

to be allowed. Two ideas presented themselves to my mind as to the possible origin of the beading. One was that it might have something to do with the way in which the path crossed a series of electromagnetic waves, like those of light, except as to the scale of wave-length. Another, which seems more probable, is that they are of the nature of the stratified discharge in exhausted tubes. This supposition indeed is not free from difficulty, though I do not think the difficulty fatal. In an ordinary tube it requires a very good exhaustion to get strata as much as an inch thick. But here, at full atmospheric pressure, we have strata a foot or more in thickness. However, in a Geissler tube the strata are closer in the capillary part, where the current is concentrated, than in the broad part. It may be that in the discharges, for example, represented in Fig. 1, which are unconfined laterally, these wide strata are possible, and if so, the density of the current is small. It has already been remarked that the intensity decreases as we go from the lamp to the ground. It seems that the current is gradually spent in electrifying the air. If this explanation be correct, the local discharges represented in Mr. Webb's photographs may not be so dangerous as some of them look. Still, until we know more about the subject, it might be prudent in a thunderstorm to keep a little away from arc lamps in a street.

If the wireless telegraphy theory which I have ventured to throw out be the true account of the Webb discharges, it seems that by imitating with any necessary modification the receiving apparatus, and introducing a telephone, as has been done with great advantage by M. Turpain in his researches, it might be possible simultaneously to see and to hear a flash of lightning.

Cambridge, January. G. G. STOKES.

#### The Mathematical Tripos.

ON February 15 the recommendations of the Special Board for Mathematics on the Mathematical Tripos will be voted on by the Senate of the University of Cambridge. With regard to the changes proposed in the general arrangement of the examinations there can be scarcely any difference of opinion. About twenty years ago the advances in mathematical science had reached such a pitch that it was impossible to cover the whole range of mathematics in a single examination, and many a promising mathematician found himself seriously fettered by the necessity of having to confine himself to those parts of the subject which would best enable him to obtain a high place in the examination, and to spend his time in attaining proficiency in rapidly solving certain classes of problems rather than devote himself to specialising in the higher branches of mathematics. It was under these conditions that the Tripos was divided into two parts, the first covering the less advanced subjects, and the second enabling a candidate to specialise in those portions of higher mathematics for which his enthusiasm and ability best qualified him. The further developments of the last twenty years have necessitated an extensive reconstruction of the schemes, and the framers of the present regulations have been at great pains to bring the Mathematical Tripos into line with modern requirements. At the same time it is becoming daily more and more evident to those competent to judge that a sound training in mathematical methods is of paramount importance in the study of applied science, and the regulation allowing candidates to take Part i. in their fifth term should prove of great value to those who wish to study mathematics as a preparation for the subsequent study of physics or mechanical science or even, nowadays, chemistry.

The abolition of order of merit in Part i. is a logical outcome of the fact that this part does not represent the highest knowledge of mathematics. In late years the title of Senior Wrangler, which is often regarded in the outside world as the highest honour which Cambridge can confer, has often been bestowed on men who have proved unequal to the task of securing the highest place in Part ii. The announcement that a lady had been placed "above the Senior Wrangler" caused the greatest excitement throughout the country; but the fact that on another occasion the only candidate who secured a first division in Part ii. was a lady passed almost unnoticed. Still, it cannot but be regretted that because the Senior Wrangler has not always subsequently proved himself the best man of his year, the University should contemplate altogether abolishing the old title of Senior Wrangler, and that even "wranglers," "senior optimes" and "junior optimes," may soon be a thing of the past. When the Tripos was first divided into two parts,

one of the mathematical authorities best qualified to judge considered it desirable that the title of Senior Wrangler should be given to the best candidate in Part ii. This was not done, and hence the position of Senior Wrangler has for many years been an anomalous one, and we have been irresistibly drifting in the direction of abolishing the title altogether. But why should not the first division in Part ii. be called "Senior Wranglers?" The number who obtain a first division in any year is very small, often not more than two, and these are surely no unworthy successors to the senior wranglers of the past. Moreover, by this means the competition for place would be avoided, each candidate being judged on his merits irrespective of whether he was in a strong year or a weak one, and the present anomaly of the second or third or even lower wranglers in a strong year being better than the senior in a weak one would be obviated.

Such a proposal is not inconsistent with the changes in the examinations proposed by the Board. The plea for the retention of the old titles is no question of sentiment. The mathematical school of Cambridge has, under the "coaching" system, taken a unique position in the educational system of the country, and it is but right that Cambridge honour-men should retain the marks of distinction which at present distinguish them from graduates of modern Universities. These marks of distinction are well known to the world at large, and may enable their possessors to carry greater weight in insisting on the importance of providing efficient mathematical teaching in our schools, and adequate endowments for the mathematical schools of our provincial University Colleges. Too often these schools and colleges are controlled by councils and governors consisting of business men, with whom the name "Senior Wrangler" carries weight, but who only look to the "main chance," and who see no use in encouraging mathematics because they do not understand it and think it "unpractical." In encouraging the purely experimental side of science there is a danger of neglecting that training which is needed to enable logical conclusions and practical applications to be deduced from experiments. It is, therefore, important that the old titles should be retained, not only to enable their bearers to point out that they have been trained in the same school which has produced so many of our best physicists, including a Maxwell and a Kelvin, and has thus contributed so greatly to the advancement of Applied Science, but also to encourage others to submit to that rigorous mathematical training without the fruits of which even the most practical of "practical men" would soon come to a standstill.

G. H. BRYAN.

#### Floating Stones.

THE correspondence on "Floating Stones" brings to my mind a phenomenon I often noticed about ten years ago, when my work caused me to spend a good deal of time on the upper reaches of the River Mersey, of patches of earth floating down the river on the surface of the water. This occurred during the early part of the ebb tide and on water obviously contributed by the river. I concluded that this earth was detached from the banks during the quiescent period of high water, and that the surface tension of the water was so increased by the strength of the effluents from the manufactories and other sources, that lumps of earth, often several inches in area and of appreciable thickness, were enabled to float. Unless the conditions have since changed, no doubt the same thing may still be observed.

Coopers Hill, February 3.

A. W. BRIGHTMORE.

#### ENGINEERING AT CAMBRIDGE.

ON Friday, February 2, a large and important addition to the Engineering Department of the University of Cambridge was inaugurated by Lord Kelvin, as a memorial to the late Dr. John Hopkinson, and his son, John Gustave Hopkinson. In August 1898, only a few days before the terrible accident by which he lost his life, Dr. Hopkinson had discussed with Prof. Ewing the rapid growth of this department, and the urgent need for its extension, and had expressed his intention of starting a fresh movement among engineers to secure the necessary funds. In October of the same year, Mrs. Hopkinson communicated to the Vice-Chancellor of the University the desire of herself and her son and daughter to give