PALÆOMAGNETIC STUDIES IN THE U.S.S.R.

IN the U.S.S.R. intensive palæomagnetic studies began in 1953. Since that year three palæomagnetic conferences have been held and a special Palæomagnetic Commission formed at the Institute of Physics of the Earth. A special task entrusted to this Commission is the collection of palæomagnetic data for further studies and generalizations. One of the first comprehensive and detailed works on palæomagnetism in the U.S.S.R. was the memoir by Khramov¹ on the palæomagnetic correlation of sedimentary formations in Western Turkmenia, ranging in age from the Lower Jurassic to the Quaternary. Besides its main object this study opened up other problems, such as geochronology on a wider scale, the rate of sedimentary accumulation and the problem of the continental drift. In the introduction and in the first chapter Khramov gives a brief history of palæomagnetic research and a detailed description of the methods used. The last-mentioned subject has provided material for a special book written by Khramov and collaborators². Another important publication is that by Kalashnikov³, who begins by providing the general setting of the problem (pp. 1242–1257) and by giving a succinct review of the achievements in this field outside the U.S.S.R. This study, Kalashnikov claims, demonstrates beyond any doubt that there exists a definite functional relation between the orientation of magnetic vectors of rocks and their age. Many problems, however, such as the cause of reverse polarity and of the part played by the continental drift, remain still unsolved.

In the second part of this work (pp. 1257–1279) the author gives a most valuable summary of the results of palæomagnetic studies in the U.S.S.R. during the past decade. This summary consists of the tabulation of data relating to 111 collection localities, involving more than 5,000 oriented and measured specimens of rocks ranging in age from the Cambrian to the Quaternary. Against each locality item are given the values of declination and inclination of the magnetic vector and the calculated values of the co-ordinates of the North Pole. These data are then represented on eleven polar projections of the northern hemisphere, one for each geological period. The

average values of the positions of the North Pole during each period are used to provide a background for the construction of the polar migration curve. The greater scatter of points relating to the polar position during the Lower Palæozoic era necessitates the separation of the migration curve into two widely separated sectors, one based on the data of the European part of the U.S.S.R. and the other of the Asiatic part. The main migration curve with its European sector extension is in general alignment with the migration curve constructed on the basis of data from West European and British localities, but, as the summary diagram shows, differs widely from the migration curves based on American and Chinese data. This suggests the influence of continental drift. Such a world-wide marshalling of palæomagnetic data and comparison of the polar migration curves is a great achievement. At the same time Kalashnikov points out that to be fully acceptable these results must agree with the results of palæoclimatology and palæo geochemistry. He does not discuss the data of palæo geochemistry, but with regard to the data of palæoclimatology he claims that so far as the U.S.S.R. is concerned such a correlation has been achieved, as shown by the material published by Forsh and Khramov⁴, Rukhin⁵ and Strakhov⁶. Among problems still remaining unsolved are the problem of the continental drift, of the possibility that the Earth is increasing in size in time, of the velocity of polar migration and its variation in time (the average velocity of polar migration as calculated by Kalashnikov for the span of 500 m.y. is about 2 cm per annum). S. I. TOMKEIEFF

¹ Khramov, A. N., "Palæomagnetic Correlation of Sedimentary Formations", *Trans. All-Union Petroleum Sci. Res. Geol. Prosp. Inst., Leningrad* (1958).

² Khramov, A. N., Petrova, G. N., Komarov, A. G., and Kochegura, V. V., *Methods of Palæomagnetic Research* (Gostoptekhizdat, Leningrad, 1961).

³ Kalashnikov, A. C., "History of Geomagnetic Field (Based on Data of Palæomagnetism)", *Bull. (Izvestia) Acad. Sci. U.S.S.R. (Geophysical Series)*, No. 9, 1243 (1961).

⁴ Forsh, N. N., and Khramov, A. N., "Palæomagnetism and Palæoclimates on the Russian Platform in Carboniferous and Permian Periods", *C.R. (Doklady) Acad. Sci. U.S.S.R.*, No. 1, 137 (1961).

⁵ Rukhin, L. B., *Foundations of a General Palæogeography* (Gostekhizdat, Moscow, 1959).

⁶ Strakhov, N. M., "Foundations of the Theory of Lithogenesis", 1, *Pub. Acad. Sci. U.S.S.R., Moscow* (1960).

TROPICAL HÆMATOLOGY

AN international colloquium on "Tropical Hæmatology" was held at the Prince Leopold Institute of Tropical Medicine, Antwerp, during November 30–December 2.

The inaugural academic session was presided over by the Governor of the Province of Antwerp, president of the Administrative Council of the Institute, who welcomed the participants among whom were many foreign hæmatologists.

In his opening lecture, Prof. P. G. Janssens, director of the Institute, dealt with the perspectives offered by the proposed installation at Antwerp of university faculties; on the other hand, he emphasized the responsibilities of official bodies in the particular problems raised by the medical aid given by Belgium to the developing countries.

The Academic Lecture was given by Prof. J. Van Riel, of the Institute of Tropical Medicine, the subject being "The Great Steps of Progress in Public Health".

The first working session, presided over by Prof. J. Schneider (Paris), was concerned with tropical hyper-eosinophilias. This was discussed by Dr. A. M. Smit (Amsterdam), Dr. M. Fernex (Basle), and Profs. W. Mohr (Hamburg), A. F. Essellier (Zurich) and P. G. Janssens

(Antwerp). From the discussion it appeared that though many of the hypereosinophilias contracted in the tropics can be explained by helminth infestations, many cases remain enigmas. Infestations by parasites of which natural hosts are animals are responsible, at least in part, for the appearance of the syndrome. It was also emphasized that the eosinophilia of helminthiasis is a reflexion of the tissue mastocytosis found in these cases, in which allergy seems to play only a minor part (so-called 'resorption eosinophilia').

The second working session, with Prof. Mohr (Hamburg) in the chair, discussed blood groups and blood transfusion. Prof. J. Schneider (Paris) dealt with tropical diseases transmitted by blood transfusion; of these, malaria is the most frequent, the other tropical diseases being seldom or only very rarely transmitted by this procedure. Prof. J. Jadin (Antwerp) dealt with blood groups in Congolese. The pygmoids possess genetic ABO frequencies very different from the negroids. Certain negroid tribes seemed to have cross-bred with the pygmoids, especially in Kivu and in the north of Equateur Province.

The third working session, under the presidency of Prof. Lambin (Louvain), was devoted to the serum proteins of

haematological importance. Profs. G. Charmot (Marseilles) and R. Vargues (Tours) dealt with African macroglobulinæmias. They showed that, in Africa, macroglobulinæmia secondary to first stage trypanosomiasis, tuberculoid leprosy and to malaria is not uncommon. All their cases of macroglobulinæmia were confirmed by ultracentrifugation. Drs. G. Van Ros and M. Van Sande (Antwerp) and R. Druet (Usumbura) then discussed the serum haptoglobin and transferrin groups in White and Negro peoples as demonstrated by electrophoresis on starch gel. The frequencies of the genes determining these groups has been established as well as the existence of certain uncommon types in Negro peoples. It was also stressed that anhaploglobulinæmia was common in carriers of the sickle-cell trait. Finally, Drs. Van Sande and Van Ros also dealt with the value of agar-gel electrophoresis in haematology, especially in the determination of the types of haptoglobin and transferrin, and in the detection of abnormal hæmoglobins.

The fourth session, with Prof. J. H. P. Jonxis (Groningen) in the chair, was concerned with the investigation of foetal hæmoglobin. Prof. A. B. Raper (Bristol) mentioned the factors delaying the passage of foetal erythropoiesis to that found in adults. Prof. J. Sonnet and Dr. M. Michaux (Leopoldville) described in detail a case of persistence of foetal erythropoiesis in an adult, and Dr. G. Helderweirt (Antwerp) demonstrated that the detection, by a personal method, of Rh + foetal red cells in the

blood circulation of pregnant and delivered Rh - women enables us the better to understand and supervise Rh immunization during pregnancy.

The fifth session, presided over by Prof. A. C. Allison (London), discussed tropical anæmias. Prof. T. A. J. Prankerd (London) described two methods of detecting folic acid deficiency. One of these determines the concentration of folic acid in the serum using *L. casei*, the other measures the excretion of formimino-glutamic acid in the urine after the administration of histidine. Dr. H. R. Marti (Basle) reported observations made on the symptomatology of thalassæmia in 200 patients showing either the alpha- or beta-forms. Dr. H. Knüttgen (Hamburg) gave a report on the phagocytic activity of the cells of the bone marrow in malaria. Finally, Dr. H. M. Gilles (Liverpool) dealt with the epidemiological and clinical aspects of the anæmia caused by hookworms.

The sixth and last session, under the presidency of Prof. A. Dubois (Antwerp), considered the abnormal hæmoglobins (Hb). Prof. J. H. P. Jonxis (Groningen) described the molecular structure of these Hb's, and Prof. P. Boivin and L. Hartmann (Paris) their antigenic specificity. Prof. A. C. Allison (London) dealt with the relationship between the hæmoglobinoses and deficiency in erythrocytic glucose-6-phosphate dehydrogenase. Finally, Profs. E. Silvestroni and I. Bianco (Rome) described the varieties of human Hb and of thalassæmia reported so far from Italy.

G. VAN ROS

QUASI-CONTINUOUS OUTPUT FROM A RUBY OPTICAL MASER

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SEVERAL workers^{1,2} have observed that reducing the crystal temperature may suppress the relaxation oscillations (or spikes) in some ruby optical masers. As the fluorescence line-width narrows the energy is made available to fewer resonator modes, and the interval between successive spikes is progressively shortened until they merge and quasi-continuous output results.

We wish to report observations of a similar effect, but at room temperature and for quite different reasons. We have observed quasi-continuous output from a ruby optical maser oscillating with a very non-uniform distribution of energy along the length of the maser rod.

Our observations were made on a ruby rod 2.5 mm in diameter and 3.76(7) mm long, faced with spherical surfaces in what was to have been a near-confocal configuration. The radii of curvature of the reflecting surfaces were found to be 3.84 mm and 3.69 mm. The detailed optical properties of this crystal are not known. Such maser crystals are, of course, far from optically perfect³⁻⁵. The ruby was excited in the usual way by a linear flashtube in an elliptical cylinder reflector. Part of the emerging maser light beam was sampled by means of a beam splitter and directed to a fast-response photocell from which the temporal development was recorded. At the same time a magnified image of each face was photographed in turn (through a red filter to remove background light) with a single-lens reflex camera.

Fig. 1 illustrates the kind of temporal behaviour that was observed at room temperature, while Fig. 2 shows a corresponding set of photographs of the reflectors. It should be noted from Fig. 1 that, although the maser light fluctuates fairly strongly, its intensity does not approach zero for several hundred μ sec. Similar behaviour was observed both for input energies near threshold and well above threshold. Near threshold, where a few well-defined spikes might have been expected, the output lasted for 50 μ sec or less.

The photographs of Fig. 2 show the mode pattern at both ends of the maser rod. Maser light diverges from tiny areas on one surface to a broad area on the other surface and re-converges to conjugate points on the first surface. The maser modes are therefore cone shaped. Fig. 3 illustrates the situation.

Some features of these modes are somewhat puzzling. For example, the bright pairs of spots always occurred at the reflector of smaller radius of curvature, even for quite a variety of reflecting coatings. A possible reason for this preferred direction is that the reflector of greater radius of

Fig. 1. Time development of the output from the maser. *a*, Vertical scale arbitrary, horizontal scale 50 μ sec per division. The signal is due entirely to the maser radiation. The input to the flashtube is 180 joules (15 per cent above threshold); the pulse of pumping light lasts about 1 m.sec. *b*, Portion of trace under the same conditions as *a* expanded to 1 μ sec per division.