1916 in the University of Sydney, has been appointed to the chair of chemistry in the University of St. Andrews.

DISCUSSION AND CORRESPONDENCE

THE UNIVERSITY OF TENNESSEE AND PROFESSOR SCHAEFFER

THE Board of Trustees of the University of Tennessee has dismissed five professors from the university, among them, Dr. A. A. Schaeffer, professor of zoology. The dismissal of Professor Schaeffer seems especially significant inasmuch as he is president of the local chapter of the American Association of University Professors, and this chapter had made request for an investigation of the case of Professor Sprowls, who was dismissed from the university some months ago. No satisfactory reason for the dismissal of Professor Sprowls has been given, it may be mentioned incidentally, but it is believed that a certain opposition to his introduction of the evolutionary point of view into his educational work contributed to the result. Professor Schaeffer was at the Marine Laboratory of the Carnegie Institution of Washington in the Gulf of Mexico when dismissed. Immediately before leaving Knoxville in June the president discussed with him a special appropriation for his laboratory and was far from showing any dissatisfaction with him. The action of the president seems to be a direct challenge to the American Association of University Professors to show whether it has any potency. Meanwhile the loss of Professor Schaeffer to the University of Tennessee is bound to be the gain of some other university.

CHAS. B. DAVENPORT

THE STREAMS OF LONG ISLAND

THE interesting difference between the east and west banks of the streams of Long Island has been the basis of suggestive comment by contributors to SCIENCE. Jennings,[1] who doubts that the westerly deflection of the streams by the earth's rotation is most largely responsible for the steeper west bank and the imperceptibly sloping eastern one, is more inclined to attribute these conditions to the cumulative effects of wind and wind-borne materials, particularly after consideration of the geological history of the region. Hayes[2] states that because of the earth's rotation, longitudinal rivers in the northern hemisphere erode their right banks, whether they flow north or south, while Davis[3] recalls that in the plateau of Launemozen, at the northern base of the Pyrenees, the valley sides facing against the wind are the steeper, while in Long Island they face with the wind. French physiographers explained the former condition not as a consequence of the earth's rotation, but as the result of the stronger action of rain driven by westerly winds. In this case it is of course conceivable that drifting materials would be held in quantity by the denser vegetation of the moister stream margin only when other conditions enabled vegetation to be present in a quantity sufficient to retain it, and to prevent the erosion of that bank. This presumably finds additional explanation in the downward sweep of the winds.

Following Jennings's suggestion, I have studied cross sections of the banks of four small streams of Long Island, two near Oyster Bay, one below Mineola and one emptying near Glen Cove. Comparative cross sections of the steeper west bank and the eastern one indicated that pebbles of a size easily movable by the wind were by far the most common in the west bank, their place being taken by coarse gravel in the eastern one. In these sections, the black topsoil above the yellow sandy clay was in the western bank usually 2–3 times the thickness of the smaller deposit in the eastern bank. Further, faint lines of stratification could be seen as indicated by coarser vegetable remains. These facts indicate that the cumulative effects of wind and vegetation upon wind-borne materials explain in large part at least the steeper west bank of Long Island streams.

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[1] Jennings, O. E., SCIENCE, LV, p. 291.
[2] Hayes, E., SCIENCE, LV, p. 567.
[3] Davis, W. M., SCIENCE, LV, p. 478.

SCIENTIFIC BOOKS

Earth Evolution and its Facial Expression. By WILLIAM HERBERT HOBBS. The Macmillan Company, New York, 1921, 178 pages.

THIS interesting and suggestive book deals with major problems in advanced dynamical and theoretical geology. It represents the results of a long period of thought and study on the part of the author of the "fundamental questions of theoretical geology which are in one way or another connected with the growth of continents and mountains." The book is divided into fourteen chapters.

In Chapter I the field of cosmogony is traversed in a brief and general way. Reference is made to the conceptions of Greek, Latin and other philosophers of antiquity. The views of early modern thinkers are considered, together with the origin and rise of the nebular hypothesis. The author regards the objections to this hypothesis as fatal, and adheres to the planetesimal hypothesis, although in the development of his conceptions he departs markedly from certain postulates of that hypothesis.

The nature of the earth's interior is considered in Chapter II. The arguments supporting a solid, rigid and elastic condition for the earth's interior are emphasized, but a new conception is offered to explain the arrangement of denser and lighter material within the earth. It is assumed that a selective addition of meteoric (planetesimal) material obtained during the growth of the earth, resulting in a core of meteoric stone-iron, surrounded by an intermediate shell of meteoric nickel-iron, with an outer shell composed of meteoric stony matter enveloped by a skin or rind possibly less than 10 km. thick composed chiefly of sediments. It is further suggested that the central core has a radius of 3,500 km. with an average density of 6.93, that the intermediate shell is 1,700 km. thick with a density of 7.6, and that the outer shell has a thickness of 1,200 km. and an average density of 3.6.

Vulcanism forms the theme of five chapters. The author maintains that temperature and aqueous conditions are such that rocks may fuse within the earth's rind of sediments, and probably not more than six miles below the surface. It is concluded that shales constitute the source of essentially all lava, for they make up the bulk of sediments, they are very similar in composition to igneous rocks, with a range in fusibility near the temperature of lava. It is further contended that this mode of origin of lava readily explains the conceptions of "consanguinity" and "petrographic provinces."

The fusion of shale is regarded as resulting from relief of pressure following block faulting and folding. Block faulting is considered as due to compression rather than tension, the compression elevating segments, the heavier, competent strata of which tend to separate from the weaker shale members below. The lava from the fusion of the shale is squeezed out along fissures bounding the blocks by the weight of overlying rock and by the jolting effects of earthquake shocks. This lava is basic in composition, for it is derived from calcareous shale resting beneath competent limestone beds, that being the order of deposition in a transgressing sea. Later lava of andesitic and more acid types may be exuded due to extension of magma chambers downward into shale of average composition and siliceous shale.

In folding shales located in the lower part of anticlinal arches fuse as a result of the lifting of their load by stronger members involved in the fold. Continued application of lateral pressure and underturning of the folds squeeze out the magma. In this case the lava is of average composition derived from the fusion of shale of average composition, that shale being forced into a superior position in the anticline, as shown by experiment. Later fusion of lower siliceous shale would give rise to dacitic and rhyolitic lava, and the formation of secondary anticlines paralleling the principal folds would extend the lava chamber upward into higher calcareous shale, basaltic lava resulting to be extruded as a later phase of the vulcanism associated with growing mountain folds.

The author does not regard laccolites as the result of intrusion, but considers them as illustrating initial efforts towards folding, the competent strata rising in domes and shale below migrating inward to be fused in a lava pocket. The same idea is applied to the origin of sheets, and the conception is extended to the origin of batholiths forming cores of recently elevated folded mountain ranges.

Gases present in lava are all to be accounted for by the materials already present in the original shale, or by accessions secured during the ascent of the magma. The source of the atmosphere under this conception is not apparent.

Six chapters are devoted to the consideration of the earth's physiognomy. In the first of these chapters, Chapter VII, the author considers the change of figure through which the earth has passed. He follows the tetrahedral theory, a theory that has not found wide acceptance among geologists because of the mechanical difficulties in the approach to such a form by a rapidly rotating, solid, elastic spheroid. Students of historical geology will find the illustrations accompanying this portion of the text interesting even if they do not agree with the conceptions the figures are intended to convey. In the development of this chapter the author gives scant heed to the "permanence of the ocean basins," a theory he regards as untenable.

A chapter is devoted to the rapidity of geologic changes. The border zone of the Pacific and the zone traversing the Mediterranean Sea of Europe and America are considered as regions where geologic changes are going on rapidly to-day—a testimony to the rapidity of geologic changes in general, and a challenge to the orthodox view concerning the time necessary for the accomplishment of past geologic changes. Few geologists will be found to agree with Professor Hobbs in his position on this question. In fact, the investigations of the last two decades in earth genesis, historic geology, radioactivity, etc., have emphasized the enormous duration of geologic time.

The author follows Suess in dividing the continental areas into two sections, one characterized by folded structures, the other by plains and plateaus. He likewise considers the folded structures as arcs developed with convex faces and steeper sides facing oceans existing at the time of their formation, and festooned about old lands of earlier eras. The thrust responsible for the formation of the arcs, however, is

regarded as generated by a subsiding ocean floor and directed against strata near the coast, producing underthrust folds with thinned under limbs, and bordered on their outer sides by synclinal fore-deeps. The Appalachians, Rockies and other mountain systems are taken as examples. In the first case it is assumed that the thrust came from the interior (Mississippi valley) sea, not from the east as usually supposed; in the case of the Rockies the thrust came from the Cretaceous sea covering the region of the Great Plains; and the thrust forming the Coast Ranges has come from the subsiding Pacific basin. The effect of the trend of the coast lines on the shapes of arcs rising off their shores is elaborated.

In the closing chapter on physiognomy the author reemphasizes his well-known ideas regarding the intimate relationship existing between fractures and surface expression. It is pointed out that in the Great Basin province north-south and east-west fractures with their bisectrices are dominant, and Africa is regarded as divided into a fault mosaic by fractures developed in the same directions. This fracture system is also applied to southern South America, and the author concludes that this pattern of fractures is continental in extent and probably worldwide.

The conception is entertained that both fracturing and folding may go on simultaneously within the same strata, rather than limited to separate depth zones. The author does not regard the theory of a zone of fracture as distinct from a subterranean zone of flow as tenable.

The book closes with a concise survey of the field of theoretical geology in which the author enumerates the theories he regards as tenable and which are emphasized through the book, together with the theories that are rejected as not being tenable.

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The Air and Its Ways. The Rede Lecture (1921) in the University of Cambridge with other contributions to meteorology for Schools and Colleges. By SIR NAPIER SHAW, Sc.D., F.R.S. With 100 figures, Royal 8vo, pp. xx + 237. Cambridge University Press, 1923. New York, The Macmillan Company. Price, $7.00.

LECTURES and addresses on meteorological subjects are always easy to make and sometimes interesting to hear. So Sir Napier Shaw says and doubtless believes. But some of us on this side of the Atlantic can not help but qualify his statement with our own "That depends"—because of our own experience.

However, few of us can lecture or write like Sir Napier Shaw—more's the pity—and perhaps this is one reason why meteorology or to give it a modern and more suitable appellation, *aerography*,[1] makes but slow headway in university curricula.

The present volume is not a text-book. We have the author's word for that; and yet it certainly can serve as such and serve admirably in any university course on atmospherics, using this word in its general sense and not the restricted one, of irregular and unwelcomed static interferences with radio messages.

Sir Napier Shaw says frankly that the book shows meteorology (awkward word) in its workaday clothes, with loose or missing buttons here and there and the tailoring not always perfect. This may be so; but we fail to observe it; and the originality and attractiveness of the work permit no notice of defects in dress.

In the book there are essays on climatology, air physics, dynamics of the atmosphere, agriculture as dependent on weather; and much valuable historical matter.

In a brief review, these can not be dwelt upon, and it is enough to say that he who is interested in any one of these fields of applied science will find page after page of up-to-date information and stimulating discussion.

Sir Napier is himself easily the most suggestive of aerographers. In this book he brings out no less than three new lines of investigation, or, in his own words, "new meteorological principles, as inductively justified": First, the motion of the air under balanced forces; second, the *eviction* of air by turbulent motion as an inevitable concomitant of convection; and third, *stratification* in consequence of the resilience due to excess temperature. He hopes that the last will in time lead to satisfactory explanation of the formation of high pressure areas.

The book is in the main not beyond a layman's depth and seems to the reviewer to be exactly the type of book an instructor in aerography should own, read, re-read and ponder over.

Typographically, the book is beyond criticism, as well it might be, having been seen through the press by a master hand, being indeed the last work of Mr. J. B. Peace of the Cambridge University Press, the author's college friend of many years.

ALEXANDER MCADIE

ZOOLOGICAL NOMENCLATURE

THE Secretary of the International Commission on Zoological Nomenclature has the honor to notify zoologists, especially icthyologists, that Professor David Starr Jordan and the U. S. Fish Commission concur in recommending the adoption of the general principle that names now current are not to be dis-

[1] Aerography, literally the air and its ways.