problem and its practical importance should justify its most active investigation.

The author gives in some detail, fully illustrating his thesis, the results of his early studies in Mississippi along these lines, presenting in Figs. 79, 80 and 81 the most striking illustrations of how individuals of one and the same species of post-oak, black-jack oak and deciduous cypress persistently differ in both stature and habit of growth when they recur on the same soil types in different localities throughout the state; finally extending the discussion to observations in the United States at large and to Europe. I can not do better, in closing the review of this valuable work, than to quote again the author where he is discussing the influence of lime in the soil on the character of floras.

What is a calcareous soil? The definition adopted for this volume has been given in a previous chapter; viz., that a soil must be considered calcareous so soon as it naturally supports a calciphile flora—the lime vegetation so often referred to above and named in detail. Upon this basis it has been seen that some (sandy) soils containing only a little over one tenth of one per cent. of lime show all the characters and advantages of calcareous soils; while in the case of heavy clay soils, as has been shown, the lime-percentages may rise to over one half per cent. to produce native lime growth.

At first thought it may appear to some that the adoption of such a definition is a subterfuge to make observations harmonize with theory, but it is not so. Every one will agree that a moist soil, defining it from the standpoint of plant nutrition, is one which will yield moisture to a plant as rapidly as it is needed. On this basis a sandy soil containing 4 per cent. of moisture is as moist as a clay soil carrying 20 per cent., the physiological difference being determined chiefly by the relative amounts of internal soil surface in the two cases.

This volume should be introduced to a much wider circle of students than those of the agricultural colleges generally. It will be found well suited to serve as the foundation of im-

portant seminars in chemistry, in geology and especially in plant physiology and ecology.

F. H. KING.
October 30, 1906.

HATCH AND CORSTORPHINE'S GEOLOGY OF SOUTH AFRICA.[1]

THE visit of the British Association to South Africa was the occasion for the appearance of two noteworthy books on the geology of that region: Rogers's 'Geology of Cape Colony,' and Hatch and Corstorphine's 'Geology of South Africa.' The latter is the more general of the two, as it treats of much the larger area; the former is somewhat more detailed, as all of its space is devoted to the formations that occur in the single colony with which it is concerned.

The small geological map, scale, 1:5,000,000, which serves as frontispiece to Hatch and Corstorphine's book, provides a good introduction to the problems considered in the text. The greater part of the area described is occupied by the nearly horizontal beds of the Karroo system, a vast body of continental deposits which has shared the fate of other stratified formations not containing marine fossils in having been explained by earlier observers as a lacustrine deposit, but which is now recognized as of mixed origin. Its lowest member is the famous Dwyka glacial conglomerate, or 'tillite,' as Penck has suggested it should be called, unquestionably of glacial origin. The overlying members of great thickness are probably of mixed fluviatile and lacustrine deposition, as they contain beds of coal and fossils of reptiles, as well as numerous dikes and sheets of dolerite. This great body of continental formations occupies a geosynclinal basin, some 600 miles east and west by 400 miles or more north and south. It is obliquely truncated by the seacoast on the southeast; there the ancient lands from which the basin deposits were derived, appear to have been lost in the Indian Ocean. On the south, the Karroo system and the underlying formations are folded in long east-and-west anti-

[1] Macmillan, 1905, 348 pages, 2 geol. maps, 89 figures and plates. $7.00.

clines and synclines which present in structure and topography many resemblances to the Alleghenies of Pennsylvania. The older formations here involved include many sandstones, of which the Table mountain series is the basal and heaviest member. The very ancient Malmesbury series, under the Table mountain sandstone, is presumably of Archean date; it consists largely of slates, with bodies of intrusive granites. This fundamental complex is exposed chiefly to west of the Karroo basin, as far as the Atlantic. A recent paper by Rogers, of the Cape Colony survey, announces the discovery of a very ancient glacial deposit, much more indurated than the Dwyka tillite, in this series of fundamental rocks.

The older formations that underlie the Karroo system in the Transvaal, on the north, are much more complicated than those on the southwest. Beginning at the base there are Archean schists and slates, with granitic intrusions; over these comes unconformably the Witwatersrand system, famous for its gold-bearing Banket or pudding-stone; then follows after a second unconformity the Ventersdorp system with heavy amygdaloids; and again after a third unconformity, the Potchefstroom system. This entire complex series was deformed by folds of moderate intensity and greatly eroded before a northern equivalent of the Table mountain sandstone, called the Waterberg sandstone, was deposited; and this in turn was heavily eroded before the first member—the Dwyka tillite—of the Karroo system was formed. A geological map of this region by Hatch on a scale of 1:1,250,000, is given at the end of the book.

The younger rocks are chiefly of Cretaceous age, near the southern and eastern coasts. The 'pipes' of diamond-bearing volcanic rocks are also younger than at least some of the Karroo formations, inasmuch as the Karroo members are cut through by the pipes. The diamond mines of Kimberly and Pretoria and the gold mines of the Rand are described in some detail. The last chapter of the book treats the correlation of the pre-Dwyka formations, which are mostly non-fossiliferous, so that the occurrences in widely separated areas are of difficult identification. An excellent list of papers on South African geology and an index close the volume.

W. M. D.

'*Gli Insetti, loro organizzazione, sviluppo, abitudini e rapporti coll'uomo.* By Professor Antonio Berlese, director of the Royal Station for Agricultural Entomology in Florence. Milan, Societá Editrice Libraria. 1906. Published in parts at one lira each.

With such excellent recent general American books on insects as those of Kellogg and Folsom, it would seem difficult for a book in a foreign language to meet any great demand in this country, yet the admirable work of Professor Berlese, of which seventeen parts have already been published, will undoubtedly prove a very important addition to the libraries of all institutions in which advanced morphology is being studied and in all laboratories in which the study of insects is undertaken from any point of view.

Berlese is a master, a man of broad ideas, thorough training, admirable in technique, clear in demonstration, an excellent writer, and a capable draftsman. His work when completed will be both sound and comprehensive. It will comprise two volumes, of which the first will in a general way contain the anatomy and the second the biology of insects. The first volume will consist of from seven to eight hundred pages and will be accompanied by about one thousand figures. Of these, 550 pages have been published in seventeen parts, and the printed parts contain six hundred figures and four plates.

The subjects considered in the first volume, by chapters, are:

    I.   Brief History of Entomology.
    II. Size of Insects.
    III. Plan of the Insect Structure.
    IV. Embryology in General.
    V.   Morphology in General.
    VI. Exoskeleton.
    VII. Endoskeleton.
    VIII. Muscular System.
    IX. Integument and its Structure.
    X.   Glands.

There still remain to be published chapters on the nervous system and organs of sense, organs of digestion, organs of circulation, organs of respiration, organs of secretion, and sexual organs. In the part already completed the chapters on morphology are marvels of detail and thoroughness. The work itself is a large octavo, and more than ninety pages are devoted, for example, to the study of the exoskeleton of the head, while nearly eighty pages are occupied with the treatment of the muscular system. Nearly all of the numerous and strikingly apt illustrations are original, having been drawn by Dr. Berlese himself. Each section of the work is followed by a very complete bibliography, and the author has shown a perfect knowledge of the work of other men, the publications of American authors having been considered and studied with a thoroughness quite unusual among European authors.

The second volume, which has been reserved for the treatment of biology of insects, will contain a careful consideration of all questions of economic importance, and it will undoubtedly be of interest to learn from this work Berlese's final views on the subject of parasitism, and especially the relations of insects and birds upon which point he has long been at odds with other Italian zoologists.

L. O. Howard.

SCIENTIFIC JOURNALS AND ARTICLES.

The October number (volume 7, number 4) of the *Transactions of the American Mathematical Society* contains the following papers:

O. Bolza: 'Weierstrass's theorem and Kneser's theorem on transversals for the most general case of an extremum of a simple definite integral.'

J. Pierpont: 'Area of curved surfaces.'

W. A. Manning: 'On multiple transitive groups.'

L. Stickelberger: 'Zur Theorie der vollstandig reduciblen Gruppen, die zu einer Gruppe linearer homogener Substitutionen gehören.'

L. E. Dickson: 'On commutative linear algebras in which division is always uniquely possible.'

H. F. Blichfeldt: 'On the order of linear homogeneous groups.'

J. I. Hutchinson: 'On automorphic groups whose coefficients are integers in a quadratic field.'

F. R. Moulton: 'A class of periodic solutions of the problem of three bodies with application to the lunar theory.'

J. H. McDonald: 'A problem in the reduction of hyperelliptic integrals.'

C. N. Haskins: 'On the differential invariants of a plane.'

This number contains also: Notes and Errata, volumes 6, 7; Table of Contents, volume 7.

The November number (volume 13, number 2) of the *Bulletin of the American Mathematical Society* contains: Report of the Thirteenth Summer Meeting of the American Mathematical Society, by F. N. Cole; Report of the New Haven Colloquium, by Virgil Snyder; 'Theory and Construction of Tables for the Rapid Determination of the Prime Factors of a Number,' by Ernest Lebon (translated by W. B. Fite); 'On a Fundamental Relation in Abstract Geometry,' by A. R. Schweitzer; 'On the Orderly Listing of Substitutions,' by D. Lehman; 'The Boston Colloquium' (Review of Lectures on Mathematics by E. B. Van Vleck, H. S. White, F. S. Woods) by J. I. Hutchinson; Correction; Notes; New Publications.

SOCIETIES AND ACADEMIES.

NATIONAL ACADEMY OF SCIENCES.

The autumn meeting of the academy was held on Tuesday, Wednesday and Thursday, November 20, 21 and 22, in the new buildings of the Harvard Medical School, Boston. The list of scientific papers was much longer than it has been at any session of the academy in recent years. It was, indeed, necessary to read by title many of the papers, which according to the program were as follows:

Alexander Graham Bell: 'A few Notes Concerning Progress in Experiments relating to Aerodromics.'

William Edward Story, Clark University (introduced by A. G. Webster): 'A Method for the Enumeration of Algebraic Invariants.'

Arthur Gordon Webster, Clark University: 'Acoustic Measurements.'

W. T. Porter, Harvard Medical School (intro-