

## RESEARCH ITEMS

## Blood Sugar Levels in the Bengal Famine

DR. M. L. CHAKRABARTY, at the Campbell Medical School, Calcutta, has measured the blood sugar in a series of starvation cases admitted to hospital during the recent famine. In a communication to *Nature*, he states that some surprisingly low figures were found; the lowest recorded was 20 mgm. per 100 c.c., and this case recovered under treatment. In a normal individual, definite symptoms of hypoglycaemia occur when the blood sugar falls below about 70 mgm. per 100 c.c.; but these starvation cases, although weak and lethargic, with profound depression of all bodily activities, never exhibited any of the typical nervous symptoms of hypoglycaemia in spite of their extremely low blood sugars. The absence of hypoglycaemic symptoms was probably due to the slow and insidious onset of the hypoglycaemia; in such cases of 'chronic' hypoglycaemia it seems that the nervous system has time to adapt itself to the low sugar level. Biochemical investigation of these cases is proceeding and the main interest so far is the demonstration that life can continue, albeit at a low ebb, with a blood sugar of only 20 mgm. per 100 c.c.

## Immunization against Malaria

H. R. JACOBS (*Amer. J. Trop. Med.*, 23, 597; 1943), working on immunization against malaria, has shown that, in ducklings, the subcutaneous injection of saline-insoluble residues of *Plasmodium lophurae*, mixed with a staphylococcus toxoid, give practically 100 per cent immunity to malaria. The substance used is "an extract of protamide plasmodial precipitate insoluble in saline solution". It appears that such plasmodial substances insoluble in saline contain antigenic material which is effective, and that by addition of bacterial toxin its efficacy could be increased sufficiently to give promise of a wider application. F. F. Schwentker and F. C. Comploier (*J. Exp. Med.*, 70, 223; 1939) have shown that a toxoid combined with a non-antigenic material served to make it antigenic. Jacobs does not claim that immunity is produced, but that effective protection against malaria is obtained; and he feels that the way is opened for the preparation of a good vaccine which will provoke an immunity so powerful that overwhelming doses of the parasites will be neutralized quickly.

## Poisoning by Tetrodon Fishes

WARREN HAROLD YUDKIN in an interesting paper discusses and summarizes information on the poisoning properties of the Tetraodontidae or puffer fishes (Tetrodon Poisoning. *Bull. Bingham Oceanographic Coll. Peabody Museum of Natural History, Yale University*, 9; 1944). Poisoning by various fishes belonging to this family has been known for centuries and much has been written about it, as is shown in the present paper. A certain amount of research has been done, especially by the Japanese on species of *Tetrodon*. These fishes are eaten to a large extent in Japan and a number of people die of poisoning every year. Macht and Spencer (1941) have recorded interesting work done on *Spheroides maculatus*, the Atlantic puffer. This fish has recently attained market status as a result of the increased utilization of 'trash fish'. Evidence is provided that toxic substances of many Tetraodontidae are located chiefly in the gonads and liver and may vary with the breed-

ing seasons. *Spheroides maculatus* has been eaten for some time in various regions, with few, if any, reports of ill-effects, and it is probable that when properly cleaned it is not ordinarily toxic. Experiments are now being conducted at the Bingham Oceanographical Laboratory on this fish to ascertain whether it can be toxic under certain conditions, and it is strongly recommended that similar detailed researches should be made in other localities.

## Diphyllobothriidæ in the South Wales Trout

FURTHER reference to the occurrence of larval stages of Diphyllobothriidæ in trout in South Wales and in the Dublin area (see *Nature*, Aug. 5, p. 185, and Aug. 26, p. 267) is made by K. Unsworth (*Brit. Med. J.*, 385, Sept. 16, 1944), who says that a full account of the life-cycle of the parasite found in the trout in South Wales will be published in the near future. The life-cycle has now been successfully completed experimentally in the dog, with *Cyclops* and the stickleback (*Gasterosteus aculeatus*) as intermediate hosts. Discussing the view of M. D. Hickey and J. R. Harris that cormorants and seagulls are the naturally infested definitive hosts of the parasite in the Dublin area, Unsworth suggests that the trout in South Wales were infested with two distinct species, one of which develops in an avian and the other in a mammalian host.

## Naked Pigeons

"PIGEON courtship, with its strutting, cooing and puffing out of feathers is an interesting performance. When there are no feathers to puff or to clothe the performer it becomes a ludicrously macabre travesty of a dance." L. Cole and R. D. Owen (*J. Hered.*, 35, 3; 1944) describe such a case which results from a simple recessive gene. The accompanying photographs suggest a complete picture of the Dodo in "Alice in Wonderland". The interest of the case is that all the normal reactions of attempting to fly, to parade before the female and to fight with the wings are present. As a result of the absence of feathers the birds do not retain the heat and must be kept in artificial warmth; they are infertile as males since they are unable to balance properly in mating. Artificial insemination has been successful, but is laborious. There was no inferiority complex shown by featherless pigeons and artificial clothing was deeply resented.

## Occurrence of Epilepsy in Cattle

A YOUNG brown Swiss bull showed signs of epilepsy at six months old. Tongue chewing, slight foaming at the mouth and collapse in coma were the chief symptoms. Injections of calcium gluconate relieved the symptoms in about fifteen minutes. F. W. Atkeson, H. L. Ibsen and F. Eldridge (*J. Hered.*, 35, 45; 1944) describe this case and the progeny derived from this bull. There were thirty-seven offspring, of which twenty-three were apparently normal, thirteen were epileptic and one died at birth. There are indications that this autosomal dominant is of recent origin. The attacks take place in the first two years of life; as the animal gets older, the intensity and frequency of the attacks varies considerably and in some cases may not be detected.

## Oxidation and Mechanism of Action of Mutagenous Factors

ACCORDING to the current biophysical theory, a mutation caused by X-irradiation is regarded as a



result of direct action of a secondary electron upon an atom in a genetically significant structure. Investigations undertaken by I. A. Rapoport in the Institute of Cytology of the U.S.S.R. Academy of Sciences (*J. Gen. Biology*, Moscow, 4, No. 2; 1943) suggest that the phenomenon may be more complex. It appears that the mutation effect of short-wave irradiation is due to the appearance in the irradiated cell of a substance inducing mutations. Such a substance is possibly ozone, formed in the cell from oxygen as a result of irradiation. Combined action of iron (in the larval food of *Drosophila*) and X-rays resulted in a marked increase in the percentage of mutations. This stimulating effect of iron on the mutation process cannot be explained on the basis of biophysical theory but it accords well with the fact that physiological action of ozone is stimulated by iron. The chemical action of X-rays and of the activated oxygen is similar in some respects. The disturbance of continuity of a chromosome thread due to irradiation may be compared with the rupture of ozonides at the site of the unsaturated bond. The presence of such unsaturated bonds in the chromosome would make it possible to interpret synapsis and crossing-over as phenomena of labile polymerization and depolymerization. Since very active forms of oxygen are formed regularly in the course of normal metabolism, they may constitute an important factor in a spontaneous mutational process.

#### Non-Coherent Scattering in Astronomy

A DETAILED review by Spitzer has appeared (*Astro-phys. J.*, 99, 107; 1944) of a paper by Houtgast of Utrecht on the variations in profile of strong Fraunhofer lines across the sun's disk, and some remarks are made (*ibid.*, p. 1) by the same author on the theory of non-coherent scattering, stimulated by Houtgast's work. The observational material in Houtgast's paper is by far the most extensive and homogeneous yet obtained; but divergences between the measured profiles and those previously published suggest the presence of systematic differences which may be instrumental or may be real, caused perhaps by variations in solar activity. The centre-limb variations found in the far wings of absorption lines are compared in turn by Houtgast with what would be expected for pure absorption, pure extinction and pure scattering. It is found that coherent scattering does not adequately represent the observations even qualitatively, especially in the ultra-violet lines, for which the absorption wings should vanish towards the limb and be replaced by emission wings close to the limb. It is therefore suggested that the dominant process in the formation of strong absorption lines is non-coherent scattering, a phenomenon which arises when the selectively scattered radiation is first captured in the usual way and then re-emitted with a slightly different wave-length, and which appears as pure absorption in the wings. Spitzer's own investigation shows that non-coherency may be expected to occur, partly or wholly, in the scattering process which forms almost all absorption lines of astrophysical importance. The effect of the process on line profiles is not very large: no major change in the curve of growth is to be expected, but the cores of strong lines will be sharper than predicted on the assumption of coherent scattering, especially away from the limb. This is in qualitative agreement with accurate profiles determined interferometrically for the *D* lines in the sun, and with the sharp cores of

the hydrogen lines in *A*-type stars. Further study of this almost unexplored field promises to be interesting.

#### Relation between Magnetic Storms and Solar Activity

C. W. ALLEN, Commonwealth Solar Observatory, Canberra, has described a statistical investigation of the influence of solar flares and sunspots on terrestrial magnetic storms (*Mon. Not. Roy. Astro. Soc.*, 104, 1; 1944). The magnetic data cover the period 1906-42, and up to 1937 international character figures were employed; during 1938-42, *K*-index daily sums were used. In the period 1906-43 there were 2,800 disturbed days, and these were divided into four groups on the basis of recurrence tendency, as shown in 27-day charts. There is some evidence to support the view that great magnetic storms are caused by chromospheric eruptions, the time interval between the eruption and the maximum of the great storm being approximately  $1\frac{1}{2}$  days. Eruptions are also responsible for some smaller storms with a  $2\frac{1}{2}$ -day interval. Smaller storms tend to recur at intervals of 27 days, which betrays their solar origin, and shows that there are regions on the sun's surface, known as Bartel's '*M* regions', not distinguished by any markings, which are associated with these minor geomagnetic disturbances. A period of about three days is required for *M*-region particles to travel from sun to earth. The *M*-region is considered to be an emission coming continuously from almost all the sun's surface, and constrained to move in streams by forces in the sun's atmosphere. The persistence and changes of the recurrent magnetic storms would then be due to the continuity of these streams. A close relationship has been found to exist between sunspots and coronal plumes, though the foci of the plumes do not coincide exactly with sunspots. While the plumes come from areas that in general surround or are close to group spots, the 1919 eclipse did not show this relationship, thus proving that the large groups and spots are not invariably connected with one another.

#### Meteor Observations during 1941-42

MOHD. A. R. KHAN (*J. Hyderabad Acad.*, Studies No. 6; 1943) has discussed observations during two years of shower meteors and exceptionally bright meteors. The shower meteors were the Quadrantids, Lyrids,  $\eta$  Aquarids,  $\delta$  Aquarids, Perseids, Orionids and Geminids. In 1941 the Quadrantids and Lyrids were extremely scarce, only one of each being observed, but the other showers were fairly active. In 1942 moonlight and other hindrances prevented systematic observation of the first four showers, and few of the meteors recorded during the Perseid and Orionid period belonged to either of these showers. In addition to some exceptionally bright meteors emanating from the showers referred to, 28 more were observed during the two years. In 1941 during a watch totalling 57h. 02m. over 114 nights, 914 meteors were seen, and in 1942 a total of 44h. 54m. was spent on 118 nights, during which 710 meteors were seen. The questions of persistence of streaks and of their colour and size are discussed. Dryness of the air, like clearness or dust-free conditions, seems to determine the visibility of enduring trains. The author's observations lead him to conclude that the drier the air is in certain regions the more likely will enduring streaks be seen. In addition to this factor, it is suggested that the electrical condition of the upper atmosphere is also important, because it is known that ionization plays a very important part in the development of meteor trains.