From the above brief description it will readily appear that the Sauropod manus in *Brontosaurus* at least was like the pes, arranged on the entaxomic plan, and not mesaxomic as Professor Osborn was led to believe from a study of the abundant but isolated material in the collections of the American Museum of Natural History.

This foot and limb will be more fully described and adequately illustrated in the coming number of the *Annals* of this Museum.

J. B. HATCHER.

CARNEGIE MUSEUM,
December 2, 1901.

GOLDFISH AS DESTROYERS OF MOSQUITO LARVÆ.

IN Professor L. O. Howard's recent excellent volume on 'Mosquitoes,' etc. (p. 161), reference is made to a reported employment of 'carp' as destroyers of mosquito larvæ and doubt is expressed as to the facts in the following words:

"It was stated a number of years ago in *Insect Life*, that mosquitoes were at one time very abundant on the Riviera in South Europe, and that one of the English residents found that they breed abundantly in the water tanks, and introduced carp into the tanks for the purpose of destroying the larvæ. It is said that this was done with success, but the well-known food-habits of the carp seem to indicate that there is something wrong with the story. If top-minnows or sticklebacks had been introduced, however, the story would have been perfectly credible, and it points to the practical use of fish under many conditions."

An examination of *Insect Life* (Vol. IV., p. 223) and also of *Nature* (Vol. XLIV., 1891, p. 591)—the original source of the statement in question—fails to reveal the precise species of 'carp' here referred to, but if, as seems likely, it was the common goldfish, *Carassius auratus*, I happen to be in a position to confirm the general truth of the story.

About six years ago at my home in Belmont, near Boston, Massachusetts, I constructed a small artificial pond in which to grow water-lilies and other aquatic plants, and also to breed, if possible, some varieties of goldfish—though the latter object was a secondary consideration. The advisability of making this pond had been somewhat questioned on account of its close proximity to my house and the fact that such ponds are likely to become excellent places for the propagation of mosquitoes. Nevertheless, the plan was carried out and the pond was stocked with goldfish taken from natural ponds in the vicinity where they had been living and breeding, to my personal knowledge, for a number of years.

The aquatic garden has proved a success and the goldfish have meantime thriven and multiplied. Moreover, no mosquitoes attributable to the pond have appeared and I have been unable to find any larvæ in it, although I have searched repeatedly and diligently for them. I have always believed that the absence of mosquito larvæ from this pond was due to the presence of the goldfish, and I have so stated in a paper 'On the Drainage, Reclamation and Sanitary Improvement of Certain Marsh Lands in the Vicinity of Boston' in the *Technology Quarterly*, XIV., 69 (March, 1901), as follows: "In the water [of this pond] are hundreds of goldfish that feed upon the larvæ of mosquitoes and serve to keep this insect pest in check."

On observing the statement referred to in Professor Howard's book I determined to make careful observations, to settle the point in dispute. Within fifty feet of the pond in question stands a large tank which for a long time last summer was filled with rain water. Here I found constantly large numbers of mosquito larvæ, of both *Culex* and *Anopheles*. Between this tank and the pond runs a cool brook, fed by a spring. Here also I found abundant mosquito larvæ, those of *Anopheles* being more prevalent than those of *Culex*. Reflecting upon this fact it seemed more probable than ever that the goldfish were holding the mosquitoes in check in the artificial pond while in the brook the insects were breeding in comparative safety.

To test the correctness of my theories I took from the pond a small goldfish about three inches long and placed it in an aquarium where it could, if it would, feed upon mosquito larvæ and still be under careful observation. The result was as I had anticipated. On the first day, owing perhaps to the change of environment, and to being rather easily disturbed in its new quarters, this goldfish ate eleven larvæ only, in three hours; but the next day twenty were devoured in one hour; and as the fish became more at home the 'wigglers' disappeared in short order whenever they were dropped into the water. On one occasion twenty were eaten in one minute, and forty-eight within five minutes. This experiment was frequently repeated, and to see if this partiality for insect food was a characteristic of those goldfish only which were indigenous to this locality, I experimented with some said to have been reared in carp-ponds near Baltimore, Maryland. The result was the same, though the appetite for mosquitoes was even more marked with the Baltimore fish than with the others. This was probably due to the fact that they had been in an aquarium for a long time before I secured them, and had been deprived of this natural food. I also tried the experiment of feeding commercially prepared 'goldfish food' and mosquito larvæ at the same time, and found that in such a case the goldfish invariably preferred the larvæ.

It is not as generally realized as it should be that goldfish will thrive in our natural northern waters. In my experience they can easily be bred in any sheltered pond where the water is warm and not fed by too many cold springs, and form any years they have been breeding naturally in many small ponds in the vicinity of Cambridge, Massachusetts.

When it is once understood that these fish are useful as well as ornamental and comparatively hardy, it is to be hoped that they will be introduced into many small bodies of water where mosquitoes are likely to breed, and thus be employed as a remedy for mosquitoes sometimes preferable to kerosene.

WILLIAM LYMAN UNDERWOOD.
MASSACHUSETTS INSTITUTE OF TECHNOLOGY, November 27, 1901.

NOTES ON INORGANIC CHEMISTRY.

NEW WORK ON RADIUM.

A NEW series of experiments has been carried out by Berthelot on radium, with reference to its chemical action, as shown upon several compounds. The radium used was enclosed in one sealed glass tube within another, and in some of the experiments within a third, so that its influence was much weakened and some of the active rays were altogether cut off. The action took place in the dark and was exceedingly slow. Iodin pentoxid was decomposed by the radium rays just as by light, and the same was true of nitric acid. Since both of these reactions are endothermic, the rays must furnish chemical energy. The change of rhombic sulfur into the insoluble variety, an exothermic reaction which is effected by light, was not affected by the radium rays. The rays have no influence upon acetylene, which is very sensitive to the action of the electric current but is unaffected by light. Oxalic acid also was not changed, though it is readily oxidized even in diffused light. The glass tubes in which the radium was contained were blackened, owing probably to a reduction of the lead. A purple color was also noticed in the glass near the blackened portions, which was attributed to an oxidation of the manganese present.

In this connection it may be noted that the existence of the radio-active lead, recently described by Hofmann and Strauss, is denied by Giesel. He considers it to be a mixture of lead with a little radium. He confirms, however, the observation of several workers, that water can be rendered strongly radio-active by radium. He enclosed half a gram of radium-barium bromid in one arm of a sealed U-tube, distilled the water of crystallization over into the other arm, and then sealed it off by fusion. Both the water and the air in the sealed tube were strongly active, more so indeed than the original salt. That this was not due to minute particles of radium which had been driven over mechanically was proved by the fact that the radio-activity disappeared within a few days.

AMMONIA ON METALS.

IN endeavoring some years since to find a metal which would withstand the action of ammonia gas at high temperatures, G. T. Beilby noted the fact that every metal tested soon become brittle and spongy. In conjunction with G. G. Henderson, Mr. Beilby has now investigated the phenomenon more closely and the results are published in the last number of the *Journal of the Chemical Society* (London). It has