Book Reviews

The Biology of Human Starvation, 2 vols. Ancel Keys *et al.* Minneapolis: Univ. Minnesota Press; London: Geoffrey Cumberlege, Oxford Univ. Press, 1950. 1,385 pp. $24.00 the set.

This is largely a report concerning the influence of a six-month's semistarvation experiment on 32 healthy young men with an average age of 25 years. The subjects were volunteers from the camps or groups of conscientious objectors in World War II. The food restriction resulted in a loss of about 25% body weight at the end of the period. This study, which has become known as the University of Minnesota Experiment, might be said to be a revised and enlarged, or World War II edition, of the Carnegie Nutrition Laboratory study of the effect of undernutrition on young men which was stimulated by World War I.

A great deal of valuable data on the morphologic, biochemical, physiological, and psychological aspects of semistarvation and rehabilitation was secured in the Minnesota experiment with techniques developed since World War I, but the over-all results are in some respects disappointing. The semistarvation diet used undoubtedly produced conditions like those produced by semistarvation in Europe in World War II, but the value of the study might have been considerably increased by using two or more types of restricted diets. At least the salt intake could or should have been on different levels. Some of the subjects questioned the competence of the experimenters to plan adequate dietary rehabilitation. In the absence of knowledge based on previous experience, it would have seemed wiser to depend partly on instinct by allowing half of the subjects relatively free choice after a day or two of controlled food increase. On the basis of known facts, the statement that the fat content of a rehabilitation diet is unimportant (p. 1057) is not justified. Moreover, the claim that hunger disappears after a few days of total starvation (p. 829) is contrary to our findings.

No attempt was made in the Minnesota experiment to make a detailed study of hunger and appetite, but it was found that hunger definitely increases with semistarvation and in the early stages of rehabilitation. An important discovery was the finding that the amount of interstitial fluid remains relatively constant in spite of a loss of about 25% body weight and the development of edema in some of the subjects, but the question remains whether this would also be found with other types of restricted diets. The proportion of body fat was found to rise above the pre-semistarvation level during dietary rehabilitation, and the question raised here is whether complete dietary rehabilitation can be secured in any way without the development of a transient excessive fat deposit or a complication with poststarvation edema.

The authors seem to overemphasize the differences between the results of nutrition studies made on animals and on man. Animal experiments have, however, contributed greatly to our present knowledge of foods and nutrition, and it is highly probable that many of the unsolved problems of human starvation will be clarified by animal studies. The attitudes developed by some of the subjects in the Minnesota experiment also indicate that it might be extremely difficult to obtain a group of human guinea pigs for such studies in peacetime.

As stated in the authors' foreword, one of their objectives was to present a critical analysis of all the world's knowledge concerning the biology of human starvation. With a flow of important new literature coming out of Europe, this proved to be practically impossible. These two volumes will nevertheless long serve as the chief source of information concerning human semistarvation, a chronic state of millions of people in many lands.

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A Geography of Europe. Jean Gottmann. New York: Holt, 1950. 688 pp. $5.00.

Readers of SCIENCE who have been wanting to get a better grasp on the geographic, economic, and political realities of present-day Europe would do well to double-star this volume. Although written primarily as a textbook, it will undoubtedly satisfy the needs of other serious students who feel that America's destiny is somehow enmeshed with that of our European cousins.

The appearance of a new textbook in regional geography is always an event of importance to college and university teachers. Particularly so is the publication of this first book on the geography of Europe to make its appearance since World War II. It is a worthy successor to the half dozen or so prewar texts on Europe published in the United States, two of which, like this one, were written by European-trained geographers. Even though the author of a book on the geography of an entire continent must of necessity depend largely on secondary materials, the organization, point of view, and treatment of detail are all benefited by careful training in, and wide observation of, the area being described. The excellent bibliography is indicative of the author's familiarity with French, Italian, German, and Scandinavian source materials as well as the best of the literature in English. Bibliographies are always easy to criticize, but this reviewer cannot refrain from wondering why a two-volume work on "*Hochbulgarien*" is included when there is no mention of such standard German works as the *Handbuch der Geographischen Wissenschaft* or the European volumes in the *Enzyclopedie der Erdkunde* series.

After devoting 90 pages to the general features of Europe, in which he presents with sweeping strokes the physical and cultural-economic patterns of the continent as a whole, Gottmann analyzes the geographic "personality" of the individual countries. He groups these countries as belonging to four large regions: Western

Europe, Central Europe, Mediterranean Europe, and Eastern Europe, placing in the last of them only European Russia. Although in general Gottmann's subdivisions of the continent correspond quite closely to those of the masterful *Géographie Universelle* series, to which he recognizes his indebtedness, this reviewer sees little point in placing Rumania and Bulgaria in two separate regions, or in detaching the treatment of Finland completely from that of Scandinavia, with which it has so many obvious affinities. In view of the present availability of textbooks on the geography of the entire USSR, it appears rather unnecessary to perpetuate the fiction of a boundary at the Urals by including a treatment of European Russia.

The chapters on individual countries are well written, with a fine balance between physical considerations (landforms, climate, soil, etc.) and human factors such as population density, economic development, and political experience. France and Scandinavia are particularly well handled. There are occasional lapses into loose writing. Without defining terms it is confusing to write that "in Stockholm winter lasts 121 days, spring 57, summer 124, and autumn 63" (p. 122). It is incorrect to describe Luxembourg as being located "in the heart of the Ardennes Plateau" when only about one-third of the territory and probably not one-tenth of the population of the Grand Duchy live in the area of Paleozoic bedrock (p. 246). A few misprints were noted which can easily be corrected in later printings. The photographs are excellent, and good use has been made of numerous maps originally published in the *Geographical Review*.

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Gray's Manual of Botany: A Handbook of the Flowering Plants and Ferns of the Central and Northeastern United States and Adjacent Canada. 8th ed. Revised by Merritt Lyndon Fernald. New York: American Book, 1950. 1,632 pp. $9.50.

This new centennial edition follows the first after an interval of 102 years, and the preceding seventh edition after 42 years. The last edition actually prepared by Asa Gray was the fifth (1867). Since then the successive copyrights have been held by the president and fellows of Harvard College, and the revisions have been primarily the work of the staff of the Gray Herbarium. Needless to say, the changes have been so extensive that each of the last three editions has been essentially a new work, although retaining some features of its predecessor.

M. L. Fernald, who largely revised this edition, had already put the indelible mark of his personality into the seventh, which was the joint effort of himself and his colleague B. L. Robinson. It was Fernald who had the zeal and physical aptitude for field work which resulted in important botanical explorations of Quebec and Newfoundland and the extension of the range covered by the seventh edition of the *Manual* northward to cover the area below the Straits of Belle Isle and from Anticosti Island westward along the 49th parallel in Quebec to the northwestern corner of Minnesota. Southward from that point the "Gray's Manual region," unchanged since the former edition, follows the western boundaries of Minnesota and Iowa and then the 96th meridian. The southern boundary, likewise unchanged, follows the southern boundaries of Virginia, Kentucky, Missouri, and eastern Kansas. Nebraska and Kansas are thus the only states whose floras are but partially covered.

Although Fernald devoted almost all his energy to botanical exploration of the "Manual" area and revision of the *Manual* in the 42 years after the seventh edition, he had the help of some 400 collaborators, whose problems and questions all had to be to a high degree satisfied by his conclusions. Probably no botanical systematist has ever before gone so far in satisfying so many active finders of deficiencies and faults in a standard flora! Fernald has been an inspiring leader, and during four decades botanists of the "Manual" region have looked forward to "the new Gray" as though it would be oracular. There was a constant outpouring all this time of from one to several articles a month from Fernald's pen, mostly in *Rhodora*, the journal of the New England Botanical Club, of which he became the editor after Robinson's death, so that it came to be one of the most highly personalized of scientific journals, in an era in which most editors have deemed it scandalous to reveal any personality at all. *Rhodora* indicated, as the years went by, more and more of what would eventually be summarized in the *Manual*.

Fernald sought places for his own field work where there were the best chances of significant discoveries, and where workers were few. At first his efforts were devoted largely to Gaspé and Newfoundland. Having stimulated local zeal in further development of floristic knowledge of the northern border, he turned to the coastal plain of Virginia, and made a multitude of interesting discoveries. Moreover, he was ever ready for a trip to some neglected place within a short distance of Cambridge and even there he often found something that others had overlooked. When his eyes became impaired there was general lamentation, and fears were expressed that perhaps the *Manual* would become a casualty, but with the loyal aid of Bernice G. Schubert he valiantly pushed it along to a conclusion.

The *Manual* carries on the old tradition of recognizing many systematic entities as varieties and forms. Fernald did not follow the recent tendency either to consider everything as a species if it could be distinguished at all, or to require that every distinguished subspecific entity have a distinctive geographic range. Although he was ever a keen student of geographic distribution, he showed little regard for "life-zones," which in practice cannot be usefully defined or delimited.

Fernald likewise had no use for spurious common names, made by translating scientific names into English, and had the courage of his convictions in refusing to use them. The furtherance of "standardized plant names" gets no encouragement from the new *Manual*. To be recognized, common names must somewhere belong to common language. Fernald was, however, a critical student of real vernacular names, as is evidenced in the