should be made at an early date to the chairman of the Department of Physics of the University of Missouri.

SIR HENRY TIZARD, president of Magdalen College, Oxford, formerly head of aircraft research at the Ministry of Aircraft Production, addressed the House of Commons recently at a meeting of the Parliamentary Scientific Committee on problems of aeronautical research with special relation to civil aviation. According to *The Times*, London, "he recommended that aeronautical research should be placed in the hands of an aeronautical research council, which should come directly under the Lord President of the Council, that the director of research at the Air Ministry should be represented on that body, and that the Government should be prepared to spend at least £1,000,000 a year for the purpose." He stated that "the future of transatlantic travel would lie in flying above the 40,000 foot level, and that it could never be a regular and economic service below that height. Flights across the Atlantic should before long be possible in automatically controlled machines which would not need any navigator on board."

DISCUSSION

BLANCAN AS A TIME TERM IN THE CENTRAL GREAT PLAINS[1]

THERE are extensive Cenozoic deposits of nonmarine and nonglacial clastic sediments in the Central Great Plains region of the western interior of the United States. These deposits, mostly unconsolidated, underlie the surface of this plains area to depths of more than 500 feet, and they are considered to be mostly of upper Tertiary (Pliocene)[2] and Quaternary (Pleistocene) age. During recent years their character, stratigraphy, faunas, floras and correlations have been studied in some detail. For the most part the term Ogallala formation (or group) has been applied to that part of these deposits agreed to be Pliocene in age, and a multiplicity of names has been applied to the clastic sediments agreed to be Pleistocene in age.

The placing of these strata within the standard scale of geologic time has been accomplished largely by a study of their contained faunas supplemented by paleobotanical and stratigraphic studies. These faunas, consisting mostly of fossil vertebrates, have generally proved satisfactory for the correlation of beds within the Great Plains region, but there is not yet general agreement as to placement in this region of the time line that marks the boundary between the Pliocene and the Pleistocene. In order to clarify conflicting points of view and in an attempt to unify usage of time terms in Nebraska and Kansas, the writers of this note, representing the Nebraska Geological Survey, University of Nebraska State Museum, State Geological Survey of Kansas and the Museum of Vertebrate Paleontology of the University of Kansas, during the autumn of 1944 examined in the field some of the significant localities in the Great Plains region of these two states. As a result, the following general stratigraphic relationships and local time classifications were agreed on.

The Tertiary strata of this region exhibit normal stratigraphic relationships (modified by some local channeling)—that is, younger beds overlie older beds in ascending order. On the other hand, the Pleistocene deposits, with exception of deposits in the Meade basin of southwestern Kansas and comparable areas, display a fluvial physiographic sequence; *i.e.*, the oldest deposits occur in high terrace levels and the younger ones occur in successive lower terrace levels. The point in time that marks the end of general upward accumulation of deposits is the close of the period of deposition of the "algal limestone" or "*Chlorellopsis* limestone." This unique limestone bed is generally accepted as marking the close of Ogallala deposition in Nebraska and northern Kansas. There is general agreement among the writers that the events at the close of "algal limestone" deposition were caused by the most important diastrophic episode of late Cenozoic history of the Central Great Plains, but there is lack of agreement as to the correlation of this episode with the standard Pliocene-Pleistocene time line.

In a committee report published in 1941,[3] correlations were suggested for the several vertebrate faunas from the Great Plains and provincial time zones were proposed. The term Blancan, from the Blanco locality in northwestern Texas, was proposed as the late Pliocene provincial time zone to include beds containing the Blanco fauna and faunas of equivalent age. However, in the committee report, Wood and others considered the Broadwater fauna of Nebraska as Pleistocene and the Rexroad fauna of Kansas as Blancan, which they correlated with the late Pliocene,

[1] The manuscript for this note has been read and approved by G. E. Condra, state geologist of Nebraska, and R. C. Moore, state geologist of Kansas, on leave.

[2] Except in parts of western Nebraska and adjacent states where Tertiary formations older than Pliocene are also present.

[3] Horace E. Wood and others, *Bull. Geol. Soc. America*, Vol. 52 (1941), pl. 1.

whereas Kansas and Nebraska paleontologists agree that the Broadwater and Rexroad faunas are equivalent in age and that both faunas correlate with that of the Blanco locality. These beds (Rexroad and Broadwater) occur stratigraphically above the horizon of the "algal limestone" and below the horizon of beds of undoubted Pleistocene age (Meade formation in southwestern Kansas, Grand Island and Upland formations in western Nebraska).

It is here proposed that the placement of the Blancan in either the late Pliocene or in the early Pleistocene of the standard time scale be held in abeyance until there is more general agreement among paleontologists as to its age; and that Blancan be used to serve as a provincial time zone for beds and faunas in the Great Plains region younger than the "algal limestone" and older than beds of undoubted Pleistocene age. The use of Blancan in this sense will serve to clarify current concepts with reference to these beds, will afford a uniform regional classification usable by workers in different states, and will avoid exhaustive controversy about a point of correlation that is not yet subject to conclusive proof. Of course, it is to be hoped that continued study of these beds and faunas will eventually lead to general agreement on correlation with the glacial sections of the Upper Mississippi valley and other parts of the world, and with marine beds, and thus effect a placement of Blancan time within the standard time classification.

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SPINACH AND BONE FORMATION

IN some experiments designed to test the availability of iodine as contained in certain vegetables, we have had occasion to feed a commercially prepared powdered spinach (Spintrate) to rats as an addition to a diet that had been successfully used by us as a breeding ration over several years (Purina Dog Chow). Since it has been reported that there is some substance, presumably oxalic acid, present in spinach which interferes with the utilization of calcium for bone formation,[1] it seemed of interest to keep records (Table 1) of food consumption and gain in weight of the different groups during the experimental period, and also to determine the ash content of the dried, fat-free leg bones of the animals at termination. Each group consisted of 10 young rats, equally divided as to sex. The experimental period was 35 days.

On the assumption that fresh spinach contains 90 per cent. of water, the rats which received 20 per cent. of dried spinach consumed an equivalent of 25 grams of fresh spinach per day, roughly proportional to 2¾ pounds in a human dietary of 2,500 calories. Calcium deficiency manifests itself by either decreased bone-ash or stunting of growth or both. Such effects are absent in the experiment reported, neither is there any decline in appetite or efficiency of food utilization.

TABLE 1

Diet	Gain in weight	Daily food intake (Ave.)	Bone ash
Basal	149 grams	12.3 grams	68.3 per cent.
5 per cent. spinach .	139	12.0	69.1
10 per cent. " .	148	12.2	67.4
20 per cent. " .	141	12.3	67.9

Since the basal diet here used is considered to have supplied an adequate amount of calcium for growth, it would seem that spinach, even in such relatively enormous amounts as would never be taken by human beings, would not exert a deleterious effect on growth or on bone formation unless the customary diet of the individual were lacking in calcium.

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PHOSPHORESCENT TEXAS EARTHWORMS

WHEN going down damp woods earth paths at night the writer occasionally has noticed that bright spots of phosphorescence lighted up in the disturbed soil surface after he passed, glowed for a while and then ceased. He also noticed that by scraping a foot over the area the phosphorescent effect could be repeated an indefinite number of times.

On examination of the path with a flashlight nothing was visible which could have caused the illumination. The tentative conclusion then was that the illumination came from soil bacteria or some other form of invisible microorganism which thus reacted to disturbance. However, the phosphorescence glowed in pea-sized balls, which when raked about remained as units in new positions and glowed brightly. While these balls of light sometimes were thickly placed there was no uniform distribution through the soil such as one might expect if bacteria were the cause. This phosphorescent effect usually had only been noticed during the cool weather of fall or early winter. On the night of December 6, 1944, the closing of the writer's garage door activated some of this phosphorescence when the door scraped the soil surface. The idea then occurred to remove the spots of light and examine them under bright indoor electric lights to see if the cause could be located. The area of phosphorescence was on the edge of a gravel driveway which was covered with a thin film of leaf mold composed of the small leaves of the mesquite tree.

[1] M. L. Fincke and H. C. Sherman, *Jour. Biol. Chem.*, 110: 421–428, 1935.