SCIENCE.

FRIDAY, APRIL 9, 1886.

COMMENT AND CRITICISM.

THE RISE AND FALL of the waters in the northwestern lakes, and the consequent dangers to the lake cities, have frequently been a sensational subject for discussion. The great tidal waves, like the one which rolled in on Cleveland a few years since, and the piling-up or lowering of the waters by continued gales, are, of course, real dangers on account of the suddenness of their occurrence, though, happily, they are rare and temporary events. But alarmists are continually announcing the discovery that the gradual or secular changes in the lake-levels are sure to bring disastrous results. According as the waters are rising or falling, we hear of grave fears that some lake-post is likely to be inundated, or left high and dry inland. Recent reports in the daily press indicate that Lake Michigan is assuming a threatening attitude towards Chicago and its suburbs. The lake is now rising, the reports state, at the rate of several inches per year; and one needs only to imagine this rise prolonged at the observed rate for a few years to get an idea of startling possibilities for the Garden city. But the records of the fluctuations in water-level of the Great Lakes, which have been carefully kept for many years by the corps of engineers, U.S.A., do not warrant us in prolonging any observable rise or fall indefinitely. On the contrary, these records indicate that the variations in the lake-levels, above or below the mean stage, are confined to a very few feet, — about three feet at the most. The variations are greatest in Lake Ontario, less in Lake Erie, still less in Lakes Huron and Michigan, which form a single level surface, and least of all in Lake Superior. With reference to Lake Michigan in particular, a glance at the water-level curves published in the report of the chief of engineers, U.S.A., 1882 (the curves do not appear to be published in the later reports), shows that the average yearly variation in level of that lake is about one foot, that the maximum variation during any one year included in the period (1859–82) covered by the published record was two feet and a half, and that the extreme fluctuation during the same period from the highest stage (in 1859 or 1876) to the lowest stage (in 1869 or 1873) was three feet and seven-tenths. The highest recorded stage of Lake Michigan, viz., that of 1838, was only one foot higher than the stage of 1859 or 1876. It seems tolerably safe, therefore, to conclude that the prospective dangers to Chicago or any of the lake cities from too much or too little water in the lakes are all such as may be overcome by acts of congress in the shape of timely items in the river and harbor bill.

THE OUTLINE-MAP of the United States in four sections, prepared by Dr. A. B. Hart of Harvard, and lately issued by D. C. Heath & Co., may be a means of leading the numerous teachers of history throughout the country to adopt more scientific methods of instruction. On this account alone, and wholly apart from its intrinsic excellence, it deserves recognition and notice. The map is in four sections, each thirty-one by forty-four inches, the United States being divided at the 37th parallel and at the 95th meridian. Being in outline, and showing the principal water-courses, a skilful teacher can, without any great ability as a draughtsman, color the map so as to present in graphic form geological facts or the course of political and social development. Changes of population, the local strength of political parties, the distribution of railways, schools, or industrial establishments, topographical features, — in short, any thing which admits of statistical and graphic presentation, — can be shown with a minimum of expense and labor. The map is so cheap that a teacher can easily procure a number of them; and, when once colored to illustrate any particular subject, they can be rolled up, and used again at any future time.

We would suggest that the principle here applied by Dr. Hart to United States geography and history will bear extension. The map should be reproduced on a smaller scale for the use of pupils; for, by copying the display-map on an outline of his own, the facts will be more deeply impressed upon the student's mind, and he will always have a graphic summary of them for reference. We shall soon hope to see outline-

maps of Europe on the same plan. Nothing could throw more light upon the mazes of mediaeval and modern French, and particularly German history, than such a method of illustration as is here offered. Where the pupil now possesses an unmanageable congeries of facts, names, and dates, he could then carry away with him a vivid picture of the intricacies caused by the constant series of wars and dynastic contests. These maps are virtually the object-method applied to history, social science, geology, ethnography, and their related sciences. They are in every way commendable, and no teacher of those subjects should fail to apply the method which they suggest.

ALTHOUGH SENATOR ALLISON'S commission which is investigating the surveys reported the evidence taken some weeks since, no conclusions have yet been made public. Nothing officially authenticated can therefore be said as to what legislation the commission will finally recommend. But those who have most closely followed the proceedings, and watched the effect of the evidence upon the minds of the members, feel entire confidence that no very radical measures will be proposed, and especially that the integrity of the coast survey will not be threatened. It is scarcely believed that the commission will even recommend its transfer to the interior, or any other department than that under which it is now placed. The impression that no change will be made has become so wide-spread, that candidates for the position of superintendent are again coming forward. The friends of Gen. W. F. Smith are said to be the strongest, but it is not well to predicate any thing upon newspaper reports of the prominence of Smith, Rosecrans, or any other candidate. It is safe to say that the President is fully conscious of the importance of the position, and of the small value to be attached to recommendations secured by the candidates themselves. We believe that he will make the best selection he can from the names presented to him, disregarding their influence, and that the standing of the candidates as scientific experts will not be disregarded in the choice.

ELECTRIC RAILWAYS.

AMERICA seems to lag very much behind Europe in the matter of electric railways. Indeed, our lighting systems seem to have absorbed all our energies; and perhaps the most appropriate and lucrative use of dynamic electricity, its application to locomotion, has been overlooked, or been treated in so superficial a manner as not to have resulted in commercial success.

Every American supposes himself capable of intuitively doing his own engineering, regardless of the fact that he may have neither experience in any of its various departments nor education in the fundamental facts and methods of computation of technological application of scientific truths. Inventors with good ideas regarding electrical work gravely spin for us complete systems for electrical railways, drawing only on their intuitions for every thing save the dynamos and motors. Do they realize that a vast number of problems of organization and system still remain unsolved upon the steam-railroads? Do they realize that they are not engineers, but only electricians, with a vast deal yet to learn in their own field? They do not: they are in possession of one good idea, and they recklessly proceed to surround their invention with all sorts of engineering crudities, thus rendering their chances of success almost nothing.

Germany has been more fortunate in having its first electric railway undertaken by Siemens & Halske. This firm brought to bear upon the problem the profound researches and the engineering education of its staff, and, acting in the cautious and thorough manner resulting from its wide experience in many fields of engineering, has been successful. In the exhibition of Berlin, 1879, they established a circular railway of 350 metres length, one metre gauge, and, placing a three-horse power motor in a car capable of carrying thirty people, transported passengers at a rate of fifteen to twenty miles per hour. The current was taken along one rail, and by an insulated tire was conveyed to the positive pole of the motor, and thence to the other rail, by which it returned to the generating-dynamo. No special care was taken to insulate the rails, which were placed high above the ground on wooden ties. The current was of low electromotive force, and therefore did not require special means for insulation. This road was exhibited in Düsseldorf and Brussels, and finally in London in 1881.

The success of this experimental plant was uniformly so great as to make Messrs. Siemens & Halske desirous of building an elevated electric railway in Berlin, for which the plans and estimates were made with great care, but unfortunately this enterprise was not carried out, because the Emperor William would not permit 'The Linden' to be marred by being crossed at one point, and because the citizens objected to having people looking into their second-story windows.