

Ce rapide examen des rares données chronologiques obtenues en dehors de la Somme, permet, comme pour cette région, de constater que la théorie explique les faits, sans qu'aucune difficulté d'interprétation soit apparue (p. 128).

Every theory of this nature must be judged on two considerations: first, its physical basis must be sound, and secondly, there must be agreement between the theoretical deductions and the observed facts. As to the first, one can only say that while Blanchard devotes many pages to saying why we might expect the pole to react to the several perturbations of the orbit, he nowhere gives a convincing proof that it does so react. As to the agreement between the theory and the observations, no one but an authority on the prehistory of the Somme area could criticize the many pages of detailed discussion which Blanchard gives to this aspect of the problem. But even if we accept Blanchard's own conclusions quoted above, we must not forget that other com-

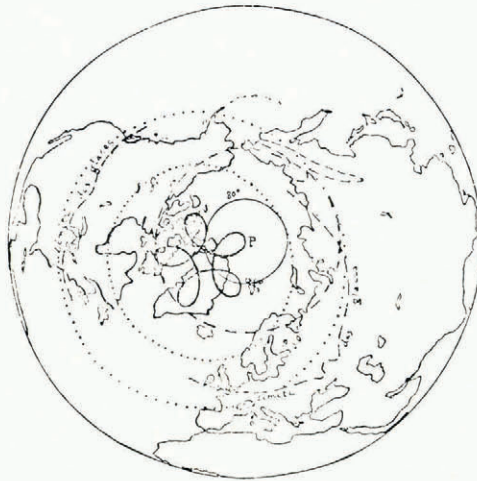


Fig. 1. Déplacements probables du Pôle Nord sur la globe, d'après les faunes

petent workers in this field<sup>2</sup> have shown equal skill in fitting the same evidence into Milankovitch's theory which, while being based on practically the same astronomical data, gives entirely different results both in time and space. G. C. S.

#### REFERENCES

1. Köppen-Wegener. *Die Klimate der geologischen Vorzeit*. Berlin: Gebrüder Bornträger, 1924.
2. Zeuner, E. *The Pleistocene Period*. London: The Ray Society, 1945, Fig. 33, p. 99.

GLETSCHERKUNDE. E von DRYGALSKI and F. MACHATSCHKEK. Vienna: Frank Deuticke, 1942, 17×24 cm., pp. 261, Plates 11 pp.

THE book is one of a series of an *Enzyklopaedie der Erdkunde*, just as was its forerunner, *Das Eis der Erde*, by H. Hess. The work may be regarded as a textbook of glacier science (*Gletscherkunde* has a less wide meaning than "Glaciology") and as such claims a considerable measure of success. But the authors wrote under the handicap of the war years, so that some of the more recent contributions to the subject are missing. Even the narrower *Gletscherkunde* embraces a big field and it seems desirable to give here the chapter headings into which the authors have divided it: I. The Region of Snow. The Snow Line. II. Glacier Forms. III. Glacier Economy. IV. The

Physics of Ice. V. Temperature in Glaciers and in the Inland Ice. VI. The Structure of Ice and of Glaciers. VII. The Movement of Glaciers and Inland Ice. VIII. Moraines, Drumlins and Glacioluvial Formations. IX. The Geographical Distribution of Glaciers. X. Glacier Fluctuations.

The general impression given is that the treatment, with perhaps the exception of the climatological section, is severely factual and that it omits discussion of the causes and mechanism of glacier phenomena. For example the chapter on Banding makes little attempt to account for the way in which the various glacier bands are formed. Forbes' Bands are mentioned practically without comment. It must be conceded, however, that to discuss the many theories and suggestions that have been put forward to account for glacier structures would fill a very large book indeed and might even be out of place in a textbook.

The index is not very full, a failing which is accentuated by the paucity of paragraph headings in the text. This is particularly unfortunate in a book which should assist reference. For the same reason the list of authors would have been more useful if arranged in alphabetical order. On the other hand, the bibliographies are good with the limitations mentioned earlier in this review. The photographs are excellent but all too few in number. The printing is clear and fortunately forsakes the Gothic.

In other respects, too, the work is excellent. No one has greater practical experience of glaciers in many parts of the world than von Drygalski and he has conceived his task on a broad geographical basis, neglecting no glacierized area, and has lent his ripe knowledge and great scholarship to produce a work of real importance.

G. S.

## ABSTRACTS

SHARP, ROBERT P. Soil Structures in the St. Elias Range, Yukon Territory. *Journ. of Geomorphology*, Vol. 5, No. 4, 1942, pp. 274-301.

The various soil structures in Wolf Creek are attributed to vigorous frost action supplemented by solifluction. Stone nets, stone garlands, stone stripes and earth hummocks are dealt with. Some of the soil structures are in process of development, others are thought to be of 100 to 4000 years old.

KLEBELSBERG, R. VON. Die Heutige Schneegrenze in den Ostalpen. *Berichte des Naturwissenschaftlich-medizinischen Vereins in Innsbruck*, Bd. 47, 1939-46.

The height of the snow line (*Schneegrenze*) is given as 2600 to 3100 m. in the eastern Alps, the lowest figure being in the Lechtal ranges and reaching its highest level in the Oetztal and the Litzner group. In a review of this work, the Editor of *Die Alpen*, Dr. Max Oechsli,\* comments that there should be a clear distinction between snow line (*Schneegrenze*) and firn line (*Firngrenze*) since the former may change from day to day, while the latter only varies at fastest from year to year. The firn line has little influence on the glacier economy.

SCHAEFER, VINCENT J. Properties of Particles of Snow and the Electrical Effects they Produce in Storms. *Trans. Am. Geophysical Union*, Vol. 28, No. 4, 1947, pp. 587-614.

Two types of atmospheric electricity were found to occur during storms. These have been related to specific forms of snow crystals and other properties which can be observed at ground stations. Measurement of velocity of fall, quantity and sign of electric charge, mass, range in quiet air, variety of crystal forms and other properties of single crystals are given. The fragmentation which results when snow crystals hit a solid at high velocity is described and illustrated with photomicrographs. The frictional electricity produced when crystals are broken as they hit a metal surface, when compared to the charge carried by falling crystals, is found to be more than a hundred times greater in some instances. Unusual amounts of atmospheric electricity recorded in fair weather are described and shown to be related to the passage of frontal systems and other meteorological phenomena. A

\* *Die Alpen*, Vol. xxiii, 1947, No. 7, II, p. 165.