SCIENCE.

FRIDAY, FEBRUARY 22, 1884.

COMMENT AND CRITICISM.

It was an old theory, taught in text-books of philosophy, that the conclusions of mathematics were absolutely certain, — quite exempt, in fact, from that liability to error which so troubles our conclusions on other subjects. Yet disagreements among mathematicians upon the demonstrable results of their science, even if rare, are not wholly unknown. A remarkable case of this sort is now seen in a discussion which has been going on since last summer in the Royal astronomical society of London. Mr. E. J. Stone, president of the society, and director of the Radcliffe observatory at Oxford, informed the society that he had detected a serious error in the astronomical measurement of time, arising from the substitution of Le Verrier's tables of the sun in the *British nautical almanac* in 1864 in place of the old ones. To this cause, he claimed, were due certain extraordinary errors in the tables of the moon, which had perplexed astronomers for the past ten years. At the same time he communicated to the Royal society an extended memoir, in which he gave several elaborate demonstrations of his views.

These papers no sooner appeared than the new theory became the object of attack on all sides. Such astronomers as Airy, Adams, Cayley, and Christie, in England, as well as their French neighbors, published elaborate refutations, showing that Mr. Stone was wholly mistaken. His carefully prepared memoir was refused admission to the Philosophical transactions. If mere numbers or authority could have settled the question, Mr. Stone would have been crushed; but he has so far maintained his ground against his numerous opponents with a perseverance which we cannot but admire, how little soever we may share his views. After going on for eight months, the discussion seems to be as lively as ever. Its most curious feature is, that the questions involved are purely mathematical. The new tables of the sun make the year shorter than the old ones by about one and a half seconds. Mr. Stone claims that the unit of time is changed by this same amount; that is, that we are using a new measure of time, which is gaining on the old one at the rate of three seconds every two years, so that it has gone ahead thirty seconds since 1864. His opponents claim that this is absurd, since it is not the year, but the day, which is taken as the fundamental unit; and the change in the length of the day is totally inappreciable. As yet, the dispute shows no signs of approaching its end.

It is stated that the outlines of the plan for the Greely relief expedition, approved by the Navy department, are practically as follows: the relief party to go north in two vessels, reaching Upernavik not later than May 15; thence to Littleton Island, endeavoring to open communication with the Eskimos at Cape York. A depot with one year's supplies, coal, clothing, boats, and a steam-launch, should be established at Littleton Island by the first ship, and left in charge of an officer and two men. This vessel would then approach the borders of the pack, and push northward at the first favorable opportunity; the second vessel to cruise about the edge of the ice, and hold herself in readiness to establish another depot on shore in case the first vessel be lost, and the second required to proceed northward in her place. Should Smith Sound be comparatively open, the first vessel will proceed to form secondary depots at or near Washington Irving Island, Cape Collinson, and Carl Ritter Bay; the second, after making a depot at Cape Sabine, to proceed north not farther than Dobbin Bay, unless required by disaster to the first vessel.

In the latter case, before proceeding farther, the second vessel is to land her house, two boats, and a year's supplies for the whole party, in the vicinity of Dobbin Bay. Should both vessels avoid disaster, yet not succeed in communicating with Greely, one is to winter in Franklin Pierce Bay, and the other near Littleton Island. The coast is to be examined on the way north, and cairns enclosing notices of the relief party's plans established at prominent points on both coasts. The naval vessel or tender is to go as far as Littleton Island or Cape Sabine. Whalers and sealers are to be asked to keep watch of the ice-floes for any drifting party. It is also suggested that an advance ship be sent up still earlier, if possible, to relieve the Greely party, if by any chance they should have reached the Danish settlements or the entrance of Smith Sound. It is stated that Commander W. S. Schley, U.S. N., has been selected to take charge of the expedition.

In many respects this plan seems well considered, and, in proper hands, likely to succeed in the desired object. It may be doubted, however, if the projectors fully realize the inadvisability of too great haste in attempting to proceed northward of Littleton Island, or the strong probability that no satisfactory opportunity for northward progress will occur in the natural course of things much before the end of July. Nothing would be easier than to grind up two or twenty of the strongest ships by pushing them into the pack too early. On the other hand, a proper method of early relief preceding the time of navigation — namely, by small coastwise boat and sledge parties combined — does not seem to have received any consideration in the report. Such parties would be much more likely to get early information than any number of vessels entangled in the floes off shore. It is certain, from all previous experience, that the chances are greatly in favor of finding the party on the western shore rather than on the Greenland coast. The probability of their having been able to reach Littleton Island is infinitesimal. We hope, that, in addition to the government expedition, a large reward will at once be offered to any one who may succeed in rescuing the party. This would enable private parties to make their preparations for such an attempt before all the whalers and sealers have left port, would greatly increase the chances of a rescue, and would put all parties on their mettle. To neglect this precaution would be almost criminal.

The destruction of the forests is frequently assigned as an efficient cause of freshets. But all the primeval forests which covered the head waters of the Ohio did not prevent freshets, nor could they under certain combinations of circumstances. A wide-spread storm, with heavy rain on frozen ground and snow, such as to raise all its tributaries at once, must inevitably cause a flood. The floods of early days were of longer duration than those of to-day, by reason of the forests standing upon the river-bottoms and adjacent banks, which became filled with matted drift-wood, forming a tangled mass which obstructed rapid flow, and through which the water found its way but slowly. The most serious effect of the denudation of the land is the increased erosion to which it is exposed, by which the fertile soil, unprotected by vegetation, is swept by the rains into the rivers, and lost. The magnitude of this loss, and the great erosive effect of water on the clay soil of the west, can only be realized by those who have observed the tawny floods, thick with mud, which flow through the deep and wide valleys which the western rivers have cut in the soft earth.

In bright lands like Australia, where sunshine is sometimes so prevalent as to give rise to complaint, it would seem that the advent of the rain-doctor should cause no alarm. Mr. Russell, the government astronomer of New South Wales, has, however, gone a long way toward discouraging the endeavors of this well-minded individual, notwithstanding his offer to work reasonably, as it will appear to some, with nitroglycerine, with cannon, with elec-

trical machines, with kites, etc. But Mr. Russell predicts his speedy loss of position in the modern social scale, if, having no correct understanding of cause and effect, he pretends to pull down the clouds with a wire, or frighten them with a few crackers. In this habit of belief, apparently so thoroughly ingrained in human nature, that a comparatively slight artificial commotion in the atmosphere is enough either to bring rain out of a clear sky, or to superinduce a calm in violent storms, there is, it must be confessed, something akin to the popular conception of homoeopathy. But in countries other than Australia it may be possible that the necessary condition of unstable equilibrium is more frequently attained, when artificial rain might be a matter of easy production. For Australia, however, there can be little doubt that Mr. Russell is in the right; and when, as he remarks, so many proposals are put forward, some even going so far as to propose that his government should take to cannonading the sky, it is time that some one took the matter up.

THE Philadelphia papers are vigorously discussing Dr. Harrison's plan for a biological institute in that city, and the outlook for it appears favorable. The only exception that has been taken to the plan has been doubt as to the desirability of creating an independent institution, when the work might better be intrusted to the already existing academy or university. This is comparatively unimportant: what is essential is a separate and ample endowment in safe hands. Yet it must be said, that neither of those establishments carries on its work primarily for the training of *investigators*, which is the special aim of the proposed institute; and such an institute Philadelphia absolutely requires, if it would not lose the position it has long held in American science. The academy certainly has neither room nor funds for the purpose; and being at this moment before the public, asking for a large sum of money for building-purposes, only to carry out more fully work in which it has long been engaged, it would be hampered rather than aided by the partial endowment which would probably result for either purpose.

THE legislatures of Virginia and Maryland, stirred by the approaching failure of the oyster-crop, are moving for protection for the beds in apparent good faith. Something will doubtless be done; but the devastation has gone so far, that no immediate improvement can reasonably be expected.

RETURNING to the question of the use of copper as a prophylactic in cholera cases, so much discussed during the recent Egyptian epidemic, Mr. Vulpian presented a note to the French academy, at a recent meeting, written by Mr. Axel Lamm of Stockholm. Mr. Lamm states, that it is a fact that the workers in the copper-mines of Fahlun, in Dalecarlia, did escape during the epidemic of 1834. Judging by this, plaques of copper were tried as a remedy, placed on the stomachs of the patients in the cholera hospitals. The only result was the formation of verdigris if the plaques were not properly cleaned, and consequent ulceration from its caustic action. Fahlun has escaped five or six times, however, when Stockholm has not; and Mr. Axel Lamm suggests the possibility of the great amount of sulphuric-acid gas in the air being the reason, but he has not as yet made any further investigations.

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.*

Macrospores in the rocks about Chicago.

SINCE submitting the committee's report on this subject (see p. 237) to the Chicago academy of science, I have continued the investigation of drift material in this vicinity, and from other parts of the northwest. So far as examined, all of the clays on the west shore of Lake Michigan, from Kenosha, Wis., on the north, to the Indiana state line on the south, contain an abundance of the disks, or macrospores, referred to in that paper, both free in the clay and *in situ* in fragments of shale. These clays range from some seventy feet above the level of Lake Michigan to (I am advised) over two hundred feet below its surface.

In the examination of clays from other localities, I get some very unexpected results. In several specimens of 'blue bowlder clay' kindly sent to me by Prof. N. H. Winchell, state geologist of Minnesota, and "taken from fourteen to twenty-one feet below the surface, when digging a well at Litchfield, Meeker