research there can be no question. The nation is not nearly scientific enough, or, to say it plainly, does not know nearly enough. Yet on knowledge, and on the pursuit of knowledge, the welfare of its citizens and the prosperity of its industries increasingly depend. Sir Alfred Yarrow's reasons for making this gift for scientific research are stated in his letter, and they are incontestable. He recalls the dangers to which lack of science, or ignorance, exposed us in the war and the advantage which the country reaped then and before from the labors of its scientific investigators. This testimony to "pure" science, as it is called, is all the more forcible in that it comes from a mind which has been devoted over many years not only to the application of acquired knowledge in shipbuilding and engineering, but also to its theoretic extension in the laboratory. It is on quiet laboratory work that everything in the long run depends. The Royal Society by its rules and traditions consists chiefly of persons engaged in the pursuit of knowledge for its own sake, and they are therefore least likely to be misled by the desire for immediate fruits. Sir Alfred Yarrow has left the society free as to the mode in which the capital or the income of his gift is to be expended, but he declares his preference for the adequate payment of scientific workers and for the provision of apparatus and facilities rather than the erection of costly buildings. He recognizes that conditions may alter from time to time, and suggests that if rules are framed for the administration of the fund, these should be revised at least every ten years. The suggestions are as prudent as the gift is generous. The nation will expect the Royal Society to translate into action the wise intentions of the donor with corresponding sagacity.—*The London Times.*

SCIENTIFIC BOOKS

DR. JORDAN'S AUTOBIOGRAPHY[1]

DR. JORDAN has chosen a most apt title for his autobiographical volumes. It is a "man," in the meaning of the accented use of the word, of whose life from childhood to seventy we are told in this book; and the activities and achievements of this life are revealed rather in the form of a record of the succeeding days and days' work of this life, with all their crowding and various activities of student, teacher, scholar, administrator and publicist, than in the form of an organized grouping of these activities and interests according to subject. This manner of treatment, chronological, inclining toward the diary form, has its drawbacks of diffuseness and mixing of subject matter and, one must perhaps admit, of overmuch detail, to the reader interested primarily in one or more of those important subjects, such as reform in university methods, introduction of the evolutionary point of view into the teaching of biology, the relations of science to every-day life, the encouragement of internationalism and pacifism, and what not else to which Dr. Jordan has so valuably contributed. But it has its great advantages to the reader interested in following closely the development and unremitting activity of a great personality. It reveals the methods of a highly intelligent and informed man, of robust, forthright character, working always with a steadfast aim to be useful to the youth and to the public and government of the American nation; the methods of a man intent on making use of every least as well as largest opportunity, with entire disregard of personal advantage or hurt, to contribute up to the very limit of his power to the advancement of the higher civilization of America and the world. As such it is a fascinating, stimulating and really ennobling record of the "days of a man."

Dr. Jordan tells interestingly of his childhood, in a manner always influenced, but never deadened, by the scientific student of heredity. He describes his days as pupil at home in the village of his birth in Western New York, then in a near-by academy, and finally as college student, beginning with seventy-five dollars in his pocket, at Cornell. His double interest in science and literature, maintained all through life, revealed itself from the beginning of his days of understanding. This story of adolescent development is seizing; one wishes there were more of it.

[1] *The Days of a Man*, being memories of a naturalist, teacher and minor prophet of democracy. By David Starr Jordan; two volumes, illustrated, 1922. World Book Company, Yonkers-on-Hudson.

It was in the Cornell days that he made those important contacts and friendships with a group of young men devoted to scientific study, among them Branner, Comstock, Dudley, Copeland, and Kellerman, which had a lasting influence on his life. And it was at Cornell that he came to know its famous first president, Andrew D. White, who was to have such an important part in determining his selection as the first president of Stanford, and such an influence on Jordan's own attitude and efforts as university president in Indiana and California.

In 1873, Dr. Jordan, only just graduated from Cornell, was a member of that famous first, and only, summer class of Louis Agassiz on Penikese Island. (A second class, of which Jordan was also a member, was held next summer under the direction of Alexander Agassiz and Burt G. Wilder. This ended the Penikese Island experiment.) Here young Jordan came to know Brooks, Whitman, Minot, Faxon, Fewkes and others, all since famous in scientific annals. Agassiz made a great impression on Jordan, probably the greatest impression ever made on him by any man of science. One constantly meets references to Agassiz and his point of view and methods all through Dr. Jordan's two volumes.

After Penikese, begins the record of the days of the teacher and investigator of natural history in various collegiate institutions, as well as of the work of the wide-travelling field naturalist already specializing in ichthyology, a special interest which has been maintained to the very present day. His first fish-hunting trip to the South came in 1876; he made a second trip there in the next year and still a third in 1878. It was in 1877 that he made his first trip to Washington, becoming acquainted there with Baird, Gill, Coues, Dall, and Ridgway, the result of which was to make connections with the Smithsonian Institution which, with later connections made with the U. S. Bureau of Fisheries, were to give him unusual opportunities for the faunistic and taxonomic work on American fishes that soon resulted in making him the first American authority in this field.

In 1879 Jordan became professor of natural history in the University of Indiana. He taught botany, zoology, physiology and geology. This was only forty years ago. Now Indiana has a department of botany with one professor and three associate professors, a department of zoology with three professors and one assistant professor, a department of physiology with one professor and one assistant professor, and a department of geology with two professors, one associate professor and two assistant professors.

In 1880 Dr. Jordan made his first trip to California and the Pacific Coast. The first of his many trips to Europe was made in 1879. On January 1, 1885, he became president of Indiana University. In 1891 he was chosen by Senator Leland Stanford and his wife, the founders of Leland Stanford Junior University, to be its first president. It was a privately endowed university established, under extraordinary conditions, on the west shore of the long southern extension of San Francisco Bay, about thirty miles south of the city of San Francisco, in the middle of a great grain and stock ranch where fast trotting horses were being bred. Dr. Jordan had been recommended to the Stanfords for this position by Andrew D. White of Cornell.

So much, and perhaps too much for the fair balancing of this review, concerning the events in Dr. Jordan's life recorded in the first half of the first volume of the "Days of a Man." But the events of the days from 1881 to the present, told in the remaining three quarters of the book, are more familiar to us. They need no such detailed cataloging. It is in these thirty years of never abated activity as educator, scientist and publicist, that Dr. Jordan won his present national and international reputation. From 1893 on I have known him intimately, admiringly, reverently. I have been privileged to work with him in classroom and field, and to play with him in mountains and tropic islands. His active brain, ever driving him and all of us around him to constant effort; his freedom from convention and hampering tradition; his intelligent progressivism; his high honesty to his high ideals; his saving grace of humor; his active sympathy with all aspiring youth; his philosophic grasp of the one essential, truth, as a basis for all philosophy of action; all these traits explain his achievement

as "naturalist, teacher and minor prophet of democracy." He has been great in all these characters.

The story of his highly successful development, in the face of seemingly insuperable obstacles, of Stanford University; of his contributions to internationalism by his services as official representative of the United States in connection with the solution of the fur seal problem and as unofficial but powerful representative of this country on many visits to Japan, Australia, and Europe; his consistent struggle against the Gods of War through a period where these Gods had their way with mankind; the stories of all these are illuminatingly told in the "Days of a Man." They are all inspiring; they all point the way toward human advancement; they all make one eager to go and try to do likewise. The "Days of a Man" is a good book for youth to read, and a good book for men and women, eager to help in the progress of humanity but occasionally discouraged by their hard contacts with the inertia and sordidness of much of our governmental and educational politics, to have conveniently at hand from which to draw new encouragement and determination.

VERNON KELLOGG
NATIONAL RESEARCH COUNCIL
WASHINGTON, D. C.

SPECIAL ARTICLES

USE OF THE CARBON DIOXIDE FREEZING ATTACHMENT ON THE ROTARY MICROTOME

SEVERAL years ago in the *Botanical Gazette* (Vol. 63, pages 236-239, 1917) Professor N. L. Gardner described a method for securing sections of various plant objects easily, quickly, and in large numbers by means of a brine-cooled microtome stage mounted on a rotary microtome. This apparatus has proven particularly useful in preparing sections of fresh leaves, or other living plant objects containing little woody tissue, for study by students in general botany. When sections prepared by this method are examined within an hour or two of cutting, the cells show no evidence of injury from the short exposure to low temperature. They appear to be in all respects equal to fresh free hand sections and are superior in that they are complete and much thinner than those usually secured by hand sectioning.

There are two serious disadvantages, however, in using this method in preparing sections for a large class. First, the preparation of the ice, its mixture with salt, and the charging of the containers which deliver the brine to the freezing chamber are rather arduous and time consuming tasks and second, if laboratory classes are spread over four or five days each week it is necessary either to charge the apparatus with ice and salt on several occasions in order that fresh sections may always be available or to use sections which have been cut for several days. Such sections are entirely unsatisfactory even if kept on ice.

It had occurred to the writer that, in place of the brine freezing attachment, a carbon dioxide freezing attachment might be connected to a rotary microtome and that thus both of the disadvantages mentioned might be avoided. The only objection which presented itself was that the short metal tube of the carbon dioxide attachments furnished by the dealers in microtomes might prove so rigid as to interfere with the free movement of the microtome stage on the rotary microtome and thus cause considerable irregularity in the thickness of the sections and perhaps injure the microtome. To avoid this the tube of a Spencer Carbon Dioxide Freezing Attachment was separated from the threaded connections for the CO_2 tank and microtome stage, and in its place was brazed a ten-foot length of one quarter inch, a one thirty-secondth inch wall copper tube such as may be secured for a small sum from any dealer in automobile garage supplies. The greater length of this copper tube and its somewhat greater flexibility permitted such freedom of movement of the freezing chamber that the latter could be safely attached to the rotary microtome and sections of uniform thickness could be secured. This application of carbon dioxide freezing to the rotary microtome has proved entirely satisfactory and much more economical than brine freezing except where cutting is to be continued without interruption over a period of three or four hours.

With the rotary microtome and CO_2 freezing attachment set up in the preparation room adjoining the elementary laboratories it is now