

Research Items

Population of Europe. Some comparisons of density and distribution of European population in 1720, 1820 and 1930 are made by Mr. J. Haliczzer in *Geography* of December 1934. The data for 1720 involve various calculations back from later years and contemporary estimates. Those for 1820 include census figures for most of the States of Western Europe but, as in 1720, no data of any value are available for the Balkan peninsula. In 1930 reliable census figures are used. So far as comparisons are valid, Mr. Haliczzer computes that the population in 1820 was 1.89 times that in 1720 and in 1930 it was 4.51 times that of 1720. Two centuries ago the population everywhere was sparse except in the Rhine valley, central Germany, the English plain and the Po basin. The regulating factor of chief import was then soil fertility, but the black soil area of southern Russia was almost empty. By 1820, the ranges between maximum and minimum densities were small, but industrialised areas were beginning to show marked increases. The peopling of the black earth region was beginning. By 1930 inequalities in density were very marked owing to industrialism, and in Russia the 'centre of gravity' of population had shifted south. A further estimate shows that in 1720 the 'centre of gravity' of Europe's population was about 45 miles east of Munich, in 1820 it was 14 miles east of Passau and in 1930 it had moved to 30 miles north of Vienna. In other words, it has shown a steady tendency to move east, thus decreasing the percentage of the whole population that inhabits western Europe. The total shift in two centuries is 124 miles.

Life-History of *Euphausia krohnii*. Miss Winifred E. Frost has described the occurrence and development of *Euphausia krohnii* off the south-west coast of Ireland (*Proc. Roy. Irish Acad.*, 42, (B), No. 3, 1934). Already in a previous publication (1932) she has considered the distribution of the larvæ of *Meganyci-phanes norvegica* and *Nyctiphanes couchii*, and the present paper is on the same lines. *Euphausia krohnii* is one of the species of euphausiids most frequently taken in these waters, and the adults occur in large numbers. It is interesting that Miss Frost finds the same number of furcilia stages which occurred in Mr. F. S. Russell's material from the Mediterranean (Lebour, 1926) and only these, three in all. No intermediate forms have ever been described, and this indicates the probability of the 'jumping' of several stages, which is apparently not unusual in deep-sea species. Eight cyrtopia stages are described which gradually lead to the adult form. This species is only found in waters of high salinity and is a typical oceanic species. Its normal habitat for living and breeding is on, and westward of, the Atlantic Slope. All the present material, with one exception, came from a depth of more than 100 fathoms, although some of the Mediterranean larvæ were found in only 17 fathoms. They are always found in water of a fairly high temperature. Breeding appears to take place almost throughout the year, with varying seasonal intensity.

Effect of X-Rays on a Sex Cell of Tobacco. In an investigation of the effects of X-rays in producing

mutations in *Nicotiana Tabacum* var. *purpurea*, Goodspeed and Avery (*J. Genetics*, 29, No. 3) treated the megaspore mother cells to radiation at about the time of the reduction divisions. The resulting progeny showed a large series of variations. One of these was crossed with the control and the offspring were bred through five generations. In this way were obtained from the descendants of a single X-rayed megaspore 14 derivative types, 7 of which bred true. These types differed from the control in habit, form of leaf, flower and capsule, and in colour of leaf and flower, some of the types being so marked that they would rank as varieties or even species. Two types shown to be due to different genes bore stigmatoid anthers, another had pointed capsules, while the leaves ranged from broadly ovate to elliptic and the flower colour from carmine to rose and orange-red. Cytogenetic analysis showed that at least five of the 24 haploid chromosomes had been altered. Chromosome fragmentations had occurred, leading to homozygous duplications and deficiencies, as well as translocations and gene mutations. Probably plants which are homozygous for a chromosome deficiency can survive because the tobacco is a polyploid species.

Sclerotinia Rot of Patwa in India. Patwa (*Hibiscus sabbdariffa*) is a fibre crop grown fairly extensively round the Pusa district of Bihar, India. It is sown with the monsoon rain in July, and is usually harvested for fibre in late October. A few plants to provide seed, however, are left until the end of February. The appearance of a destructive disease in December and January is therefore a serious menace to the continued propagation of the crop. Dr. B. B. Mundkur has studied this disease (*Indian J. Agric. Science*, 4, Part 4, 758-778, August 1934). The fungus attacks the flowering stem, causing brown patches or cankers to appear on the surface. Black sclerotia may also appear, and frequently are found in the seed bolls. They are about the size of Patwa seeds, but are easily distinguished by their colour. The causal fungus has been identified as *Sclerotinia sclerotiorum* (Lib.), de Bary. Ascospores are produced from apothecia lying on the soil in November, and can infect unwounded, healthy plants. The optimum temperature for growth is 22° C. Hand separation of sclerotia from harvested seeds, combined with deep ploughing to bury sclerotia which may lie on the surface, are the control measures recommended.

Advance of Glaciers. In a recent paper to the Royal Geographical Society (November 19) on "Threatening Glaciers", Prof. K. Mason reviewed the evidence available regarding the movement of glacier snouts in the Karakoram during the last twenty years. He believes that substantial advance of the snout follows a period of degeneration or retreat, and that the rate of advance is controlled by topography. After the advance the snout takes some time to settle and if unenclosed is liable to spread. The variations in the dates of advance of various contiguous glaciers suggests that the advances cannot be due to climatic cycles. With some glaciers, periodic rapid advances occur. Prof. Mason thinks that these advances are due to accumulations of ice in the

gathering ground either by avalanches, the advance of tributary glaciers or by normal snowfall. The accumulation is slow, and the outflow may be obstructed, but eventually the pressure becomes irresistible and the glacier advances. In discussing what could be done to mitigate disasters due to ice advances and associated floods, Prof. Mason believes the best plan is to study the intermittency of the glacier and so be able to predict its advance. If the causes are of the nature he suggests, no doubt the advances and retreats are rhythmical.

A Forgotten Indian Meteorite. In his presidential address to the Hyderabad Science Association in July last, Mohammad A. R. Khan, principal of Osmania University College, Hyderabad, directs attention to a recorded fall of a meteorite which was omitted from C. A. Silberrad's "List of Indian Meteorites" (*Min. Mag.*, 23, 290; 1932). The circumstances of the fall referred to were recorded at the time by Jahāngīr in his memoirs, of which several translations are available. The meteorite fell in one of the villages of the Jalandhar district, Punjab, in 1621 (30 Fawardin, A.H. 1030) and was brought to the Emperor Jahāngīr, who ordered a sword, a dagger and a knife to be made out of it. The sword-maker found that the meteorite broke to pieces under the hammer, whereupon he was told to mix it with some other iron. This he did, using 3 parts of meteorite to 1 of 'common iron', and made two sword blades, a knife and a dagger, and brought them to Jahāngīr, who found they cut splendidly. The fact that the swords had been made was known to James Sowerby, who, in 1820, published in the *Philosophical Magazine* an account of a sword which he had made in 1814 for Alexander, Emperor of Russia, out of a piece of the Cape of Good Hope meteoric iron. In this instance, the blade was made from the meteorite without any admixture of other metal. It has been suggested by H. Blochmann that the Jalandhar meteorite was a stony iron or siderolite, and not a true meteoric iron, since it broke to pieces under the hammer. Its weight is given as 160 tolas (about 2 kgm.). Mr. Khan has published his address in an abridged form hoping to induce some of his readers to inquire as to the present whereabouts of the swords made from this meteorite. In an appendix he has collected published accounts of a recently recorded fall of meteoric iron at Bahjoi, south of Moradabad, United Provinces, on the night of July 23, 1934. One piece, the only one so far recovered, weighs nearly 23 lb.

Infra-Red Spectrum of Iron. The production of photographic plates sensitive to infra-red light has been of great value in the study of this part of the spectra of both laboratory and other sources. It has also, however, emphasised the need for accurate wave-lengths which can be used as a comparison in this region. The iron arc is a very convenient source of comparison spectra for most types of work, but the wave-lengths in the infra-red have not been satisfactorily studied. This has now been remedied by Prof. H. Dingle (*Mon. Not. R.A.S.*, 94, 866) who has measured the wave-lengths of 68 lines between 8838 Å. and 10219 Å. The photographs were obtained in the first order of a 10-ft. concave grating, the overlapping second and third orders being used as comparisons for determining wave-lengths. The results are not proposed as ultimate

standards, but are probably correct to within 0.01–0.02 Å., and should be found of great value to those engaged in infra-red investigations.

Liquefaction of Helium. The liquefaction of helium, using the Joule-Thomson cooling effect, is ordinarily a costly process requiring large quantities of liquid hydrogen for pre-cooling. P. Kapitza (*Proc. Roy. Soc.*, Nov. 1, 1934) has succeeded in liquefying helium by adiabatic expansion, the expanding gas being made to do external work on a moving piston. The difficulty of lubricating a piston working at very low temperatures is surmounted by making the piston fit its cylinder fairly loosely. The loss of helium past the piston is reduced by making the expansion stroke very quickly, and the work is done against hydraulic pressure. The temperature is reduced in this engine to 10° K. and the gas is finally liquefied by expansion through a nozzle, using the Joule-Thomson effect. Liquid air only is used for pre-cooling and when the apparatus is working, 2 litres of liquid helium are produced per hour, with a consumption of 3 litres of liquid air (see also *NATURE*, 133, 708; 1934). This apparatus marks a very important advance in the technique of low temperatures.

Active Chlorine. Various workers have found that an abnormally active form of chlorine is produced by an electric discharge in the gas. E. J. B. Willey and S. G. Foord (*Proc. Roy. Soc.*, A, Nov. 15) have repeated and extended this work under more carefully defined conditions. No pressure change was observed when an enclosed mass of chlorine was subjected to the silent electric discharge in an ozoniser, and no special optical absorption could be detected in the treated gas. The chemical reactivity was tested in several different ways. A marked increase in the reaction with water was observed when the chlorine was activated by a silent or spark discharge. The chlorination of benzene, both substitutional and additional, was used in much of the work as an index reaction. It was found that the activity was not produced without the presence of a small quantity of impurity, possibly a trace of water or hydrogen chloride. The experiments on this point were inconclusive, but it was thought that the reactivity is genuinely due to chlorine and not to a reactive impurity.

New Methods in Stereochemistry. The purification of crude *d*- or *l*-borneol, obtained directly from natural sources or by reducing *d*- or *l*-camphor, usually falls into two stages: (a) the separation of borneol from isoborneol, and (b) the stereochemical purification of the resulting borneol. J. Clark and J. Read (*J. Chem. Soc.*, 1773; 1934) now show that crude *d*- and *l*-borneol may be effectively purified by a species of auto-catalytic process. Thus, a specimen of commercial *d*-borneol was converted into impure *d*-bornylacetic acid; the impure *d*-bornyl *d*-bornoxyacetate obtained by esterifying this acid with some of the original *d*-borneol yielded stereochemically pure *d*-bornyl *d*-bornoxyacetate when fractionally crystallised; and upon hydrolysis this ether-ester yielded pure *d*-borneol and pure *d*-bornoxyacetic acid. In a similar way, pure *l*-borneol and pure *l*-bornoxyacetic acid were prepared from a specimen of commercial *l*-borneol. The method permits also of the preparation of stereochemically pure *l*-camphor from commercial *l*-borneol.