

similar tide-ways, is affected by the complex action of the tides and consequent currents.

It is much to be regretted that the economy or parsimony of the Government has caused a suspension for the present of the special survey of the currents, and has restricted the work to tidal observations, which, though of great value to the shipping interests, can only be considered as preliminary in regard to the investigation of the currents themselves, which lead to so many losses of property and life, and tend to high rates of insurance, injurious to the shipowners and merchants of Canada, and through them to those of an empire as a whole.

The present report, in addition to what can be done with the insufficient grant allowed, in the matter of tide-gauges and tide-tables, has reference to the behaviour of the gigantic tides of the Bay of Fundy, when confined by the converging coasts at the head of the bay, and their relation to the smaller tides on the opposite side of the isthmus connecting Nova Scotia and New Brunswick at Bay Verte on the Gulf of St. Lawrence. These and the phenomena of the "bore" at the head of the Bay of Fundy are here for the first time described, illustrated by maps and sections, and tabulated, and will be found of the greatest interest by all who desire information as to the exceptional tides of this region.

J. W. DAWSON.

School Laboratory Plans.

As one who has had the privilege of seeing Mr. Dymond's excellent arrangement and outlay of money in his laboratory at Chelmsford, may I make a comment on his letter in your issue of July 13? I think the conditions of work in an average school laboratory show some points of difference from those in Mr. Dymond's laboratory. Of course qualitative analysis is now confined to quite senior boys, who can be persuaded not to treat the subject as if they were working from a cookery book; but though owing no allegiance to the Science and Art Department, I believe that drawers and lockers are valuable, not only in relieving the general stock of the laboratory (very heavy for descriptive and quantitative work) of some smaller apparatus in constant use, but also in conferring a feeling of ownership, which induces some care and respect in a boy for his belongings. With snap-locks answering to one master key, and the lockers of each class bearing a label of a distinctive colour, they may be at once opened by the assistant before a class, so that there need be no keys to lose and no depredations on neighbouring lockers. Mr. Dymond's objection to that most durable of woods—teak—or why it alone should be left in a dirty state, I do not understand. Admitting that in all but very elementary work some tuition in the way of lectures is necessary, a laboratory will generally possess a lecture room; and where this is a separate room, I grudge the space usually given to a demonstrator's table in the laboratory, because no large section of a practical class is ever doing the same experiment at the same time. Physics, again, is often involved in this question of arrangement in a school, since the two subjects may, I think, with little detriment and great economy often have a common lecture room. Considering the prodigal waste of space often seen in laboratories, and the number now being built by public bodies, some further views on this subject ought to be of value.

A. E. MUNBY.

Felsted School.

Duties of Provincial Professors.

THE article in your issue of July 13 upon "The Duties of Provincial Professors" will be welcomed by all professors in local university colleges. It insists none too strongly upon the disadvantageous position they occupy with regard to the opportunity for the prosecution of original research, and the unfortunate result of compelling our best students to complete their scientific education in Germany.

It is not sufficiently recognised that the reputation of a university is advanced more by the contributions to science and literature produced by its staff than by the mere number of its students. Unfortunately, the staff of assistants in the university colleges is often totally inadequate to the work required, and the knowledge that their energies will be dissipated in elementary teaching, and no time given for continuing original investigation, is deterring men of really high academic distinction from accepting such appointments. The government of a local college is largely directed by business men, and the methods which ensure commercial success are hardly those best calcu-

lated to further the interests of true education. Salvation lies apparently in the fact of Government inspection; the Government grant is only given when the education is of an advanced university type; and, judging from the tenor of the Treasury Minute, "University Colleges, Great Britain—Grant in Aid," the fullest recognition is given to those colleges which offer opportunities for advanced work and research and can show an adequate educational equipment. "A PROFESSOR."

July 23.

IN the articles on "The Duties of Provincial Professors," it is stated: "In such cases students . . . may be called on to give evidence against their professors." This is almost incredible, but, to my great astonishment, I learnt quite lately that the only possible alteration in the statement consistent with truth would be the substitution of the words "have been" for "may be." The adoption of such a course must be fatal to good discipline in a college, and it leaves the members of the staff at the mercy of a few unruly and ignorant students whose disposition to learn may be small, though their capacity for agitation is great. From time to time students of this description will be found in every college. Apart altogether from these evils, there is another reason why the practice of allowing students to give evidence against a professor is decidedly objectionable; and that is, the lay members of the governing body of a provincial college are not likely to fully understand how incompetent the average pass student is to form an opinion as to the soundness of the teaching he receives.

In the interests, not merely of the provincial colleges, but of higher education throughout the country, it is desirable that professors should not, for any except very grave reasons, and then only after a perfectly fair trial, be forced to resign their offices.

THE REDE LECTURE.¹

THE WAVE THEORY OF LIGHT: ITS INFLUENCE ON MODERN PHYSICS.

OUR era is distinguished from preceding ages by wonderful utilisation of natural forces; man, that weak and defenceless being, has been enabled by his genius to acquire an extraordinary power, and to bend to his use those subtle yet dreadful agents whose very existence was unknown to our ancestors. This marvelous increase of his material power in modern times is due only to the patient and profound study of natural phenomena, to the exact knowledge of the laws that governed them, and to the skilful combining of their effects. But what is peculiarly instructive is the disproportion between the primitive phenomenon and the greatness of the effects which industry has drawn from it. Thus, those formidable engines, based on electricity or steam, grew neither from lightning nor the volcano; they had their birth from scarcely perceptible phenomena which would have remained for ever hidden from the vulgar eye, but that penetrating observers were able to recognise and appreciate. This humble origin of most of the great discoveries which are to-day a benefit to the

¹ Besides the interest presented by a glance on the progress and the influence of optical science, this lecture offers the conclusions of a careful study on Newton's treatise of optics. It will be seen that the thought of the great physicist has been singularly altered by a sort of legendary interpretation developed in the elementary treatises where the emission-theory is expounded. In order to make the theory of fits clearer, the commentators have imagined to materialise the luminous molecule under the form of a rotating arrow offering now its head, now its side. This mode of exposition has contributed to lead to the belief that the whole emission-theory was comprehended in this rather childish image.

Nowhere in his treatise does Newton give a mechanical illustration of the luminous molecule: he confines himself to the description of facts, and sums them up in an empirical statement without any hypothetical explanation. Moreover, he denies the opinion that he raises any theory, though he holds occasionally as very probable the intervention of the waves excited in the ether.

So that the general impression resulting from the reading of the treatise and above all of the "queries" in the 3rd Book, is the following: Newton, far from being the adversary of the Cartesian system, as he is commonly represented, looks, on the contrary, very favourably at the principles of this system. Struck by the resources which the undulatory hypothesis would offer for the explanation of the luminous phenomena, he would have adopted it, if the grave objection concerning the rectilinear propagation of light (only recently solved by Fresnel) had not prevented him.