Oral administration of 5–7.5 mg. of folic acid to two normal human subjects increased their serum cholinesterase activities by 33 and 16 per cent within five hours.

It is concluded from these experiments that liver extract and folic acid act by increasing, in some manner, the formation of cholinesterase in the body.

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Some Effects of Electronic Transitions Upon Precision Thermometry

Recent measurements of the electrical resistance of various materials at elevated temperatures have disclosed the following information which may be of value in precision thermometry:

(1) The electrical resistance of a pure conductor is a straight-line function of temperature, but the slope changes appreciably between certain specific temperatures.

(2) Since the temperatures at which these discontinuities have been found are independent of purity, concentration, or heat treatment, the resistance-temperature curve for an alloy will be affected to some extent at each of the temperatures which are characteristic of each of its components. These temperatures may be used as an accurate method of calibration in the proper temperature range. The discontinuities in the curve for carbon, for example, are particularly satisfactory for calibration in the range above the melting point of gold.

(3) Errors may be introduced in certain ranges of temperature by the common practice of drawing calibration curves smooth instead of as straight lines changing in slope at these specific temperatures. These errors may be as large as 6° C. in a chromel-alumel thermocouple or as large as 2° C. in a platinum resistance thermometer. The chromel-alumel thermocouple is free from these errors below about 160° C., and the platinum thermometer is not affected markedly except in the range 160°–932° C., most of the trouble being between 160° and 800° C.

(4) Heat treatment is equally as important as purity in affecting the temperature coefficient of resistance for platinum. Depending upon the heat treatment, values of the coefficient as high as 1.400 or as low as 1.366 have been secured, using the same specially prepared high-purity wire.

Further information on these points will be published in the near future.

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Some Thoughts on "Gene Action"

Dr. Deakin's recent letter (*Science*, 1946, 103, 570–572) prompts me to add some thoughts which I noted down some time ago on the same subject. I am presenting them merely in the hope that they may invite extended discussion of this problem.

It has been generally accepted that the control of hereditary factors is closely associated with the desoxyribonucleic acid (DRA)—protein components of the chromosomes. A widely held concept has attributed to these components the ability of catalyzing enzyme processes or has assigned to them a principal role in the production of enzymes. In view of some recent work, however, the question may be raised whether all action (or some action) of DRA may not be in the nature of *inhibiting* enzyme processes, either qualitatively or quantitatively. Among the recent work to which this might be applied are the data by Avery and co-workers on the specific transformation of bacterial types of DRA, the data by Dickinson on the suppression of bacterial mutation through enzyme inhibitors, as well as the results of Lindegren on yeast and Sonneborn on *paramecium*. Furthermore, *in vitro* tests by Greenstein have actually demonstrated the ability of DRA to inhibit enzyme reactions. If the action of DRA in the chromosomes is totally or partly of an inhibiting nature, it implies that the extrachromosomal material contains many more ultimately possible enzyme reactions than those actually realized during the development and life of an organism, since many of them would be blocked by the chromosomal constituents. This block may or may not be a total one. The inhibition may be in some cases a quantitative one, delaying time and amount of action of a particular enzyme. A loss in DRA would result in the release of one or more additional enzymatic processes. This possibility may be realized in the well-known mutation due to chromosomal deficiencies. This concept would assign a much greater importance to extrachromosomal constituents than has hitherto been customary. Extrachromosomal constituents, as long as they remain stable, would limit the extent of variation possible through changes in the chromosomes, since the ultimately possible enzyme reactions would theoretically be exhausted if none of them is blocked by chromosomal constituents (microevolution). However, changes or extrachromosomal constituents may occur, but far less frequently than changes of chromosomal constituents. Such changes would then permit the realization of completely different enzyme processes, dependent on the extent of their quantitative or qualitative inhibition by chromosomal constituents (macroevolution).

Incidentally, the inhibiting-factor hypothesis is not altogether a new concept. Bateson, for example, speculated along these lines as early as 1913 (*Problems of genetics*. Yale Univ. Press, esp. pp. 94–96).

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Meteor Crater, Arizona

In December 1945 Nelson H. Darton restated to the Geological Society of America, and also to the Association of American Geographers, his belief that Meteor Crater, east of Flagstaff on the Arizona Plateau, is of volcanic rather than meteoritic origin. He cited a decision of the U. S. Board on Geographic Names in which the name *Crater Mound* was officially adopted, and he urged that the use of the term *Meteor Crater* be discontinued. Since notices of Mr. Darton's views have been published in *Science News Letter* and other nontechnical media, it seems timely to indicate that the majority of geologists,

astronomers, engineers, and others, who have studied the crater disagree with Mr. Darton and are convinced that the crater was made by the impact of a large meteorite.

Mr. Darton appears to stake his opinion largely on the failure of exploration (by drilling and geophysical methods) to reveal the presence of a buried meteorite beneath the crater. He is perhaps not aware that in 1930 F. R. Moulton showed that if a large meteorite did strike the plateau, it must have developed at the point of impact such a high temperature as to result not only in a tremendous explosion but also in vaporization of the meteorite itself, along with part of the surrounding rock strata. Under those circumstances one could not expect now to find more than incidental fragments of the meteorite.

Mr. Darton also seems to ignore the significance of the unique composition of the parapet which surrounds the crater and the material which partially fills the cavity itself. He is perhaps unaware that underneath the surface rubble these consist largely of quartz powder and silica glass, derived from the underlying sandstone by pulverizing and melting. No materials of this kind have ever been found in association with volcanoes, and temperatures high enough to produce silica glass are probably rarely, if ever, attained in volcanic eruptions.

It seems, therefore, that the current use of the name Meteor Crater is well justified, and the field evidence is heavily against the hypothesis of volcanic origin.

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Book Reviews

***Encyclopédie entomologique.* XXII: *Les Coléoptères des denrées alimentaires et des produits industriels entreposés.* P. Lepesme. Paris: Paul Lechevalier, 1944. Pp. 335. (Illustrated.) 350 fr.**

This is a compilation of information useful and valuable to the general worker and to those interested in coleopterous insects injurious to stored products. It should also prove of interest to those in other fields of work. However, a specialist may find his particular field inadequately treated and will probably disagree with the author on certain points.

The work is divided into two parts. Part I deals primarily with the taxonomy and descriptions of certain species of 24 families, with keys to the families and to the species discussed. Common names in one or more languages are given in addition to the scientific name. The specific descriptions are too brief for general taxonomic purposes, but they are given in sufficient detail for the purpose of this paper. In the case of most species the author has included data on geographic distribution, biology and damage, life cycles, and natural enemies. A total of 214 figures illustrate Part I.

Part II deals with theory and general information concerning the beetle population of stored products. In it are considered and discussed the environment of the food products, including constant and variable factors; the relationship or bond between the insects and the products; diet and the climatic factor; geographical distribution, broadly but briefly treated; life cycles and factors influencing them; the relationship of insects with other organisms; the theory of "vacant space" and the coleopterous population of the food products; tropisms; hybridization and variation; biological equilibrium; damage; and means of control. Because of the scope of each subject covered, it is obvious that only the essentials could be mentioned. It appears, therefore, that it was the desire of the author to expose the reader, however briefly, to some of the factors influencing insects and to some facts and information that should be known by the general worker for a clearer understanding of, and a better approach to, the control of insects infesting stored products. The section is illustrated with 19 figures, one of which is a diagram for a fumigator in which methyl bromide is employed.

The paper is terminated with an extensive bibliography, an index to genera and species, an index of common names, and 10 plates of commendable photographs demonstrating the damage caused by various insects. Plates 11 and 12 contain reproductions of photographs of installations for the fumigation of the various products.

If the purpose of the paper is correctly interpreted, it would have been greatly improved and made more practical if, in some instances, more detailed information had been given for the individual species and not reserved for a general discussion of a closely related group of species. This paper and the one by Hinton (1945) supplement each other.

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***A primer of electrocardiography.* George Burch and Travis Winsor. Philadelphia: Lea and Febiger, 1945. Pp. 215. (Illustrated.) $3.50.**

The reviewer was disappointed in his hope that this book by Burch and Winsor might be the long-awaited book for medical students and those beginning the study of electrocardiography. It is timely and has much to recommend it, but it has many faults.