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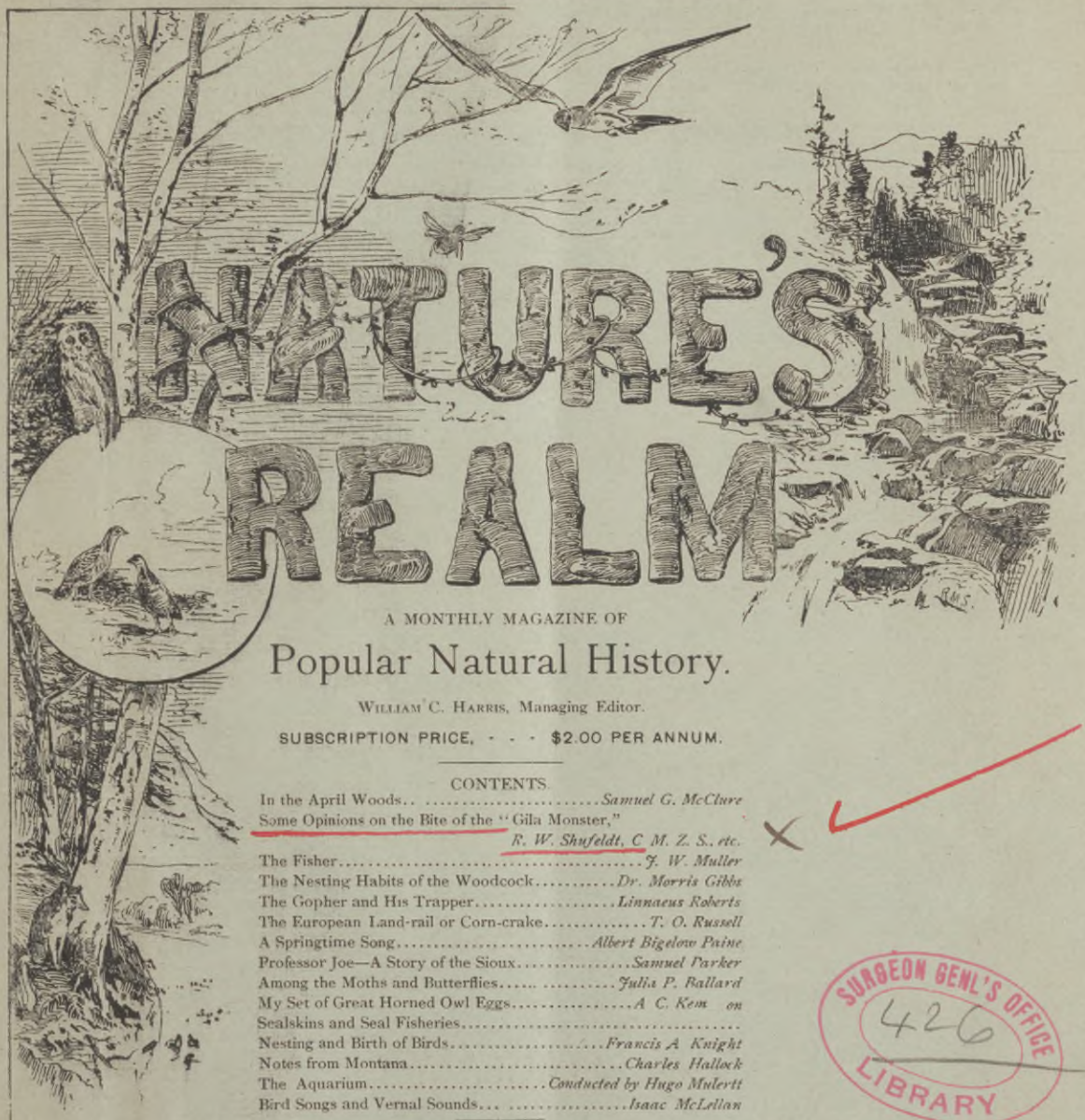

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CONTENTS.

In the April Woods.....*Samuel G. McClure*
Some Opinions on the Bite of the "Gila Monster,"
R. W. Shufeldt, C. M. Z. S., etc.
The Fisher.....*J. W. Muller*
The Nesting Habits of the Woodcock.....*Dr. Morris Gibbs*
The Gopher and His Trapper.....*Linnaeus Roberts*
The European Land-rail or Corn-crake.....*T. O. Russell*
A Springtime Song.....*Albert Bigelow Paine*
Professor Joe—A Story of the Sioux.....*Samuel Parker*
Among the Moths and Butterflies.....*Julia P. Ballard*
My Set of Great Horned Owl Eggs.....*A. C. Kem on*
Sealskins and Seal Fisheries.....
Nesting and Birth of Birds.....*Francis A. Knight*
Notes from Montana.....*Charles Hallock*
The Aquarium.....*Conducted by Hugo Mulertt*
Bird Songs and Vernal Sounds.....*Isaac McLellan*

NOTES AND QUERIES.

Tenacity of Life in Animals.
Nest-building Fishes.
The Kibi—Maori Skulls.
A Large Sunfish.
Coquina Rock.
Fish Breeding in the Clouds.
The Flight of Birds.
Showers of Fish.
How Snakes Swallow Fish.
Cats Affected by Feeding on Scallops.
Dead Alewives in Lake Ontario.
The Manatee or Sea-cow.

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SOME OPINIONS ON THE BITE OF THE "GILA MONSTER" (*Heloderma suspectum*).

By R. W. Shufeldt, C. M. Z. S., Etc.

While residing in New Mexico a few years ago the writer paid some considerable attention to the life-history and structure of that biggest of all our lizards, the "Gila monster," more properly referred to as the *Heloderma*. For a year or two at a time I had them alive in my keeping and under my daily observation, and I case it is believed that the figures here presented will meet with acceptance in many quarters. They are faithful reproductions of photographs made by the author from living specimens once in his own possession. The life-size left lateral view of the head is from a female, taken as she lay in an hypnotized state

Fig. 1.—Left Lateral View of the Head of a Heloderma—Life Size.

once had a large one that possessed a length of 41.3 cms., and a smaller one of rather more than half that size. They have occasionally been taken nearly 51 cms., or about twenty inches long. To the general reader the coloration and form of this remarkable lizard is as yet but imperfectly known, especially in the far eastern sections of our country, where it still remains one of the scarcer acquisitions to the larger zoölogical gardens. This being the over a roughish piece of pine bark; the two others, shown in the second cut, were photographed as they lay basking out in the sun in the rear courtyard of my quarters in New Mexico. The larger one of these latter two is the same from which the figure of the above head was taken. Helodermas have a tuberculated armor of black and orange scales, brilliant and shiny, that vary both in size and form for different parts of the body. On the head

and elsewhere these often ossify in adult specimens, thus enhancing their purpose as a means of defense.

But to come strictly within our title it is my only object here to briefly remark upon some of the opinions entertained in reference to the bite of this lizard. Now there are a great many people in Arizona, where *Heloderma suspectum* is found, and still more in Old Mexico, where its congener, *H. horridum*, ranges, that believe that the very breath of one of these reptiles breathed in a person's face may prove to be poisonous, and as regards the bite there is but one opinion among this class of folk, and that is that it is almost invariably fatal. No less a well-known naturalist than Sinnichrast gives instances, citing the reports of Mexicans, where fowls and small mammals bitten by a *Heloderma* have died within a few hours; but his own experiments did not confirm them. While in London Sir John Lubbock, a most careful observer and naturalist, declares that he saw a frog die in a few moments from the bite of a lizard of this species which had been sent to him. A number of years ago the present writer was bitten by a large and infuriated *Heloderma*, but aside from some serious and painful symptoms at the time, and a swelling of the hand bitten, no permanent effects remained. Thus the bite and the results following the same came gradually under the investigation of science. In 1883 two distinguished physicians, Mitchell and Reichert, of Philadelphia, published an admirable report upon the subject, and declared, from a careful series of experiments they had made with the saliva of living *Helodermas*, that there was no doubt whatever of its highly venomous nature, and the dictum of those so authoritative in such matters carried great weight everywhere.

The tide of opinion changed somewhat, however, when three years later Dr. H. C. Yarrow made some very excellent experiments at the Smithsonian Institution, and published his results in *Forest and Stream* (New York, June 14, 1888). His researches practically went to prove that in the case of chickens and rabbits, at least, the saliva absorbed copiously by them from the bite of an angry *Heloderma* was harmless. Still later, Professor Samuel Garman, of Harvard University, published it as his opinion that "in regard to the nature of the vemon and fatality of the bite (of a *Heloderma*) there is little to offer that is new. The results of the experiments suggest danger for small animals but little or none for larger ones. Large angle worms and insects seemed to die much more quickly when bitten than when cut to pieces with the scissors." Thus the matter seems to stand at the present time—perhaps the vast majority of physicians who followed Doctors Mitchell and Reichert in their experiments fully believe to-day that the bite of a "Gila monster" will very often prove fatal even in the case of man; while, on the other hand, naturalists almost universally believe that the saliva of this saurian is hardly at all venomous, and then only under certain conditions. The subject will repay fuller investigation and research. There are also several questions to be carefully taken into consideration in future experiments and observations. In the first place, in the case of man, the condition of the victim at the *time of the bite* must be carefully recorded, and then one must be sure afterward that the patient, in the event of death, was not destroyed by the remedies given to offset the effects of the bite. As, for instance, a quart o whiskey or other strong alcoholic liquor will often, of itself, kill a man outright. Again, when a *Heloderma* bites a pigeon, a chicken, rabbit or cat, does it *invariably* inject the wound with the supposed-to-be poisonous saliva? In connection with this it must be remembered that this reptile often in nature catches and eats small mammals and birds, and it is just possible that he kills them by the wound inflicted by the bite alone, and injects nothing thereinto. This may be the case in some of the animals he has bitten in the hands of experimenters. A reptile may have sufficient control over a poison gland situated beneath its jaws as *not* to call its secretion into use every time he bites. He may possess an innocuous *buccal* secretion *in addition* to the poisonous secretion of the submaxillary gland. In view of this possibility, it is an open question, owing to the different methods employed to obtain it, whether Doctors Mitchell and Reichert and Doctor Yarrow obtained the

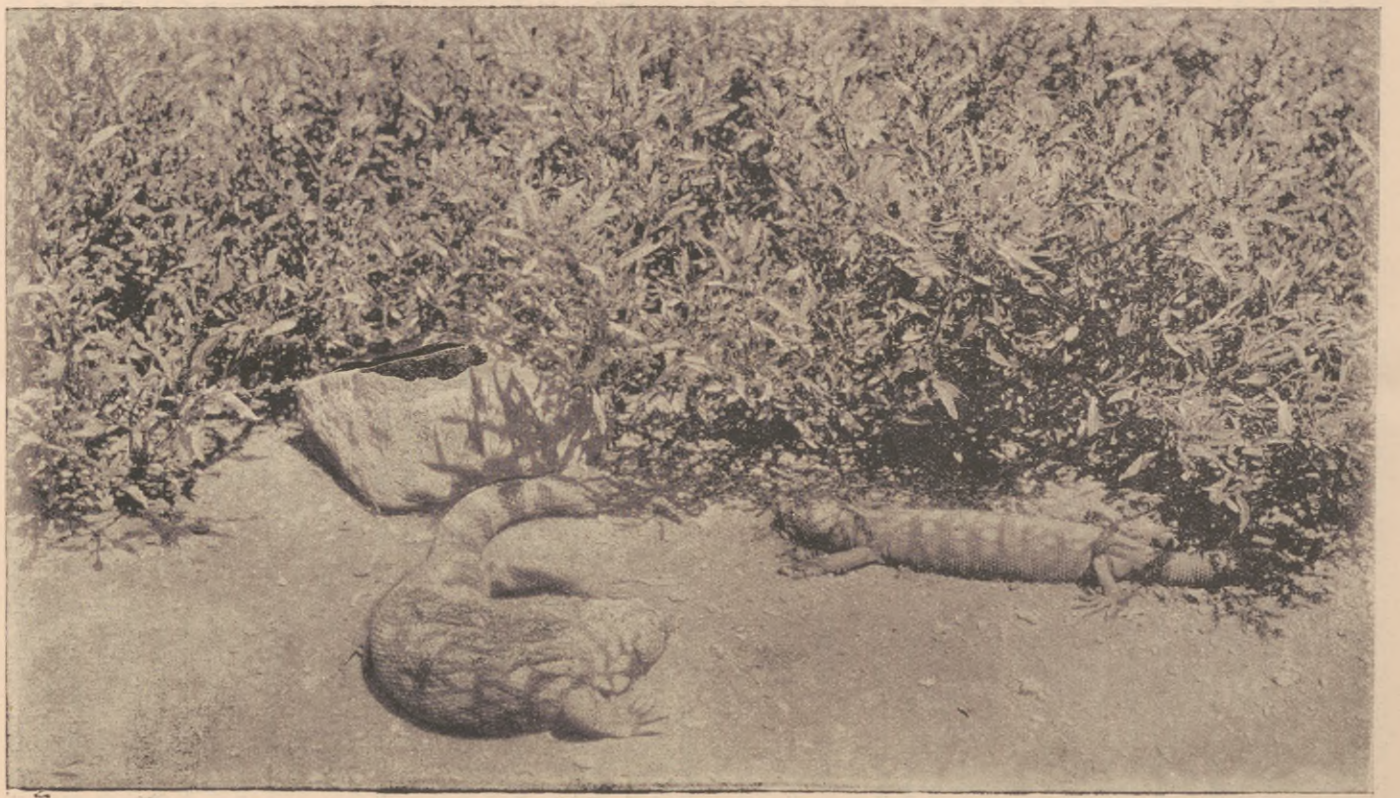

FIG. 2.—THE "GILA MONSTER" AS HE APPEARS IN HIS NATURAL HAUNTS.

same kind of saliva; and it must be noted that the various steps in their experiments were essentially very different indeed. In the case of Sir John Lubbock's frog, it is also possible that the tooth or teeth of the *Heloderma* may have punctured one of the large arteries, a thing quite possible in the case of a small frog, but rather improbable in the case of a cat or even a chicken. Indeed, it must be very evident that there are yet to be made many experiments in this extremely interesting field before the exact facts can be known in the premises.

[In connection with the above interesting paper we append observations on the "Gila monster" made by Dr. R. W. Shufeldt, and published in the Proceedings of Zoölogical Society, of London, April 1, 1890. It is to be regretted that no exhaustive notes exist as to the life history of the *Heloderma*. The subject is, however, attracting much attention among naturalists, and a full biological history of the animal will doubtless follow at an early date. —ED.]

During the summer of 1887 the present writer came into possession of two very fine living specimens of *Heloderma suspectum* that had been obtained for him in Southern Arizona, in that section of the United States zoogeographically known as the Sonoran Region, and where the natural habitat of this, by far the largest of all of our North American lizards, is located.

Never having been so fortunate as to have enjoyed the opportunity of studying the habits and life of the Heloderma in its native haunts, I can add nothing here to the accounts of others already published; nor am I familiar with the mode of reproduction in this interesting species of lizard, though I have heard it stated, by good observers, that it is an oviparous reptile. The two living specimens above referred to were separately packed each in a small box, and in coming to me arrived in excellent condition, after making a journey of several hundred miles, lasting six or eight days, and each lizard consuming only on the day of starting part of a boiled egg. Upon being removed from their boxes they drank freely of water, and afterward each ate the best part of a hard-boiled hen's egg. Both of these acts, however, were performed with marked deliberation, so much so that one would little have suspected that the creatures were in any way particularly hungry. In eating they employ their broad, black, forked tongue to a considerable extent, protruding the organ slowly from the mouth, spreading it out, and licking the morsel well before it is taken into the mouth and swallowed. They may also, in drinking, occasionally be seen to lap the fluid with this organ, and still in a more or less deliberate manner. These two specimens have already been several months in my keeping and under my daily observation, during which time they have not eaten half a dozen hen's eggs between them, sometimes taking them hard-boiled, but as a rule seeming to prefer them raw; they have refused all other nutriment which has been placed before them.

I have shown elsewhere that another American lizard, *Phrynosoma*, is capable of enduring an absolute fast for a period of three months or more (*Science*, vol. vi. no. 135, September 4, 1885, pp. 185-186); and it is a well-known fact that other reptiles can do likewise. Moreover I am quite sure, from what I have seen, that a good healthy adult *Heloderma* would prove to be another representative in this category, capable of sustaining a prolonged period without taking any nutriment whatever into its system.

When one of these reptiles is placed on the open ground and left to itself it soon takes itself off, and notwithstanding its rather awkward mode of progression makes withal very good time. Head, body and tail are all kept in contact with the ground, while the alternate fore and hind limbs are thrown forward as the animal takes its rather ample steps and keeps its way along, with no other apparent motive in its mind beyond making good its escape. In walking thus it constantly protrudes, and again whips back into its mouth its great black tongue, evidently to some degree using the organ as a detector of anything that may possibly stand in the road to impede its progress.

If you now suddenly check it, the animal quickly rears its body from the ground by straightening out its limbs, wheels about, opens its mouth widely, snaps its tongue in and out,

and gives vent to a threatening blowing sound. The whole aspect of the reptile, taking its great size into consideration, is now quite sufficient to keep the best of us at bay at first, and the moment it is let alone it takes the opportunity to make off again, usually in another direction.

My two specimens seem to be quite attached to each other, and are never so well satisfied as when curled up together in a sunny corner of their cage; I am unable from their external characters to determine their sex, and this will only be possible later on, when we come to examine into their structure.

These lizards are, too, very fond of basking in the hottest of noonday suns, and I have satisfied myself that upon these and other occasions, when I have closely watched them, they possess to a certain extent chameleonic powers, for I have observed the orange part of their scaly armor pass from that color to a decided salmon tint and *vice versa*, remaining normally, however, at some shade of orange or yellow. When thus sunning themselves they have a habit of stretching their limbs backward, even to the extent of having the feet with their dorsal aspects in contact with the ground, the palms and soles being directed upward. They will then close their eyes and lay in this position for hours at a time. So far as their physical strength is concerned, it seems to be about equal to that of young alligators of a corresponding size; they do not, however, possess the power of striking a blow with the tail, enjoyed by the latter reptile. And in getting over rough ground, where branches, large stones, or other obstacles stand in the way, Heloderms evince no little patience, ingenuity, and downright obstinacy in overcoming such barriers to their progress. By a series of simple experiments I have been enabled to satisfy myself that the senses of sight, smell and hearing are all quite acute in these reptiles, and they are also sensitive to the sense of touch. As to their general intelligence, however, or such mental attributes as they may be possessed of, I have made no special investigations, but from my casual observations I am inclined to believe that they stand rather above the average reptile in both of these respects.

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