

cially by some indication of such piles of raw material for discussion as have been accumulated by the Fishery Departments of many governments. A compilation of this sort depends for its value on its completeness, as the reason for adopting one theory or classification rather than another must be the outcome of an attempt to weigh evidence. After a brief discussion of the conditions of life, there follow sections on the life-districts of the ocean, Hæckel's classification of marine organisms, a concise discussion of the influence of light, temperature, salinity, tides, waves, and currents on marine life, and a short statement of the flora and fauna of the littoral, shallow water, estuarine, open sea, deep sea, and oceanic archipelago divisions, concluding with a few pages on the geological changes of ocean basins.

It would be premature to express an opinion of Prof. Walther's contemplated work. The sketch he gives of its plan stimulates interest and curiosity, and we can heartily congratulate him on the orderly way in which he has collected and laid down the building-material, while we wish him success in his labours.

LETTERS TO THE EDITOR.

*[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]*

Correlation of Solar and Magnetic Phenomena.

THE opinion of Mr. Whipple, quoted at p. 2 of NATURE for November 2, to the effect that the solar outburst observed by Messrs. Carrington and Hodgson on September 1, 1859, was not the cause of the coincident magnetic perturbations, corresponds to my own conclusion in regard to the matter based upon evidence of an altogether different character. There was a recurrence of strong magnetic perturbations and auroras twenty-seven days later than the great magnetic storms of August 28 and September 1, 1859, thus following the general rule which is found to apply in such cases, there being a well-marked periodicity of such outbreaks at this precise interval corresponding to the time of a synodic rotation of the sun. Such recurrence manifestly could not exist if outbreaks upon the sun were able to produce terrestrial magnetic effects indifferently in all locations. In order that there may be recurrence at the synodic period the magnetic effects must proceed from the sun at some particular angle exclusively, and fortuitous outbursts elsewhere, no matter how violent, must fail to have any perceptible effect. In the estimation of the writer there is no point more important in connection with solar physics than the determination of this period and this angle with the greatest accuracy possible.

M. A. VEEDER,

Lyons, N. Y., December 26, 1893.

MY letter in NATURE (vol. xlix. page 30), amongst other interesting communications, has brought one from Mr. Lawrence (vol. xlix. page 101) and the accompanying letter from Dr. Veeder. Mr. Lawrence's graphic account well describes the circumstances attending the manifestation of 1882 (November 17). The magnetic disturbance which broke out at 10 a.m. on that day set us all on the look-out for aurora in the evening. Neither were we disappointed; the display was remarkable. But the question in this case, as with the Carrington-Hodgson and Young instances, is still whether the solar and magnetic phenomena were directly related or simply coincident. This cannot be said to be determined, and nothing less than proof, in so important a matter, will serve. Better to advance surely if slowly towards truth, rather than accept too hastily evidence that is incomplete. We must remember that on the occasion of the solar disturbance seen by Trouvelot, the magnets were especially quiet, not only at the time but also before and after. But any explanation of these phenomena must include all cases. The position of things, as stated in my first letter, referred to above, still I consider holds, qualified only by the circumstance that instead of one presumed case of direct relation, three are now adduced, with a fourth case (the Trouvelot observation), which unquestionably was not accompanied by magnetic disturbance.

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If we further consider that, since the year 1859, when attention became distinctly drawn to this question, there has occurred magnetic movement, equal to and in very many cases far exceeding that accompanying the Carrington-Hodgson observation, on some 400 different days, we see on how slight a foundation the presumption for direct relation, that is of a nature more or less instantaneous in action, exists, although the general relation between the two classes of phenomena remains undoubted.

Dr. Veeder, from his own point of view, supports the contention that the 1859 solar outburst cannot be taken as causing the accompanying moderate magnetic movement; indeed there was far greater movement some three days previously, and again early on the morning of the following day; but in regard to his affirmation that there exists a well-marked periodicity in magnetic outbursts corresponding to the period of the sun's rotation, whilst this in a limited sense may be in some degree true, I cannot say that my personal acquaintance with magnetic records during very many years enables me at present to accept such conclusion as a general one, or indeed what as a consequence follows, that anything really depends on the position in rotation which the sun occupies relatively to the earth.

The whole subject is, however, exceedingly interesting, and various considerations arise. One bearing on the present question may be mentioned. Great terrestrial magnetic disturbances are evidently in character cosmical, produced, it would seem, or stimulated, by some external cause. For it has been shown (Proc. Roy. Soc. vol. lii. p. 191) that, on occasions of unusually sudden magnetic disturbance, the commencement of disturbance, at places so widely separated on the earth's surface as Greenwich, Pawlowsk, and Bombay, is simultaneous within a much smaller limit of time than had before been supposed. Such sudden simultaneous action would thus appear to indicate an impulse, solar or otherwise, from without, but whether one distinctly solar, or in what other way produced, is a question yet to be determined.

WILLIAM ELLIS.

Greenwich, January 6.

The Mendip Earthquake of December 30-31, 1893.

I SUBMIT the following notes for the use of any of your readers who may be collecting information on the subject:—

So far as I can judge, from statements obtained directly from inhabitants of the locality, and from the experiences of various persons, recorded in the *Shepton Mallet Journal* of January 5, the movements in this earthquake occurred chiefly along the south flank of the Mendip Hills between Shepton Mallet on the east-south-east, and Draycott (near Cheddar) on the west-north-west. The shock extended as far southwards as Evercrech and West Pennard; it reached as high up as Priddy, which is near the axis of the hills, and was also noticed at Chewton, several miles distant on the northern flank.

The force of the shocks appears to have been very irregularly distributed, in some houses the movements being quite alarming, while in others not far distant they were trifling though unmistakable. Some persons failed to hear the sound, which was very evident to others. Persons out of doors heard the sound most distinctly, even when they felt no shock.

A lady at Shepton Mallet, who had previously experienced an earthquake in New Zealand, recognised at once what was occurring, but was not in any way alarmed. She says that her bed began suddenly to shake or rock, and as suddenly ceased. She was also conscious of a movement of the whole house, and in the sharper shock heard the furniture rattle; but she did not observe any rumbling. Another lady in the same house noticed particularly the "funny unusual sort of noise." Again, in the same house a man describes the movement as resembling a wave moving from east to west. A school master and mistress got up under the impression that the water-heating apparatus had burst. At West Compton a lady in a farmhouse thought from the sound and movement "that some one was about the house, or that a barrel of cider had burst." At Westbury-below-Wells the shock was sharp enough to cause alarm.

The policeman on duty at Shepton Mallet very naturally referred the sound to the direction of the Midland Railway, which runs high on the hills in such a way that the rumble of its trains is heard at a great distance. It is well known that we have but little certainty in localising sounds, especially if of indefinite character, and that we usually refer them to positions whence we expect them.

The area in which the earth-movements seem to have been