mixed membership, however, the British Association is in a different—and also more difficult—position. Interpreters are needed, if not in the Section rooms themselves, then in the public press. Leading newspapers prefer that their own correspondents or contributors should perform this function, but there are many others which would gladly make use of notes and articles on scientific subjects suitable for the general reading public.

In the United States an institution entitled "Science Service" was established a year or so ago to provide such popular articles as a scientific news syndicate, and it now supplies about fifty American newspapers, and several in Canada and other parts of the world, with news Bulletins sent from Washington every day except Sunday. "The first consideration in a Bulletin story," says a circular of instruction to writers of articles, "is to tell of or interpret a scientific event. But the news stories must be so well written that large national newspapers will use them without rewriting or revision, either in form or language. Write your story so that those who know nothing about science will understand and want to read it. Weave in the scientific background that the man in the street does not have. Use simple words. Make your story as graphic as if you were talking about it." It is pointed out, in addition, that " 'By Science Service' must stand for accuracy of content and implication."

In order to establish this publicity agency for science, a generous benefactor gave a large sum to a Board of Trustees which includes among its members several of the most distinguished men of science in the United States. The whole field of scientific activity everywhere is covered by "Science Service," and the Bulletins are first-rate examples of what can be done to present scientific progress in popular and yet accurate form. We understand that the demand for the Bulletins from newspapers is now sufficient to make this admirable news agency practically self-supporting.

Here, then, we have an excellent example of what can be done successfully for the popularization of science; and it is obvious that the constitution and methods of such an organization are very different from those of the British Association, though the aims of both are "to promote general interest in science and its applications." We believe that the National Union of Scientific Workers contemplates establishing a similar scientific news agency to that of "Science Service," and a beginning has already been made by the British Science Guild by the issue of Publicity Pamphlets sent to the newspaper press for reproduction in whole or in part without payment. Since January, 1921, the Engineering Foundation of New York has been issuing a series of such "Research Narratives," each containing the story of some research, discovery or notable achievement in science or engineering. In one form or another these narratives have found their way through practically the entire range of the public press in America as well as the technical journals.

It is clear, therefore, that we in the British Isles are much behind the United States in the provision made for publicity for science. Our scientific societies are second to none, and the number and value of papers published by them are higher now than ever they were, yet no adequate agency exists to extend the knowledge of this work beyond scientific circles and thus to create in the public mind a feeling of pride in our scientific achievements. A great opportunity awaits the benefactor who will provide a liberal sum to establish a British science publicity service comparable with what has proved so effective in America. Political, social, religious, temperance, labor and scores of other organizations regard it as a duty to carry on their propaganda by means of leaflets and like publications, but science is content to keep its message to itself. It is no wonder, therefore, that the community understands so little of the value and meaning of science. Let us hope that means will soon be forthcoming to establish a bureau which will not only make the proceedings of annual meetings of the British Association widely known and easily intelligible, but will also, throughout the year, continue to interpret scientific advances to a world eager to learn of them but unacquainted with the technical vocabularies in which they are commonly expressed.—*Nature*.

SCIENTIFIC BOOKS

World Weather, Including a Discussion of the Influence of Variations of Solar Radiation on the Weather and of the Meteorology of the Sun. By HENRY HELM CLAYTON. 8vo. New York, The Macmillan Co., 1923. Pp. XX, 393; Figs. 265; Pls. XV.

"WORLD WEATHER" embodies the results of the author's investigations, study and thought during his association of more than twenty years with the Blue Hill Observatory, and, more recently, during his term of service as chief of the forecast division of the Argentine Meteorological Office. Those who have followed Mr. Clayton's writings throughout this time will see in this volume the careful elaboration and critical analysis of many of the views which he first announced a good many years ago. "World Weather" is far more a discussion of certain selected topics in meteorology than it is a general text-book of that science. In fact, it is not a text-book at all, in the ordinary meaning of that term. It is true that there is a consideration of certain general matters such as

moisture, clouds and rainfall, for example, and of sky colors and the "visible signs of the sky and air," with brief mention of other well-known meteorological phenomena. In the main, however, the plan of the book is quite different from that with which teachers and students of meteorology are familiar.

The fundamental idea, as the title indicates, is world meteorology, and it is the larger aspects of the subject which are stressed. The usual discussions of the composition of the atmosphere; of the ordinary instruments; of isothermal charts; of the characteristics of the surface winds; of the distribution of the mean annual rainfall, etc., are lacking. As we see it, "World Weather" is suited for the use of the teacher and the advanced student of meteorology; of the physicist and astronomer with an interest which reaches somewhat beyond the narrower limits of their own sciences; of the intelligent reader who, knowing something of meteorology, wishes to enlarge his vision by acquaintance with some of the new researches in the mechanism of the atmosphere which promise so much for the future. While much of the book can be read easily and rapidly, there are many parts of it which, in order to be fully understood, need careful study.

The real purpose is to bring out the relations between the variations of solar radiation and terrestrial meteorological conditions as Mr. Clayton sees them, not only in connection with forecasting for a week ahead, which he himself carried on successfully in Argentina, but also in connection with various more or less well established periodicities in weather and solar phenomena. In the introduction the author distinctly states his conviction that the "newer researches . . . indicate that the time is near at hand when weather changes can be anticipated so far in advance as to save much of the loss and distress which now follows in the wake of the unexpected adverse conditions." Mr. Clayton believes that without solar changes "there would result a balanced system of atmospheric changes such that the same conditions would return year after year at the same time of day and at the same time of year." He believes that the irregular changes which we call weather result chiefly, if not entirely, from irregular changes in solar radiation. Not only so. Our author also attributes long-period changes of temperature and of rainfall, occupying several decades or even centuries, at least in part to solar changes. Even glacial epochs may have been due to great increases in solar radiation, which would have intensified tropical rainfall, the oceanic cyclones and the continental anticyclones of high latitudes, thus bringing about lower temperatures over the high latitude land areas.

A detailed explanation is given of the method of forecasting in Argentina on the basis of the observations of solar radiation made by the Astro-Physical Observatory of the Smithsonian Institution in Chile. This method, begun December 12, 1918, originated with Mr. Clayton, and was made possible through the cooperation of the Smithsonian Institution. The field is one which our author has made peculiarly his own, and to it he has devoted a large part of his time during the past few years. It is one of the outstanding developments in the history of weather forecasting. The changes in temperature and in pressure from day to day are believed to have close relation to short-period changes in solar radiation. The monthly means of temperature and pressure are also closely related to the monthly means of solar radiation. Further, year-to-year variations are shown to be connected with year-to-year variations in rainfall and in the height of rivers in North and South America and in Australia. Long-period weather changes are found which correspond with the sunspot period, but these are less marked than the changes of shorter duration. Pressure, rainfall, temperature and other phenomena were investigated at stations all over the world, and oscillations similar to those of the sunspots appear, although the weather conditions are more variable than the sunspots. Sunspot influence shows both an annual and a semi-annual period, but the conditions are far from simple. There is some evidence that snowfall is deeper and icebergs are more numerous at sunspot maximum, and that the Nile and other tropical rivers are highest at sunspot maximum, while rivers like the Parana in temperate regions show an inverse effect.

There are other subjects to which Mr. Clayton makes noteworthy contributions. In regard to the general circulation of the atmosphere our author, after a consideration of the various views which have been advanced during the past fifty years or more, states that Ferrel's theory furnishes the simplest and most plausible explanation yet given of the motions of the atmosphere under the influence of heat and gravity on a rotating body like the earth. This is a very interesting confirmation of the soundness of Ferrel's reasoning, for at the time of his writing very few observations of cloud movements had been made. This view may, however, possibly need modification as further facts become known. The explanation of the essential facts of upper air temperatures in relation to the stratosphere and its height above sea-level is found in the expansion and cooling of the ascending air in equatorial latitudes and in its warming by compression and cooling by radiation as it descends toward the poles on the upper gradients. Regarding the much-discussed question as to the origin of extra-tropical cyclones and anticyclones, Mr. Clayton believes that an explanation is found in contrasts of temperature observed when large bodies of colder air

lie in close proximity to warmer air. The available facts as to temperature, winds and pressures in cyclones and anticyclones are found to be in agreement with the results of computation, so that the statement can be made, "sharp contrasts in temperture in adjacent bodies of air causing steep gradients are fully capable of producing the permanent and wandering cyclones and anticyclones of the atmosphere in temperate regions." Mr. Clayton's views on this matter are different from the recently much-discussed Bjerknes polar front theory, yet there are points of resemblance between the two. Regarding tropical cyclones there is naturally a good deal of doubt, although here also differences of temperature between a central area and the surrounding air are believed to explain the origin.

Other subjects discussed in "World Weather" there is no opportunity to consider here. There are chapters on the physics of the air in relation to solar and terrestrial phenomena; and on the meteorology of the sun, and there are three appendices dealing with mathematical methods of treatment. We regret that, in a book of this character, many of the illustrations are very crude, and a few are so indistinct that they are barely serviceable. Many references are incomplete according to the usual standards in such matters, and occasional references to writers in the text without any indication as to what and where these persons have written are not helpful in a scientific discussion. Misprints are fairly numerous, but in no case are these so glaring that the meaning is obscured. The summaries at the beginning of each chapter are a very useful feature of the book. When so much that is new and necessarily still more or less controversial is presented by an author of Mr. Clayton's standing there is sure to be a more or less animated debate as to the value of the evidence and as to the methods of using it. Into any such critical analysis it is impossible to enter here, nor has the reviewer any desire to do so. It may very likely be that the author himself may see reason to revise and to modify some of his conclusions, and it is almost certain that a good many persons, meteorologists and others, will hesitate to accept them all as they stand. They are by no means all equally convincing. But that the author has taken infinite pains in his laborious and time-consuming investigations is evident on every page, and that he has written a very important chapter in the new world meteorology no one can deny. It is a very inspiring view of the future of meteorology in relation to long-range forecasts, of immense economic importance to man, which Mr. Clayton here gives us.

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SPECIAL ARTICLES

INHERITANCE OF DIRECTION OF COILING IN LIMNAEA

A RECENT paper by Boycott and Diver (1923, Proc. Roy. Soc., 95 B; 207) on the inheritance of dextral and sinistral coiling in the snail Limnaea suggests that this character may give an exceptionally clear illustration of "maternal" inheritance that is nevertheless dependent upon the chromosomes.

These authors find that if a single individual of Limnaea is isolated at an early stage it will reproduce, presumably by self-fertilization. Broods produced in this way are always either wholly dextral or wholly sinistral (with the rare exceptions noted below)—but either type of parent may produce either type of brood. This result agrees with the findings of Mayor (1902) and Crampton (1916) on the viviparous Tahitian land-snail Partula, where a given individual contains in its brood-pouch only one type of young. A sinistral individual may have either sinistral or dextral young—but never both types at once; and the same is true for a dextral mother.

Boycott and Diver have also mated together two individuals, and have reared from such pairs mixed broods, which they report as giving 3 dextral : 1 sinistral or 1 dextral : 1 sinistral. In the absence of numerical data, and in view of the fact that the eggs from the two parents were not separated in these experiments, one may doubt if these ratios are anything more than fortuitous ones due to the two members of the pairs in question producing different types of offspring. If one does interpret these ratios as merely chance ones, it becomes possible to formulate a much simpler interpretation than the one suggested by these authors.

An analysis of the data presented suggests that the case is a simple Mendelian one, with the dextral character dominant, but with the nature of a given individual determined, not by its own constitution but by that of the unreduced egg from which it arose.

This last assumption becomes extremely plausible when it is recalled that it was shown by Crampton and by Kofoid in 1894 that dextral and sinistral snails can be distinguished at least as early as the second cleavage division (perhaps at the first), since the cleavage-pattern of one is the mirror-image of that of the other. A character that appears so early in development might well be expected to be determined by the genes present in the mother—*i.e.*, in the unreduced egg, rather than by the combination present after reduction and fertilization. Yet the results obtained by Boycott and Diver can not be accounted for unless it is supposed that the sperm does actually