s'observent dans cet ordre sont maintenus dans des bornes qu'ils ne sauraient dépasser; les races des corps vivants subsistent toutes, malgré leurs variations; les progrès acquis dans le *perfectionnement* de l'organisation ne se perdent point; tout ce qui paraît désordre, renversement, anomalie, rentre sans cesse dans l'ordre général et même y concourt; et partout et toujours la volonté du sublime Auteur de la nature et de tout ce qui existe est invariablement exécutée." Lamarck rather rarely uses the word *perfectionnement*; hence I have italicized it.

The passage concerning the aquatic animals very clearly shows a belief in a tendency toward perfection apart from other factors. The other passages, especially the last, are fully confirmatory.

I have been unable to consult the Histoire Naturelle, except as quoted by Professor Osborn and others. Possibly it is there that Professor Osborn finds authority for the statement that Lamarck denied absolutely the existence of a perfecting tendency. But so far as the Philosophie Zoologique is concerned the case is clear.

The point I have raised is important now only as a matter of history, but in the interest of accuracy it seems desirable that Lamarck's true views should be emphasized. It would appear that he was not 'completely carried away with the belief that his theory of the transmission of acquired characters was adequate to explain all the phenomena' (Osborn l. c., p. 180); rather, the 'Lamarckian factor' played a subordinate part in his scheme of evolution. And, if this interpretation be correct, it would seem that Darwin's criticisms of Lamarck are more nearly just than is generally supposed, and that, as Perrier says, he was, 'by an astonishing contradiction, at once a finalist in his general views, and a determined opponent of final causes in details.'

JOHN GARDINER.
UNIVERSITY OF COLORADO, BOULDER, COLO.

MEMORIAL MEETING COMMEMORATIVE OF ALLEN AND HORN.

A GENERAL invitation is extended to all those interested to be present at a memorial meeting, commemorative of Harrison Allen, M.D., and George H. Horn, M.D., to be held in the library hall of the Academy of Natural Sciences of Philadelphia, on Friday evening, December 31st, at eight o'clock. The following gentlemen will make addresses:

Dr. Edw. J. Nolan, 'The Relations of Doctors Allen and Horn to the Academy and other Societies.'

Mr. S. N. Rhoads, 'Dr. Allen's Work in Zoology.'

Dr. D. G. Brinton, 'Dr. Allen's Contributions to Anthropology.'

Professor John B. Smith, Sc.D., 'Dr. Horn's Contributions to Coleopterology.'

Rev. Henry C. McCook, D.D., 'Dr. Horn as a Physician and Naturalist.'

E. G. CONKLIN, PH.D.,
J. CHESTON MORRIS, M.D.,
D. G. BRINTON, M.D.,
REV. HENRY C. MCCOOK, D.D.,
HENRY SKINNER, M.D., *Ch'm.*
Committee.

THE ACADEMY OF NATURAL SCIENCES
OF PHILADELPHIA,
LOGAN SQUARE.

SCIENTIFIC LITERATURE.

Memorials of William Cranch Bond, Director of the Harvard College Observatory 1840–1859, and of his son, George Phillips Bond, Director of the Harvard College Observatory 1859–1865. EDWARD S. HOLDEN. San Francisco. 1897. Pp. iii+296. 8oc. With illustrations.

In this work Professor Holden has given a most interesting account of the two men who established the Observatory of Harvard College and carried it on for its first quarter of a century—a time of great importance for the development of astronomy in this country.

In 1840 the beginnings of permanent observatories in this country had already been made; in 1865 the Observatory at Cambridge had acquired, under the Bonds, a recognized position in the astronomical world, and the Bonds had contributed to the general progress of the science.

Professor Holden's work has been rendered important, and at the same time difficult and thankless, by circumstances which he finds

himself compelled to mention. It cannot be called a history of American astronomy for the quarter of a century in question, but Professor Holden has furnished, with the help of the family of the Bonds, a valuable contribution thereto.

The most troublesome part of the author's task has been to rightly explain the long and persistent unfriendliness of prominent American astronomers to the new institution and its conductors. W. C. Bond was one of those quiet artists who so often do admirable service to the science in an unpretending way without making claim to the position of a great theoretical astronomer.

The first difficult task for Professor Holden has been to give the history of chronographic registration and the part of the Bonds in the invention.

Wilkes in 1844 (p. 239) made the first experiment for determining longitude by the electric telegraph between Washington and Baltimore. Sears C. Walker, a most able astronomer, gives in *Silliman's Journal*, Second Series, Vol. VII., pages 206 to 217, a report to Dr. A. D. Bache, then Superintendent of the Coast Survey, in which the history of the first experiments in chronographic registration is well told. Professor Holden mentions the subsequent experiments of 1847 and 1848 to render the telegraphic method thoroughly practicable for longitude determinations.

In Loomis's 'Recent Progress of Astronomy' (New York, 1850) we find the actual results of the longitude operations of the summer of 1847 conducted between Philadelphia, Washington and Jersey City, from which Loomis draws the inference: "These experiments seem to authorize the conclusion that the electric telegraph affords the best means for the determination of terrestrial longitude between places in telegraphic connection with each other." This inference of Loomis has been confirmed by subsequent experience.

Walker, in his article before cited, mentions the experiments of Locke, Mitchell and others, and dwells greatly on the merit of the proposed 'automatic clock register,' and of the principle of chronographic registration for all time-observations.

Locke's part in the experiment seems to have been to arrange, under Walker's direction, apparatus for making and breaking circuit without damage to the clock. Mitchel, on the other hand, suggested a form of chronograph not suitable in Walker's opinion for nice astronomical observations.

The apparatuses of both Locke and Mitchel were tried in 1848 under Walker's direction. On the whole, Professor Holden has well stated the history; some points are obscure in all the accounts, and it requires a careful reading and putting together of the literature of the subject to rightly assign priority in the different parts of the invention, in which howsoever we combine the materials; the principal figures are Walker and W. C. Bond, and the subordinate ones are Locke and Mitchel.

Bond's chronograph was exhibited at the Great Exposition of 1851 in London, and distinguished with a gold medal. These circumstances seem to have led to the introduction of chronographic registration at Greenwich in 1854. Thence it spread rather slowly over the Continent; it was adopted for standard right ascension at Pulkova in 1861, but the eye and ear method was still retained there for polar stars and secondary catalogues, in which it has some advantages, especially in respect of personal equations. In America the chronographic method has been used quite generally, and the Bond chronograph has become a standard instrument. It has been used at the Harvard College Observatory from its first construction in 1850 to the present time. It served for the zone 50°–55° of the catalogue of the Astronomische Gesellschaft, as well as for the Bonds' own zones of small stars observed in 1852–53, and other work executed during their successive directorships and later.

Other difficult matters of the history of the Observatory are stated by Professor Holden with due regard for the feelings of the representatives of the astronomers of the last generation. The Perkins professor of astronomy when W. C. Bond removed to Cambridge in 1838 and began the duties of his office was Benjamin Peirce, one of the most eminent mathematical astronomers of his day. It is rather difficult, as Professor Holden im-

plies on pages 36 and 37, to understand the whole matter, without alluding to 'grievances half a century old.' W. C. Bond became, in 1838, 'astronomical observer' without salary except the rent of a dwelling house, and without definite relations to the younger 'Perkins professor.' Peirce, perhaps, expected rather too early from the new establishment results which could be 'passed over to the computer.' G. P. Bond, B. A. (Harvard), 1845, was a diligent student of astronomy in all its branches, and soon showed himself capable of improving the methods of computation, as is shown by his early papers, especially 'Some Applications of the Method of Mechanical Quadratures'—a paper which anticipated an important method of Encke's, and which affords ideas not yet completely worked out. One of the few papers which he contributed to the *Astronomical Journal* is entitled 'On the Orbit of Wilmot's Comet,' and employs methods of his own which deserve study.

When W. C. Bond passed away in 1859, at the age of 70, his son had long been the chief assistant in the Observatory, and succeeded quite naturally to his father's place, but Peirce had been himself a candidate, and circumstances had brought about an estrangement between him and Bond, but the latter seems to have done his best to renew pleasant relations.

Other matters, easily traced, are involved in the reasons why these relations were not renewed. Professor Holden alludes to the circumstance that George Bond was not selected as an original member of the National Academy of Sciences as a matter requiring explanation. But this concerns the history of American science in general, and not merely the few persons who may have made up the list submitted to Congress. It is not best to imply here that the omission was more unfair than similar transactions are often liable to be.

At the time, 1863, when the National Academy was founded, Bond had been four years Director of Harvard College Observatory, and had shown in that capacity ample knowledge of mathematics and astronomy to fill the position completely. He had gathered around him a corps of hard working assistants, among them Asaph Hall. The meagre salaries which the College could pay were rendered still more inadequate by the war then prevailing, and the corps of astronomers was diminished by the call for soldiers. One able and enthusiastic observer, Sidney Coolidge, fell in the battle of Chickamauga. The remainder of the assistants were compelled, with one exception, to seek occupation elsewhere. Bond himself struggled on heroically, although stricken with a mortal disease, and finally passed away at his post in 1865, before the close of the war, after completing the great work on Donati's Comet of 1858, the first work of an American astronomer to be rewarded with the gold medal of the Royal Astronomical Society. The vindication of the wisdom of his appointment as Director was complete, but he never received the medal which reached America a short time after his death.

Professor Holden's book has been put together from G. P. Bond's diaries and correspondence, and with the zealous cooperation of his family, Mrs. Richard Bond and his daughters. The author's work is, on the whole, well and judiciously done; some trifling defects are apparently due to unfavorable circumstances; such, for instance, are the want of a subject index; the Index of Proper Names is very defective; the spelling of German names like Brünnow and Rümker is not correct, and the use of capitals to indicate names of persons is a technical practice not approved in general literature. While the book is not a complete history of astronomy in America from 1840 to 1865, it affords precious materials for such a history, and should be read by all who desire to follow out that period of our science, and at the same time to become acquainted with two of its most prominent and faithful workers in the traditional as well as in the newer astronomy. G. P. Bond's experiments in astronomical photography were of very great importance and, in fact, were prior even to Rutherfurd's.

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Handbuch der Klimatologie. Von DR. JULIUS HANN. Stuttgart, Germany, J. Engelhorn. 1897. Second edition. 3 vols. 36 Marks.

If I were asked to mention the greatest authority on matters pertaining to climate and