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.

carded unless the data show this to be a clear cut necessity. Under this general principle, they propose that the following 14 generic names of fishes, in regard to which a difference of opinion exists, shall be provisionally legitimized with the types indicated:

Aëtobatus Blainv., 1816 (type, *Raja narinari* Euphrasen); *Conger* Cuv., 1817 (*Muraena conger* L.); *Coregonus* Linn., 1758 (*Salmo lavaretus* L.); *Eleotris* Bloch & Schneider, 1801 (*gyrinus* Cuv. & Val.); *Epinephelus* Bloch, 1792 (*marginalis* Bloch); *Gymnothorax* Bloch, 1795 (*reticularis* Bloch); *Lampetra* Gray, 1851 (*Petromyzon fluviatilis* L.); *Malapterurus* Lacépède, 1803 (*Silurus electricus* L.); *Mustelus* Linck, 1790 (*Squalus mustelus* L. [= *Mustelus laevis*]); *Polynemus* Linn., 1758 (*paradisaeus* L.); *Sciaena* Linn., 1758 (*umbra* L. = *Cheilodipterus aquila* Lacép. as restr. by Cuvier, 1815); *Serranus* Cuv. (*Perca cabrilla* L.); *Stolephorus* Lacép., 1803 (*commersonianus* Lacép.); *Teuthis* Linn., 1766 (*javus* L.).

The secretary of the commission will delay the vote on this case until one year from date, in order to give to the profession ample opportunity to express concurrence or dissension as respects any or all of these names.

C. W. STILES,
Secretary to Commission

WASHINGTON, D. C.

SPECIAL ARTICLES

NOTE ON THE THEORY OF PHOTOGRAPHIC SENSITIVITY[1]

THE very small amounts of substance involved in the formation of photographic latent images have prohibited conventional methods of chemical analysis. The ingenious attempt of P. P. Koch[2] to apply the Ehrenhaft condenser method to the initial reaction of silver bromide in light has apparently not yet given unobjectionable results. But in any case, the use of gelatin-free silver halide can not yet be regarded by the photographic chemist as significant for the gelatino-silver bromide of photographic emulsions. The generally accepted conclusion that the substance of the latent image in these consists of absorbed colloid silver has been reached by indirect methods, and is largely due to Lüppo-Cramer.[3]

Reasoning from the general principle that the fundamental photographic reaction $Ag^+ + \theta = Ag$ is autocatalytic in character, various investigators have suggested that the precursor of the latent image, the "sensitivity" of the silver halide grains, might itself be substantial in nature, and indeed actually itself colloid silver. Thus R. Abegg[4] brought forward evidence, inconclusive but suggestive, for "sensitizing" by finely divided silver. The idea that the "ripening" of silver bromide emulsions was associated with a partial reduction forming "Reduktionskeime" was advocated by J. M. Eder,[5] although this investigator regarded both the "Reduktionskeime" and the latent image as subhalides of variable composition Ag_mBr_m Ag_mBr_{m-n}. Evidence for the existence of such colloid silver nuclei in relation to sensitivity was brought forward by Lüppo-Cramer,[6] who found that the sensitivity of "ripened" emulsions could be reduced greatly by treatment with silver solvents such as a mixture of chromic and sulphuric acids prior to exposure. Again, one of the writers and A. P. H. Trivelli[7] showed that the development of latent images by fuming with ammonia, whereby a recrystallization of silver bromide on silver nuclei was effected, was accompanied by partial reduction of the halide to silver, increasing the probability that such reduction took place in the ammonia ripening of gelatino-silver bromide emulsions. The theory that sensitivity, at least in high speed photographic emulsions, is due to colloid silver was put forward in a very striking form by F. F. Renwick.[8] He suggested that the change involved on exposure of these is entirely limited to the preexistent colloid silver, which he supposed to be converted by light from a charged "sol" form to a neutral "gel" form, the former being incapable of initiating development, the latter able to act as nuclei for the actual reduction of the silver halide by developers. Quite independently, F. Weigert[9] brought forward evidence that in "printing out" with silver chloride plus silver citrate, the actual light sensitive substance was colloid silver; that this reacted initially according to the Einstein photochemical equivalence principle, one quantum hv being photochemically absorbed per atom of (colloid) silver.

Proof or disproof of this hypothesis is equally difficult to obtain. But inferential evidence of the same character as that regarded as establishing the nature of the latent image has been obtained by the writers recently. In a recent paper[10] they have pointed out that a discrimination between the hypotheses that sensitivity is due (a) to a photocatalyst, *e.g.*, colloid sil-

[1] Communication No. 185 from the Research Laboratory of the Eastman Kodak Company.

[2] *Zeit. fur Physik, 3,* 169–74 (1920).

[3] Das latente Bild. (W. Knapp, Halle; 1911).

[4] *Arch. wiss. Phot. 1,* 18 (1899).

[5] Cf. Lüppo-Cramer, *op. cit.*

[6] Phot. Mittl., 1909, p. 328.

[7] "The Silver Bromide Grain of Photographic Emulsions," 1921, p. 25 (Van Nostrand, N. Y.).

[8] *J. Soc. Chem. Ind.,* 1920, p. 156T.

[9] Sitz. ber. Bul. Akad., p. 641 (1922).

[10] *J. Frankl. Inst.,* 1922, p. 486.