by the secretary of the treasury upon the recommendation of the United States Public Health Service, and the production is controlled by regulations drawn up by a board composed of the undersigned. These regulations provide for repeated inspections of the producing laboratories, for proper labeling, and for all safeguards which may be thrown about the making of such an important product. At present even the placing of the vaccine in the small tubes and the sealing of these tubes is required to be done in such a way that no hand, even though sterile, touches the vaccine. Repeated examinations of the product, for safety, are required.

This vaccine was used in the vaccination of the millions mentioned in the above table and is exactly the same as that used by doctors in private practice in the vaccination of the general public throughout the United States.

M. W. IRELAND,
Surgeon General, U. S. Army,
E. R. STITT,
Surgeon General, U. S. Navy,
H. S. CUMMING,
Surgeon General, U. S. Public Health Service.

FACTS AND THEORIES IN GEOLOGY

As a member of the American Association for the Advancement of Science for more than one decade, may I be allowed to reply briefly to various people who have expressed themselves adversely regarding my "New Geology, a Text-book for Colleges"?

Professor Edwin Linton's second communication (SCIENCE, Vol. LXIV, No. 1665, pp. 526–7) is the latest of this kind that I have noticed. He looks upon my book as a "transcendent absurdity," though in reality the one point wherein it differs from other text-books on this subject is that it endeavors to make a clear distinction between geological facts and geological theories. Why is not this sharp distinction between facts and theories just as essential for text-books on geology as for text-books on physics or chemistry or astronomy? That I have stated some theories of my own which are not generally accepted is a very small matter; the real peculiarity of my book is that I have endeavored to make this separation, so that the student may have some chance for his intellectual freedom of choice. If I have not always succeeded in making this separation, that would be cause for just criticism; but that this book should try to make this separation hardly entitles it to be called a "transcendent absurdity." I do not think that Bacon or Newton, Linnaeus or Agassiz would look upon it in that light.

Three ideas are outstanding in this text-book and in my various other books:

(1) An emphasis on the fact that uniformitarianism is at best only a theory, to be evaluated according to the facts of modern discoveries, like any other theory.

(2) The fact, as stated by T. H. Huxley, that "All that geology can prove is local order of succession"; and "the moment the geologist has to deal with large areas, or with completely separated deposits," there is danger of "incalculable mischief" in confounding similarity of stratigraphical arrangement with "synchrony" or identity of date; hence that "'not proven and not provable' must be recorded against all the grand hypotheses of the paleontologist respecting the general succession of life on the globe."[1] If this has become a "transcendent absurdity" in this year 1927, I should like to know wherein we have outgrown the "methods" which Huxley condemned in 1862.

(3) That monophyleticism should be frankly and openly repudiated; and we should just as openly and frankly affirm, as Dr. Leo S. Berg, of the University of Leningrad, has done in his recent notable book, that "not only do phyla, classes, and orders not infrequently prove to be polyphyletic, but such is often the case with lesser taxonomic divisions."[2]

As I have been contending for this last idea for many years, it is some satisfaction to see Dr. Berg declaring that "Organisms have developed from tens of thousands of primary forms" (p. 406). *E pur si muove.*

May I call attention to two other works that I have not yet seen noticed in the columns of SCIENCE? One is "The Case against Evolution," by Dr. Geo. Barry O'Toole, issued two years ago by the Macmillan Company. It devotes some twenty pages to endorsing wholeheartedly my geological argument. The other is "The Dogma of Evolution," by Professor Louis T. More, delivered as a series of lectures at Princeton University, in the spring of 1925. This book is issued by the Princeton University Press, and is handled here in England by the Oxford University Press. When works like these are loftily ignored by the official organ of the American Association for the Advancement of Science, is there not danger that we may degenerate into a mere mutual admiration society?

I do not have the space to reply to my other critics, like Arthur M. Miller and Edwin Tenney Brewster. Dr. Chas. Schuchert's professedly formal review of "The New Geology" appeared shortly before I left America. He makes merry over his straw man; for

[1] "Lectures and Lay Sermons," pp. 29, 30, London, 1913.

[2] "Nomogenesis," p. 244, London, 1926.

his "review" is a sheer burlesque of what my book contains. He also complains because I have stolen some of his thunder; in other words, he says I have "appropriated" over two dozen *more* illustrations from his text-book than the few which his publishers authorized me to use. In this Dr. Schuchert is quite mistaken. He seems to forget that I and my publishers may possibly have access to the same original sources for illustrations that he himself had.

Possibly it may interest Dr. Edwin Linton and my other critics to know that the latest example of a "transcendent absurdity," issued by me, is entitled "Evolutionary Geology and the New Catastrophism," and that it was published only a few months ago.

GEORGE MCCREADY PRICE

STANBOROUGH PARK,
WATFORD, ENGLAND

LONG RANGE WEATHER FORECASTS

IN a review of "Man and Weather," SCIENCE (Vol. LXV, No. 1681, p. 281), March 18, 1927, some personalities may be passed without remark; but the attitude of the reviewer on the problem of long range forecasting should not pass without comment. He holds that such forecasts are not possible at present and by implication that there is little prospect of accomplishment. "No one," he says, "is in position to forecast for California or any other part of the country the distribution of atmospheric pressure even a week ahead, to say nothing of a month or season." Yet he admits "a fair degree of success in seasonal forecasting" in India; and concedes that "we are on the eve of attaining similar success in parts of California."

Years ago this relationship was pointed out in California; and it is our understanding that forecasters on both sides of the Pacific, Okada in Japan, Eeals, Bowie and Reed on this side, utilize knowledge of the intensity and extent of the Aleutian infrabar and other pressure distributions in long period forecasts. Across the Atlantic similar procedure is followed. The reviewer has overlooked that in Shaw's "Forecasting Weather," 2nd Edition, p. 181, is a pressure chart on which a forecast *for 14 days was issued* by the Meteorological Office.

Weather maps covering a hemisphere are now available with an increasing number of kite and balloon stations. It is not so difficult now to outline and watch the development of major pressure systems as it once was.

The reviewer will doubtless agree that there is room for improvement in forecasting. The present synoptic map remains substantially the same as fifty years ago. It tells what has happened but not what will happen. If we may not scrap it, we at least should modify it—to tell of the advance of cold-dry and warm-moist fronts, and the interpenetration of strata. It is the conflict of air streams that means accurate anticipating of rain areas and their duration. Winds are initiated by pressure differences, hence the significance of major pressure distributions, controlling the paths and constancy of the fronts. It is gratifying to note a growing appreciation of these points by official bureaus abroad and at home.

ALEXANDER MCADIE

SCIENTIFIC BOOKS

The Insects of Australia and New Zealand. By R. J. TILLYARD, F.R.S., etc. Sydney, Angus and Robertson. 1926. 560 pp.

THE insects of the Antipodes claim our attention for numerous reasons. From Australia came the dreaded Cottony-cushion scale (*Icerya purchasi*), which at one time threatened the destruction of the orange industry of California. From Australia also came the lady-beetles, of diverse species, which have proved invaluable in checking the *Icerya* and other coccid pests. From Australia, Froggatt described the extraordinary archaic giant termite *Mastotermes darwiniensis*, close relatives of which have since been found fossil in Europe. The fauna of New Zealand amazes us by its poverty of types, but it is rich in certain groups. These southern lands have not only furnished many entomological surprises, but they will afford new wonders for many years to come. Nowhere else is there such a good chance for the discovery of relicts of an early fauna, now exterminated in other parts of the world.

In 1907, Mr. W. W. Froggatt, entomologist of New South Wales, published an excellent book of 449 pages, entitled "Australian Insects." In it he gave a readable account of the leading or more conspicuous forms, with very good figures. Those of economic importance were discussed quite fully. Now, after twenty years, Dr. Tillyard gives us a new and more comprehensive book, including also the insects of New Zealand. In this interval, the additions to our knowledge have been very numerous, and very much has been done to arrange and systematize what was known before. Among all the discoveries and additions we must place first the revelation of a wealth of fossil insects of great antiquity, which as elaborated by Tillyard, throw new light on the origin and relationships of the various orders.

Tillyard's book is actually much more than its title might seem to indicate. It is a great contribution to the classification of insects in general, and as such will necessarily be at the elbow of the working entomologist everywhere. We note the extraordinary wealth of