Behaviour of Radium Bromide Heated to High Temperatures on Platinum.

IT may be of interest to record that radium bromide obtained from Schuchardt, of Görlitz, and stated to be pure, melts at 728° C. This number is arrived at by observations on minute specks of the substance heated upon the platinum ribbon of the meldometer.

At higher temperatures—up to 1600°—there is every appearance of decomposition, a quiescent glass finally remaining on the hot platinum. After the experiment it is found that the platinum is deeply pitted, and that in some of the pits the limpid glassy substance remains imbedded. This glass is insoluble in hot or cold water or in HCl even after prolonged immersion in the hot acid. It can be removed only partially from the platinum by scraping. Its refractive index is low.

The pitting would most readily be accounted for by supposing a platinum bromide formed, but what, then, becomes of the radium? Is an alloy formed? The ribbon is found to be still radio-active after the experiment, but feebly so. I have not made quantitative observations for possible recovery of activity. J. JOLY.

Trinity College, Dublin, May 7.

Electromotive Force between Two Phases of the Same Metal.

FROM the microscopic study of the changes which take place in metals in hardening and annealing, I had been led to the conclusion that metals may occur in two phases, a hard or amorphous phase and a plastic or crystalline phase (*Proc.* Roy. Soc., vol. lxxii. pp. 218, 232). In seeking for independent evidence of this, it occurred to me to try if there existed a measurable electromotive force between the two phases, and I have now obtained definite proofs that this is the case in all the metals which have been tested. In the case of silver, a thermo-junction consisting of a hardened and an annealed wire gave an E.M.F. of 128 micro-volts at a temperature of 250° C. This temperature appears to be near the transition point, and beyond this the E.M.F. falls to zero, as the wires are then both in the same phase. Further experiments on the subject are in progress, and the results will be published in due course. GEORGE BEILBY.

11 University Gardens, Glasgow, May 7.

A Simple Method of Showing Vortex Motion.

IF a little aqueous fluorescein be placed in a glass tube drawn out to a capillary bore, and supported vertically over a tall cylinder of water, so that the orifice is just beneath the surface, the fluorescein will descend through the water in a fine stream.

If the water be quite tranquil and free from any rotatory motion, this stream will continue straight, unbroken, and clearly defined to the bottom of the jar.

Let a tap be given to the stand supporting the tube; a slight swelling will appear on the issuing stream and gradually increase in size, widening as it goes, while the part immediately behind it becomes more and more slender, and finally parts altogether.

The separated portion continues to widen, and the velocity of the centre being greater than that of the edge, it acquires a motion of rotation, and becomes a perfect vortex ring. If a succession of taps be given to the stand, a series of such rings are formed in regular order. As their velocities diminish, their cross sections increase; they alternately pass through one another, and their motion can be observed with great ease on account of the slowness with which it takes place. I do not know if this method of producing vortices is new or not, but at all events it possesses the merit of simplicity. P. E. BELAS.

Royal College of Science, Dublin, May 3.

Napier's Logarithms.

STUDENTS interested in this subject may be recommended to consult "The Construction of the Wonderful Canon of Logarithms," by John Napier, Baron of Merchiston; translated from Latin into English, with notes and a catalogue of the various editions of Napier's works, by William Rae Macdonald, F.F.A. (William Blackwood and Sons, Edinburgh and London, 1889.) G. B. M.

THE EXCAVATOR'S VADE MECUM.[1]

IF any man living is qualified to write a book on the subject of excavating it is Prof. Petrie, than whom no one has had a longer and wider experience or more consistent success. And, as a perusal of these pages will show, the work of excavation is something more than the mere overturning of earth with the spade and extraction of such treasures as may be concealed beneath it. There is not only the organisation and direction of labour, with all the knowledge of human —and especially of the Oriental—nature that it involves, the adaptation to physical conditions, the comprehension of the history and geography of the country, and, last but not least, the unerring eye for the disposition of cemeteries or temple sites which is almost an instinct rather than a matter of experience. The ideal excavator must, in addition, be a skilful draughtsman and photographer; he must have some knowledge of chemistry, geology, mechanics, and surveying, besides—*cela va sans dire*—the archæological knowledge which enables him to identify, estimate, and classify on the spot the results of his researches.

That the writer of this book fulfils perfectly in his own person all these requirements, he would probably be the first to deny; but his long experience has given him a title to speak, as it were, *ex cathedra* on all such subjects, and though the work deals almost exclusively with excavation from an Egyptian point of view, it will henceforth be indispensable for its practical value to all investigators in any part of the world. In fact, it contains so much practical advice on every possible head that one may fancy the would-be follower of Prof. Petrie somewhat staggered at the task set before him. The apparatus laid down as essential for preservation and packing of objects alone would seem to necessitate the transport of a whole Whiteley's or Gamage's to the Egyptian deserts. We have been sufficiently curious to compile a list of materials named in these two chapters. They include barrels, zinc trays, brushes of various kinds, paraffin wax, tapioca water, emery paper, gelatine, benzol, silicate solution, glycerine, nitric acid, fuller's earth, sheets of glass, plaster, ammonia, hydrochloric acid and other chemicals, in addition to tools and other more obvious necessities. But perhaps the author regarded this list as a counsel of perfection, as he gives a much shorter one on pp. 112–113.

Seriously, however, all such hints are extremely valuable, and provide for every contingency and every difficulty that may arise in the course of an excavation. The only valid objection that might be taken to them is that much of what is said is perfectly obvious to a person of average intelligence, and that plenty of good work on these lines has been done elsewhere besides in Egypt. However, Prof. Petrie takes his subject seriously and with genuine enthusiasm, and his system affords a welcome contrast to that of the excavator for mere pleasure or for unblushingly commercial ends, to whom archæological results are nothing, and whose labours therefore confer no benefit on any save himself. If we may venture on a word of criticism in general, we may say that he is inclined to be somewhat too severe on the work done by museums and by the stay-at-home archæologist. The explorer, as Mr. Hogarth well pointed out in his charming "Wandering Scholar," can never supply the place of the scholar; happy is he who combines both capacities in his own person, as it has been given to few to do; but the one will always be complementary to the other. Hence we think Prof. Petrie too much inclined to regard excavation (even with all its con-

[1] "Methods and Aims in Archæology." By W. M. Flinders Petrie Pp. xviii+208; with 66 illustrations. (London: Macmillan and Co., Ltd New York: The Macmillan Co., 1904.) Price 6s.