

structure which consists of two similar interpenetrating lattices. The frequency of the vibration of these two lattices relatively to each other is known from studies on light-scattering in diamond to have the high value of 1332 cm.^{-1} in spectroscopic units or in absolute measure, 40×10^{12} per second. It will be seen on examining a crystal model of diamond that an oscillation of the two lattices relatively to each other would cause a large variation of the structure-amplitude of the crystal for the [111] spacings. The frequency of the vibration is so high that

at the ordinary temperature its thermal excitation is negligible. The fact that the modified reflections are as intense as they are is thus explicable only on the quantum point of view.

In addition to the modified reflections, Fig. 1 shows other features of great interest, e.g., a diffuse halo falling off in intensity as the [111] reflections are approached and faint streamers stretching out obliquely from the modified reflections. Into the explanation of these features, we shall not here enter.

THE SEVERE MAGNETIC STORM OF MARCH 24, 1940

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A VERY violent magnetic storm was recorded by the magnetographs at the Alibag Observatory from $13^{\text{h}} 50^{\text{m}}$ G.M.T., on March 24, 1940. The duration of the storm was about 27 hours. In point of intensity, this appears to be the severest of all the storms recorded during the last 70 years. The only storms that approach the present one in severity are those of 13th May 1921, 7th July 1928, and 16th April 1938. In Fig. 1 are reproduced the Horizontal force and Declination magnetograms of the severe storm of March 24, 1940, as recorded by the Alibag instruments. The vertical force trace is unfortunately very faint and cannot be reproduced satisfactorily.

During the course of this storm considerable dislocation of telegraph traffic was observed by the Indian Telegraph Department in all their circuits. According to Reuter's news report, similar disturbance to telegraphic transmission was experienced all over the world. The storm played havoc with radio and cable communications in England. In New Zealand, the radio station could not re-broadcast the news broadcast from Britain. The most intense period of the storm as seen from the Alibag records was between $15^{\text{h}} 45^{\text{m}}$ and $19^{\text{h}} 3^{\text{m}}$ on the 24th March and the Reuter's report says that the United States suffered most severely during this period of the storm and that communications with Europe and South America were crippled for about five hours. The telephone and teleprinter circuits were also put out of action. Britain's overseas

radio and cable communications were severely interrupted.

A few days prior to the severe storm there was a gorgeous display of Aurora Borealis as far south as Bulgaria and also at Bologna in Italy. Aurora Australis is reported to have been observed in the southern hemisphere. No unusual activity on the sun was, however, noticed till March 24, the day of the severe storm, when seven large spots were reported to have been seen on the sun at the Heyden Planetarium, United States.

The Solar Physics Observatory at Kodai-kanal, on the other hand, observed a large sun-spot group approaching the central meridian on the morning of March 25, when the storm was still in progress. No other special solar activity was noticed at Kodai-kanal but the surrounding flocculus showed some bright points.

An examination of the magnetograms shows that practically quiet conditions prevailed from $20^{\text{h}} 5^{\text{h}}$ on March 20 to 6 hours on March 23. At $6^{\text{h}} 17^{\text{m}}$ on the 23rd, however, a moderate disturbance began with a marked "sudden commencement" and continued till $13^{\text{h}} 50^{\text{m}}$ on March 24, when the violent storm commenced.

CHARACTERISTICS OF THE STORM

The storm began at $13^{\text{h}} 50^{\text{m}}$ G.M.T., on March 24, 1940, with a sudden increase of 62 gammas in H, a change of $1.3'$ westerly in D and a fall of 10 gammas in Z. $15^{\text{h}} 45^{\text{m}}$ on March 24, marked the beginning of the most violent period of the storm. At

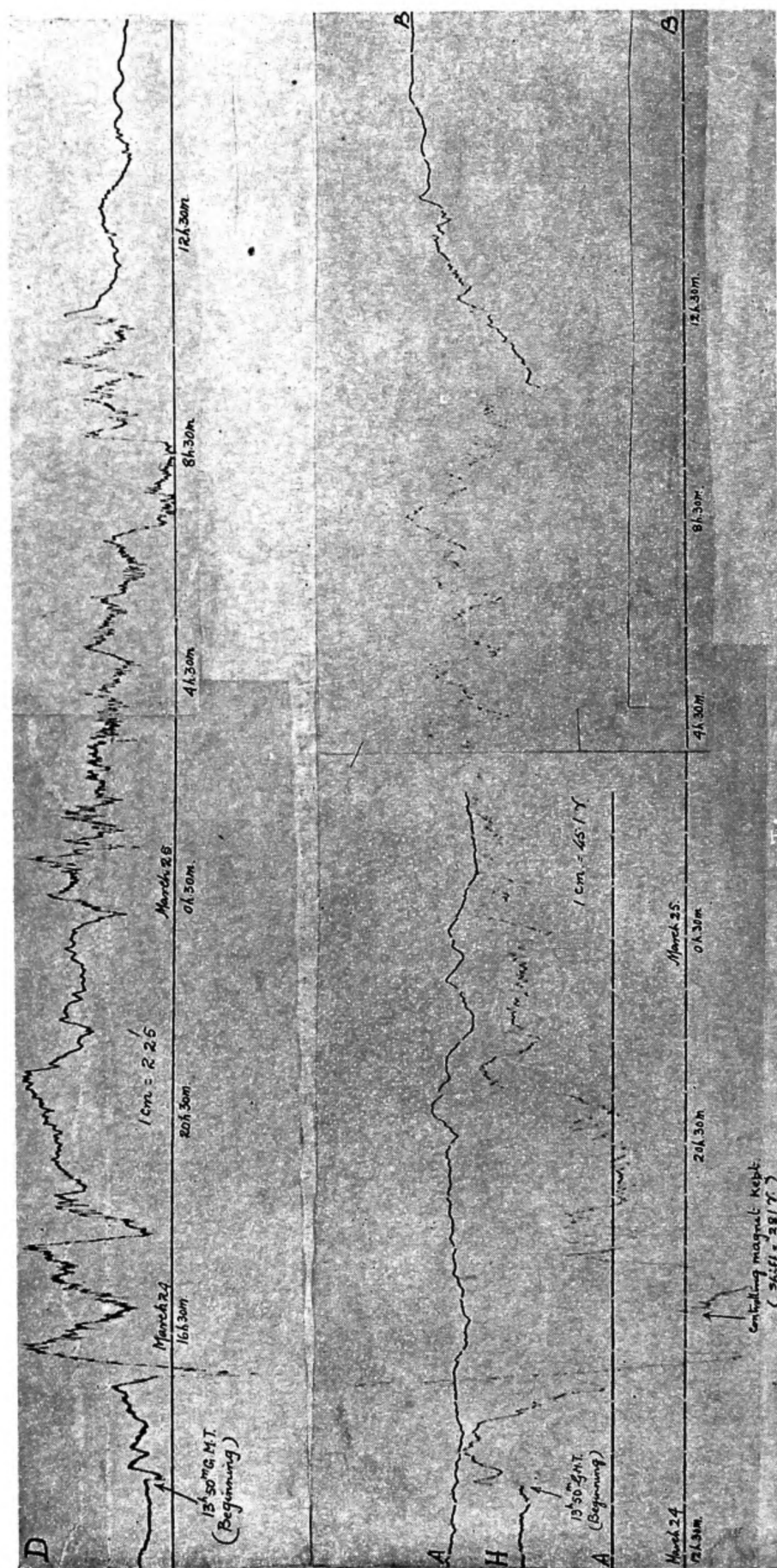


FIG. 1
The Severe Magnetic Storm of March 24, 1940, recorded at Alibag

this time, H and westerly D rose suddenly by 321 gammas and 8.3' respectively. The sudden rise of 321 gammas in H is so far the largest value of any instantaneous rise in H recorded at Alibag. Reaching its maximum value at 15^h 46^m H experienced a very sudden fall of 500 gammas in 36 minutes. At 16^h 33^m it fell so rapidly that it immediately went off the recording limit of the photogram causing a loss of record between 16^h 33^m and 17^h 8^m. Later on H was brought within the field by the use of a controlling magnet which shifted the trace by 281 gammas. After 32 minutes H fell further and the light speck was off the recording sheet again from 17^h 40^m to 18^h 4^m, in spite of the controlling magnet. During this interval H attained its minimum. Though the actual

value of the range cannot be determined due to the loss of the minimum outside the magnetogram, it is believed to exceed 785 gammas by a fair amount. The H range in this storm is the highest so far recorded at Alibag. The ranges in D and Z were 17 minutes and >100 gammas respectively but these limits have been exceeded on some previous occasions. Pronounced oscillations in H continued between 18^h 18^m and 19^h 18^m, when they became feebler. At 21^h 4^m, H rose with fluctuations till 21^h 56^m when it fell. Minor fluctuations continued till 0^h 3^m on March 25, when disturbed conditions reappeared and continued till 11^h 6^m after which a gradual return to pre-stormy conditions commenced. The storm ended at about 18.5^h on March 25, 1940.

PALÆOBOTANY IN INDIA

THE study of palæobotany in India on modern lines may be said to have begun in the year 1921 when Prof. Birbal Sahni, on his return to India after a distinguished career at Cambridge, started the Lucknow School of Palæobotanical Research. Due to his unbounded enthusiasm and under his able direction the study of palæobotany soon made rapid strides, with the result that during these 20 years not only has an enormous amount of valuable palæobotanical work been done by himself and his co-workers at Lucknow, but our interest in the study of fossil plants has been so successfully revived and stimulated that quite a number of other centres of palæobotanical research have come into existence in different parts of the country; and the total number of papers published year after year is rapidly on the increase. There has thus arisen the need for a suitable body to co-ordinate these activities, and we are glad to find that Prof. Sahni himself has taken the lead in the matter and has arranged to publish hereafter annual reports of the progress of palæobotanical studies in India; and in this task, he will be assisted by a committee composed of all the important workers in this field in India.

From a perusal of the first number of the Progress Report which is now before us, we are struck by the large number and variety of palæobotanical investigations now being pursued in India. As is only naturally expected, a large portion of this work is being

done by Prof. Sahni himself and his co-workers at Lucknow—Miss C. Virkki, R. V. Sitholey, K. Jacob, A. R. Rao and others—resulting in most valuable contributions to our knowledge of fossil floras in India, the importance of which has secured world-wide recognition.

The discovery in 1931 by Prof. L. Rama Rao (Bangalore) of fossil algæ in the Cretaceous rocks of South India revealed a new field of palæobotanical research in India, and from the Report now under review, it is seen that Prof. Rama Rao and his co-workers S. R. Narayana Rao and K. Sripada Rao have been making extensive and valuable contributions in this field. The rich algal flora which they have recently discovered in the Eocene beds of the Salt Range has provided a new wealth of material for study of great interest both from the stratigraphical and palæobotanical points of view.

A valuable collection of fossil plants from the Pleistocene Karewas of Kashmir recently made by de Terra, is being described by Mr. G. S. Puri (Amritsar). Over 90 species belonging to 48 genera and 24 families have already been determined, nearly all of them being similar to modern forms living in parts of Kashmir.

We welcome the Report as a most valuable publication and we have no doubt that under the inspiring leadership of Prof. Sahni, the study of palæobotany has a great future in this country.