

SHORTER NOTICES.

Oeuvres de G. H. Halphen. Publiées par les soins de C. Jordan, H. Poincaré, E. Picard, avec la collaboration de E. Vessiot. Vol. I, 1916, xlv + 570 pp. Vol. II, 1918, vii + 560 pp. Paris, Gauthier-Villars.

Picard in his *Notice sur la vie et les travaux de Georges-Henri Halphen* and Poincaré after him in his *Notice sur Halphen* urged that one could distinguish among the mathematicians of thirty years ago two well-marked and opposing tendencies of thought separating mathematical labors into two distinct categories and the mathematicians themselves, perhaps less definitely, into two classes. Those of the one class are preoccupied principally with enlarging the field of known notions; the others prefer to devote their energies primarily to penetrating more deeply into notions which already have been analyzed and elaborated. This distinction of classes is just as valid today as it was when Picard and Poincaré insisted upon it in 1890; and it is likely to remain so as long as mathematics develops along the lines already marked out.

Those who are most concerned with extending the frontiers of science often find it necessary to leave their new ideas without much elaboration and to proceed to a general account of the lay of the field, so to speak, in order to obtain at once a comprehensive view. In such investigations many questions will be raised and not answered, it is very difficult to stand always clear of errors in detail, lines of investigation which deserve to be followed up must at most be only indicated, and many promising thoughts must be dismissed altogether.

The mathematicians of the second class, of whom Halphen is one of the greater, are more intimately concerned with a desire to give to their work a character of absolute perfection. An error with respect to even the smallest detail becomes a matter of acute pain. Whatever these mathematicians touch they wish to achieve to the point of leaving unanswered no question which their investigation raises. They seek nothing less than to put their thought into a form of absolute perfection and beauty.

These two directions of mathematical thought are observed also in the different branches of the science. One can probably