the second digit is the longest of the series. In only one genus, *Stenotatus*, are any of the phalanges coossified. The ungual phalanges are always long, heavy, decurved and pointed, and were evidently well adapted to burrowing habits.

The pelvis varies considerably in the different genera, but does not depart widely from the modern type. The femur is elongate and has a very prominent great trochanter, which in *Proeutatus* reaches remarkable proportions; the third trochanter is also well developed in all cases. As in the recent armadillos, the tibia and fibula are invariably coossified at both the proximal and the distal ends. Like the manus, the pes is always pentadactyl, though in some of the genera, and especially in *Peltephilus*, the lateral digits are much reduced. The ungual phalanges are usually much shorter and broader than those of the manus, and are often more like hoofs than claws.

In size, there is much variety among the Santa Cruz armadillos, ranging from the minute *Prozaëdius* to *Proeutatus*, some species of which are larger than any existing armadillo, except *Priodontes*, while the very incompletely known *Peltephilus grandis* may have equaled or even surpassed the latter.

To sum up: The Santa Cruz armadillos differ comparatively little in appearance or in structure from the modern ones, and yet it is apparent that they do not, as a whole, represent the main line of descent which ended in the recent genera. That evolution must have taken place in some other region of the South American continent, doubtless the same region as that which gave rise to the true sloths and the anteaters.

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SCIENTIFIC BOOKS.

The Constructive Development of Group-theory; with a Bibliography. By B. S. Easton. Boston, Ginn & Co. 1902. Pp. iv + 89. Cloth, $0.75. (Publications of the University of Pennsylvania, series of mathematics, No. 2.)

This monograph aims to present in continuous form, but omitting all proofs, the main concepts and results of abstract and substitution group theory. While the theory of linear groups is expressly excluded, some of its results are tabulated on pages 83 and 84 under 'systems of simple groups.'

Employing a set of abbreviations for the journals, the author has succeeded, in the short space of thirty-four pages, in giving an exhaustive bibliography of the subject. In it appear 157 names of authors. To further indicate its extent, we note that it gives 97 titles by G. A. Miller, 35 by L. E. Dickson, 33 by C. Jordan, 23 by W. Burnside, 21 by Cayley, 20 by Cauchy and 16 by Kronecker.

The treatise proper extends over 39 pages, the successive headings being as follows: substitutions, groups, substitution groups, conjugacy, multiple isomorphism and quotient-groups, composition series, commutators, Abelian groups, groups or order a power of a prime, Sylow's theorem and its extensions, Hamiltonian groups, transitivity, intransitivity, primitivity, regular groups, imprimitivity, multiple transitivity, class of a group and degree of transitivity, automorphism, representation, index notation.

The tables give the numbers of distinct abstract groups of each order as far as 63; the number of substitution groups of each degree as far as 18, classified as multiply transitive, other primitive, imprimitive, and intransitive; the types of group of orders p^2, pq, p^3, pq^2, pqr, $8p(p > 2)$, 16, $p^4(p > 2)$, p^3q, 32, $p^5(p > 2)$; simple groups of low orders; orders of composite and soluble groups; systems of simple groups.

Some minor remarks or corrections are here in order. In § 21, for 'class' read 'degree.' In § 44, for 'product of two elements' read 'product of any two elements.' In § 26, add alternative designation 'commutative

group' and remark that 'abelian group' is used in an entirely different sense in linear group theory. In § 38, on abstract groups, it is stated that 'these generating elements define the group completely,' whereas the generating elements with a complete set of generational relations are necessary for the definition of the group; also as alternative for 'equations' should be given 'generational relations.' In § 63 add 'itself and.' In § 73, 3 the correspondence should be defined. For $(m-1)$ read $(m, 1)$. In § 74, for $(m-n)$ read (m, n). In §85, the identity group is not, as usual, included in the composition series. In § 239 is quoted incorrectly the reviewer's generalization of Hermite's theorem on the analytic representation of a substitution of degree p^a. The two congruences modulo p^a should be equations in the Galois field of order 1^a. Since the variable z is indeterminate in the field, the only reduction consists in applying the algebraic equation $z^{p^a} = z$ and reducing the coefficients modulo p. In formula 9 of page 84, $p^{3n} - 1$ should read $p^{2n} - 1$.

For so elaborate a piece of work, executed with such thoroughness and success, both the specialist and the beginner in group theory must feel most grateful. In pointing out various errors in the literature, a valuable service has been rendered to the student.

L. E. DICKSON.

Pathologische Pflanzenanatomie. E. KÜSTER. Gustav Fischer, Jena. 1903. 8vo. Pp. iv + 312; 121 figs.

Dr. Küster's investigations upon gall-formations and structures of similar character in the plant has led him to a discussion of the entire subject of pathological anatomy of plants. The text-book resulting from this treatment of the subject takes into consideration the major structures that might be considered as histological or organographical departures from the normal, but does not include degenerations, or the phenomena of decay due to fungi or other causes.

The various abnormalities are classified according to the cytological and topographical features presented by their development, and are embraced under the following general heads: Restitution, Hypoplasie, Metaplasie, Hypertrophie and Hyperplasie. *Restitution* is the term applied to all processes set in activity by the loss of a tissue or an organ, and may include the replacement of the lost members by the development of new ones on adjacent parts of the body, or on the injured surface; the substitution of an organ of a different character arising on the injured surface, or the substitution of an organ of a different character on adjacent portions of the plant. *Hypoplasie* includes all processes resulting from disturbances of any kind in which the number, size or differentiation of the cells does not attain the normal. *Metaplasie* is taken to include all development of the protoplasts by which their structure, composition, form or character of the membrane is different from the normal, and includes all progressive changes of the cell not connected with growth and division. *Hypertrophy* is used in its accepted sense to designate the production of abnormally large cells which may be aggregated in such manner as to result in abnormally large organs. Such enlargements may ensue in meristematic or permanent tissues. *Hyperplasie* is used to designate the abnormal increase in the volume of a tissue resulting from an unusual multiplication of the cells. Such increase in the number of cells may consist in the formation of a surplus number of the ordinary tissues, or by the formation of cells of a different character, such as in galls or calluses.

The two last-named divisions of the subject are of the greatest importance from the standpoint of the practical pathologist, and are given an adequate treatment in the present volume. These sections of the book owe much of their value to the original matter adduced by the author from his own investigation. The concluding section of the book consists in a general consideration of the etiology and morphology and pathological structures, and sets forth some of the more important problems of general pathology.

Dr. Küster's book is invaluable to the student of plant pathology, and has much more to commend it than any of the few reading books on the subject which have been written