a period of maximum abundance observed from traces in the snow how the animals had assembled in the night, nosing up to "every conspicuous object about camp—the water pail, axe, overturned boots, etc." The occasional carnivorous habits also referred to by Soper would seem to be restricted—at least mostly—to years of maximum abundance. Many other cases of depraved appetite in herbivorous mammals could be cited. Jacobi,[4] in his monograph of the reindeer, has brought together many interesting instances. We are concerned here with symptoms known to indicate mineral deficiency. It is not necessary to look for special food plants, the lack of which may bring about fatal results, because most plants are known to vary enormously as to minerals.[5] To veterinarians it is a familiar fact that serious diseases may result from deficiencies of minerals in pasture, and there is no reason why wild animals living on the same food should not be affected in a similar way. While, to judge from cattle pathology, the lack of certain "trace" elements (Cu., Co) occurs in restricted areas only, it appears that deficiencies affecting the acid-base balance are sufficiently wide-spread to account for the sudden drop in health observed in herbivorous mammals and birds at certain times. As an instance of such diseases in cattle may be mentioned licking disease, the name of which is derived from symptoms strikingly similar to those referred to above; even liver damage has been observed.[6] It is caused by a deficit of K (and Na) in proportion to the sulfuric and hydrochloric acids formed when the grass is digested. The enormous variations in this proportion found from year to year[7] are dependent on bacterial processes in the soil, and these in turn are said to be influenced to some extent by climate.[8] On the whole, climatic conditions appear to be one of the set of factors influencing the mineral contents of plants, and moreover the various elements are not affected alike.[9] It may be possible therefore to account for the regularity of the cycles in numbers by oscillations in the biological and chemical processes in the soil regulated by or adjusted to climatic cycles.

While it is true that the ten-year cycle in hares, ruffed grouse, etc., can not be correlated with sunspots,[10] a well-marked climatic oscillation of the same average length seems, nevertheless, to exist,[11,12] and parallels to the cycles of four years in mice, and six years in red grouse[13] and crossbills,[14] are also found in meteorological literature.[15,16] These climatic cycles may need further confirmation, but their close agreement as to length with the biological ones, in spite of the fact that in most cases these have been unknown to the authors, strongly suggests that they are real. Elton's[17] theory that the fluctuations in numbers are caused by meteorological cycles seems so far confirmed, but there is probably general agreement to-day that it is impossible to explain the phenomenon by *direct* climatic influence on the animals, as was at first supposed.

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PURIFICATION OF THE PITUITARY INTERSTITIAL CELL STIMULATING HORMONE[1]

THE paper by Shedlovsky, Rothen, Greep, van Dyke and Chow[2] on "The Isolation in Pure Form of the Interstitial Cell-stimulating (Luteinizing) Hormone of the Anterior Lobe of the Pituitary Gland" reports results in such contrast with those found in our own laboratory[3] that we consider it important to emphasize these differences.

Both papers describe the preparation of an apparently pure protein with similar biological properties, the minimal effective dose (MED) also happening to be the same. The evidence for belief in the purity of the substance herein reported is as follows:

1. *Specificity of biological behavior.* The substance has a specific effect on the ovary and testis of hypophysectomized immature rats—the repair of the interstitial cells. When injected intraperitoneally into normal immature female rats, it reduces the potency of certain concordantly administered gonadotrophins (pregnant male serum and chorionic gonadotrophin). When injected into hypophysectomized immature males, it stimulates the accessory organs of reproduc-

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[1] Aided by grants from the Board of Research of the University of California, from The Rockefeller Foundation and from Parke, Davis Company. Assistance was rendered by the Works Progress Administration, Project No. OP 665–08–3–30, Unit A–5.
[2] SCIENCE, 92: 178, 1940.
[3] C. H. Li, M. E. Simpson and H. M. Evans. "The Interstitial Cell Stimulating Hormone. II. Method of Preparation and Some Physico-chemical Studies." *Endocrinology*, in press.

tion. (In some strains, the stimulation is more limited than in others.) It augments the potency of the follicle-stimulating hormone (FSH) judged either by increase in follicular development or in uterine weights. It is to be emphasized that one half unit or 0.0025 mg of the substance, when combined with 2 RU of FSH, doubles the uterine weight in immature hypophysectomized rats. Shedlovsky *et al.* do not report tests essential for establishing the freedom of their material from contamination with other hormones of the anterior hypophysis. The substance herein reported is free of follicle-stimulating effects when given in 600-fold the MED for repair of the interstitial tissue; no thyrotrophic hormone was detected at the 0.50 mgm level in the one-day-old chick thyroid weight test; no growth-promoting activity or adrenocorticotrophic effect was detected in hypophysectomized rats when injected at a total dose of 8 mg in 10 days; the local crop test for lactogenic hormone was negative at 0.68 mgm.

2. *Chemical characteristics.* The protein contained 14.2 per cent. of nitrogen with approximately 4.5 per cent. of tyrosine and 1 per cent. of tryptophane. The carbohydrate content remained constant on repeated ammonium sulfate fractionation; analysis showed 4.45 per cent. mannose and 5.86 per cent. glucosamine.

3. *Physical study* (cataphoresis) has indicated the homogeneity of the protein. The schlieren picture obtained in the Tiselius apparatus showed only one boundary by scanning the whole field after electrolysis for 90 minutes. The mobility of the protein was found to be -6.36×10^{-5} in phosphate buffer of pH 7.53 and ionic strength 0.05 at 1.5° C. Electrophoresis experiments showed the isoelectric point to lie between pH 4.6 – 4.8. It is to be noted that in contrast with our results, Shedlovsky *et al.* obtained a mobility of 0.66×10^{-5} at pH = 7.86 and an isoelectric point of pH 7.45. It may therefore be said that although proteins with similar biological properties have been isolated by two laboratories, the results from electrophoretic study are so different as to forbid identification of the substances in question.

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THE BLACKENING OF COOKED POTATOES

THE blackening of cooked potatoes is a different process from the darkening that occurs when raw peeled potatoes are exposed to air; the latter darkening is known to be due to melanin. Although both darkening processes are oxidations, the synthesis of melanin involves an enzyme whereas the other type does not require one. Potatoes which did not darken when kept in an atmosphere of nitrogen during boiling and cooling blackened when removed to the air.

Certain properties, including the ultraviolet absorption spectra of the pigments from the darkened raw and cooked potatoes, were compared. Those of the blackened cooked portions differed markedly from the melanin and, moreover, showed properties similar to flavones.

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SCIENTIFIC BOOKS

CATASTROPHISM VERSUS EVOLUTIONISM

The Material Basis of Evolution. By RICHARD GOLDSCHMIDT. 436 pp. New Haven: Yale University Press. 1940. Price $5.00.

THIS book contains the only basically new theory of organic transformation propounded during the current century. For notwithstanding the colossal literature concerning organic evolution which has accumulated since the publication of Darwin's "Origin of Species," only three main types of theories can be distinguished. One type is based on Lamarck's assumption of direct adaptation by inheritance of results of use or disuse of parts. Other theories are built on Darwin's principle of natural selection of the fittest variants produced by interactions of the organism's inherited structure with the external as well as internal environments. Theories of the third group assume autogenesis, that is, unfolding of the potentialities hidden in the organism, impelled by an urge toward development in a certain direction. According to all these theories organic transformation takes place by evolution, that is, gradually by accretion of more or less small changes. According to Goldschmidt, however, it occurs by cataclysmic upheavals rather than by summation of individually small steps.

Lamarckianism has become obsolete owing to its basic assumption having fallen short of experimental verification. Autogenesis has always been in conflict with the principle of causality in vogue in the materialistically-minded modern science. Darwinism underwent great changes because of the forward strides of genetics, but the unbroken continuity of ideas between the "neo-Darwinism" and Darwin's original theory is evident. The appearance of Goldschmidt's book connotes an at least temporary end of the undivided reign of neo-Darwinian theories. For Goldschmidt not only relegates natural selection to a place