

## Research Items.

**SURVEYS IN SPITSBERGEN.**—In the *Geographical Journal* for November Mr. R. A. Frazer gives an account of some work which he did on the edge of New Friesland in company with Mr. N. E. Odell and Dr. T. G. Longstaff in August 1921. The party travelled north-eastward for about 25 miles from the head of Klaas Billen Bay into the highland ice of the interior. Crossing the watershed between the western and eastern drainage areas, they surveyed the salient features in a small area lying between the Mount Svanberg group to the south and the peaks around Mount Chernichev to the north. Weather and travelling conditions were bad, and time was short, but the work which was accomplished fills one of the gaps in the skeleton survey of the Russian Arc of Meridian Expedition of 1898-1902.

**DESICCATION IN THE LAKE CHAD REGION.**—In an article in the *Geographical Journal* for November on the Lake Chad region, Mr. F. W. H. Migeod returns to the much debated question of desiccation on the southern edge of the Sahara. According to Mr. Migeod there is abundant evidence of the advance of arid conditions southward into the belt of fertility in Bornu. The dry area has been steadily increasing at a great rate for at least three-quarters of a century, and apparently at a slower rate for many centuries. Mr. Migeod cites evidence from the drying up of rivers and ponds, but on the other hand he found no personal evidence of the exhaustion of wells in the part of Bornu which he visited. The evidence from changes in forest growth he does not find conclusive, but with regard to human migration, he points to the significant fact that every successive capital of the Bornu empire during the last six centuries has been south of its predecessor. The general trend of migration is southward, and whenever a new village is founded it is always in a position south of the previous site.

**PROBLEMS OF MENDELIAN RATIOS.**—Mr. R. A. Fisher gives an elaborate mathematical treatment (*Proc. Roy. Soc. Edin.* vol. 42, Part 3) of certain problems connected with Mendelian ratios. He concludes that the ratio of frequency of the various types in a Mendelian population will be stable only when selection favours the heterozygote, such factors only tending to accumulate in the stock, while other factors will tend to be eliminated. He also develops formulæ for determining the rate of mutation which is necessary to maintain the variability of a species under different conditions. We are not competent to discuss his mathematics, but some of his biological statements are perhaps open to criticism. For example, he assumes that recessive factors tend to be harmful or harmful factors recessive, whereas in man the majority of harmful factors are dominant. He also repeats the current fiction that the mutations of *Oenothera* are explained by the crossing-over of balanced lethal factors.

**ABSORPTION OF WATER BY ROOT AND STEM TIPS.**—Prof. Priestley and his students have now published the fourth in their series of studies on the anatomy and physiology of the endodermis and related structures in plants. The present contribution (*New Phytologist*, vol. 21, No. 4) considers the water relations in the growing root and stem tip. Experiments of de Vries in forcing water into roots were confirmed and extended, showing that the endodermis prevents leakage of water from the stele into the cortex. At the same time the meristematic root tip before the endodermis is organised was shown to be

impervious to water under ordinary pressures. This is apparently owing to the peculiar non-cellulose composition of the cell walls in this region, in contrast to the corresponding region of the stem tip. The impervious character of this region accounts for the failure of water-leakage from root tips, and is contrary to the views of a French worker who believes that the root tip below the root-hair zone is an absorptive region.

**COAL IN SOUTH AFRICA.**—Memoir No. 19 of the Geological Survey of the Union of South Africa, issued recently, forms the first volume of a study of the coal resources of the Union of South Africa compiled by Mr. W. J. Wybergh. The coalfields dealt with are those of Witbank, Springs, Heidelberg, and the coalfields of the Orange Free State; they are all described in considerable detail, numerous analyses are given, and the general character and properties of the coals are fully discussed. It may be of interest to reproduce the author's estimate of the existing coal resources of the Union, although, as he points out, considerable deductions may have to be made from these figures for losses in working.

Witbank Coalfield . . . . .	7,926,206,000 tons
Springs area . . . . .	485,000,000 „
Nigel area . . . . .	65,000,000 „
Vischkuil-Delmas area fairly proved . . . . .	218,400,000 „
Vischkuil-Delmas area conjectural . . . . .	1,411,200,000 „
Heidelberg South Rand area . . . . .	8,064,000,000 „
do. other areas . . . . .	965,544,000 „
Orange Free State above . . . . .	100,000,000,000 „
Total . . . . .	119,135,350,000 tons

**THE NEW BRAUN TUBE.**—Two years ago Mr. J. B. Johnson of the Research Laboratories of the Western Electrical Co., and the American Telephone and Telegraph Co., exhibited to the American Physical Society a Braun cathode ray tube operating at low voltage, and an abstract of a more complete description of the tube in its present improved form will be found in the September issue of the *Journal of the Optical Society of America and Review of Scientific Instruments*. The cathode consists of a strip of platinum covered with an oxide, the anode of a tube of platinum 1 cm. long and 0.1 cm. diameter, only 0.1 cm. from the tip of the cathode. Between cathode and anode is a metal shield with a small hole in it through which the electrons from the cathode pass. Beyond the anode are the two pairs of deflector plates at right angles to each other, which can be connected to the two sources of electromotive force which are to be compared. The electrons finally impinge on a fluorescent screen and their deflection is of the order 0.1 cm. per volt applied to the deflector plates. When the plates are replaced by coils, the same deflection is obtained per ampere turn in the coils. In the paper referred to, the hysteresis loop for iron in an alternating field and the characteristic curve for an oscillating valve tube are given. At the exhibition of the tube before the Institution of Electrical Engineers on November 16, the anode current and grid voltage curve of a valve was shown. As the cathode ray has to produce ionisation as it moves sideways, it is not possible to obtain a sharp spot at frequencies of more than  $10^6$  per second, but below that figure the slight pressure of mercury vapour in the tube ensures a sharp image. With the oxide cathode an electromotive force of 300 volts is sufficient to run the tube.