# DISCUSSION

## A KITCHEN MIDDENS WITH BONES OF EXTINCT ANIMALS IN THE UPPER LAKES AREA[1]

RECENT evidence of ancient man associated with extinct bison has been found this winter in the drainage of the St. Croix River—which river for a considerable distance is the boundary between Minnesota and Wisconsin.

October 28, 1934, a farmer brought to the University of Minnesota some large bison bones which he had recently found in a bog occupying an old lake bed on his farm. Since then some 1,500 bones, mostly bison, have been recovered from the deposit. The bones were found at an as yet undetermined depth of from 10 to 18 feet below the surface of the bog in a deep marl bed covered by three feet of peat. A few bones of elk and caribou were in the deposit, but most of the bones are of a large-horned bison determined as *Bison oliverhayi* Figgins.[2] No bones of *Bison bison* have been found. The bones now recovered represent at least 40 individuals. Most of them are of young animals ranging from calves to those of three years. But remains of at least six adults also have been secured. Many of the bones show that they were food refuse. Cuts and scratches made as by flint implements are present on some 20 per cent. or more of the bones. A few of the recovered specimens are broken as if to extract the marrow. Several have been burned. Nearly all the bones are in excellent preservation; even some of the rib cartilages are preserved.

A small number of artifacts as well as the many bones have been recovered. These include a few artifacts made of elk and bison bones, one artifact of oak wood and a few of stone. The artifacts are quite unlike those associated with modern North American Indians in the area.

Many sticks and small logs cut by beavers were found in one part of the deposit. Like the bones, they are in an excellent state of preservation. The wood is largely oak, although some fragments of alder and willow were also found.

The age of this kitchen-middens deposit in the marl has not been determined. The marl lies on red drift of the Wisconsin glacier. The succeeding young gray drift of the Wisconsin glacier, the last phase of the Wisconsin, stopped some five miles short of the site. We also call attention to the fact that bison bones of similar measurements, now in the U. S. National Museum, were found under 6 feet of peat on Wisconsin red drift at Crosby, Minnesota, in 1923. Those bones were described by the late Oliver P. Hay[3] as *Bison occidentalis* Lucas. From his description on page 2 we quote as follows: "We can be certain therefore that *Bison occidentalis* lived in Minnesota until the middle of the last glacial age. How much longer we can not now determine." Hence the problem of ancient man in late glacial time or early post-glacial time is again thrust into our faces by this new find in the area of the Upper Lakes.

Post-note: As this notice was about to be mailed to the editor of SCIENCE, a copy of *The American Anthropologist* for April–June, 1935, came to hand with Dr. Schultz's article on the Scottsbluff bison quarry. Because the extinct bison in said quarry is the same as that in the St. Croix marl bed, we add a statement regarding the antiquity of the Scottsbluff site from the closing paragraph of Schultz's important article: " . . . it would seem that to propose a late Pleistocene dating for this site is not too radical. Though many puzzling facts remain to be interpreted and future work in this area will undoubtedly permit the drawing of less tentative conclusions, the writers feel confident that such a dating will not prove to be far wrong, and, if modified, is much more likely to be extended downward than upward"[4] (p. 318).

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## STUDIES OF CRYSTALLINE VITAMIN $B_1$ VII. ITS RELATION TO PATHOLOGICAL STATES

SUPPLIES of crystalline vitamin $B_1$ obtained by a recently developed method[1] offered the possibility of clinical trial of this material. Confirmation of the anti-neuritic activity of the crystals was obtained by treatment of thirteen cases of human beriberi through the cooperation of A. J. Hermano in Manila, Philippine Islands.

Rats on a vitamin $B_1$ free, but otherwise supposedly complete diet show complete freedom from polyneuritis with amounts as low as 1-2γ of the crystals per day, but the growth is slight. Increase of the vitamin dosage even up to approximately 100 times that necessary for prevention of paralytic symptoms effects increasingly greater weight gains. Evidently gross $B_1$ insufficiency is possible without manifestations of polyneuritis.

These results suggest that similar insufficiencies may be present in man, due to inadequate diets, idiosyn-

[1] A preliminary notice.

[2] J. D. Figgins, *Proceedings of the Colorado Museum of Natural History*, Vol. XII, No. 4, pp. 16–42, December 5, 1933.

[3] Oliver P. Hay, *Proceedings of the U. S. National Museum*, Vol. 63, Art. 5, pp. 1–8.

[4] C. Bertrand Schultz and Loren Eiseley, *The American Anthropologist*, New Series, April–June, 1935, Vol. 37, No. 2, Part I, pp. 306–319.

[1] R. R. Williams, R. E. Waterman and J. C. Keresztesy, *Jour. Amer. Chem. Soc.*, 56: 1187, 1934.

crasies of the individual or to temporary derangement of the metabolism giving rise to pathological states not recognizably associated with beriberi. To appraise this possibility we enlisted as medical associate Dr. Martin G. Vorhaus. Clinical trials have been made in polyneuritis of pregnancy, colitis, nutritional edema, gastro-intestinal atony, polyneuritis of undiagnosed origin, etc., as indicated in part elsewhere.[2] Study of these conditions is being extended with gratifying results.

Considerable evidence also exists as to a relationship between vitamin $B_1$ and carbohydrate metabolism.[3] In view of this the effect of the administration of large amounts of the pure vitamin in human diabetes is being studied. The early results are extremely interesting and give further evidence of the significance of $B_1$ in metabolism and its possible therapeutic use in cases of deranged carbohydrate utilization. When these results have more fully matured they will be reported by Dr. Vorhaus and collaborators through the usual medical channels.

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## A PHYTOSTEROL AND PHYTOSTEROLIN FROM THE SWEET POTATO

DURING the process of isolation of carotene from the sweet potato *Ipomoea Batatas* Poir., a phytosterol and a phytosterol glucoside or phytosterolin were separated. Since these substances have not been previously reported from this source, it seems desirable to record them in the literature.

The phytosterolin was separated from a concentrated solution of the sweet potato pigment before saponification, and the phytosterol was removed from a concentrated extract of the material remaining unsaponified by alcoholic potassium hydroxide.

After repeated recrystallization of the crude phytosterolin from dilute pyridine it melted at 285° to 286° and gave an acetate melting at 165° to 165.5°. With careful manipulation a positive Salkowski sterol reaction and an alpha naphthol test for carbohydrate were obtained on the parent substance.

After two recrystallizations of the phytosterol from ethyl alcohol-ethyl acetate mixture it melted at 136.5° to 137° and gave both the Liebermann-Burchard and Salkowski reactions for sterols. On treatment with acetic anhydride an acetate was formed which melted at 129° to 129.5°.

From these data it is concluded that the phytosterol of the sweet potato consists chiefly of sitosterol and that the phytosterolin is a sitosterol glucoside.

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[2] Carnegie Inst. Year Book, No. 33, 297, 1934.

[3] M. Labbe, F. Nepveux and J. D. Gringoire, *Bull. Acad. Med.*, 109: 689, 1933; C. A. Mills, *Am. Jour. Med. Sci.*, 175: 376, 1928.

## THE APPLICATION OF ARTIFICIALLY IONIZED AIR

IN the first volume of transactions from the Central Laboratory for Scientific Research on Ionification, entitled "Problems of Ionification," and edited by Professor A. L. Tchijevsky,[1] is presented an extensive review of the theory of ionization, the general biological influence of ionization on animals and the results of experimental ionization of chickens.

The ionization of air (or the accumulation of negatively charged particles in the air) has been done by the use of high-potential, 100,000 volts, 0.5 milliampere, frequency at least 3,000 cycles per second electric current, transformed from the original source of 110–220 volts D.C. This has been considered as one of the cheapest and the most convenient methods of artificial ionization of air on a large scale. There were produced from about 400,000 to 600,000 negatively charged particles per $cm^3$ (as compared with ordinary air, which has about 2,000) by brush discharge ("electrofluvial luster") from the negative electrode suspended from the ceiling at a distance of about $3\frac{3}{4}$ feet from the floor, or about 35 cm from the layer of treated eggs.

The experimental results on the influence of ionized air on the chicks and mature birds, as well as on the eggs during the incubation, though they were obtained under highly unfavorable experimental conditions and with a low quality of experimental material, in most cases were very significant and convincing.

On the basis of these experiments as well as in the consideration of the studies presented in Volumes II, III and IV, on other domesticated and wild animals, insects, bacteria, plants, seeds, etc., it was concluded that ionized air prevents weak individuals from early death, increases the growth of birds and their productiveness (egg laying), helps to assimilate food, increases general metabolism, raises physical activity, improves reproduction, favorably affects the composition of blood, increases the resistance of an organism and has preventive and therapeutic value in some diseases (such as avian tuberculosis). From these one can see a definite biological influence of ionized air,

[1] A. L. Tchijevsky, *et als.* "Problems of Ionification," 1: 1–487, Voronezh, U. S. S. R., 1933 (in Russian).