

stone is "too permanently hard to be a wholesome drinking-water," whilst a few lines further on we are surprised to read that "the total solids rarely exceed 20 grains per gallon." The chapter on the atmosphere makes no mention of the numerous investigations which have been made both at home and abroad on the aerial microbes and their distribution. The authors almost apologise for the prominence they have given to the subject of micro-organisms, but we think they might more appropriately have tendered some excuse for their unfortunate frontispiece, which endeavours to represent the microscopic appearance of the typhoid and anthrax bacilli; for whatever the excellence of the original illustrations may have been, the reproductions in the copy before us do little credit to British printing.

*Practical Astronomy.* By P. S. Michie and F. S. Harlow. Second edition. (London: Kegan Paul, Trench, Trübner and Co., Ltd., 1893.)

In this book the authors have brought together all those astronomical problems which are required for field work, limiting themselves simply to these, and dealing with them at sufficient length for practical work. The volume is intended especially for the use of cadets of the U.S. Military Academy, and as a supplement to Prof. Young's text-book, and several subjects not sufficiently discussed there for this special branch of practical work are here expanded. After a short discussion on the uses of the *American Ephemeris and Nautical Almanac*, and a few words on interpolation, the authors launch out into the usual methods of determining Time, Latitude, and Longitude on Land, explaining them concisely and deducing the requisite reductions formulæ. Corrections for refraction, parallax, &c., also receive a good share in their respective places, while the instrumental errors are fully explained and discussed. Excellent illustrations of instruments (those in use in the Field and Permanent Observatories of the Military Academy during the summer encampment) are inserted and described. In addition to a set of tables collected together at the end, a few well-arranged forms, showing the methods of computing several problems, are inserted, which should prove a great help to those not accustomed to such calculations.

W. J. L.

LETTERS TO THE EDITOR.

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The Publication of Physical Papers.

THERE is little doubt that there is much to be done towards improving the machinery connected with the publication of papers on physical science. By publication of a paper I do not mean printing and binding and sending it to libraries in inconvenient places, which are open at inconvenient hours, but bringing it under the eyes of those interested in its subject. It is hardly possible to discuss this matter without being personal to journals and societies, so perhaps direct references may be allowed.

The present position is that as societies we have the Royal Society, which nominally embraces all branches of science, and the Physical Society, which is alone devoted entirely to physics, and several important general scientific societies scattered about the present kingdom. We have also some journals. Of these NATURE must here be put first, but NATURE is by no means purely physical, and is a scientific newspaper, and not a collection of scientific papers, and, owing to the nature of the case, incomplete as regards abstracts. The *Philosophical Magazine*, with its splendid record, fills its place alone. It contains a certain propor-

tion of original papers, and a number of others communicated by the Physical Society, with which there is evidently an arrangement. There are also purely electrical paper like the *Electrician*, which covers most branches of electrical work, and the *Electrical Review*, which publishes filtrates of papers on electrolysis and kindred subjects editorially, with the names and references left out; an annoying proceeding. Coming to the societies, the Physical Society is alone devoted to physics. The Royal Physical Society in Edinburgh need not be considered, as it indulges in ornithology and things of that sort. The Physical Society publishes well. Abstracts of the papers and discussions appear in NATURE and in most scientific or technical, and in some literary journals. The papers are often published in the *Philosophical Magazine*, and again in the Society's own Proceedings. No doubt in time this society will be to physics as the Chemical is to theoretical chemistry, but at present it does not command by any means all the most important physical papers. There is also some waste in republishing in the *Philosophical Magazine* and the Proceedings, though this does not cost much. The arrangement with the *Philosophical Magazine* prevents the immediate publication of a Physical Society paper in the scientific and technical journals at home and abroad. This is a source of weakness. A society which objects to its papers being published everywhere before appearing in its own journal does much to defeat its own ends. The Physical may be unable to help this, but in the Royal, or other wealthy institution, it is defeating the main object of the society's existence for the sake of selling a few odd copies of the Proceedings. To go back to the Physical, the result is that its papers are never reprinted either from the *Philosophical Magazine* or from the Proceedings. The *Philosophical Magazine* is not very cheap, and the Proceedings are, I think, not sold to non-members.

The Royal Society gets physical papers. I believe they are sometimes read, but do not know, not being a Fellow. The best papers are published a long time afterwards in a form which is very expensive to buy, and those who are not Fellows generally know nothing about them until they find them by chance. Royal Society papers, again, are seldom reprinted in the journals.

Then there are various other societies, like the Royal Society of Edinburgh, and the Cambridge and Dublin societies, which shroud valuable papers of all sorts in their transactions, and bury them in public libraries. The result of the present state of things is that an English physicist—it is difficult to get on without this curious word—has no simple means of following the progress of his own special study.

There are several courses which would improve matters, but none of these is perfect. The most obvious is for all physical papers of any importance to be sent to the Physical Society, and published in its Proceedings. The advantages of this need hardly be enumerated. Of course the Physical Society would develop, and would at once become one of the most important in the world. The drawback is that if this principle were carried out in all branches of science we should have a number of special societies in London, and none anywhere else, which would be a very bad arrangement. Another plan would be for the various societies to join, so that one journal, say that of the Physical Society, contained all the important physical papers read at the various societies. A society would communicate its best papers to the Physical Society's Proceedings, these Proceedings being controlled partly by representatives of all the other societies. The papers would, of course, also appear in the Proceedings of the societies to which they really belonged. One drawback to this would be that the Royal Society might object to communicating its papers to the Physical; and this might lead to competition between a special and a more powerful general society.

Another course would be for the Royal Society to act as the central body. This would be rather hard on the Physical, and would tend to reduce its standing, so that we would have no first-rate society devoted specially to physics in a country where an enormous amount of work is done in a disorganised way. There would be another difficulty. The Royal Society standard of papers is supposed to be very high, and though it occasionally publishes papers of no value, the high standard generally maintained would exclude many papers of great importance which were hardly good enough for the Royal Society. Then the Royal Society is specially devoted to pure—that is unapplied science, and there are very many papers on applied physics which are of the highest importance.