also calculates the history of the world in the future.

Geology gives us similar knowledge of the past, and shows that the world has not developed by sudden changes, as was formerly supposed, but that it has developed in accordance with the same laws which now reign.

Harry C. Jones.

BUFO AGUA IN THE BERMUDAS.

One of the characteristics of the fauna of the Bermudas is the scarcity of terrestrial vertebrate forms. At present there is known but a single reptile (*Eumeces longirostris*) and a single amphibian (*Bufo agua* Daudin). In 1884 Jones and Goode ('Contributions to the Natural History of the Bermudas,' Bull. U. S. Nat. Mus.) recorded no amphibian. Heilprin ('The Bermudas,' Philadelphia, 1893, p. 84) says that in 1888 he saw a few individuals of *B. agua* in the salt marshes. As far as recorded, no amphibian had been known in the colony until the introduction of this species.

The history of its introduction, as gained from an interview with Captain Vesey in July, 1900, is as follows: Captain Nathaniel Vesey (at present a member of the Colonial Parliament from the parish of Devonshire) 'about fifteen years ago' engaged the master of a vessel plying between Hamilton and Demarara, British Guiana, to secure for him some of the Guianan toads, with a view to using them to catch garden insects. The toads were brought from Demarara to Hamilton, and were carried out to Devonshire by a native, who must have purloined some of the animals, for individuals were seen near the native's home (Tuckerstown), ten miles distant, soon afterward. Captain Vesey liberated 'about two dozen' individuals in his garden, where they thrived from the first and ate many insects.

From these two centers the animal has spread until it is common throughout the colony. In its search for moist places it often gets into the cisterns, fouling the water. This fact, together with its ugly appearance and the common opinion that it is venomous, has brought it into disfavor with the inhabitants.

The porosity of the rock permits no springs, streams or ponds in the islands. The only bodies of water are several brackish tidal ponds near the shore. There are some brackish marshes the salinity of which is less than that of the ponds, but which are by no means fresh. It is in these marshes that the animal breeds. It seems to have adopted these from necessity rather than from preference, for in Jamaica (Andrews) and in Brazil (Hensel) it spawns in fresh-water pools.

The eggs are extruded 'early in the spring,' according to local report, but this must be regarded as uncertain until we have better evidence. In Jamaica spawning is said to occur in October, and in Rio Grand do Sul, Brazil, in the middle of winter (June). In July, while at the Biological Station of New York University at Hamilton, I found large numbers of young, nine to fourteen millimeters long, in the grass and on the roads near the brackish marshes. They were especially abundant just after a shower.

Bufo agua is the largest living Anuran known. The largest specimen I have seen from Bermuda was collected by the New York University Expedition of 1898 and is now in the Zoological Museum at Columbia University. It measures 155 mm. from snout to vent, and weighs 960 gm. after having been two years in a four per cent. solution of formalin.

This toad is found in South and Central America and in the warmer parts of Mexico. It has not been included in the Neoarctic fauna by either Cope or Garman. I have found no record of it west of the Andes further south than Chimbo, Ecuador (about

2° S.). The expeditions to the Andes have not recorded it above altitudes of 1,500 feet nor more than about a hundred miles back from the coast. On the east coast it is recorded as far south as the Sierras del Tandel, Argentina (38° S.) by Berg. It is found throughout Brazil and in eastern Ecuador well up towards the headwaters of the Amazon.

It has been introduced into many of the Lesser Antilles to catch insects (Herrera). In 1844, according to Gosse, it was introduced into Jamaica from the Barbadoes, where it has been used to catch field rats. It had been brought from Martinique to Barbadoes, and had been carried to Martinique from Cayenne. It appears doubtful that it is indigenous to any of the islands with the possible exception of Trinidad. Faunal lists from Cuba, Porto Rico and the Bahamas do not include it.

Bermuda is now its northern limit, both in latitude (33° N.) and in mean annual isotherm (70° F.), but this distance from the equator is exceeded on the east coast of South America both in latitude (38° S.) and in mean annual isotherm (58° F.). It is essentially a tropical and subtropical form, and I do not find record of it in the region of frost in either latitude or altitude, except for a small area in Argentina.

Bufo agua is known by various local names. The natives of parts of Brazil call it aguaquaquan, from which comes its specific name. In Jamaica it is known as a 'bull-frog.' The inhabitants are prejudiced against it throughout its range and it is killed at every opportunity.

There is a general belief that it is venomous. One Brazilian writer (Filho) says that travelers report the use of its venom in place of curari by the natives of the upper Amazon region.

Experiments show that the secretion of its cutaneous and parotoid glands, when injected into the circulation of dogs, fowls or frogs has poisonous effects, and in moderate doses causes convulsions, followed by death. There is no evidence that mere external application causes more than a slight irritation unless it reaches mucous membrane, when ulceration follows, or the cornea, which is rendered temporarily opaque.

There is not sufficient evidence to substantiate the popular belief among the natives of Bermuda that the animal can eject its secretion to a distance. There is some evidence that the secretion when taken into the digestive tract—as in the case of a dog getting it into the mouth—will cause death in a few hours, but there are no careful records of the physiological effects of the secretion beyond the fact that subcutaneous injections cause tetanic convulsions, followed by death in from one-half to two hours, according to dose.

F. C. WAITE.
UNIVERSITY HEIGHTS, NEW YORK CITY.

SCIENTIFIC BOOKS.

Le préhistorique, origine et antiquité de l'homme. Par GABRIEL et ADRIEN DE MORTILLET. 121 figures dans le texte. 3e édition. Paris, Schleicher frères, 1900. Pp. xxii + 709. Bibliothèque des sciences contemporaines.

The first edition of *Le préhistorique* dates from 1883. A second edition appeared two years later and was exhausted at the end of ten years. The value of the work, as well as the rapid growth of the science, has made a third edition imperative. Gabriel de Mortillet devoted the closing year of his life to this task, which was destined to be completed by his son and collaborator, Adrien de Mortillet.

The incorporation of an immense amount of new and valuable material, made possible by a recasting of the work, has of necessity limited its scope. The Neolithic period is left to be treated in a separate volume together with the Bronze age.

The two main divisions of the present volume are devoted to the Tertiary and early Quaternary, respectively. The authors are inclined to make the most of the evidence bearing on a