such a unicellular organism as *Paramecium bursaria* shows in connection with reproduction a considerable degree of differentiation and social organization. There are young immature clones, adolescents, sexually mature clones reproducing vigorously, and aged clones that no longer reproduce successfully, and that finally die. Among the mature clones, we may find representatives of the three different groups or varieties, and of the sixteen different sex types that constitute the three varieties. That is, the individuals are functionally differentiated, and react to each other in a highly selective way. In these respects the social system is complex, resembling that in some of the higher animals. The social organization connected with family life is of such a type as to form a natural step in the evolution of social systems, suggesting a unity throughout the world of organisms in respect to these matters.

To summarize the whole, we find that the transition from the individual to the social level begins in the one-cell organisms; and advances there by several steps. In connection with reproduction and development there has arisen a social organization of a considerable degree of complexity.

OBITUARY

JOHN STANLEY PLASKETT
1865–1941

WITH the passing of Dr. J. S. Plaskett, who died at his home in Victoria, B. C., on October 17 of this year, the astronomical world loses another of the men who were responsible for the rise of modern astronomy. Canada loses in him the leader who secured for her a prominent position in the astronomical world of to-day.

Dr. Plaskett was born on November 17, 1865, near Woodstock, Ontario. The financial resources of his family were meager, and for this reason Plaskett did not complete the work for the bachelor's degree until 1899, when he graduated from the University of Toronto. Plaskett was first an engineer in his home town of Woodstock and later for the Edison Electric Company, and for thirteen years he was an assistant in physics at Toronto. In 1903 he went as a mechanical superintendent to the Dominion Observatory in Ottawa, where he attracted the attention of Dr. W. F. King, the government astronomer of that time, and in 1905 he was appointed as director of the newly established astrophysical division of the Dominion Observatory at Ottawa. Plaskett entered upon his astronomical career at the age of forty.

During the eight years at Ottawa Plaskett's star rose rapidly. His proficiency in the adaption of the 15-inch refractor at Ottawa for spectroscopic research showed him to be one of the foremost designers of astronomical instruments. Through a careful design of the spectroscopic attachments Plaskett was able to photograph the spectra of unusually faint stars with the relatively small Ottawa refractor. The program for the measurement of stellar radial velocities which was initiated at Ottawa dealt especially with eclipsing binaries. During this same period Plaskett studied the rotation of the sun by spectroscopic means.

It was not long after his appointment at Ottawa that Plaskett began to feel keenly the need for a larger and more powerful telescope to carry on his spectroscopic researches. He discussed his needs with the chief astronomer, Dr. King, with whose strong support the project of a large reflector on Canadian soil was presented to the Canadian government. In 1913 the government placed Plaskett in charge of the development of the plans for a large reflector and soon the contracts were let for the mounting, the mirror and the optical work for a 72-inch reflector to be erected on Little Saanich Mountain near Victoria, B. C.

The mirror blank was poured at the St. Gobain works near Charleroi, Belgium, and the disk left Antwerp for the United States less than a week before the outbreak of World War I. The mounting was made by the Warner and Swasey Company of Cleveland and the optical work was performed by the Brashear Company of Pittsburgh. In the spring of 1918 the large telescope was put into operation. Because of his early training as an engineer, Plaskett was the ideal person to draw up the plans and supervise the erection of the 72-inch telescope.

Plaskett and his associates at the new Dominion Astrophysical Observatory lost no time in getting down to work. In a paper published in November, 1918, he writes:

> The mirror arrived at the Observatory on April 29, the first spectrum was obtained on May 6, and in the measurement of some 750 spectra secured since that date, these twelve spectroscopic binaries have been discovered.

Plaskett was the director of the Dominon Astrophysical Observatory from its beginning until his retirement at the age of 70 in 1935. The Publications of the Observatory published under his directorate by himself and his associates, Harper, Young, H. H. Plaskett (his son), Pearce, Redman and Beals, are a lasting monument to his driving effort and insight in astronomical matters.

The measurement and interpretation of stellar radial velocities was the main purpose of the new observatory. In the course of time Plaskett touched upon almost every phase of radial velocity work. A

great deal of useful information was gathered about the masses of the eclipsing binaries. An incidental discovery was "Plaskett's star," a massive spectroscopic binary, with two component O-type stars, having a total mass of more than 100 times that of our sun.

Largely under the influence of his son, H. H. Plaskett, the elder Plaskett became in the early nineteen-twenties very much interested in the problems of O-type stars. In a masterful paper published in 1924 Plaskett presented the results of his researches about these extremely hot stars. This paper deals with a wide variety of topics related to O stars. Their spectral characteristics were examined with great care, and much new material was given on the masses, intrinsic brightnesses and motions.

Through the studies of early-type stars Plaskett soon became very much interested in the stationary lines from ionized calcium. Originally Slipher had suggested the interstellar origin of these lines, but to most workers around 1920 it seemed more likely that they were formed in the regions directly around the star. On the basis of his observations of radial velocities and intensities of the stationary H and K lines, Plaskett decided in favor of the interstellar origin. He writes in his paper of 1924:

> The stellar and calcium velocities are generally greatly different, the former wandering all over while the latter do not differ greatly from the reflex of the solar motion. . . . A new hypothesis of widely extended, very tenuous clouds of calcium and sodium in which the star is situated and moving and which it excites and ionizes and so produces the sharp absorption line is developed.

It is hardly necessary to say that this hypothesis has been verified by subsequent studies. Plaskett became more and more interested in the interstellar gas and most of his subsequent papers contain useful information about further characteristics in the behavior of the interstellar lines.

In addition to the more glamorous type of work related to eclipsing binaries, O stars and the interstellar gas, Plaskett and his staff spent much of their time on a large routine program of the kind that forms the real backbone of modern astronomy. In cooperation with the Mount Wilson and Lick observatories, the astronomers at Victoria did their part toward completing the determination of the radial velocities for all stars in Boss' Preliminary General Catalogue of proper motions.

After the publication of a first general list, containing the radial velocities of nearly six hundred stars, Plaskett turned his attention more and more to the early-type stars. It was about this time that Oort and Lindblad advanced the theory of galactic rotation. Plaskett, who was very much impressed with this new development, saw immediately that his 72-inch reflector was the ideal instrument to provide the radial velocities of faint and distant stars that would prove or disprove the theory.

From 1928 on Plaskett's papers, published in part jointly with Pearce, deal almost exclusively with problems related to the rotation of the galaxy. The first paper in the series appeared as early as 1928, and in several numbers of the Victoria Publications the subject is considered again. It may well be said that Plaskett's measurements of radial velocities of O and B stars and of the interstellar lines in their spectra provided a firm foundation for the theory of the rotation of the galaxy. During the last five years of his directorate Plaskett gave several formal addresses, among them the George Darwin lecture for the Royal Astronomical Society on the subject of "The High-Temperature Stars" and the Halley lecture at Oxford on "The Dimensions and Structure of the Galaxy." The topic of galactic rotation was considered in almost every one of these lectures.

Shortly after his retirement Plaskett was asked by the Warner and Swasey Company to serve as a consultant for the work on the 82-inch mirror of the McDonald Observatory. He served intermittently in this capacity from 1936 to 1938, and at the symposium for the dedication of the McDonald Observatory in the spring of 1939 Plaskett presented a paper about the new telescope and mirror.

During the last fifteen years many of the highest scientific honors came Dr. Plaskett's way. He received honorary degrees from leading Canadian universities, including his alma mater, Toronto, and from the University of Pittsburgh. Between 1932 and 1935 he received the Rumford Medal of the American Academy of Arts and Sciences, the Gold Medal of the Royal Astronomical Society, the Bruce Medal of the Astronomical Society of the Pacific, the Favelle Medal of the Royal Society of Canada and the Henry Draper Medal of the National Academy of Sciences. He was a commander of the Order of the British Empire.

Plaskett was a great traveler. In the early days of the Solar Union, Plaskett was active on several of its committees; he was the Canadian representative at the meeting in Germany in 1913. In his later years he was one of the leading figures in the International Astronomical Union. He was active on many committees of the I. A. U. and president of the committee on stellar radial velocities from 1932 to 1938. After a serious illness in the spring of 1928, he came on crutches to the meeting at Leiden; Plaskett wanted to attend the meetings, where he was very eager to discuss with Oort and Lindblad his projects for the study of galactic rotation, and no doctor was going to keep him in Canada!

Plaskett's temperament was well suited to the re-

sponsibilities and duties that came naturally with the directorship of a large observatory. But whereas heavy directorial duties weigh down many a good man they seemed in the case of Plaskett to stir him to greater and more intense activity. He frankly enjoyed the job and the freedom that it gave him. I shall always remember his saying, "As a director it is your privilege to ask advice from many people, consider all suggestions carefully and then do as you please."

It is impossible to appreciate J. S. Plaskett without considering his happy family relations. Mrs. Plaskett and his son Harry played a very important part in his life. Plaskett was a strong man who could on occasion be sharp and blunt, and he needed the sweetness and kindness of Mrs. Plaskett. I doubt whether any astronomer of the present generation will ever think of him without picturing his wife somewhere in the background, not very far away. The success of Harry H. Plaskett, who after some years at Victoria went to Harvard and from there as Savilian professor of astronomy to Oxford, meant a great deal to his father. Harry Plaskett was in no small measure the cause of his father's expanding his field of research from eclipsing binaries and routine radial velocities to include spectral studies and general research on stellar motions. In knowing the elder Plaskett we can not overlook the contributions made by his wife and son.

Plaskett's name will go down in astronomical history as that of a leading designer of astronomical instruments, an untiring contributor of basic observations and a keen analyst through whose work our knowledge of the galactic system and its component stars was greatly advanced. Above all, however, we shall remember Plaskett as the man who placed Canada among the leading nations in astronomical research. We expect of the Canadian astronomers, present and future, that they carry on in the tradition established by Plaskett.

BART J. BOK

HARVARD COLLEGE OBSERVATORY

DEATHS AND MEMORIALS

SIR ARTHUR WILLIAM HILL, since 1922 director of the Royal Botanical Gardens at Kew, was killed on November 3 when thrown from his horse while riding. He was sixty-six years old.

DR. JOHN ERIC WELIN, emeritus professor of chemistry and physics at Bethany College, Lindsborg, Kans., died on October 23. Dr. Welin was a native of Stockholm, Sweden. He was graduated from Augustana College and the University of Kansas. He served as a teacher at Bethany College beginning in the year 1891, and was elected emeritus professor in 1937.

A PLAQUE in memory of Dr. William North Rice, since 1918 professor emeritus of geology and natural history at Wesleyan University, three times acting president of the institution, was unveiled in Memorial Chapel on November 8. Dr. Rice died in 1928 at the age of eighty-four years.

AT noon on October 26, two-score friends of Dr. Robert Thomas Hill met at the foot of Round Mountain, seven miles west of Comanche, Texas, and after appropriate ceremonies, climbed the slope and scattered his ashes on the summit. It was on Round Mountain where in the eighteen seventies the orphaned printer boy, Robert Hill, first found fossil shells. His curiosity was aroused and from this place as a starting point he worked out the Comanche series now recognized wherever geology is taught. Dr. Hill died at Dallas, Texas, on July 28, 1941, aged eighty-two years.

SCIENTIFIC EVENTS

THE SCHOOL OF PUBLIC HEALTH OF THE UNIVERSITY OF MICHIGAN

THE Rockefeller Foundation and the W. K. Kellogg Foundation each contributed last January the sum of $500,000 to be used in the establishment of a School of Public Health at the University of Michigan. As already announced in SCIENCE, Dr. Henry F. Vaughan has been appointed dean of the school. Dr. Vaughan is a son of the late Victor C. Vaughan, who was from 1891 until his death in 1929 dean of the Medical School of the university.

According to an account of the plans of the new school in *The Michigan Alumnus,* until this year, the M.P.H. degree has been granted for thirty hours of academic work. Forty-eight hours are required for the degree now, with one year, at least, spent in the university and not less than twelve of the forty-eight hours given to field work. The practical experience is to be gained under the approval and direction of the School of Public Health, with at least six months to be devoted to it.

The program is set up so that after one year of study at Michigan the student enters the field of public health as a worker, either specializing in some branch with which he wishes to become particularly familiar or dividing his experience among several types of public health work for the purpose of gaining a general background. Not until after this practical experience is completed does the School of Public Health grant the degree.