bottom lies 6 to 8 feet below the present water table as exposed in Nicollet Creek, which feeds the west branch of Itasca. The bone bed varies in thickness up to about 4.5 feet. It lies from about 3.5 to 9 feet beneath the present surface of the bog, which consists of living grasses, sedges and marsh weeds growing above successive layers of massive peat, sandy peat, marly sand and more consistent marl having abundant snail shells. Immediately below this stratified bog is the old lake bottom of boulders, cobbles, gravel and sand.

The bones are well preserved and some of them, even as washed in the field, are distinctly seen to be mineralized. Their surfaces are knife-marked to an unusual degree. None have been noted bearing tooth marks of carnivores.

Among the bones rescued and identified in the field are those of bison (*Bison occidentalis*)[2] represented by a skull with horn cores, long bones, jaws, vertebrae, cartilage and fragmentary identifiable pieces. There are bones of elk, represented by several jaws, vertebrae and long bones—two of which have been modified for artifacts. There are a few bones of bear, caribou and, probably, moose and wolf. Besides, there are numerous bones of fish and carapace of at least two species of turtles.

Five stone artifacts have also been recovered from the bone bed, three of which are flake specimens with retouching, while the fourth and fifth are chopping tools chipped to rough, parallel faces, and retouched on working edges.

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A FIRE-BALL

THE electrical phenomenon known as a "fire-ball" is rather a rare occurrence. Therefore one that I saw at Fitzwilliam, New Hampshire, at 5 P.M. on August 10 may be worthy of record. I was seated on a second story porch enclosed with glass watching the storm. A radio aerial extends from a distant tree to a point on the side of the house some distance from the porch. Coincident with a crash of thunder, the fire-ball appeared. I can not say that it followed the wire or came from the sky. It just came out of space and seemed to move directly toward the window and then fell as though to enter the cellar of the house. It was a round, bronze, glistening ball with gleaming rays shooting from the top and sides; by its beauty and brilliance reminding one of an ornament at the top of a Christmas tree. Such was my fleeting sight of a fire-ball. Probably at the same instant, all electric fuses in the house blew out with unusual violence.

MARY ETHEL HUNNEMAN

SPECIAL ARTICLES

CATATONIA PRODUCED BY THE INTRODUCTION OF HEAVY WATER INTO THE CEREBROSPINAL FLUID

THE mammalian central nervous system is known to react to heavy water (deuterium oxide). Barbour and Trace[1] described in mice hyperexcitability succeeded by depression, when the animal's body water was about one third saturated with deuterium. Hansen and Rustung[2] in more acute experiments, with several cc of deuterium oxide at one time, described depression, catatonia and rolling movements. We[3] have seen the same effects, as well as potentiation of the convulsant action of ergotoxine.

In larger animals we have now achieved concentrations effective for the nervous system by injections directly into the cerebrospinal fluid, whence, due to slow drainage, the deuterium is dissipated much more slowly than from other sites.

Over the parietal brain cortex of seven rats we have introduced one or two tenths of a cc of deuterium oxide through a previously made trephine hole. The uniform result was catatonia (catalepsy). This state developed within a few minutes, lasting usually for many hours, sometimes being evident on the next day. Ultimately complete recovery occurred in all animals. Other central effects were observed in some; for example, the eyeballs receded in three rats, two showed ataxia and one showed hyperexcitability, with jumping. Two adult cats were also given deuterium oxide, by lumbar puncture, with the successful production of catatonia in both cases. This was accomplished in a female cat of three kilos by withdrawal of 0.4 cc spinal fluid, followed by injection of 0.7 cc deuterium oxide, 99.5 per cent., and in a male four-kilo cat, from which 1.5 cc fluid was removed and 2.8 cc deuterium oxide injected without excess pressure.

Abundant evidence has accumulated in this laboratory[4] of a variety of pharmacological actions occurring when 20 per cent. heavy water is in contact with body cells. In the catatonia experiments a like degree of saturation must have been attained in parts of the

[2] Identified by Dr. Samuel Eddy, associate professor of zoology, University of Minnesota.

[1] H. G. Barbour and Jane Trace, *Jour. Pharm. and Exp. Therap.*, 58: 460, 1936.

[2] K. Hansen and E. Rustung, *Klin. Wochenschr.*, 14: 1489, 1935.

[3] H. G. Barbour and J. B. Herrmann, *Jour. Pharm. and Exp. Therap.*, 1937. (In press.)

[4] H. G. Barbour, *Yale Jour. Biol. and Med.*, 9: 551, 1937.