animals are practically identical. Even the tiny muscles moving the wings of insects, such as the fly and the mosquito, resemble microscopically the muscles of man.

If man was a special creation, the Almighty was not limited to the lowliest form of matter—the "dust of the ground"—as material for the human body. He could have created a nobler, a more subtle, a more puissant and exalted stuff out of which to fashion man. The plan and structure and function of man's body would then supposedly have differed *toto coelo* from man's present body. Probably it would have been free from the defects and deformities inherent to the animal body, and free from the diseases which it shares with animals.

But, no! God deliberately made man out of the same stuff as the animals, and, as I have shown, on the same plan as animals. Body-wise, man *is* an animal, but, thanks be to God, his *destiny* is *not* the same as that of the beasts that perish. To develop great men, such as Shakespeare, Milton, Washington and Lincoln, and then by death to quench them in utter oblivion, would be unworthy of Omnipotence. To my mind, it is simply an impossible conclusion. Man's soul *must* be immortal.[5]

* * * * * *

W. W. KEEN

CULTIVATION AND SOIL MOISTURE

THE question of cultivation in relation to soil moisture is one on which there has been difference of opinion among agricultural workers. The work of Professor Call of Kansas has tended to show that (under his conditions) cultivation, as cultivation, does not conserve soil moisture.

Since 1913 the writer has been engaged in agricultural work where the question of cultivation in relation to the conservation of soil moisture has been important. In the early years of this work the surface mulch idea, which is quite generally accepted by agriculturalists, was believed and used to explain the presence of ample moisture under cultivation when there was a deficiency without cultivation. When other features of plant growth were investigated some effects of cultivation, other than moisture, were brought out.

The recent controversy between Dr. Jerome Alexander and Mr. L. S. Frierson in the September 2, 1921, the February 10 and March 24, 1922, issues of SCIENCE has been interesting. One of these writers accepts the general view that cultivation of the surface of the soil conserves soil moisture by preventing surface evaporation, while the other does not believe that this is in accord with engineering experience. If our work had shown that, in cultivation, we were dealing with a moisture factor alone, the writer might agree with one of these two men without going into the specific conditions under which the data were obtained. Our work has shown that cultivation changes the composition of the soil solution and has an effect on the water requirements of the plants grown.

The Journal of Industrial and Engineering Chemistry for March, 1922, Vol. 14, No. 3, has the following in an article by the writer in discussing a composition basis for the water requirements of plants: "There is a common saying, cultivate to conserve soil moisture and you will have larger crops. The author believes that cultivation lets air down into the soil, thereby increasing bacterial activities which in turn cause the plants to get more food and grow larger on less moisture, would be nearer the truth. Experiments are reported where fertilization has decreased the water requirements of plants over one half, when expressed as the amount of water necessary to produce one unit weight of plant.

In the field experiments we had plants growing well, *with* cultivation, when on the same soil *without cultivation,* lack of water in the soil was hindering plant growth. It was easy to say that these were the results of cultivation in conserving soil moisture but to find out how the mulch conserved the soil moisture was a problem for intensive study. The evident facts were that the well cultivated crops were not suffering from lack of water in the period of dry weather.

It was found that the soil having the water reserve had a higher concentration of plant food and the plants growing in this soil con-

[5] The full address will appear in the *Philadelphia Public Ledger* for Sunday, June 11.

tained larger quantities of the plant food elements. Plants of the same species are known to vary in analysis and plants of different analyses in our experiments were found to have different water requirements. It appears that if the soil solution is weak the plant transpires more water in its attempt to make a normal growth. The larger number of stomata on the leaves of plants with high water requirements substantiate this.

The results of cultivation are a different plant growing in a different soil and requiring less water per unit of weight.

In the spring the soils of the humid regions of the United States contain plenty of water and it is general observation that the results of cultivation (higher moisture in the soil) do not show up until periods of dry weather come. In the fall there is again plenty of water, under all systems of soil management. It is the author's belief, based on experimental results, that proper cultivation throughout the season will allow the plants growing on good soils to make their growth on enough less moisture (early in the season) so that they can keep on growing during periods of dry weather on what may be called an accumulative moisture reserve.

The summary of the water requirement paper in the *Industrial Journal* follows:

The results of field and greenhouse experiments recorded in the following paper indicate that fertilization of a soil which responds to direct or indirect fertilizer treatment allows the plants to make their growth on a smaller amount of water and to have a different composition from what they otherwise would.

The same effect is produced by cultivation, which by opening up the soil increases bacterial activity, which in turn gives increased concentration of the soil solution.

Proper fertilization and cultivation minimize dangers to crops from drought injury in humid regions of the United States by having the plant go into the drought period with an accumulative reserve of soil moisture.

This work opens up the study of fertilization from the basis of water requirement.

H. A. NOYES

MELLON INSTITUTE OF INDUSTRIAL RESEARCH

THE COPPER ESKIMOS

I RETURNED in the autumn of 1921 from six consecutive years in the arctic regions. Three of these were spent for purposes of geographic and ethnographic study among the Copper Eskimos. I am now engaged upon writing up the results of that investigation, but, as there is no prospect of getting this printed before at least one year, I want to make a preliminary announcement about certain results of my archeological and ethnological work.

Previous to 1912, the eastern known limit of pottery among the Eskimos was Point Barrow (cf. Murdock on the Point Barrow Eskimos). Stefansson's work of the years 1908-12 extended the known pottery area eastward some six or seven hundred miles to Cape Parry, and he found it there in the most ancient ruins, indicating that pottery has been used by the Eskimos for centuries and perhaps by the earliest Eskimos who occupied that country.

Jenness has published the results of his two years spent among the Copper Eskimos (*Report of the Canadian Arctic Expedition*, 1913-1918, Vol. XII, published by the Department of the Naval Service, Ottawa). In this he does not mention pottery, which would indicate that he found none to the east of Cape Parry. In excavating various sites I have found pottery fragments as far east as Point Agiak, just west of Gray's Bay, or about 80 miles east of the Coppermine. This extends the known pottery territory some 400 miles east beyond Stefansson's results. Like Stefansson, I found the pottery deep down, indicating that it had been in use probably several centuries ago and perhaps by the earliest Eskimos. The implements associated with the pottery were of undoubted Eskimo type.

Previous to 1910 houses of earth and wood had not been reported from the western arctic coast of Canada further east than Pierce Point. Stefansson in his journeys along the coast the spring of 1910 and again the summer of 1911 found the ruins of earth and wood houses as far east as one mile east of Crocker River. In an appendix to Jenness' report (cited above) we learn that since his return in 1916 Captain Joseph Bernard, who entered the Copper Es-