Oeuvres de G. H. Halphen. Publiées par les soins de C. Jordan, H. Poincaré, É. Picard, avec la collaboration de E. Vessiot. Tome IV.* Paris, Gauthier-Villars, 1924. xv + 657 pp.

The works of G. H. Halphen with the exception of the three-volume *Traité des Fonctions Elliptiques,* are contained in four volumes the last of which is now before us. Each volume opens with a "notice" concerning Halphen and his works written either on the occasion of his death or not long afterwards; in fact, the first volume contains two such notices. It has also Halphen's own account (pages 1–47) of his mathematical works written on the occasion of his candidature for membership in the Academy of Sciences. It is natural to find at the beginning of his *Oeuvres* this summary of his own works up to 1885. Except for this paper his memoirs are arranged in the *Oeuvres* in almost chronological order, the deviations from this order being unimportant and not many in number. Owing to Halphen's custom of carrying one investigation to a complete achievement before taking up another and owing to the fact that the order of completion of memoirs is also very nearly their order of publication, the chronological arrangement of Halphen's work is also to a considerable extent a logical arrangement. But the former in some respects departs considerably from the latter so that it is desirable to have added (as on pages 645–653) the "Table Méthodique Générale."

Among the memoirs contained in the first volume are those on the characteristics in the theory of conics, on singular points of plane curves, and on the points where an algebraic curve satisfies a condition expressed by means of a given differential equation. For the second volume we may mention those on the singularities of twisted curves and of algebraic surfaces, on the differential invariants of plane and twisted curves, and on the representation of functions in various types of series. Two of the four memoirs in volume III contain the best work of Halphen. These are the memoir on the reduction of linear differential equations to integrable forms and that on the classification of twisted algebraic curves.

This leaves to the fourth volume the last works of Halphen other than his treatise on elliptic functions, the memoirs and papers appearing in 1883 to 1890, together which such unpublished material as his editors have seen fit to preserve with his collected works. The papers for the most part deal with differential equations, the theory of numbers, and elliptic functions and their applications; they are more fragmentary in character than the comprehensive memoirs in the earlier volumes, doubtless owing to the fact that Halphen's consecutive

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* The previous volumes have been reviewed in this BULLETIN, vol. 27 1920-21), pp. 466–468 and vol. 28 (1921-1922), pp. 271–272.

thought in his last years was being given largely to his treatise on
elliptic functions. Here is reproduced also his work on the theory of
the singularities of plane curves, originally published as an appendix
to the French translation of Salmon's analytical geometry.

In addition to these previously published writings there are two
appendices. The "Mémoires et Fragments Inédits" (pages 465–627)
contain a considerable variety of material taken from the manuscripts
which Halphen left and thus preserve what is most useful in this
material. The editors desired also to publish the letters which Halphen
had written to several scientists with whom he had been in correspon-
dence; but they were able to bring together only a certain number
of extracts from the letters of a single one of his correspondents,
namely, Zeuthen. The "Extraits de Lettres à Zeuthen" (pages 628–644)
were chosen and transcribed by Zeuthen himself. These letters belong
to the period 1876 to 1881 of Halphen's life.

Owing to the fact that the various "notices" in the four volumes
contain several brief accounts of Halphen's work the reviewer is re-
lieved of the duty of making an analysis of the separate memoirs.

R. D. CARMICHAEL

The Mathematical Theory of Relativity. 2d edition. By A. S. Eddington.
    Cambridge, University Press, 1924. ix + 270 pages.

The second edition of this important work differs from the first
mainly in the addition of thirteen pages (pp. 241–263) of "Supplementary
Notes" relating to various sections throughout the whole volume. There
is no general revision of the main body of the text. A few corrections
have been made, and in such way as not to disturb the paging. An
erroneous formula [numbered (59.6)] on page 137 has been suppressed,
the paragraph containing it having been replaced by another. The
remarks on the problem of the homogeneous sphere on page 170 have
been modified, this page having been largely rewritten. The other
changes are less important than these two.

R. D. CARMICHAEL

Statistical Methods. By Frederick Cecil Mills. New York, Henry Holt
    and Co., 1924. xvi+604 pp.

This book has been prepared with particular "reference to the
specific needs of quantitative workers in economics and business" and
therefore calls for little comment here. It includes, in addition to an
extensive elementary treatment of statistical graphs, averages, correla-
tion theory, etc., an extensive treatment of index numbers and time
series. It has been carefully prepared and with suitable abbreviations
could be used as a textbook in a mathematical course in statistics where
no collegiate course in mathematics is a prerequisite.

C. H. FORSYTH

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