

## RESEARCH ITEMS

### Transmission of Leprosy by Ticks

ACCORDING to the *Journal of the American Medical Association* of November 28, Dr. H. Souza Aranjó, of the Oswaldo Cruz Institute, has carried out experiments showing that leprosy can be transmitted by the bite of common ticks. After repeating Max Rudolf's experiment showing that pupæ of *Amblyomma cayennense* show live bacilli in their intestine thirteen days after the last bite of leprosy patients, he described a new experiment with a cattle tick, *Boophilus microplus*, which was fed for a few days on patients in a leprosarium. Seven days after the last meal of blood the intestines of the ticks showed strongly positive acid-fast bacilli.

### Vitamin C in the Protozoa

ALTHOUGH the occurrence of vitamin C in the cells of higher plants is well known, the same cannot be said with regard to unicellular organisms, and G. Roskin and O. Nastiukova provide data on the subject (*C.R. Acad. Sci. U.R.S.S.*, 33, No. 8; 1941). No vitamin C has been found in free-living Infusoria, paramecia and Stentor, or in the parasitic Opalina and Nictoterus. When vitamin C was introduced into paramecia with food, it was not stored in the plasma but was liable to disintegration in the digestive vacuoles. On the other hand, vitamin C was found in the protoplasm of *Trypanosoma brucei*, where it was present in the shape of variously distributed granules. Observations on the changes in the quantity of vitamin C during the different stages in the development of infection of guinea pigs by the trypanosome have merely shown that such changes occur but more definite relations could not be established. When guinea pigs were injected with 0.01 per cent ascorbic acid, there was a sharp increase in the vitamin content of their trypanosomes. Thus, the trypanosomes may seriously disturb the vitamin balance of their hosts by consuming vitamins.

### Crayfishes of Florida

HORTON H. HOBBS, JUN., has published an important monograph on these freshwater decapods (*University of Florida Publications*, 3, No. 2; Nov. 1942. Biological Science Series). Its chief value lies in the fact that he has himself collected nearly all the species in the field and gives detailed notes on their habits, habitat and distribution. Apparently the migration of crayfish into and within the State must have taken place largely subsequent to early Pleistocene and is still in progress. The Florida crayfish all belong to the subfamily Cambarinae in the family Astacidae, and there are many groups and sub-groups showing numerous adaptations to a wide range of ecological conditions. Their natural relationships are described in detail. Forty-two species and sub-species are described, twenty-five of which are, so far as is known, endemic to the State. Among those of greatest interest are some cavernicolous forms. *Troglocambaris maclanei*, a new species belonging to a new genus, is peculiar in living, ventral side up, clinging to the ceilings of wholly submerged portions of underground waterways. The burrowing species are altogether the most numerous. The first pleopods of the male and the shape of the annulus ventralis of the female are the most important organs for taxonomic work. There are many plates illustrating these. Two forms of adult male are recognized, associated with the reproductive cycle. Seasonal

data of some of the species are given with records of eggs and young, but there are no descriptions of the young themselves, which presumably, as in all known Astacidae, cling to the pleopods of their parents by means of the first chela. With so many variations in the parents, one would like to know if the young show any important modifications.

### Mammalian Fauna of the Duchesne River

A PAPER on this subject was read by William B. Scott at the autumn general meeting of the American Philosophical Society during November 20-21. The Duchesne River formation has been known for a long time and was supposed to be merely the upper position of the Uinta, in which fossils are exceedingly rare. The Carnegie Museum of Pittsburgh has kept parties in the field collecting fossils from these beds. They have gradually accumulated a remarkable fauna which is of especial interest and importance as being intermediate in time and in character between the Uinta and the White River. The fossils are for the most part very fragmentary, but there are enough excellently preserved specimens to make clear the character of the fauna as a whole. Carnivora are rare and fragmentary, but there is one very interesting specimen which appears to belong to the sabre-tooth cats, and is thus the most ancient American example of this family, or sub-family, which persisted in the Americas until the end of the Pleistocene. The hoofed animals include horses, rhinoceroses, true camels, oreodonts and agriochærids. These latter families, so characteristic of North America and long extinct, are transitional between Uinta and White River forms. We have also the first of the White River type of brontotheres. The genus *Teleodus* is common to the White River in its lowest members. Other White River genera are the cursorial rhinoceroses *Hyracodon* *Hyaenodon*. The important feature of the Duchesne River fauna is this transitional character between Upper Eocene and Lower Oligocene.

### Cytoplasmic Inclusions in Virus-infected Plants

B. Kassanis and F. M. L. Sheffield (*Ann. Appl. Biol.*, 28, 4, 360; Nov. 1941) report new results from their studies upon the inclusions associated with virus-infected host plants. Striate material, amœboid X-bodies and raphides are the usual inclusions, and these workers have reached the important conclusion that the type of extraneous material formed depends largely upon the amounts of light and heat available to the host. The warm, sunny summer of 1940 brought the appearance of spike-like bodies which had not been seen for some years previously, and several new fibre-like and amorphous forms were also found. All the new types arose either directly or from pre-existing inclusions of the kinds already known. Tobacco mosaic, aucuba mosaic and enation mosaic viruses were used, and it was established that the variation of inclusion bodies was not due to mutation of the virus. A further point substantiating the discovery of inclusions in meristematic cells has been elucidated by Sheffield (*Ann. Appl. Biol.*, 29, 1, 16; Feb. 1942). She has demonstrated the presence of virus in growing points of stem and root by the successful inoculation of specially dissected primordia of tomato and tobacco infected with tobacco mosaic, and tomato with aucuba mosaic. Severe etch virus did not appear to enter the apical meristems of the tomato plant, for inoculation of tobacco with such primordia gave only negative results.

### Progress with Indian Fossil Plants

THE fossil *Azolla* is known from material showing both the organization of the plant body and the characteristic reproductive organs. A recent paper describes a new specimen of remarkable beauty ("Indian Silicified Plants—(1) *Azolla intertrappea*"), Sahni and H. S. Rao. By B. Sahni, *Proc. Ind. Acad. Sci.*, 14, 489; 1941). It is a megaspore seen in longitudinal section showing the frothy floats round its upper part, while below, the spore wall is covered by filamentous appendages to which a couple of the microspore massulae are anchored by perfectly preserved hooks. The whole preparation looks as distinct as an ordinary slide of recent material. *A. intertrappea* is considered a typical member of the sub-genus *Euazolla*, but distinguished from the living species by details of the massula hooks. Its age is probably Eocene, and it is the oldest, as well as most fully known, fossil member of the genus.

### Formation of Nicotine in Plants Grafted on Tobacco

SOME interesting experiments, throwing some light on the problem of the synthesis of alkaloids in plants, have been carried out by A. Shmuck, A. Smirnov and G. Ilyin (*C.R. Acad. Sci. U.R.S.S.*, 32, No. 5; 1941). When nightshade (*Solanum nigrum*) was grafted on tobacco, the scions developed well, came to flower and formed fruit; the nicotine content of the scions was considerable, though somewhat less than in normal tobacco plants. Tomato plants grafted on tobacco stocks deprived of their leaves developed into large plants, often more vigorous than the control tomato plants, and their nicotine content reached about 0.8 per cent of dry leaves. Even higher nicotine content, 1.5–2.2 per cent, was found in *Datura stramonium* grafted on tobacco stock. When, however, tobacco was grafted on nightshade, tomato or *Datura* stock, nicotine disappeared entirely from the resulting plant, which otherwise developed normally. The same happened in the case of tobacco grafted on tomato stock. These results show that the formation of nicotine by tobacco depends in some way on the root system and on the stem, and when both these organs are present, nicotine can be synthesized even by plants normally unable to do so.

### Effects of Altitude on the Chemical Composition of Cultivated Plants

EXPERIMENTAL sowings of various cultivated plants at altitudes ranging from 1,520 m. to 2,400 m., made by S. O. Grebinsky in the Alma-Ata district of Kazakhstan, produced somewhat unexpected results (*C.R. Acad. Sci. U.R.S.S.*, 32, No. 4; 1941). In the case of sugar beet cultivated at 2,000 m., there was more sucrose and less of the undesirable non-protein nitrogen than in the roots grown at 848 m. In peas, there was an increase in monosaccharides from 1.98 to 3.63, in sucrose from 2.65 to 5.56, and a reduction in ash from 6.77 to 3.45 per cent, when plants grown at 848 m. and 2,000 m. were compared. Tobacco (*Nicotiana rustica*) grown at 2,000 m. had 5.44 per cent nicotine, as compared with 3.58 per cent for tobacco produced at 800 m. Barley has shown a doubling of the average seed weight at high altitudes, while the grains contained less protein and more carbohydrates, which should improve the malting quality. The experiments suggest that many plants do better at higher altitudes, and provide a basis for large-scale tests which may make it possible to utilize high mountainous regions of Middle Asia for agriculture.

### Effect of Irradiation on Tradescantia

A COMPREHENSIVE quantitative analysis has been made of the effect of X-ray and neutron irradiation of chromosomes in microspores of *Tradescantia* by D. E. Lea and D. G. Catcheside (*J. Genetics*, 44, 216–245; 1942). Several important conclusions are drawn. Whenever a densely ionizing particle such as a proton passes through a chromatid, the latter is broken. A fast electron is unable to break a chromatid except by the tail of the track, which is highly ionized and may cause a break. About seventeen ionizations are necessary to cause a break. Between 40 and 100 per cent of isochromatid breaks (simultaneous breaks in sister chromatids at the same locus) persist in the cell, while only 10–15 per cent of the primary chromatid and 5 per cent of the primary chromosome breaks remain as such. Breaks which rejoin in the original form do so within  $3\frac{1}{2}$  minutes. Simultaneous breaks which may rejoin to form interchanges may be  $1\mu$ – $2\mu$  apart. Predictions can be made as to the effect of X-rays of different wave-lengths.

### Incompatibility in Solanum

PUSHKARNATH (*Ind. J. Genet. and Plant Breed.*, 2, 11; 1942) provides convincing evidence of oppositional factors for incompatibility in different species of *Solanum* which are closely related to the potato. All the diploid species examined were self-incompatible, whereas higher polyploids were self-compatible. Self- and cross-incompatibility in *S. Caldasii*, *S. Chacoense*, and *S. subtibius* is genetically controlled by five allelomorphs. Of the ten possible combinations of these five factors, eight groups have so far been identified and search is being made for the missing  $S_3S_4$  and  $S_3S_5$  groups of individuals.

### Shape of Pebbles

WHEN natural pebbles are used as an aid to geological history there is no means of knowing by what stages the individual pebble has reached its present shape. Under experimental conditions the changing shapes of one particular pebble can be examined as attrition proceeds under controlled conditions. Lord Rayleigh reports a series of such experiments (*Roy. Soc. Proc., A*, 181, 107; 1942). Chalk pebbles, initially shaped as prolate or oblate spheroids, were subject to the abrasive action of steel nuts, nails ('tintacks') and small shot. In general the axes tend to approach equality, but not rapidly enough for the spherical form to be reached before the pebble has disappeared. The form, initially spheroidal, becomes flattened at the poles just like the natural flint pebbles, and may become concave, as flints sometimes do. The abrasion is not merely a function of the local specific curvature, as the figure at other points is involved.

### Determination of Half-Value Periods

A NEW method of determining half-value periods between  $10^{-4}$  sec. and 1 sec., using a single Geiger counter, has been described by A. G. Ward (*Proc. Roy. Soc., A*, 181, 183; 1942). Using the arrangement the following half-value periods were obtained: actinium A ( $1.83 \pm 0.04$ )  $\times 10^{-3}$  sec., thorium A ( $1.58 \pm 0.08$ )  $\times 10^{-1}$  sec. and radium C' ( $1.48 \pm 0.06$ )  $\times 10^{-4}$  sec. The work had to be terminated abruptly in April 1940 and the paper has been edited by N. Feather, who gives references to two other papers describing similar circuits developed independently.