month of that time, October, studying in Italy, will not be an accomplished Italian scholar, but he will have no trouble in understanding lectures, and in living comfortably in an Italian community.

There is, lastly, the question of the vacations. It is neither necessary nor suitable to dwell here upon the inestimable advantage to a student of spending his vacations in Italy, taking little journeys hither and thither. The serious student will choose his university by what it offers him in term time, not by what he can get out of term. Yet he who decides to come to Italy will realize that he will have the chance, with little trouble and small expense, to add to his special work a wider culture which no amount of mathematical study can give him, nor yet entirely destroy.

J. L. COOLIDGE.

TURIN,
March, 1904.

VECTOR ANALYSIS.

Vectors and Rotors, with Applications. By O. HENRICI and G. TURNER. London, Edwin Arnold, 1903. xv + 204 pp.

Introduction to Quaternions. By KELLAND and TAIT. *Third Edition*, by C. G. KNOTT. London, Macmillan and Co., 1904. xvii + 208 pp.

Vektordifferentiation und Vektorintegration. Von V. FISCHER. Leipzig, J. A. Barth, 1904. iv + 82 pp.

THE first years of this century have seen an interest in vectors and related subjects, such as has never before been observed. This may be due somewhat to the activity and broad spirit of the International association for the promotion of the study of quaternions and allied systems of mathematics; but more probably it is caused by the increasing desire of physicists for a notation which will represent more briefly and more concretely the three dimensional quantities with which they are forced to deal. With this demand on their part the champions of the various systems come forward to press upon us the advantages of their particular system and especially the disadvantages of all others. Felix Klein is at the head of a commission to investigate the relative merits of different methods, and a number of articles in the recent