiences and results form the most interesting part of his memorable communication to this learned society. "The author of this communication, now 72 years old, has for the past twelve years watched his physical powers slowly and continually decline. The laboratory work has become laborious and heavy, and after each meal I have been obliged to take a short nap. After the third injection a complete change took place. The work in the laboratory has become agreeable, not the least fatiguing, and after three and a half hours of such work I have been able to edit a memoir. The dynamometer showed an increase of 6.7 kilogrammes, the bowels regained their former activity, and, in short, I have regained all that I have lost."

These results, coming from one of the ablest physiologists in France, yea, of the world, were in an incredibly short space of time dispatched to all corners of the earth, and Brown-Séquard's "Elixir of Life," erroneously called, was being tested by hundreds of doctors and would-be scientists.

Enthusiastic reports are not easy to corroborate, and the Elixir of Life was doomed to bitter disappointment. At first encouraging results were reported by a class of observers least fitted to test the virtues of the new discovery, but in a short time the whole proceedings were looked upon with disdain and distrust.

Not so in France, Brown-Séquard published several later reports with equally good results, and the experiments were further conducted by some of his co-workers and students. The hypodermic injections of testicular juice gave encouraging results in anæmia, organic diseases of the brain and spinal cord, cachexia, tuberculosis, and in many of the chronic diseases. It was also found that *ovarian juice* gave nearly the same results as did the testicular juice.

Thyroid juice. It has been definitely proven that removal of the thyroid glands from a dog will be followed by death. Gley, in his experiments, decided to inject the juice of thyroid glands in dogs thus deprived of these glands, and, instead of dying, they recovered without any serious difficulties. In the human family it has been found that after removal of the thyroid gland or the destruction of this gland through disease, that a certain train of symptoms will develop, which had received the name of myxœdema, a disease characterized by swelling of the face, body, and extremities, loss of hair, sub-normal temperature, etc. Horsley attempted to transplant the thyroid gland of animals to these patients, and met with partial success. Dr. Murray of Newcastle, England, then injected hypodermically a glycerine extract of thyroid gland into patients suffering with myxœdema, and his efforts were rewarded with beneficial results. Brown-Séquard and D'Arsonval were conducting similar experiments about the same time with equally good success. It was found, however, that the injection of this substance was followed in many cases with pain, inflammation, and abscess formation. To overcome these hindrances, Fox of Plymouth and Mackenzie advised and practised the treatment of myxœdema by feeding with sheeps' thyroid glands, and the results seemed to be in every way satisfactory.

The writer has had a little experience in treating two cases of myxœdema, but he has been unable to attain anything like the results claimed by the English and French writers. In fact his experience has been negative, not even obtaining temporary improvement.

MacAlister of England has treated cases of pseudo-hypertrophic paralysis with injections of thymus gland extract; also a case of lymphadeuoma with a mixture of red and yellow marrow, with seemingly good results.

Dieulafory of Paris has injected extracts of the cortical portion of the kidney into patients suffering with Bright's disease. He proposes the name Nephrine for this particular fluid.

Comby and Dieulafory have also injected the extract of pancreas in cases of diabetes, with temporary good results.

Spermine is the name of another fluid extract derived from Brown-Séquard's testicular juice, its action seems to be similar to the testicular juice, acting upon the motor areas of the cerebro-spinal axis, increasing the strength of the arms and legs, regulating the sexual, urinary, and digestive functions, and in improvement of the general sensibility.

American experimenters have not been idle during the rise of this *fin de siècle* therapeutics. There are now houses in New York manufacturing animal extracts known as cerebrine, medulline, testiculine, musculine, and other newly-coined-word remedies which have been recommended in the various diseases of the human body. Personally, the writer has had experience with cerebrine only, and, if he has noticed any results, they have been but temporary. Perhaps they do not even deserve the name "result," only a reaction had set in. Those of the writer's friends who have had experience with these remedies have also obtained negative results. The injection of water and glycerine has succeeded in accomplishing exactly what the animal extracts have done.