nevertheless missed an article by J. Ettori, published just 10 years ago (*C. R. Soc. Biol. Paris*, 1936, 202, 852), wherein is described a reaction similar to the one reported by us at Brussels.

Might we add a word of high praise for such men as Prof. Brull, Prof. Gillet, Dr. Lambrechts, Dr. Barac, and their Belgian colleagues at the University of Liége who, in the face of many dangers and personal disasters, bravely continued their scientific researches throughout the war, and who, with their families, extended every kindness and courtesy to the American soldier and scientist.

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The Occurrence of Crystalline Naringin on Grapefruit Rind

Naringin ($C_{27}H_{32}O_{14} \cdot 2H_2O$), the glucoside which imparts the characteristic bitterness to grapefruit, was first discovered by DeVry in 1857 (*Jb. Pharmacog*, 1857, 132, 1866). According to Poore (*Ind. eng. Chem.*, 1934, 26, 637), when grapefruit is stored, the content of naringin appears to diminish in both the peel and the juice.

Not long ago the writer's attention was called to aggregates of crystalline material that had collected on the surface of grapefruit rind, a cursory examination of this crystalline material indicating that it closely resembled naringin. The sample of grapefruit examined had been in the laboratory for some time and was gradually decomposing. Due to the pressure of other duties at the time, no more attention was paid to the exhibit, although a record of preliminary observations was made. More recently, opportunity was afforded for repeating the test for the purpose of definitely confirming the results heretofore casually observed. For this purpose a one-half portion of a grapefruit was placed, cut side down, under a bell jar, the latter not resting tightly over the fruit but on glass supports to permit ingress of air. The cut portion soon became inoculated with *Aspergillus niger* (Cramer) Van Tieghem. (The writer is indebted to John F. Reed, Baldwin-Wallace College, Berea, Ohio, for this identification.) In the course of 10 days, the growth of the *Aspergillus* was quite considerable, the fruit was rapidly decomposing, and there was formed on the surface of the rind numerous yellowish-white aggregates of material. These could be readily removed with a needle to an object slide and allowed to dry at room temperature.

The dried, yellowish-white masses, upon microscopic examination with crossed nicols, consisted of narrow rods and needles showing parallel extinction and negative elongation. The significant refractive indices as determined by the immersion method were: $\alpha = 1.480$ (shown lengthwise), $\beta = 1.625$ (shown crosswise), $\gamma = 1.668$ (shown crosswise)—all ± 0.002. These optical crystallographic data all agreed with those characteristic of naringin obtained from grapefruit and Florida and California oranges.

The fact that naringin crystallizes out on the rind of the grapefruit as it decomposes is of interest. The objective evidence indicates that conditions were suitable for the occurrence of these aggregates, although it has not been demonstrated that the increasing growth of the *Aspergillus* was necessarily wholly responsible for it. Both the changes initiated by the progressive development of mold growth and the general chemical decomposition of the fruit might have some effect on the appearance of the glucoside on the rind in crystalline form.

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Book Reviews

Rockets. Robert H. Goddard. New York: American Rocket Society, 1946. Pp. xix + 69; 10. (Illustrated.) $3.50.

Dr. Goddard is well known as a pioneer, if not the pioneer, of modern rocketry. Unfortunately, this book is not, as the title might indicate, a general discussion of the principles or accomplishments of rocketry but simply a reprinting of two Smithsonian Institution publications of the author—apparently his only publications in the field.

While an historical service is unquestionably performed in making available these out-of-print publications of the "father of modern rocketry," the dates of their original publication (1919 and 1936, respectively) and the tremendous development of rocketry in the last few years make it unreasonable to expect any great scientific value to accrue to the present-day reader.

The earlier and by far the longer paper is entitled "A Method of Reaching Extreme Altitudes" and gives a discussion of the possibility of using (sounding) rockets for the exploration of the upper atmosphere. It includes a presentation of Dr. Goddard's early experimental determinations of the gas velocity of smokeless powder rockets and a computation of the weights required to reach various extreme altitudes (125,000 feet and up).

The entire paper exhibits a rather odd blend of farsightedness and a surprising scientific naïveté. The soundness of the basic conception, that a rocket provides a practical means of attaining extreme altitudes, has been amply demonstrated by now. In addition, the extreme importance of a high gas velocity and a high ratio of fuel to empty weight is properly emphasized. Other suggestions presented in this 1919 paper which have subsequently proved of value include the idea of a multistage rocket and the limiting case of a rocket with casing which is continuously discarded as the fuel burns. No practical means for achieving this last is suggested. On the other hand, there is no apparent recognition of the various factors influencing the gas velocity in a rocket. Dr. Goddard describes experiments in which a gas velocity approaching 8,000 feet per second was obtained in rockets using smokeless powder of the so-called "infallible" type. This gas velocity was obtained through the use of extremely high pressure. (The pressure is not recorded, but it is stated that the rocket, which had an inside diameter of about 1 inch and a wall 0.46 inch thick, was bulged.) In the subsequent calculation of rocket performance it is assumed that a gas velocity of 7,500 feet per second is obtainable without any recognition of the fact that this might require high-pressure operation. More seriously, the influence of molecular weight on gas velocity is apparently not recognized even in the 1936 paper. For example, it is implied that if a combination of hydrogen and oxygen is used as propellant, an optimum gas velocity would occur at a stoichiometric mixture, whereas it is now well known that optimum gas velocity is obtained with a considerable hydrogen excess.

One historical curiosity that occurs in the 1919 paper is a theory of the nature of the upper atmosphere, credited to A. Wegener:

> Wegener . . . concludes that there are four rather distinct regions or spheres of the atmosphere in which certain gases predominate: the troposphere, in which are the clouds; the stratosphere, predominantly nitrogen; the hydrogen sphere; and the geocoronium sphere. This highest sphere appears to consist essentially of an element, "geocoronium," a gas undiscovered at the surface of the earth, having a spectrum which is the single aurora line, 557 $\mu\mu$, and being 0.4 as heavy as hydrogen. The existence of such a gas is in agreement with Nicholson's theory of the atom. . . .

The calculation of the weight of rocket required to reach extreme altitudes must be considered as optimistic even in the light of present knowledge and techniques. These calculations are based on the gas velocity of 7,500 feet per second, which clearly is obtainable, though better than V-2 performance, but also on a ratio of full-to-empty weight of 15, which has not been approached so far. Finally, it is assumed that casing is discarded as the fuel burns, a desideratum which has not been even approximately attained.

The second paper in the book, entitled "Liquid-propellant Rocket Development," describes very briefly progress made up to 1936 in the development of a vertical-firing liquid fuel rocket. Operating motors using liquid oxygen and various liquid hydrocarbons, both pressurized and pumped, were constructed and fired in flight. A gyroscopic stabilization device to control the rockets to a near-vertical path was developed. Unfortunately, no details of these various devices are given in the paper, although some interesting photographs of the tests are included.

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Handbook of South American Indians. **Vol. I: *The marginal tribes;* Vol. II: *The Andean civilizations.* Julian H. Steward. (Ed.) (Smithsonian Institution Bureau of American Ethnology Bull. 143.) Washington, D. C.: Government Printing Office, 1946. Pp. xvii + 624; xxxiii + 1035. (Illustrated.) $2.75; $4.25.**

The books under review are the first two of the five volumes of the long-awaited *Handbook of South American Indians,* sponsored by the Smithsonian Institution and the National Research Council and prepared in cooperation with the U. S. Department of State as a project of the Interdepartmental Committee on Cultural and Scientific Cooperation. In his foreword Dr. Wetmore rightly says: "The present monumental work is ideally suited to carrying out the purpose of the Smithsonian Institution, 'the increase and diffusion of knowledge'. . . ." Certainly no more impressive factual digest of anthropological knowledge covering so large a region has ever appeared. These volumes are also noteworthy as the product of scientific collaboration. Authorship of the various chapters is almost equally distributed between citizens of the United States of North America and citizens of various Latin-American republics. The editor and the committee of the National Research Council are to be congratulated upon securing the cooperation of such a varied and distinguished group of scholars.

The two volumes are organized according to the plan followed by A. L. Kroeber in his *Handbook of the Indians of California* rather than that used by F. W. Hodge in editing the earlier *Handbook of [North] American Indians*; that is, the data are integrated according to certain major topics rather than divided among smaller headings (place and tribal names, ceremonies, individuals, and the like). Both volumes are magnificently illustrated and have bibliographies that in themselves are notable contributions to knowledge. The amount of work that must have gone into planning, seeking, and selecting the drawings and photographs is stupendous, but the results more than justify the effort. Particularly praiseworthy is the reproduction (or redrawing) of illustrations from rare or inaccessible travel books of past centuries. A nice balance is achieved between pictures of landscape, people, and artifacts. The maps are likewise splendid. Contributors follow a standard outline (with some deviations) in treating each people. This outline is set forth as follows by Dr. Steward:

> The articles start with an Introduction, which often includes a geographical sketch. Tribal Divisions and History then follow. The history traces the major post-Contact events which have affected the tribe. When local archeology can definitely be linked with the historic tribe, it is included as a background to the history. Otherwise it is treated in a separate article. The next section evaluates the principal anthropological sources. The cultural summaries commence with Subsistence Activities (Farming, Collecting Wild Foods, Hunting, Fishing, and Food Preparation and Storage). Then come Villages and Houses, Dress and Ornaments, and Transportation. Manufactures, which follows, is essentially technological; the functional aspects of material culture are described under other headings appropriate to the use of the objects. This section includes Basketry, Weaving, Ceramics, Bark Cloth, Metallurgy, Weapons, and other types of manufactures. The following section is usually Trade or Economic Organization. Social and Political Organization, which follows, describes the general patterns and structure of the groups. If necessary, special accounts of Warfare and Cannibalism come next. Life Cycle then sketches Birth, Childhood, Puberty rites and initiations, Marriages, and