

SCIENCE.

FRIDAY, MAY 2, 1884.

COMMENT AND CRITICISM.

ALL friends of science and learning must earnestly hope that the difficulties between the board of managers of the Winchester observatory of Yale college, and the observatory committee of the corporation, will be settled without injury to the institution. The organization of the observatory seems to be somewhat complex. The corporation of the college, in whose hands the supreme power is placed, finding itself unable to immediately organize the establishment, appointed a board of managers, among whom were included Professors Lyman, Newton, and Loomis, to advise and recommend measures, and to execute such plans as should be approved by the corporation. Under this authority, Professor Newton was made director before the funds were sufficient to justify the completion of the organization. The horological and thermometric bureaus were established before any appliances for astronomical work were completed. In the mean time, a heliometer of the first class, indeed the largest and finest ever made, has been procured, and arrangements made for its use by a skilful astronomer.

The present difficulty seems to have grown out of the peculiar position of the two bureaus above mentioned, which gave rise to a divergence of views on the subject of their relations to the rest of the establishment. These bureaus have done excellent work in testing thermometers and time-pieces, and in calling public attention to the lack of precision in observations of temperature, owing to defects in thermometers. Notwithstanding their public utility, the board of managers seem to have considered the propriety of their permanent support from a fund designed for scientific research as open to question, while the corporation committee desires to make them the

main feature of the institution, and, indeed, to take them out of the control of the director. This committee also proposes to abolish the board of managers, which seems to imply dissatisfaction with their work, and to organize the observatory in a way which is so strongly disapproved by the board, that Professor Newton has resigned the directorship, and at least one other member has left the board. As the details of the plan have not been made public, it cannot be made the subject of intelligent criticism; but it is hardly possible to avoid the impression that the authorities of the college are not sufficiently alive to the necessity of having the observatory managed by some competent and responsible authority, whether an individual or a board.

THE recent award of the gold medal of the Royal astronomical society to Mr. A. Ainslie Common of Ealing, Eng., reference to which is made in another column, should prove a powerful incentive to the amateur astronomer; and the remarks of the president of the society, Mr. E. J. Stone, in his presentation address, are no less important as indicating in general the way in which the amateur should go to work. A clear conception of the needs of astronomy in some special direction should precede all efforts to provide instrumental means; and the means should thus be suited to the ends sought. The speedy fossilizing of many an excellent instrumental outfit might thus be forestalled. The professional astronomer is frequently compelled to note the absolute incomparability of work done with the costliness and variety of the instrumental outfit; which means, of course, that scientific work of real worth is achieved, not so much by the telescope as by the observer who stands behind it. And it is worth the while, in this era of big telescopes, when the chief inquiry relates to the superior limit in size attainable, to glance backward at the results already

secured with telescopes approaching the inferior limit in aperture, and take note of the amount of work, of much the same sort, remaining to be done, largely, to be sure, of a character not intended to elicit profuse applause.

AMERICANS are less sensitive than formerly to foreign criticism, but a recent series of incidents would indicate that foreigners are beginning to be sensitive in respect to American criticism. Some six months ago a writer in *Science* called attention to the three principal currents of scientific work, — German, English, and French. He was critical in his comments, but his criticism was evenly distributed; and American work did not escape his eye. On the whole, Germany was most praised, and France least praised. The article was copied into *Nature*, and was translated for the *Revue scientifique*. The editor of the *Revue*, Mr. Charles Richet, came to the defence of France against the writer in *Science*. Now comes the work of Father Didon, on German education (*Les allemands*, Paris, 1884), which reprints a translation of the original article in *Science*, and Richet's rejoinder. The charge and the countercharge are thus brought into juxtaposition in a book which is likely to be widely read.

We are interested in Richet's answer. To the charge in *Science* that the French neglect foreign science, especially German, a flat denial is given; and a list of books translated from German into French within a short time past is printed. To the charge that the French are producing nothing new, reference is made to the current pages of the *Comptes rendus*. To the charge that "science has never been so depressed in France as at present," the chief attention is given. Mr. Richet points triumphantly to three names, — Pasteur, J.B. Dumas, and de Lesseps, and then, after asserting the distinction of these three leaders, the writer proceeds to look calmly at the situation. It is instructive to observe what he admits. In science, he says, France is like an army which has leaders, with-

out soldiers enough. No French *savant* has around him a numerous group of students; and consequently the selection of professors for chairs of science is constantly becoming more difficult. It is not so, he admits, in Germany. Why is it thus in France? Because superior instruction is so poorly paid. Millions are needed to place the country in the right condition. Professorships and laboratories should be established; but, more than that, ideas must be changed, and larger numbers of young men must devote themselves to researches which have no obvious practical bearing, — *recherches scientifiques désintéressés*.

Much of Richet's comment on France would apply to this country. The United States, like France, stands in need of more professorships, and more laboratories, devoted to the promotion of science. We need, also, more young men willing to renounce careers which will yield pecuniary returns, and ready to labor for the promotion of knowledge, and the enlargement of the boundaries of human thought. But no one should consecrate himself to such a life, unless he has the assurance of support, or unless he is willing to face the restrictions of a poorly paid career.

THE tests of a theory are found not only in its accordance with facts known at the time of its proposal, but still more in its accordance with conditions discovered afterwards. The admirable studies of tornadoes now in progress, as described in our notes, are fertile in discoveries of the special conditions in which these destructive storms arise; and, as far as published, all of these newly found limitations of occurrence give the most direct support to the mechanical theory of tornadoes put forth by Mr. Ferrel a few years ago. The tornado district, as now determined, is one where warm air is overflowed by cold air: here is found the cause of the marked vertical differences of temperatures which the theory had accepted from less extended observations. The district is distinctly within a cyclonic, spiral circulation

of the atmosphere, and is found to have a very definite position relative to the centre of the cyclone; and this directly confirms the explanation given by Mr. Ferrel of the persistent left-handed rotation of the tornado, as well as of its regular direction of advance. There is no better example than this, of the successful deductive study of meteorology.

There are, of course, other theories of tornado action still held. The electrical, or, as it may be called, the vague theory is one of the most popular; but fortunately it is condemned by

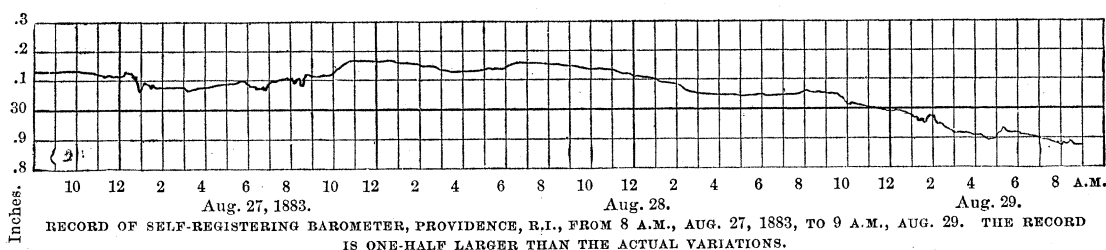
it makes a determined resistance. There it survives for a time as a curiosity, a relic of by-gone days.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

Atmospheric waves from Krakatoa.

I NOTICE, in your publication of the 14th of March, an account of an atmospheric wave which took place soon after the eruption of Mount Krakatoa. Thinking that it may be of interest, I enclose a copy of a sheet taken from a self-registering barometer that is under my charge. The fluctuations shown by the barometric line upon this sheet are very unusual; but,



electricians. The theory of descending winds, or of commotions beginning in the upper air, and then descending to the ground with actual downward currents, has had not a few supporters, but now seems to be defended only by Mr. Faye of the French bureau of longitudes. The last *Annuaire* of this bureau contains a brief repetition of his *Défense de la loi des tempêtes* of 1875, in which he persists in regarding tornadoes and storms in general as down-cast draughts of air, and, strangely enough, finds proof of his statements in the descriptions of western tornadoes published by the signal-service, which make mention of the 'descent of the tornado cloud.' It is quite time that the downward 'growth' of the cloud should no longer be misapprehended, and that the real meaning of this significant appearance, so long ago well explained, should be generally understood. But, before an error finally disappears, it is natural enough to find it restricted, like an organic species on the verge of extinction, to a small habitat, like the Island of Mauritius, or the Bureau of longitudes, where

as I was in Europe at the time they occurred, I can only say that the sheet must explain itself, and that the barometer is a very sensitive and reliable one.

EDMUND B. WESTON.

Providence, R.I., April 16.

Your correspondent, 'S.' in *Science*, No. 63, would seem to be wrong in attributing to the atmospheric waves following the Krakatoa explosion anything like the character of the rapid waves of compression and expansion which cause sound; for this would be the kind of disturbance referred to as following the explosions of powder-mines, which disturbance generally takes the form of shattering glass windows, and is probably due to the suddenness and unusual amplitude of the first wave of compression, or perhaps to the shivering vibrations set up in the window-sashes, or in the whole sides of wooden buildings. None of these waves could, on account of their frequency, show themselves at all on barometric traces.

In the Krakatoa waves the barograph traces, combined with the velocity of transmission, show that these waves must have been long, smooth swells (varying from fifty to five hundred or six hundred miles in length, with the shorter waves sometimes superposed upon the long ones) something like the groundswell of the ocean, only with the waves much longer than the latter, and travelling in an elastic medium whose density and pressure vary from that at the earth's surface up to zero.

For the cause of such an unusual condition of the atmosphere, we must examine the results of the new hydrographic survey of the vicinity of Krakatoa, as published in *Nature*, 1884, Jan. 17, p. 268 (also, in part, in *Science*, No. 54, p. 211), and also the data