due to the land grant act, to furnish this higher education, for the equipment of which they are liberally supported by the state and national means. The claims upon the preparation for entering these colleges are also about the same as that required by schools of the higher order, or the university class, that is high-school graduation, or its equivalent. But in spite of these advantages and the numerous special courses offered by nearly all these colleges, a great many of our graduates are suffering from the deficiencies complained of by Professor Vesque, thirty years ago in France.

In glancing over the catalogues of the courses of the agricultural instruction given in these colleges, one is struck by the multitude of optional courses, which are frequently restricted to very narrow specialties. The time allotted to one of these petty subjects is frequently as much as that given to the whole of the science of botany, which constitutes one of the main foundations of the entire structure of higher agricultural education.

In further examining these special courses, we shall find that many of them presuppose a careful preparation in botany which, however, has not been granted by the general curriculum. It is not infrequent that a student in some of these colleges is receiving lectures in plant breeding without previously having received any instruction, worth his while, either in morphology or taxonomy. An examination of the curriculum of many of our agricultural colleges seems to reveal the fact that there is too much specializing upon the superstructure before a safe foundation is laid. If the student be equipped with a fair general knowledge of botany, chemistry and physics, including physical chemistry, he may be trusted to develop the specialties of agriculture resting upon these as opportunity and occasions arise, but if the fundamentals be lacking, he will always remain uncertain and giddy.

H. NESS
TEXAS EXPERIMENTAL STATION

PROFESSIONAL COURTESY

TO THE EDITOR OF SCIENCE: We appreciate your courtesy in submitting to us the criticism concerning ethics involved in the publication of the article referred to by Professor Hart. We do not feel that a reply to the charges contained in his statement is necessary, further than to say that the work referred to was planned entirely by one of us (McCollum) and was carried out by Mr. Steenbock, according to the usual practise in experimental work. The detailed records of the time of extractions, filtrations, evaporations, etc., were published verbatim from notes copied by Mr. Steenbock for me as requested, and should, of course, correspond closely with his notebooks.

In a case of this kind where the veracity of one of the statements must be questioned by those who read this charge and our reply, nothing better can be done than to leave the public to judge for itself on the basis of the research records of all concerned as to the probable responsibility for the planning of this work.

E. V. MCCOLLUM,
N. SIMMONDS

SCIENTIFIC BOOKS

Societies of the Plains Indians. Anthropological Papers of the American Museum of Natural History. Volume XI. New York, 1916. Edited by CLARK WISSLER. Issued in 13 parts; C. WISSLER, R. H. LOWIE, P. E. GODDARD, A. SKINNER, J. R. MURIE, contributors.

This volume probably does not represent the greatest undertaking in modern American ethnology: it does represent one of the most efficiently executed, and is therefore of interest as an example of the method to which the science has attained. In case the designation "science" seem as yet unearned, let us compromise on "study of uncivilized culture history."

There are still many students at the height of their activity who were trained in, and some who practise, the older ethnology: a discipline begot by an intrinsic interest in the phenomena of culture, but fathered and nourished by the doctrine of evolution after it had begun to transcend its proper biological

source; and leaning as heavily as unconsciously on a kind of crude lay psychology of the individual. So strong was the impress of the idea of an unfolding sequence inhering in phenomena themselves, in this earlier ethnology or self-styled "science of man," that the actual relations of its phenomena in time and space were rarely looked into systematically. In consequence, its causal factors were determined with equal randomness. The explanations of causality of which the evolutionary anthropology of a generation ago consisted, were hypothetical and plausible.

The element of time, easily recoverable, at least as regards its relative phases, in prehistory and most fields of archeology, can be only indirectly reached in ethnology proper, which deals with living peoples innocent of writing. Ordinarily, all that we have of them is a momentary cross section of the long stream of their customs. Obviously, the course of this channel can be reconstructed factively only through a detailed determination of the data in terms of some other element which may subsequently be converted into factors of time. This other element is that of space; or, as it is usually named in this connection, geography. Experience to date has revealed no other method, except the speculation, mystical or rationalizing, concealed or avowed, of the older workers.

The spatial factors were strongly appreciated by Ratzel and his school, though still partly in terms of formal physical geography. Chance, however, brought it that in this country a body of students less driven through their general social environment to attempt interpretation than their European colleagues, found themselves envisaged at arms' length, as it were, by a mass of first-hand and living ethnological data. Once these were tasted, they proved emotionally palatable to many minds; with the result that materials were gradually accumulated on a really enormous and unprecedented scale.

It is curious how slowly the realization of this opportunity dawned. Ethnology was practised in this country fifty and seventy-five years ago, and if the students were less in number, they were, man for man, probably more illustrious, as the names of Hale, Gallatin, Morgan, Brinton, and Powell attest. These eminent men truly conducted researches, where many a successor has done little more than assemble material. But the personal contact of all of these pioneers with the Indians at their door was limited, and several disdained it wholly. The explorer, the traveler, the missionary, the military leader, sometimes the compiling historian or instituting official of civilization, were their purveyors of substance. Only slowly was it felt that as good and far better information could be got by the inquirer whose business was ethnic knowledge than by the voyager or resident whose purpose was incidental, and that such acquisition, instead of being an arduous preliminary task, was in itself a grateful pleasure. Much of the old native life long resisted the brunt of our civilization; an infinitude more lay immediately below the surface. The Indian, far from impeding serious inquiry, in most cases was only interested in facilitating it. An enormous tribal diversity lent the color of variety to every increasing endeavor. And, as the spread of the frontier and the education of the Indian tended to obliterate the continuance of native custom, they also rendered access to the people, and intelligent communication with them, easier, less expensive, and more profitable. To-day, the generation of American ethnologists is reared in field studies. Its novices take work on an Indian reservation for granted as the first step on the professional ladder. It is true that acquisition for a time so far outstripped utilization that the reproach was sometimes leveled from transatlantic quarters that purpose had been forgotten and direction lost. But it is equally important to realize that no equally extensive and continuous body of detailed ethnic data has ever been accumulated on the primitive people of any other area as on those of the United States, Canada, and Alaska.

In time, the mere mass of material forced its classification; and its arrangement by types

proved to be essentially an arrangement in space also, in practically every instance. The factor of distribution became as inescapable as in biology, and was recognized as far more momentous than had hitherto been the case in the depiction of non-literary peoples. From distributions to diffusions was only a step that forced itself on the attention; in technical language, the "culture area" began to be replaced by the "culture center" as a working tool. And any diffusion already sets us in time as well as space; with the results that ethnology is beginning to be back at the sequences with which it commenced—but now painstakingly arrived at and laboriously solidified instead of speculatively leaped at.

An example is the present volume on "Societies of the Plains Indians." The older ethnologist vaulted the gap between a tribe in Mexico and one in Alaska, or slipped between the beginning and end of a sentence from ancient Greece to modern Australia as if his bridge of fancy were one of traveled fact; and his next colleague—there were no collaborators—rambled or flew where he listed. The student of to-day begins by associating himself with colleagues. They plan an inquiry, not into a universal phase of human activity, nor of the American Indian, but of the formal religious associations of one group only of North Americans, the closely similar tribes of the Plains. They are nine years securing their material and four presenting and analyzing it; and it bulks to a thousand pages. This may seem a rioting welter of technicality. The laymen would prefer a handy pocket volume that told him incisively who the Indian was, whence and how he came, the consistent scheme of his society, the nature of his religion, and how both originated. There is no answer, nor attempt to answer, even one of these quesetions in the present work. Its thirteen parts describe the associational organization of the religion of sixteen tribes, or, with those on which adequate information happened previously to be extant, all of any importance within the cultural limits of the Plains. The type of each tribal religion is defined; interrelations elucidated; and the two concluding comparative sections by Drs. Wissler and Lowie finally settle into pure history in the most rigid sense of the term.

Thus, in his "General Discussion of Shamanistic and Dancing Societies," Dr. Wissler gives a family tree of the Iruska ceremony and associations connected with it. He succeeds in tracing this to a Dakota rite known as the Heyoka, which, with the addition of certain Omaha features, was taken by the Pawnee and worked into the Iruska proper. This traveled back to the Omaha and from them to the Dakota, who, by adding a new and vigorous series of songs, popularized the ceremony as the Grass Dance, and gave it to a long array of tribes. One of these, the Potawotomi, some twenty years later, added still farther to the religious "complex," and, as the Dream Dance, passed it on to another group of tribes. These were marginal or exterior to the Plains, distinct in their religious assumptions from the Plains tribes proper, and obviously took up the made over form of the ceremony because it was made over. A number of peoples accepted the "Iruska Trait-Complex," as the author calls it, twice in their and its careers; the Iowa even received and followed it three times, as Iruska proper, Grass Dance, and Dream Dance. It is of interest that as a rule the natives were well aware of the filial relationship between an earlier and later form of the cult.

It is clear that what we have here is history as historical as any following out of the origins and growth of Christianity or the Papacy or Parliamentary government, but reconstructed by circumstantial evidence derived from materials furnished by a group of peoples without annals, documents, or a scrap of writing. It is also evident, while the world will never be deeply moved by the Iruska cult or by the activities of the Pawnee in the nineteenth century, that studies such as this are uncovering principles of broad applicability—principles of a psychology that is truly social, and that in a greater or less degree must ultimately be met and recognized by every historian or analyst of human civilization.

Similarly, Dr. Lowie in his comparative study of the Age Societies—religious bodies grouped or graded according to the age of their members—although dealing with a set of institutions much older than the Iruska ceremonies, in fact far antedating the advent of the Caucasian in the region, establishes that the age-grade societies are an outgrowth of a system of non-graded societies still prevailing among the majority of Plains tribes; that the grading originated among either the Mandan or Hidatsa; and that the scheme spread from them respectively to the Arapaho and Gros Ventre and to the Blackfoot at a time when these peoples were in closer contact with the Mandan-Hidatsa than has been the case within the historic period. Again, the outcome of the investigation is a specifically founded reconstruction and a definite tracing of the sequence of events.

Dr. Lowie concludes by testing against these positive determinations a theory devised according to the old method by Schurtz, purporting to discern age societies as an institution arising spontaneously and necessarily at a certain stage of development of human civilization. As a wholly abstract speculation, the Schurtz hypothesis is scarcely assailable and equally useless. Matched against the analyzed facts in the Plains of North America, in Melanesia, and in East Africa, it breaks down and dissolves utterly. In fact Dr. Lowie shows convincingly that the age societies in these regions are not identical nor even parallel but represent diverse causes, diverse characters, and diverse sequences. Their uniformity and the supposed "laws" governing them are in the assumptions of the theorizer, not in the events.

This, it may be added, is the type of finding that invariably emerges when a critical and inductive examination is made of any of the smooth explanations that were the crop of the anthropology of half a century ago, and which are still the inviolable stock in trade of the anthropology dealt out in the Sunday newspapers, the drawing room, the books on "social evolution" and the mass of semi-scientific, unscientific, and pseudo-scientific literature that sets solution before inquiry. The matriarchate, the priority of female lineage, the antecedence of the clan to the family, promiscuity and group marriage, the fundamentality of the totem idea, the mana concept as the basis of religion, the development of alphabets from pictures, of geometric ornament from symbols, strange vestigial survivals generally—all these delightfully exotic, fascinatingly romantic, and often alluringly shocking views that have given anthropology most of its broad appeal, have their glitter crumble into dust as soon as critical method is applied to them. To most ethnologists of his own school, Dr. Lowie's elaborate demolition of the Schurtz speculation may seem unnecessary. Its wider significance is as a symptom of the growing conversion of anthropology from the toy of fanciful half scholarship to a product of scientific method.

Finally, too great credit can hardly be bestowed on the institutional side upon the American Museum of Natural History, its anthropological department, and Dr. Wissler, for the clean, business-like, and effective manner in which the undertaking represented in this volume was planned, carried through, and concluded. Without announcement or formal flourish an important scheme was formulated, put into operation year after year, systematically but never unbendingly adhered to, with cumulative results, and concretely accomplished through the cooperating efforts of a staff of five participating students, one of them a member of the native race whose institutions formed the subject of the inquiry. The parts of the volume were published promptly, the summaries undelayed, the typography, illustrations, and index are of the best. The record is one with which the Museum may well be content administratively as well as scientifically.

A. L. Kroeber

THE PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES

The eleventh number of Volume 3 of the *Proceedings of the National Academy of Sciences* contains the following articles: