SCIENTIFIC BOOKS

The Origin of Continents and Oceans. BY ALFRED WEGENER, 1922. (Translated from the Third German Edition by J. G. A. Skerl, New York, 1924, E. P. Dutton and Co.)

THIS book is a translation of the well-known publication by Professor Alfred Wegener, of the University of Graz, Austria, "Die Entstehung der Kontinente und Ozeane."[1] (Vieweg, 1922.)

Since the first presentation of Professor Wegener's theory of continental sliding, in 1912, European geologists have given it considerable attention. In North America, however, it has remained essentially unknown, and the publication of this translation is to be welcomed for the opportunity it will give American geologists to study the theory for themselves.

In short, the theory postulates the existence of only one continent on the earth up to Permo-Carboniferous time, when it began to break up into the present continents, North and South America sliding westward from Europe and Africa, and Antarctica and Australia sliding southward and southeastward—leaving the Indian Ocean in their wake. The movement has been more or less continuous up to the present and has progressed, of course, at a very slow rate. Labrador and Greenland have, according to the theory, been separated from northern Europe since the maximum extension of the Pleistocene ice cap. It is even held that longitude observations reveal a present westward drift of Greenland, and this point, together with similar data for other places, constitute part of the more important evidence.

An important feature of the theory is the wandering of the earth's axis of rotation with respect to the continents. (Whether there has been a change of the axis within the body of the earth is left an open question.) In Permo-Carboniferous time the south pole was situated at the southeastern extremity of Africa. Thus, with one orientation, the author accounts for the Permo-Carboniferous glaciation of South America, Africa, India and Australia (which were clustered about South Africa at that time), also for the tropical coal basins arranged along the Permo-Carboniferous equator, and likewise, for the desert regions, as shown by the "red beds" which were formed 20 to 40 degrees north of this equator. The positions of the poles are also established from Silurian time to the present, though the evidence, for other geologic periods than the Carboniferous, is not so definite and hence the determinations are more tentative.

The theory is a natural outgrowth of unreserved acceptance of a condition of perfect isostatic balance for the earth's crust. Without the isostatic foundation the "displacement" theory, as it stands, could by no means have been developed. It is postulated that somewhat "rigid" continental sheets (sial), which are about 100 kilometers thick, float in a more viscous, basaltic stratum (sima), which is exposed on the ocean bottoms, and which is thought to extend to a depth of about 1,500 kilometers. Gravitational and tidal forces are supposed to set up differential stresses sufficient to cause movement of the continental blocks through the less rigid "sima."

Evidence for the former union of continents consists of material taken from various fields, such as the matching of geological formations and intrusive bodies on opposite sides of the continental rifts, comparison of living faunas and floras, assembling and correlating the facts of paleoclimatology, together with facts drawn from the fields of geophysics and geodetics.

The displacement theory seems to be especially weak in its excessive demands on the very small forces available to produce sliding of continental masses. It is likewise apparently on very insecure ground when it attempts to draw, from the facts of Pleistocene glaciation, evidence for the very recent separation of North America, Greenland and Europe. Most American geologists will also believe that Professor Wegener is without sufficient foundation in his extreme acceptance of a fluid and viscous earth. Moreover, a careful review of the evidence for a westward drifting of Greenland by Sir Charles Close (*Geographic Journal,* Vol. 63, p. 147, 1924), has resulted in his finding that the evidence available at present is inconclusive, and that another exact determination of longitude at one of the Greenland stations, in about ten years, by means of wireless signals, should settle the question.

Even though the theory is highly heterodox in the eyes of many American geologists, the book is, nevertheless, an able presentation of the subject. A great number of very suggestive facts have been marshalled in support of this interesting doctrine. Considerable leeway is, in all fairness, to be allowed the author in the presentation of such a revolutionary conception.

A large European literature has already grown up around this hypothesis and, in America, Coleman, Daly and Washington[2] have recently contributed to the discussion.

[1] A contributory volume has lately been published by W. Köppen and the author ("Die Klimate der geologischen Vorzeit," Berlin, Borntraeger).

[2] Coleman, A. P., "Ice ages and the drift of continents," *Amer. Jour. Sci.,* Vol. 7, 1924, pp. 398–404.

Daly, R. A., "The earth's crust and its stability," *Amer. Jour. Sci.,* Vol. 5, 1923, pp. 349–371.

Daly, R. A., "Decrease of the earth's rotational velocity and its geological effects," *Amer. Jour. Sci.,* Vol. 5, 1923, pp. 372–377.

Washington, H. S., "Comagmatic regions and the Wegener hypothesis," *Jour. Wash. Acad. Sci.,* Vol. 13, Sept., 1923, pp. 339–347.

The translation has been very carefully made. In fact, the degree of literality is, in many places, so great that good English usage is not found. This is, however, probably to some extent intentional on the part of the translator, for the sake of exactness in presenting the author's views. Mr. Skerl has done a valuable piece of work in presenting this translation to English-speaking investigators.

FRANK A. MELTON
COLUMBIA UNIVERSITY

SCIENTIFIC APPARATUS AND LABORATORY METHODS

REGELATION AND LOW TEMPERATURES

EVERY year we show the freshman class in physics that a loaded wire will cut through a block of ice leaving the block intact. Every year the students read the insufficient discussions in their text-books (there is one recent text that does explain fully), most of them not getting beyond "The pressure melts the ice." If pushed for a further analysis, they say that the energy to melt the ice comes from the descending weight, and they accordingly conclude that the cutting of the block would go on at any temperature.

After several years of arguing, finding the students uniformly unconvinced and even the instructors often doubtful, and never in the whole time having met an inquirer who had seen the experiment tried at low temperatures, I decided to bolster up "I can see, with my mind's eye" with "I have seen with my own eyes."

A rectangular block of ice, taken from the refrigerator and treated in the usual manner, was cut through by the loaded wire in forty minutes. The whole apparatus was then put out of doors for several hours and then the wire loaded as before. During the eighteen hours that the experiment was continued the temperature of the surrounding atmosphere varied from 0° Fahr. to −20° Fahr. In that time the only effect of the wire on the ice was a mechanical chipping out of a bit at each of the sharp upper corners of the block. Across the top of the block the wire touched only the highest points and even there produced no observable effect.

This experiment is reported as just one more instance where the time and energy required to make the convincing test is but a small fraction of the time and energy spent in fruitless office-chair debate about how nature ought to operate.

HARLEY E. HOWE
CORNELL UNIVERSITY

SPECIAL ARTICLES

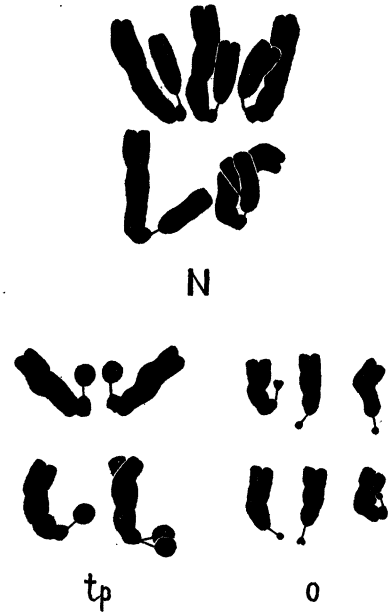
THE S-CHROMOSOMES IN ORNITHOGALUM L.

As my paper on the chromosomes of the Ornithogalum, which I wrote in 1923, is not yet printed, I should like to publish a preliminary note concerning the chromosomes possessing satellites,[1] which I call chromosomes S.

In 1915 D. J. Persidsky found in *O. umbellatum* L. satellites of a length hitherto unknown. This discovery was made in the laboratory of Professor S. G. Nawaschin and remains unpublished. When, in 1921, I began the investigation of other species of Ornithogalum, I found that in them there are also chromosomes with satellites—one pair of such chromosomes in each diploid nuclear plate of each species. The length of the satellites was, however, found to be very unequal in different species. The same can be stated also about the length of the "body" itself of the chromosomes S. Nevertheless, I take it for certain that the S-chromosomes of one species are homologous with the S-chromosomes of the others.

The S-chromosomes are easily distinguishable and therefore very convenient for comparative studies.

In Fig. 1 are represented the S-chromosomes of three species: *O. Narbonense* L. (N), *O. tempskyanum* Fr. et Sint. (tp) and *O. oligophyllum* Clarke (o).



The satellites of *O. umbellatum,* studied by D. J. Persidsky, are still longer than those of *O. Narbonense.*

The lengths of all the other chromosomes of Ornithogalum are also unequal in different species, and

[1] See Tischler, G., 1922. Allgemeine Pflanzenkaryologie, Berlin, Borntraeger, pp. 526 and 632.