We would like to express our apologies to these distinguished investigators.

J. C. DRUMMOND
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INSCRIPTIONS FOR A SCIENTIFIC BUILDING

URSINUS COLLEGE is erecting a new building for instruction and research in the sciences. It will be a rather imposing structure for a small college. On the face of the building at either side above the front entrance inscriptions are to be cut. The space permits each text to consist of about seventy letters. They might be quotations or original compositions.

I am seeking suitable inscriptions and shall be under obligations to any reader of SCIENCE who may be willing to send suggestions.

GEORGE L. OMWAKE,
President
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SCIENTIFIC BOOKS

A History of Entomology. By E. O. ESSIG. The Macmillan Company, New York, 1931. 1,029 pp., $10.00.

DESPITE its inclusive title, this work treats primarily of the history and development of applied entomology in California. It is replete with valuable and interesting information on this and related subjects.

Should one insist on the definition of history as "a narrative of events," then some of the contents of the work could not qualify in that category. Nevertheless, the evidence of intelligence in the choice of material, the conscientious accuracy and completeness of the data included, and the evident effort of the author to render the work of the utmost use to the reader, all evoke his admiration and respect.

In perusing these pages, one is certain to be deeply impressed, too, with the early and leading part taken by the people of California in the advancement of applied entomology and its concomitant activities in America. Settled as it was, after the hegira of 1849, by a virile race of hardy pioneers, California's specialized forms of agriculture, which almost from the first have produced crops of high intrinsic value, together with the great wealth produced by the swift development of her mineral resources, soon gave her a surplus of vigor and power which account in large part for the courageous manner in which she has attacked not only her entomological problems but her civic and social emergencies as well. Thus she was the first of all the states (Howard[1]) to protect herself (in 1880) by legislation and quarantine against the introduction of new insect pests. And this is but one illustration of her forward-looking and aggressive spirit. Her leadership among the states, in the investigation of fumigants and chemicals for the destruction of insect foes, and her early successful adoption of biological methods of insect control, all evince the same qualities of vitality and courage as were exhibited so marvelously after the great earthquake and fire of 1906.

If, as seems possible, it be true that several serious insect pests such as the cottony-cushion scale, San José scale, black scale, etc., gained entrance to America through the activities of the early horticulturists of California, the world will learn through these recent expositions of entomological history that she has atoned nobly for such unintentional lapses by her innumerable valuable contributions to the control of these and of other insect pests for which she has been in no way responsible.

The opening chapter of the present work treats very briefly of the paleoentomology of California, while the second chapter is devoted to an entomology of the Californian Indians. This occupies some thirty-six pages and is of general interest but has a marked ethnologic flavor. After a few pages giving the general historical background, the origin and present status of the Californian institutions pertaining to entomology are related in which discussion the universities and colleges are given individual attention. Then follows a section comprising 192 pages, discussing the history of "The More Important Orchard Mites and Insects of California." With one exception (that pertaining to biography), this chapter is the longest in the book and is considerably more comprehensive than is indicated by its title. For instance, it includes important pests of forage crops, ornamentals, vegetables and even insects affecting health such as the fleas and some mosquitoes. A circumstantial account of the history of sericulture in California and a brief discussion of apiculture in the state conclude the chapter.

The matter is arranged ordinally, beginning with the Acarina, without regard to chronological sequence. A brief history of each species is given together with its common and scientific names. This often includes the formulae used in control, and numerous refer-

[1] L. O. Howard, "A History of Applied Entomology," Smithsonian Inst., Nov. 29, 1930.

ences to the literature of the insect are carried in voluminous footnotes.

The fascinating subject of the biological control of insect pests is treated extensively in a chapter of 129 pages. Here, of course, is found the somewhat hackneyed but ever dramatic tale of the introduction of the Australian ladybird by Koebele and Coquillett in 1888, and the consequent salvation of the citrus fruit culture in California. It is not too much to say that the spectacular success of this project has had a far-reaching and profound effect on the development of economic entomology in America. The idea of "a bug to eat a bug" is still so popular that the administrative officials of the Federal Bureau of Entomology are sometimes compelled to apply the brakes to ill-advised popular movements which would appropriate government funds in excess of those which can be legitimately expended for the introduction of useful parasitic insect enemies.

In passing it might be of interest to remark that the arrangement of the present work in chapters which bear no chronological relation to each other has compelled the author to numerous repetitions which would have been avoided had it been possible to carry his narrative through consistently as a continuous story. For instance, the story of the Australian ladybird introduction is repeated, at least in part, in five different chapters of the book, thus entailing both additional labor and expense for the author and a lessening of sustained interest on the part of the reader. However, it is but just to the author to say that the difficulties to be surmounted in preparing such a chronological narrative are many and formidable and had this plan been adopted it might have resulted in a less complete exposition of the subject.

Extensive tabulations showing the various introductions of the Australian ladybird and other coccinellids into California, as well as much similar information, are given in this chapter. The Hymenopterous parasites are allotted more than 50 pages in which those of the scale insects and mealybugs are most fully treated, including members of the Aphelinidae and Encyrtidae. There is included at this point an interesting account of the collectors of foreign parasites, including the work of Albert Koebele, George Compere, Henry Viereck, E. J. Vosler and others. It ends with a long tabulation of "The Most Important Parasitic and Predacious Insects Introduced into California Following the Work of A. Koebele," and a discussion of California insectaries. Following this there are one hundred pages devoted to a history of the commoner insecticides and their application principally from a Californian point of view. In these, formulae both ancient and modern are discussed. Quite properly, the discovery and development in 1886 of the fumigation of citrus trees with hydrocyanic acid gas for the destruction of scale insects, by Daniel W. Coquillett, an agent of the Federal Department of Agriculture, is fully related. Since the invaluable services of this able man both to applied entomology and its taxonomy have not hitherto been given appropriate recognition it is gratifying to see them assigned a prominent place in this historical work. This chapter ends with an account of the development of fumigation under vacuum, by Sasscer and Mackie.

As California pioneered in entomological legislation it would have been disappointing had a succinct history of this phase of entomology been omitted in the present work, but we find some 38 pages devoted to this subject. Here is told the origin of the organizations which preceded the creation of the State Department of Agriculture in 1919 and the functions they performed in protecting the rapidly developing agriculture of the state. Suitable mention is made of the integration of state and federal forces.

In none of his many excellent writings has Dr. Essig performed a more acceptable and valuable service to science at large than in the compilation of the 270 pages of biographical matter which comprise Chapter IX of the present work. Well-prepared biographies are always valuable, but until now the biographical data relating to the entomologists, a group of more or less obscure men at best, have remained scattered through the general literature of the subject or hidden away in inaccessible records. The collation and publication of this information will be welcomed by all and the more so because of the good portraits which accompany it. Regarding these biographies the author says, "It was my original purpose to include in this chapter a short biographical sketch of every one who had contributed to the development of entomology in California and it is a real disappointment to me not to be able to carry out my plans." When it is known, however, that the chapter includes most of the notables in entomological history who have had the most remote connection with California, from Linnaeus and Fabricius in the middle of the eighteenth century to L. O. Howard and Herbert Osborn, of the present day, it would seem that Dr. Essig might rest content that something remains for future historians to do. Very many of the biographies included are accompanied by more or less full bibliographies of the individual concerned.

The book terminates with "A Chronological Table Showing the Development and Progress of Entomology in Relation to History and Other Sciences." The arrangement of this material is somewhat puzzling as in both the natal column on the left, and the mortuary data headed "Deaths" on the right, two separate dates are recorded for each individual; it

would appear from this that such distinguished personages as Columbus, da Vinci and Copernicus were born twice! But, what is far worse, that such benefactors as Peter the Great, Hans Sloan and Galileo Galilei suffered a double death! It used to be said that "oil and water will not mix," but we entomologists now know very well that there is such a thing as a miscible oil. However, history and fiction are alleged to be utterly incompatible—I wonder? Seriously speaking, this chronological table will be of great service to students of entomological history.

This is a well-built book. It is bound in keratol, printed on thin, calendered paper, and although it is but little more than one and one half inches thick, it weighs about three pounds!

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

THE SHAPOMETER: A DEVICE FOR MEASURING THE SHAPES OF PEBBLES

FOR several years the senior author has been interested in methods used for calibrating the shapes of pebbles, and he has been working on a method which could be used by a number of workers and yield comparable results. In a paper published recently[1] he described a method which has been tested during the last two years by a number of students in connection with their research problems. The validity of the method became apparent not only for grains of sand size but also for pebbles, cobbles and small boulders. A method by which the shapes of sand grains may be measured by using a petrographic or binocular microscope was suggested in the paper just cited, and the statement was made that the instrument to be used in measuring pebbles and cobbles would be described later. The instrument is called a *"shapometer."* The general idea of the shapometer was suggested to the junior author who perfected it and measured several hundred pebbles to prove the utility of the instrument.

According to the method proposed by Tester,[2] the shape of any pebble measured is the ratio of abrasion to the original angularity, and measurements are made of the remnant sides or edges and of the projected original edges. Hence, a simple instrument with three or four straight edges calibrated in small units and with movable slides or pivots will suffice for measurement. Fig. 1 is a generalized sketch of the shapometer with 1 mm divisions on the main parts. The lower member "A" is graduated and slotted as shown, to permit an easy sliding of scale 'C.' Scale 'B' is attached to 'A' by a fixed

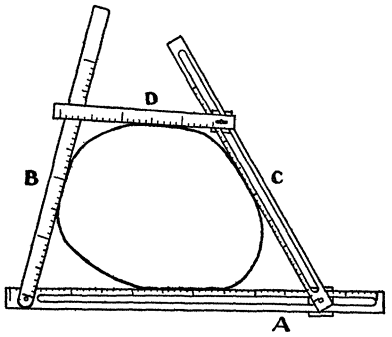

FIG. 1

pivot and although it will not slide it will make with "A" any angle desired. Scales 'B,' and 'D' are graduated in the same units as 'A.' Experience shows a millimeter scale to be satisfactory. Scale 'B' is solid, but 'C' is slotted to permit the attachment of a fourth scale 'D.' Scale 'D' is provided with a screw so it can be removed, but it is very useful when measuring a section of a pebble which has four or more principal surfaces.

The instrument may be constructed of stiff cardboard, celluloid or light weight metal. The writers have used the common 6 inch celluloid millimeter scales with considerable success, but aluminum bars are ideal. The scale 'A' is 7 inches long over-all length.

[1] A. C. Tester. "The Measurement of the Shapes of Rock Particles," *Jour. Sed. Petrol.*, Vol. 1, No. 1, 1931.
[2] *Op. cit.*

TABLE I

Surface or side measured	A		B		C		D	
Projected lengths or original edge	44		28		31		22	
Length of remnant edge	14		9		10		8	
Ratio of remnant to original edge (angularity ratio)	$(\frac{14}{44})$	31.8%	$(\frac{9}{28})$	32.1%	$(\frac{10}{31})$	32.2%	$(\frac{8}{22})$	36.3%
Ratio of abraded to original edge (abrasion ratio)	$(\frac{30}{44})$	68.2%	$(\frac{19}{28})$	67.9%	$(\frac{21}{31})$	67.8%	$(\frac{14}{22})$	63.7%

Average abrasion ratio or roundness = 66.9%.