scious awareness of the relations involved. If so it is again an example of the fact that types of action come first, awareness of the relations involved coming later in evolution.

In animals that are more complex this type of action has developed in such a way as to indicate that there has arisen conscious awareness of the self as an individual among other like individuals. This is shown in many ways beside the mating behavior; one of the most striking of these is the exhibition of jealousy. When a dog is caressed in the presence of another dog the second dog is disturbed; he seeks to substitute himself for the one caressed. It is difficult to see how a creature that is unable to speak could indicate more clearly that he realizes himself to be an individual like the other dog, that he and the other dog are rivals. Such jealousy, with the same implications, is shown by many of the higher animals.

Related to this, and with a similar significance, are the demands of many of the higher organisms that dominance and subordination be observed; that the rights of precedence be not infringed. Any one who in his youth was accustomed to drive home the cows knows with what indignation it was received when one of the subordinates attempted to go first through the gate. It was quickly put in its place by well-directed shoves from the horns of the cow that had in earlier contests made good her claim to precedence.

This matter of dominance, of group precedence, in animals has of late been studied systematically, so that knowledge of it is by no means now in the anecdotal stage. Bird society has recognized orders of dominance, established originally by contests among individuals. This order of dominance is commonly known as the "pecking order." A certain individual established his right to peck, or to threaten to peck, any of the other members of the flock. The others recognize their subordinate relation and receive the pecking without resistance or resentment. Another individual is No. 2 in the pecking order, and so on down the line, there being a complete hierarchy.

Such demands for precedence, such recognition of one's self as a subordinate, or as occupying a clearly defined place in the social hierarchy, seem clearly to involve a consciousness of the self as an individual among others; or at least they involve the objective correlate of self-consciousness. Unless we arbitrarily deny all consciousness to other organisms than man, we can not consistently deny to them self-consciousness: that is, awareness of the self as an individual among like individuals. The attempts to reserve self-consciousness as a distinctive attribute of man therefore appear to be outmoded; they appear out of touch with scientific knowledge.

Among the many features of social behavior in animals that carry similar implications, doubtless the most primitive is the behavior in seeking mates. It is found generally in unicellular organisms. Indeed it is doubtful whether any organisms exist in which it does not occur. The seeking of mates appears to be the fountain head of both social behavior and self-consciousness. It involves the recognition of mates as of one's own kind; and correlatively the recognition of the self as of the same kind as mates. Here social consciousness and self-consciousness have their roots.

OBITUARY

RODNEY HOWARD TRUE

RODNEY HOWARD TRUE during his active and productive life lived through many stages in the development of botanical science here in America. His contributions, of which there are about seventy listed in the Department of Agriculture catalogue, cover many different phases of botanical work. Always interested in men and in human welfare, he was associated in the various papers with many other prominent botanists of his time. His breadth of interest is shown in his activities, the associations he founded and fostered, the various and diverse character of his publications and, above all, by his sincere and wholehearted appreciation of his associates. It would be impossible adequately to express this humanistic side without diverting too far from the scope of a notice such as this. He helped others often at great personal sacrifice and resigned from the Bureau of Plant Industry to meet a budget cut rather than reduce his staff in salary or number. This was done with no position in sight, for he preferred a personal sacrifice to administrative injustice to the members of his staff. Many people looked to him for scientific advice which he was always ready to give, for help with personal matters and for pecuniary help in times of great need. This trait led him to take an active part in the welfare of federal employes, to work for a better organization of scientific and technical men and to serve on the Committee of 100 of the American Association for the Advancement of Science on scientific research. He was a leader in organizing the Agricultural History Society, founded in 1919 and incorporated in 1924, and was the first president of the society. He also served on the executive committee and was a life member of that organization. He was also a member of the general committee to revise the U. S. Pharmacopœia in the ninth edition.

He was a member and held important offices in many organizations such as the American Association of

University Professors, Botanical Society of America, Ecological Society, American Agricultural History Society, Pennsylvania Botanical Society, Pennsylvania Horticultural Society, Pennsylvania Forestry Association, Philadelphia Academy of Science, American Philosophical Society, Society of Naturalists, fellow American Association for the Advancement of Science; also a member of Phi Beta Kappa, Sigma Xi and Delta Upsilon. He was also on the Advisory Council of the Allegheny Forest Experiment Station.

Born in Greenfield, Wisconsin, in 1866, he was graduated from the University of Wisconsin in 1890 with the degree of B.S. He served in the department of botany as fellow and received the M.S. in 1892. Following the lead of so many other American botanists of that period, he went to Leipzig, where after two years' work with Dr. Pfeffer he received the Ph.D. degree in 1895. Having taught in the common schools of Wisconsin and been principal of the Wisconsin Academy at Madison from 1892 to 1893, he was appointed instructor in pharmacognosy in the University of Wisconsin from 1895 to 1896 and as assistant professor from 1896 to 1899. He then lectured in Radcliffe College and Harvard University from 1899 to 1901. At this time (1901) he was appointed plant physiologist in charge of plant physiological investigations in the Bureau of Plant Industry of the United States Department of Agriculture. This division also included drug plant, poisonous plant and fermentation investigations. This position was held until he resigned in 1920. Shortly after he was appointed professor of botany and director of the Botanical Garden at the University of Pennsylvania. This position he held until 1937 when he retired from the professorship but remained director of the Botanical Garden until his death on April 8, 1940.

His botanical publications began with a study of the flora of Madison, Wisconsin, and with studies of the mosses. Undoubtedly he was influenced by Professors Barnes and Kahlenberg in his earlier work. The physiological side was emphasized in such titles as effect of turgor and temperature on growth, electrolytic dissociation, algae and antiseptics, plasmolyzing agents and the poisonous effects of phenol. Drug plants came in at the very first in such titles as betel chewing, drugs of Ceylon and folk materia medica, and in 1904 the drug plant work seems to predominate with papers on cultivation in the United States of such drugs as ginsing, camphor and paprika. Along with these investigations were studies of curing and keeping qualities of lemons. The interest in mosses was still evident, and the swing to plant nutrition evinced very early became dominant about 1914 in such studies as toxicity and malnutrition, harmful effects of distilled water, exchange of ions in nutritive solutions, studies of lime and magnesia, of alkaloids, oxidases and latex and the absorption of calcium salts. Studies of normal and blighted spinach, of the ash of spinach as affected by concentrated solutions, and calcium in the nutrition of plants, of the effect of illuminating gas in soils on plants were gradually giving way to an interest in the history of botany and agriculture. As early as 1916 he published on Thomas Jefferson in relation to botany. Then Lewis and Clark, John Bradbury, Sachs, Michaux and Jefferson claimed his attention. A swing toward horticulture is evinced in later works on pecan, viburnum, Dutch elm and pine diseases and the work of the Morris Arboretum.

In many ways True was a pioneer, pushing into new worlds and reporting back with great enthusiasm, always looking for a new interest but holding to the old with undiminished enthusiasm. This enthusiasm, to a great degree, he could pass to his staff by his ability to lay out and plan experiments backed by an interest in the younger workers which stimulated them by his faith in their ability and evident satisfaction in their accomplishment. This led to a real affection for him by his subordinates. Informal gatherings in the laboratory or greenhouse for discussion of problems brought together men in related fields and did much to maintain a cooperative scientific atmosphere in the Bureau. One of his men, now a prominent botanist, says of him in a personal letter: "I've never known any one who was more generous in his appraisal of his employes or more good-hearted in his relations with them. He was a vigorous champion of research."

With such broad interests, with so much humanitarian interest, his greatest contribution was the opportunity he afforded to others to interest themselves in their own special problems. The list of men who profited by this atmosphere would include many leading American plant physiologists.

Science to True always meant a contribution to human welfare, and the welfare of the scientific worker was always important to him.

H. L. SHANTZ

HOWARD J. BANKER

HOWARD J. BANKER died in his home at Huntington, Long Island, on November 13. He was born in Schaghticoke, New York, on April 19, 1866, the son of Amos B. Banker and Frances Alcena Welling. He is survived by his wife, the former Mary Eugenia Wright, of Clifton Park, New York, and a nephew, Walter B. Banker, of Wilmington, Delaware.

He received his A.B. degree from Syracuse University in 1892 and his Ph.D. from Columbia in 1906. He was pastor of the Union Church in Proctor, Vermont, 1895–98; teacher of mathematics in Dickinson