

## RESEARCH ITEMS

## Anthropological Connexions between America and Siberia

A. HRDLÍČKA discussed this connexion at the annual meeting during April 28–29 of the U.S. National Academy of Sciences. Since 1926, under the auspices of the Smithsonian Institution, systematic anthropological researches and excavations have been carried on in Alaska. It was possible in 1939 to supplement the study of the collections, thanks to the Soviet authorities and men of science, with that of approximately 600 crania of various Siberian populations, from the Neolithic times onward. As partly reported to the Academy at its last annual meeting, the Neolithic skulls from the Angara and upper Lena region showed remarkable similarities with the oblong type of skull of the American Indian. It is now possible to supplement this with more evidence. The total is based on approximately 4,000 normal adult crania, the essential metric data on which are now ready for publication. These data show definitely a close affinity between the aboriginal Siberians and Americans. In some instances the relation between a Siberian and an American group is so close as practically to amount to identity; and similarly some of the Old Alaskan resemble certain mainland American groups. The evidence now available makes it possible, in brief, and besides the Neolithics who have already been discussed, to identify the Eskimo with the Chukchi, and the Aleuts with the broader headed type of the Tungus; nor do the resemblances stop there. In addition, the crania of the newly discovered Pre-Aleuts are seen to show a very near resemblance to the Siouan type; those of the similarly newly found Pre-Koniags of the Kodiak Island to the Algonkin type; and those of the Koniags, the people found on Kodiak at the advent of the Russians, with the southern Indian Alaskans. Thus, from the physical point of view, which alone can be reliable in the classification of human groups, America may now be definitely connected with Siberia, and Alaska with the rest of America.

## Hormones Capable of Increasing Liver Fat

THESE hormones were discussed by O. Riddle and D. F. Opdyke on April 29 at the annual meeting of the U.S. National Academy of Sciences. Hormones derived from the ovary, pancreas, adrenal and especially from pituitary glands have been studied with reference to their ability to increase the storage of fat in the livers of young pigeons and rats. Since unlike results were obtained with these two species, this report is restricted to effects produced in pigeon livers following daily treatment during 2–4 days. Neither luteinizing hormone, adrenotrophin, intermedin, nor the inseparable mixture of gonadotrophin and thyrotrophin increases liver fat when those hormones are used in the purest form now available. Prolactin usually, but inconsistently, increases the liver fat in pigeons (not in rats), though it regularly increases the size of hepatic cells in pigeons. Insulin, desoxycorticosterone acetate and oestrone all increase liver fat. Anterior pituitary fractions obtained by ammonium sulphate precipitation, with dialysis of precipitates formed at one-third (and one-half) saturation, have resulted in appreciable concentra-

tion of liver fat activity in the water-soluble portion of the precipitate formed at one-third saturation. This fraction contains notable quantities of adrenotrophin, thyrotrophin, gonadotrophin and (traces of) posterior-lobe hormone, but it is almost free from prolactin. The 'pseudoglobulin' fraction (that is, the water-soluble part of the precipitate formed at one-half saturation) obtained in this series (done according to Young, 1939), though contaminated in fairly equal degree with all the hormones listed above for the highly potent fraction (and likewise almost free from prolactin), is practically free of liver fat activity. Pituitary extracts apparently show liver fat activity in all or many species, but it is not probable that this activity is produced by a single substance and not yet proved that an extract which is effective in one species is widely effective in others.

## Sex-determination in the Earwig

*Forficula auricularia* has eleven pairs of autosomes (H. G. Callan, *J. Gen.*, 41, 349–374; 1941), and there are two types of males:  $x$ ,  $Y$ , and  $x_1x_2Y$ , and three types of females:  $x_1x_1$ ,  $x_1x_1x_2$ , and  $x_1x_1x_2x_2$ . In the  $x_1x_2Y$  there may be a trivalent or a bivalent and univalent. The  $Y$  chromosome is dicentric and aids in the orientation of the trivalent during meiosis but may sometimes fragment and nondisjoin during the spermatogonial mitoses. The  $Y$  chromosome may be lost with high frequency. The prevalence of the twenty-five chromosome male  $x_1x_2Y$  in a population may have a selective advantage in giving rise to more females than males; in a dense population, one male may be sufficient for many females. The evolution of the sex-determining mechanism in *Anisolabis* and *Forficularia* is traced, and the presumed homology of the chromosomes  $x_1$ ,  $x_2$  and  $Y$  is suggested.

## Polydactyly in the Fowl

D. C. WARREN (*J. Hered.*, 32, 3–5; 1941) has reported a further case of inherited polydactyly in the fowl. The character has been named duplicate, since in extreme cases the foot and shank are doubled. There is considerable variation in this dominant character, ranging from an appearance similar to that of a normal five-toed race to an almost complete duplication of the foot. Matings between a homozygous dominant and a heterozygous individual gave 2 normals in 144 individuals, indicating that as in the classic type of polydactyly the heterozygous individual may not show the abnormality. From crosses involving duplicate and polydactyly, it is believed that duplicate is an allelomorph of polydactyly.

## Hybrids of the Maple

O. M. FREEMAN has crossed *Acer rubrum*, the red maple, and *A. saccharinum*, the silver maple (*J. Hered.*, 32, 11–14; 1941). The hybrids were intermediate in rates of growth between the parents and had a dense amount of foliage. The leaves of some of the hybrids have holes in the leaves corresponding in position to the deep sinuses of the leaf of the silver maple. Of fourteen plants which flowered, ten were

staminate and four were pistillate. The chromosome number of the red maple may be 36, 54, or 72, whereas the silver maple has 26 chromosomes. Several second generation plants are being raised.

#### Relative Position of Cell Walls in Developing Plant Tissues

THIS topic was discussed by E. W. Sinnott and R. Bloch on April 28 at the annual meeting of the U.S. National Academy of Sciences. In growing plant tissues the position of new cell walls is not fortuitous but has a definite relation to the position of walls already present in adjacent tissues. There are two main types of relative wall position: (1) Most commonly, a new wall avoids intersecting an old one at a point directly opposite the point of insertion of an adjacent partition wall, so that the walls alternate or 'break joints' and only three meet at a point. This type can best be studied in tissues where the cells are in parallel rows and all new walls are in one plane. In such cases the degree of avoidance can be shown graphically. (2) In certain tissues just the reverse condition occurs, a new wall being formed directly opposite the point of insertion of a previous one, so that four walls meet at a point. This is frequently found in the cortex of roots, in polyderm and in normal and regenerative periderm. Developmental studies show that the factors determining the position of the wall do so very early by controlling the position of the plate of cytoplasmic strands, or phragmosome, long before the wall itself is laid down. For this and other reasons the liquid film hypothesis, commonly invoked to explain the alternating type of wall position, is regarded as inadequate. The opposite type of wall position seems to be related to local changes in the character of the mother-cell wall. Apart from their bearing on the general appearance of plant tissues, these facts are of significance in problems dealing with tissue cohesion, the production of aerenchyma, and the number of faces of contact between cells.

#### The 'Great Dyke' of Southern Rhodesia

THE mystery of the geological structure of the 'Great Dyke' has been a challenge to geologists ever since 1870, when this immense intrusion was first recognized. A summary of our knowledge of the 'Great Dyke' has been given by B. Lightfoot in a recent presidential address (*Proc. Geol. Soc. S. Africa* for 1940; 1941) in which he suggested that geophysical methods might supply some of the missing information. As a result of this call for specialized research, O. Weiss and his colleagues have carried out gravimetric and earth-magnetic measurements (*Trans. Geol. Soc. S. Africa*, 43, 143-151; 1941). The gravity anomalies are the largest ever published over similarly narrow widths on any continent, their maximum being 46.7 and 54.0 milligals on the two traverses made. The evidence proves the existence of a heavy, slowly tapering and very deep linear core below the exposed rocks. The core has an average density of about 3.3, and it is considered to be peridotite or possibly pyroxenite. It is suggested that the name 'dyke' is not appropriate and that the term 'abyssolith' would more accurately describe this enormous injection. It is remarkable that over the core of the abyssolith no major magnetic anomaly has been found, indicating that the core contains no appreciable proportion of magnetic minerals. Since magnetite is abundant in the serpentines of southern

Africa, including those of the surface exposures of the abyssolith, the evidence supports the conclusion that serpentinization has not affected the core. Weiss suggests that the superficial serpentinization was due to hydration by waters of meteoric origin. It is to be hoped that similar geophysical exploration may be extended to the Bushveld Complex, with a view to the discovery of the location and structure of the feeder or feeders of that still more amazing assemblage of igneous rocks.

#### Radioactivity of Ocean Sediments

SINCE Joly's early investigation of the radium content of samples of deep-sea deposits from the *Challenger* Collection it has been known that such deposits are extraordinarily rich in radium, the concentration being four to ten times that found in average granite. Later work has shown that there is much less radium in ocean water and much more in the abyssal sediments than is appropriate to the uranium present in the same materials. C. S. Piggot and W. D. Urry have studied core samples of abyssal deposits, several metres long (*Amer. J. Sci.*, Feb. 1941). It is found that the high concentrations of radium are purely superficial and do not extend to any appreciable depth below the ocean bottom. At a point but a few metres down, the radium falls to a value which corresponds to the amount in equilibrium with the uranium present, an amount which is of the same order as that in ordinary sediments. Thus, there is no greater generation of heat by radioactivity over the ocean floor, to blanket the flow of heat from below, than there is in the continental rocks. Evidently there is some mechanism whereby radium, and also its immediate parent ionium, is abstracted from the ocean water, leaving most of the uranium behind. The ionium produces more radium, and the excess of these two elements in the bottom sediments, unsupported by uranium, eventually disappears. Various mechanisms that have been proposed to account for the abstraction—biological, chemical and physical (adsorption or base exchange)—are critically reviewed, and it is shown that while some are inadequate, others, notably the physical, have not yet been given the consideration they deserve. More data are essential before the problem can be solved.

#### Disintegration of Boron by Slow Neutrons

THE disintegration of boron by slow neutrons has been investigated by R. S. Wilson (*Proc. Roy. Soc., A*, 177, 382; 1941) using an ionization chamber filled with boron trichloride in conjunction with a linear amplifier. Evidence is found for two disintegration energies. Assuming that the greater energy release corresponds to the formation of the  ${}^7\text{Li}$  nucleus in the ground state and is therefore 2.99 Mev., then the smaller energy, which is released in about 93-94 per cent of the disintegrations, and is  $2.57 \pm 0.05$  Mev. An explanation is offered of the contradiction with the results of Maurer and Fisk. The  $\gamma$ -radiation associated with the reaction has been detected, and a rough measurement of its quantum energy has been made.

#### Magnet for Cosmic-Ray Cloud-Chamber Studies

THE design and characteristics of a magnet for cosmic-ray cloud-chamber studies were described by R. B. Brode on April 28 at the annual meeting of the U.S. National Academy of Sciences. The study

of cosmic-ray mesotrons requires a magnet that will appreciably deflect particles of an energy of  $10^{10}$  electron-volts. The operation of a Wilson cloud-chamber requires long periods of operation at constant temperature. The design and dimensions of a magnet for this purpose were determined by studies on small models. In the final magnet 5,300 pounds of steel were used in casting the yokes and 2,700 pounds of copper wire were used in the coils. To reduce the saturation in the steel, the poles were coned from a diameter of 18 in. to a diameter of 12 in. in ten inches distance. The front pole has a conical hole in it that permits the cloud-chamber to be photographed directly without the use of mirrors. The hollow centre of the front pole throws flux from the centre towards the outside so that the flux-density as measured in the illuminated plane of a cloud-chamber 30 cm. in diameter is constant to within 5 per cent. The coils were wound with No. 6 square double-glass-covered copper wire. The turns were cemented together with an air-drying binder. Cooling is provided by the circulation of water in four layers of copper tubing in each coil. Six kilowatts obtained from the direct-current supply system produced an average field of over 9,000 gauss. In spite of the large hole in the front pole the equivalent air-gap of the magnet is only 14 cm.

#### Experiments with Mesotrons in a Large Wilson Chamber

STUDIES bearing upon the production and disappearance of mesotrons have been made by R. P. Shutt and T. H. Johnson in a large Wilson chamber containing three lead plates. These were described by the latter on April 28 at the annual meeting of the U.S. National Academy of Sciences. Since the observational data consist of the directions and the densities of the tracks before and after the traversals, whereas the processes of interest occur within the lead plates and are not observed directly, the method is essentially statistical. A pair of mesons, originating in a lead plate with no visible particle entering above, would be evidence of the production of mesons by gamma rays, but no events of this nature have been observed although many would have been expected if the hypothesis were tenable that gamma rays in the upper atmosphere are the principal producers of mesons. The ratio of the number of slow mesons with dense tracks in the gas to the number stopped by the lead plates agrees with expectations based upon the ionization losses and gives no indication of other absorptive processes. The scattering of the mesons by the lead is also that predicted for the coulomb forces, and gives no indication of extraordinary forces acting between mesons and lead nuclei. If mesons are being stopped by processes other than ionization, the statistics obtained from 10,000 tracks traversing the lead are insufficient to put such processes in evidence, and it will be necessary to adopt a technique in which the individual events are observed directly in a dense gas. For this purpose the authors are constructing a cloud chamber 12 in. in diameter to operate at a pressure of 200–300 atmospheres. This chamber will be immersed in a transparent oil contained in a thick-walled steel tank. Photographs will be made through a thick glass window the size of the camera lens, and the chamber will be illuminated by arcs placed inside the tank. When filled with argon this chamber will have a cosmic-ray stopping power equivalent to 7 cm. of water or nearly 1 cm. of lead.

#### Phosphoryl Bromide

THIS compound,  $\text{POBr}_3$ , has previously been obtained with difficulty, some of the reactions leading to explosions. C. R. Johnson and L. G. Nunn (*J. Amer. Chem. Soc.*, **63**, 141; 1941) have found that phosphorus tribromide vapour may be oxidized rapidly yet non-explosively to the oxybromide by gaseous oxygen in the presence of nitric oxide. It is concluded that the oxidation is catalysed by  $\text{N}_2\text{O}_4$  and not by  $\text{NO}_2$ . The effect of various factors on the velocity of the oxidation was studied but the paper omits to give any practical details for the isolation of the phosphoryl bromide.

#### Gratings and Replicas for Astrophysical Research

AN account of the improvements made in reflecting gratings which have resulted in their adoption in place of prisms in the large spectrograph of the 100-in. telescope on Mt. Wilson and elsewhere was given by R. W. Wood on April 28, at the annual meeting of the U.S. National Academy of Sciences. Batteries of large replica gratings have been made and tested on the 18-in. K. Schmidt star camera on Mt. Palomar with excellent results, and 18-in. disks of glass are now in preparation which will carry elementary gratings 4 in.  $\times$  6 in., covering the entire aperture of the instrument. Excellent photographs of the spectrum of Arcturus were obtained in 10 seconds with a replica having 7,500 lines to the inch, covering a Schmidt camera of 3-in. aperture and 5-in. focus, and one of the ring nebulae in Lyra in 10 minutes. A new combination of two gratings and two prisms, covering the objective of a telescope, gives two spectra of each star, in coincidence, one above the other, and displaced in opposite directions by Doppler shift due to stellar velocities. Gratings of both types have been made giving as high as 85 per cent of the light in a single spectrum.

#### Reddening of Stars near the North Pole

THE scale of normal colours of the stars is based on observations of the stars in the North Polar Sequence. It is unfortunate but not irremediable that when these stars were selected as standards it was not known that interstellar absorption near the pole appreciably reddened their light. The 1938 report of the International Astronomical Union estimated this reddening to amount to 0.10 mag. A paper by Keenan and Babcock, however (*Astrophys. J.*, **93**, 64; 1941), suggests that at least part of the reddening is only apparent: that it is not due to absorption, but occurs because the polar standards have been classified from 1 to 2 spectral subdivisions too early. They reclassify on spectrograms taken specially for the purpose 75 stars in the polar cap, and compare their photo-electric colours with those of 37 bright stars of such high galactic latitude that they can be regarded as unreddened. The colour excesses thus found can best be represented by assuming that absorption does not set in until a distance of about 200 parsecs is reached, the reddening then increasing to 0.04 mag. at 400 parsecs. Nevertheless, the data do not preclude the possibility of an absorption coefficient increasing linearly with distance. Which ever interpretation is finally accepted, however, the paper makes available for future research a valuable list of polar standard stars the deviations of which from normal colour are now accurately known.