"* * * What the recent discoveries have shown is, that during, and subsequent to, the glacial period, and since the advent of man, there has existed such an instability of the earth's crust that the present cannot be made a measure of the past. Man has certainly witnessed catastrophes by flood which are quite analogous to the one described in Genesis. But it is important, in conclusion, to obtain correct ideas of what we are required by the narrative to believe. * * *

"1. The biblical account of the flood does not imply, as many seem to assume, that the waters of the earth increased to such a degree that it swelled the circumference of the globe to the extent of the tops of the highest mountains. * * * (p. 138.)

"2. Nor is it necessary, except for the purpose of effecting the destruction of the human race, to suppose that the flood was, in the strict sense of the word, universal. We may well believe that the end in view, namely, the destruction of the human race, with the exception of Noah and his family, was accomplished without the destruction of all forms of animal life whose existence was unconnected with the general moral reasons for the flood. * * * The objects of the flood were all satisfied if the destruction of the human race was fully accomplished, so that history could make a new start with a selected family. * * * (p. 138.)

"Some time during the prevalence of glacial ice over Northern America and Northwestern Europe, man came into existence in Central Asia, where the climate was still congenial. From this point he spread as far west as the Atlantic seaboard in Europe, and eastward to the Pacific Coast, whence he succeeded in reaching, by way of the Bering Sea and Alaska, the western coast of North America, and thence migrated to the Atlantic Coast, where his remains are found in the glacial gravels of Trenton, New Jersey. But the extreme and rapid changes incident to the closing stages of the glacial period naturally, and very likely, exterminated man in company with many of the animals accompanying him both in America and in Europe. The destruction of many of the species of animals accompanying man at the close of the glacial period is a well-known fact. It also seems probable, from scientific evidence, that man shared largely in the destruction. There is everywhere a sharp line of distinction between Palæolithic and Neolithic man, *i. e.*, between the men who were limited to the use of flaked or rough stone implements and those who used smoothed stone implements. It is Palæolithic implements only which are found in the glacial gravels of America and Northwestern Europe, and beneath the loess at Kief and at three or four other localities in Southern Russia. The Palæolithic man of science may well be the antedeluvian man of Genesis" (p. 139).

From this it appears, a little darkly and vaguely, that the public are to understand from these 'recent' and 'remarkable discoveries' that Paleolithic man, scattered over Asia, Europe and America (and Africa?), was destroyed by the flood, where there was a flood, and by 'the extreme and rapid changes incident to the closing stages of the glacial period,' and that this gave rise to the 'sharp line of distinction between Paleolithic and Neolithic man,' and hence, by implication, that Neolithic man was the descendant of Noah and that the line of cultural evolution was from ark-building to 'smoothed stone implements.'

One is led to wonder how far respect for the Scriptures is fostered by 'remarkable discoveries' of this sort and by the much-trumpeted stage-play that preceded and accompanied them. * * *

THE MONGOOSE IN JAMAICA.

IT seems to be almost impossible for writers of text-books to give a correct account of the mongoose in the island of Jamaica, and its effect upon the native fauna. In *Nature*, February 7, 1901, I took occasion to point out a peculiar error in the account of the animal in an excellent text-book of zoology; to-day I open Mr. J. W. Redway's *Elementary Physical Geography* (1900) and read that the mongoose 'did not lessen the number of cane-rats,' but 'exterminated one or two species of ground-bird.' As in the former note just mentioned, I must beg those who wish to discuss this subject to read Dr. J. E. Duerden's article in *Journal of the Institute of Jamaica*, July, 1896, p. 288.

Here the facts actually known are duly set forth, and among other things it is shown that the rats were destroyed in great numbers, while it seems doubtful whether the 'ground-birds' were actually exterminated in any instance.

T. D. A. COCKERELL.

EAST LAS VEGAS, N. M.,
May 16, 1901.

AN EARTHWORK DISCOVERED IN MICHIGAN.

MR. G. N. HAUPTMAN, of Saginaw, Michigan, in a letter dated May, 1901, reports that 'there is on section 34, T. 21, N., R. 1 E., Ogemaw county, Mich., an earthwork [of horse-shoe shape]. The trench * * * is three feet' deep, and in it stand forest trees.

If any notice of this has ever been printed I should be glad to receive references to the same. I believe no note of this earthwork has previously been made, although four earthworks in the same county are well known and are recorded in the literature of archeology.

HARLAN I. SMITH.

PHYSIOLOGY IN THE SCHOOLS.

TO THE EDITOR OF SCIENCE: The writer has a 'horrible suspicion' that T. Hough imputes the physiological questions, to which he demurs, to him. He did not propound them. The high-school questions were taken from the text-book which the pupils had used, and if the text was legitimate, the questions were.

It is the writer's conviction that public school teachers are not generally qualified to teach physiology; that physiology proper is too abstruse for the grammar grades; and that the teacher in every grade should be expected to have a better knowledge of his subject than can be obtained from the elementary text placed in the hands of his pupils. Finally he may venture to express his fear that a little elementary knowledge of the reasons for the non-increase in stature of the human skeleton throughout life might not be amiss to his learned critic even.

S. W. WILLISTON.

SHORTER ARTICLES.

WHAT IS LIFE?

SOME thoughts, started by reading an article with the above title in *Nature*, Vol. 57, p. 138, 1898, by Horace Brown, and jotted down at that time, but laid aside, I have thought might perhaps interest the readers of SCIENCE, especially as the subject continues to be agitated.*

Heretofore in cases of dormant life, as in seeds kept for years, perhaps for centuries, or in dessicated infusoria, etc., in which under favorable conditions active life is revived, it has been supposed that very slow metabolic changes still go on during the state of dormancy—life is supposed to be feeble, but not extinct. The same was supposed to be the case in seeds or bacteria exposed to intense cold of — 180° to — 200° C. by Pictet or even — 250° by Dewar.

But it is now proved that at this temperature chemical affinity is destroyed and all chemical changes arrested, and therefore the chemical changes characteristic of life—metabolism—also must cease. But with the return of heat they revive. Therefore, in this case, life seems to spring spontaneously from dead matter. Must we then revive the old doctrine of spontaneous generation? If not we must change or greatly modify our conceptions of life.

From such experiments it is evident that, although life is, indeed, a distinct *form of energy*, yet its nearest alliance is with chemism. For as chemism is completely destroyed by extreme cold and again revived by heat, so life may be completely arrested by cold and again revived by heat—*if the molecular structure characteristic of living protoplasm* (whatever that may be) *remains unchanged.*

What then is the necessary condition of life—or, to put it clearly, what is the difference between *dead* protoplasm and *living* protoplasm, or rather protoplasm *capable of life?* Evidently it is not a difference in chemical composition, for no change in this regard takes place in the act of death. It is, I suppose, a difference in *molecular arrangement*—a difference in *allotropic condition.* As the necessary condition of chemical properties is a certain equivalent composition: so the necessary condition of vital properties is, in addition, a certain molecular constitution. But as equivalent composition may

**Nature*, Vol. 61, p. 67, 1899; Vol. 63, p. 420, 1901. *Revue Scientifique*, Vol. 15, p. 201, 1901, and SCIENCE, Vol. 12, p. 774, 1900.