Bloemfontein in the near future to act as assistant to Dr. Paraskevopoulos, the superintendent of the southern station.

HARLOW SHAPLEY

APPARATUS

WHILE we are polishing up our pronunciation of scientific terms why not smother the "rat" so frequently heard in ap pa "rā'" tus?

WILMER SOUDER

SCIENTIFIC BOOKS

Climate through the ages: A study of the climatic factors and their variations. By C. E. P. BROOKS. 439 pp., 39 figs. London: Ernest Benn.

THERE are two principal difficulties in the way of a satisfactory explanation of the great climatic changes of geologic time. In the first place, the problem is both meteorological and geological, and requires a command of both of these fields which is practically beyond the power of either the meteorologist or the geologist alone. Secondly, it necessarily rests upon a fragmentary and uncertain knowledge of past conditions, both of climate and physiography, which is often interpreted in very diverse ways by different students of the subject.

Both of these difficulties are illustrated in the latest excursion into the field by the distinguished British meteorologist, C. E. P. Brooks. Nevertheless, his book is one of the most valuable contributions to the problem that has yet appeared. Perhaps its most praiseworthy feature is its emphasis on the quantitative point of view, in contrast to the glittering generalities so prevalent in discussions of paleoclimatology. Even though this does in some cases result in an impression of mathematical exactness hardly warranted by the accuracy of the data involved, it certainly is a step in the right direction.

The book is divided into three parts, the first and longest being a discussion of "Climatic Factors and their Variation," the second dealing with geological climates and their causes, and the third with the climates of the historical past. Climates are broadly classified as "glacial" and "non-glacial," the distinction being based on the presence or absence of a polar ice-cap. It is clearly demonstrated that this factor is of paramount importance in determining the climate of a given period, and hence the classification into "glacial" and "non-glacial" climates is fully justified.

The discussion of the "critical temperature" which determines the expansion of a small winter-formed polar ice-cap into an ice sheet of continental dimensions is highly significant, and should be read by every student of climatic changes. It is shown that a very small fall of temperature—not more than 0.6° F.—may, under proper conditions, produce an ultimate lowering of winter temperature by about 45° F. The importance of this fact in the problem of Ice Ages is evident.

Wegener's hypothesis of continental drift is given considerable attention from a climatic point of view, the conclusion being that it is not necessary to explain even the low-latitude glaciation of Upper Carboniferous time, which Brooks accounts for by purely geographic factors. In spite of some very questionable assumptions, such as the figures for mean cloudiness and amount of solar radiation reflected from cloud surfaces, both of which are based on data applying to special cases, the argument is a strong one.

This dominance of geographic factors is the general theme of the book. While all climatic factors are recognized, and particular significance is given to volcanic dust and solar variations in special cases, the changing relations of land and sea, and the elevation of mountain ranges, with their resultant effects on winds and ocean currents, are shown as capable of bringing about even the major climatic fluctuations of geologic time. No resort to astronomic causes or to special hypotheses is necessary. In the case of historical changes of climate, which Brooks considers to be fully established, solar influences are given a prominent part.

The book is not without serious faults. It shows evidences of hasty and careless writing and insufficient proof-reading. The discussion on p. 75 is a hodge-podge of blunders, in which the direction of winds around a center of high pressure in the northern hemisphere and the direction of the Equatorial Current are both given incorrectly. The reason given on p. 182 for the vertical decrease of temperature gradient is also incorrect. No authority is quoted for the statements on pages 162 and 163 regarding the percentage of water in the Gulf Stream which reaches the Arctic Ocean and the melting of the ice floor in Spitzbergen about 3000 B. C. The figures on p. 166 and the diagram on p. 167 to which they refer are both wrong, leading to much confusion. Of p. 210 "windward" is used where "leeward" is meant. Other mistakes and omissions occur all too frequently.

Geologists will take exception to many statements in the book. Some of these, like that on p. 128, where the area of the Pleistocene ice-sheets is given as 1,000,000 sq. miles greater than the present area are inexcusable. It is far from true that "the accession of salt to the oceans is at present derived almost entirely from sedimentary rocks" (p. 93). Nor is there any adequate basis for asserting that deserts were extensively developed in southeastern United States during the Mesozoic (p. 273). The reference is presumably to the areas of Newark rocks, which

do not extend south of North Carolina and do not represent true desert conditions. The more southerly of these areas indicate distinctly less arid climates than those farther north, and even contain appreciable quantities of coal, which Brooks interprets as a product of equatorial rain forests.

It is perhaps too much to expect a meteorologist to be fully qualified to deal with purely geological questions, but when he ventures into a field in which geology plays almost as important a part as meteorology, the active collaboration of a geologist of recognized standing would appear to be a highly desirable safeguard. It would at least prevent such violence to terminology as the indiscriminate use of the word "period" to describe any and all intervals of geologic time, from "Mesozoic period" to "Pliocene period."

Although marred by too frequent errors such as those mentioned, the book is nevertheless a remarkable and highly valuable work. A prodigious amount of labor has gone into its preparation. It is to be hoped that it will have a salutary effect on those who see in new and fantastic hypotheses the only solution to the problem of geologic climates.

MALCOLM H. BISSELL
CLARK UNIVERSITY

SCIENTIFIC APPARATUS AND LABORATORY METHODS

A METHOD FOR CUTTING GLASS TUBING

READING the note by Herman E. Seemann on a "Method for Cutting Glass Tubing," SCIENCE No. 1726, I have remembered a method used to the same effect at laboratories of the University of St. Petersburg, Russia.

By means of a fine triangular file a circular furrow used to be made around a tube and then a melted glass stick applied to the cut in such a way as to press melted glass into the furrow. Usually the tubing cracked immediately and very regularly following the direction of the cut. Rather seldom it was necessary to apply melted glass repeatedly. The method, so far I am able to remember now, never failed and gave everybody a complete satisfaction. Especially it was used to open heavy glass tubings containing some preparation for analysis, for example, minerals or rocks under great pressure heated for a number of hours with sulfuric acid in a closed tubing. Any other method of cutting, for example, the one offered by Hermann E. Seemann, might not be applied in this case.

A furrow might be rather shallow, about a half of a millimeter was found quite sufficient, but has to be made accurately without lateral incisions even short ones. The whole operation, including the making a furrow, used to take less than a half of an hour even in the case of heavy tubing of a large diameter.

I. P. TOLMACHOFF
CARNEGIE MUSEUM,
PITTSBURGH, PENNSYLVANIA

A PLATINUM SPOON FOR ISOLATING AND TRANSFERRING PROTOZOA

IT is often desirable in investigations on protozoa, especially in those concerning life-histories, to secure the animals free from other organisms and detritus. The use of the capillary pipette in isolating organisms is very satisfactory in most cases if the animals are sufficiently washed. The author has experienced considerable trouble in washing to eliminate all other organisms. In an attempt to obviate this difficulty he has found that if only a few specimens are required, the instrument described below (Fig. 1) has some advantages over the pipette.

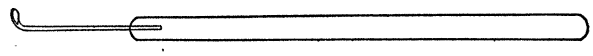

FIG. 1

The tip of an ordinary platinum bacteriological needle is flattened so as to form a circular disk about .2 mm. thick and .5 mm. to 1 mm. in diameter according to the needs. The surfaces and edges are then smoothed off so that the animal will not be injured. With a stylus or some other blunt instrument a depression is made in one of the flat surfaces of this disk forming a concavity, holding just enough water to cover the individual to be isolated.

The spoon is used as follows: A specimen desired for isolation is selected and if lying on the bottom of the dish, the instrument is lightly passed beneath it, then with a jerk it is brought to the surface by the currents produced; the spoon is now placed directly under the individual and gently raised through the surface film. In this way one can transfer active as well as sluggish animals, *e.g.*, didinia, paramecia, amoebae, etc. With a little practice specimens as small as 150 micra can be isolated under the low and high powers of the microscope.

The use of the instrument has the following advantages: It can be easily and thoroughly sterilized, a thing which is often desirable in protozoan studies; it is not fragile, an item of considerable importance as a labor saving device; and lastly, such minute quantities of fluid are transferred with the animals that the effect of it on the new solution becomes negligible after a few transfers and the possibility of contamination less.

PERCY L. JOHNSON
THE JOHNS HOPKINS UNIVERSITY