

lished in this country. On the contrary, Professor Bôcher's book bears closer resemblance to Weber's "Lehrbuch der Algebra" or Serret's "Cours d'algèbre supérieure" even if it is much less comprehensive than these classic works. It exhibits the same masterly grasp and improvements in the presentation of fundamental matters. For instance, the theory of linear dependence is treated here in a more complete and satisfactory manner than in any other text-book. Another special feature of this work is the thorough treatment of quadratic forms, culminating in the important but not easily accessible theory of elementary divisors.

The book is intended "for students who have had two or three years' training in the elements of higher mathematics, particularly in analytic geometry and the calculus," and is based upon the courses of the author's lectures delivered at Harvard University. The mode of treatment is in accord with the modern tendency not to be satisfied with results which are true "in general"; that is, which are true except in some isolated cases. In using such results it is always necessary first to inquire whether the case to which we desire to apply them is not really one of the exceptional ones, and hence they are very much less desirable than the theorems which have no exceptions. This mode of treatment is a consequence of the effort to actually prove things instead of being content with some more or less plausible intuitions which so often pass for proofs. The scope and contents of the work may be inferred from the following list of the headings of its twenty-two chapters; Polynomials and their most fundamental properties, a few properties of determinants, the theory of linear dependence, linear equations, some theorems concerning the rank of a matrix, linear transformations and the combination of matrices, first principles and illustrations of invariants, bilinear forms, geometric introduction to quadratic forms, quadratic forms, real quadratic forms, the system of a quadratic form and one or more linear forms, pairs of quadratic forms, some properties of polynomials in general,

factors and common factors of polynomials in one variable and of binary forms, factors of polynomials in two or more variables, general theorems on integral rational invariants, symmetric polynomials, polynomials symmetric in pairs of variables, elementary divisors and the equivalence of λ -matrices, the equivalence and classification of pairs of bilinear forms and of collineations, the equivalence and classification of pairs of quadratic forms.

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SCIENTIFIC JOURNALS AND ARTICLES

The Journal of Experimental Zoology, Vol. V., No. 2 (December, 1907), contains the following papers: "Regeneration of Compound Eyes in Crustacea," by Mary Isabelle Steele. The small hermit crab (*Eupagurus longicarpus*), the shrimp (*Palæmonetes vulgaris*) and the sand shrimp (*Crangon vulgaris*) were used for experiment material. Each individual had either a part or the whole of one or both eyes removed. Results obtained after removing part of the eye show: that hermit crabs may regenerate a perfect eye even after the destruction of as much as half the optic ganglion; that *Palæmonetes* does not regenerate an eye if the optic ganglion has been at all injured; and that *Crangon* regenerates an eye much more slowly than either of the other species, and only after little or no injury to the optic ganglion. After removal of the eye so that the entire optic ganglion is destroyed, the hermit crabs and *Crangon* may regenerate an antenna-like organ in place of the excised eye. *Palæmonetes* does not show any sort of true regeneration unless the optic ganglion has been left intact. The results of the whole series of experiments tend to show that the regeneration which takes place from any level is largely influenced by the presence or absence of the whole or a part of the optic ganglion. "On Some Phenomena of Coalescence and Regeneration in Sponges," by H. V. Wilson. Cells of siliceous sponges (*Microciona*) when separated by pressure from the skeleton are able to recombine, forming a plasmodial mass which differentiates anew

into a perfect sponge. "Equilibrium of Animal Form," by Hans Przibram. "The Effect of Degree of Injury, Successive Injury and Functional Activity upon Regeneration in the Scyphomedusan, *Cassiopea Xamachana*," by Charles Zeleny. The present study is a part of a series of experiments whose object is the investigation of some of the internal factors controlling regeneration in several representative forms. It is found that removal of six of the eight oral arms in *Cassiopea* constitutes the most favorable degree of injury for the regeneration of each arm, and that from this optimum there is a decrease in both directions. The data for successive injury show a greater rate of regeneration of the margin of the disk after the second removal than after the first. A comparison of the rate of regeneration of the margin in cases where the disk was made to pulsate rhythmically with cases without pulsation shows no advantage in favor of the pulsating ones, but rather a retardation. "Studies in Adaptation—I., The Sense of Sight in Spiders," by Alexander Petrunkevitch. This article shows the relation between the position of the eyes on the cephalothorax and the particular locomotion in hunting spiders, and by the application of a new method makes possible the determination of the maximum angles and of the limit of vision for each eye.

SOCIETIES AND ACADEMIES

THE GEOLOGICAL SOCIETY OF WASHINGTON

At the 200th meeting of the society, held in the Cosmos Club, on Wednesday evening, February 12, the following papers were presented:

Regular Program

The Barringer Hill (Texas) Pegmatite Dike:

FRANK L. HESS.

This dike by its resistance to erosion has formed a low hill in the flood plain of the Colorado River, and was named for the discoverer. The minerals of the dike have unusually large dimensions, the quartz occurring in masses 40 feet in diameter; the feldspar in masses 30 feet across, with individual crystals having edges 34 inches long; while fluorite

crystals enclosed in quartz show edges a foot long. A great variety of rare-earth metal minerals occur in the dike, of which the yttria bearing minerals, fergusonite and gadolinite are mined commercially. Allanite occurs in masses weighing over 300 pounds, fergusonite up to 65 pounds and gadolinite up to 200 pounds. So far, no other important occurrences of the rare-earth metal minerals have been found in the neighborhood.

The Structure of the Marble Belt of Fannin County, Georgia: LAURENCE LAForge.

The marble occurs in two lines of exposures, occupying a double valley from one to three and one half miles in width, cut about 250 feet below the general level of the region, and with a low central ridge of mica slates. Owing to strike faults, there is not a complete section, nor do the formations occur in complete normal sequence anywhere in the immediate region, and attempts to unravel the structure were unsuccessful until the key was furnished by the sequence of the formations determined by Mr. Keith in the Nantahala Quadrangle in North Carolina.

The structure shows the valley to be in general synclinal, but with a subordinate axial anticline, the two lines of marble thus occupying the lateral synclinal axes, and the slate of the central ridge belonging in a formation underlying the marble. Both the central anticline and the lateral synclines are broken by thrust faults, so that the marble occurs in discontinuous patches, and on the western side of the valley one and sometimes two of the underlying formations are faulted out. Nothing is known of the actual dip of the faults, but certain considerations lead to the conclusion that they are steeply inclined, and that the western fault is overthrust from the west, the other two being overthrust from the east.

Oxygen Values and Coal Alteration: Mr. DAVID WHITE.

Elimination of oxygen is the preeminently important feature from the standpoints both of coal efficiency and coal development. This deoxygenation, largely accomplished during the first or biochemical (putrefaction) stage of coal formation, continues during the second,