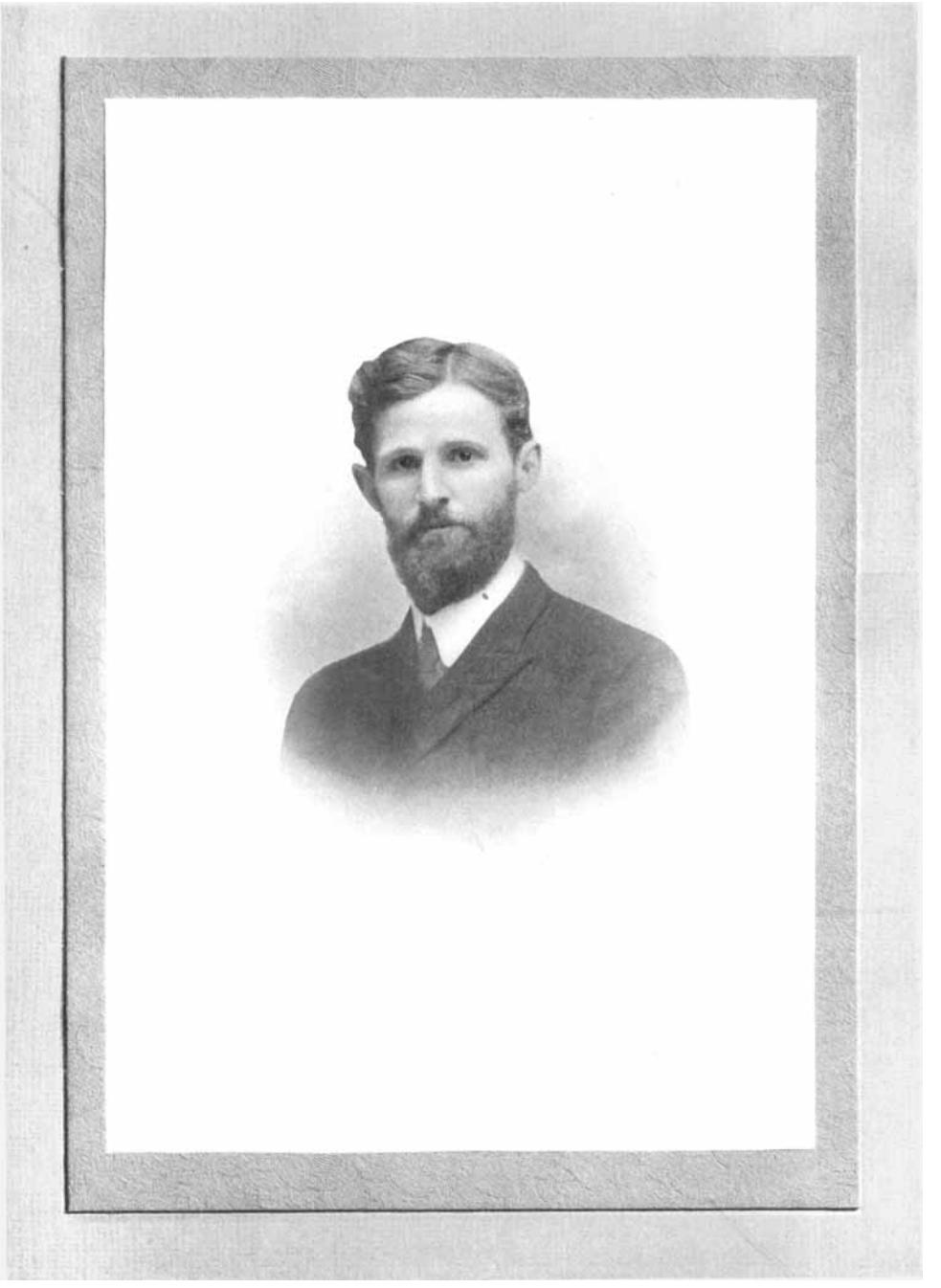

LEONARD WORCESTER WILLIAMS

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Dr. Leonard Worcester Williams, the son of Dr. Mason F. and Mary Worcester Williams, was born in Muskogee, Oklahoma, July 8, 1875. He met his death in an elevator accident in the Harvard Medical School, September 26, 1912.

His parents were attracted to what was then called Indian Territory, where his grandfather had been a pioneer missionary, by the opportunities for helping the Indians, and here his father, a graduate of Princeton, worked as physician and sometimes as pastor and teacher until his death, a little over three years ago. Here Leonard received his early education, mostly at the hands of his parents, but as he grew older there came the necessity for other instruction. The schools of the Territory were poor and so he was sent, at the age of thirteen, to a preparatory school at Hanover, Indiana. Next he entered Hanover College where he got his first introduction to science. The hills along the shores of the Ohio River are rich botanically and the rocks contain numerous fossils, and here he spent many hours collecting. In 1895 he was graduated from Hanover College with the degree of bachelor of arts.

Immediately on graduation he received the appointment of professor of natural science in Henry Kendall College, a small mission college in his native place. Here he worked for two years, giving all of the scientific instruction in the college, but he was far from satisfied with his place and his equipment. He needed more training, a deeper insight into nature, and so he surrendered his position and entered Princeton University as a graduate student. Here he came chiefly under the instruction of Drs. Dahlgren and McClure, spending his summers at Woods Hole and beginning his work on the anatomy of the squid. In 1899 Princeton gave him the degree of master of arts.

From Princeton he went to Brown University to study with Dr. Bumpus. Here he finished the account of the structure of

the squid and received the degree of doctor of philosophy in 1901. Then followed work with Dr. Mead on the Rhode Island Fish Commission and in 1903 an appointment as assistant professor of biology in Brown University, a position which he held until 1907. During these years at Providence his work, aside from teaching, was largely in economic lines, but several of his papers have a marked morphological character.

In 1907 he was called to the Medical School of Harvard University as instructor in comparative anatomy. Dr. Minot had become the head of this newly established department and it was his desire to place it in every way in the forefront. Dr. Williams was a skilled dissector and he had obtained from Dr. McClure a training in the methods of display of anatomical specimens which now stood him in good stead. A large part of his time was devoted to building up an anatomical collection which was intended eventually to cover all sides of the subject. His standards were very high; every specimen admitted must illustrate and illustrate well, some important fact or structure. One realizes, as he walks along the corridors where these specimens are exhibited, that they have taken no little patience and skill to prepare, and also that they show something more a full appreciation of the fundamental facts of comparative anatomy. Besides this work, which speaks for itself, and several investigations of importance in morphological lines referred to below, Dr. Williams gave instruction in comparative anatomy to both medical and dental students.

While at Harvard he spent most of his summers in one of the laboratories at Woods Hole or in that at Harpswell. At the latter place he began a detailed study of the anatomy of Myxine, paying especial attention to the circulatory system. In the winter of 1910 he went to Freiburg where he spent the second semester, working chiefly under those masters, Drs. Gaupp and Keibel. While there he attended the Anatomical Congress at Brussels and the Zoological Congress at Graz, returning home in the fall of the same year.

On March 9, 1904, Dr. Williams was married to Miss Martha R. Clarke, the daughter of Professor Clarke of Brown University.

She with two children, Mary Frances, aged seven, and Henry Franklin, aged five, survive him.

Personal contact, extending over several years, had endeared Dr. Williams to me and I hesitate to put my opinions and estimates into words. Foremost among his characteristics was the spirit of helpfulness. He was always ready, yes anxious to assist in every way possible, in every project that appealed to him, and his interests were catholic. He was a most careful and accurate investigator, and his knowledge of comparative anatomy was very broad and thorough. Had he lived he would doubtless have stood among the very first of American comparative anatomists. Often have I consulted with him as to the details of some problem and have always found him informed at least as to its broader features and not infrequently as to its details. He was thoroughly honest in his studies and he had no more severe critic of his work than himself. Then he was sympathetic. Many things outside his special work made their appeal to him, and he was interested in every student who came under him.

His work and his worth were appreciated by all who came in intimate contact with him, and as I write, there are letters before me from German, English and American anatomists, all expressing the highest opinions of the student and the man. Some extracts from a memorial adopted by the faculty of the Harvard Medical School may be quoted here:

> Dr. Williams was a naturalist by instinct and education, and took great delight in examining marine creatures of all sorts. In this way he acquired rare technical skill in dissection and broad knowledge of the structure of animals. In 1907 he joined the Department of Comparative Anatomy, and became at once a welcome and most valuable member of the staff. Exquisite preparations remain as permanent mementos of his industry, and his publications are those of an earnest student, careful, painstaking and exact. . . . . In recognition of loyal service, freely rendered throughout the five years that Dr. Williams was our associate, we record our high appreciation of his labor in our behalf, and our deep sense of loss in his death.

Dr. Williams was member of the American Association of Anatomists, the Society of Zoologists, the Society of Naturalists, a fellow of the American Association for the Advancement of

Science, and a member of the council of the Boston Society of Natural History.

Dr. Williams published several minor notes and book reviews in Science and the American Naturalist which were characterized by a clear insight into the main features of the matter under discussion and an adequate valuation of the merits and defects of the work reviewed. Besides these, which will have no further mention here, he was the author of several papers which demand some notice. These are as follows:

The vascular system of the common squid. American Naturalist, volume 36, pp. 787–794, 5 figures, 1902. In this paper, for the first time there was given a brief but accurate description of the main vessels and the capillary circulation of the decapod cephalopods. The difficulties of injection were many, because the intrinsic muscles of the vessels contract upon irritation. Williams was able to devise a technique which obviated the difficulties, immersion of the animal in a solution of amyl nitrite being a prominent feature. He demonstrated the existence of large sinuses, beyond the capillaries and before the beginning of the smaller veins, these being a part of the blood vessels and not a specialized portion of the body cavity.

Habits and growth of the lobster, and experiments in lobster culture. Twenty-third report of the Commissioners of Inland Fisheries of Rhode Island for 1903, pp. 57–86, 4 figures, 1903. This paper, in which Dr. Williams was associated with Professor Mead, is largely a summary of facts concerning the life history of the lobster and a statement of the unsolved questions, together with a description of the methods found available for raising the young lobsters through the critical period.

Notes on the marine Copepoda of Rhode Island. American Naturalist, volume 40, pp. 639–660, 23 figures, 1906. In this are enumerated twenty-seven species of copepods found in Rhode Island waters, three of them being new. With the exception of a paper by W. M. Wheeler, this was the first study of the American species of this group, so important in the food supply of economic fishes.

The significance of the grasping antennae of Harpactoid Copepoda. Science, volume 25, pp. 225–226, 1907. In some Cope-

poda both pairs of antennae are converted into grasping organs. Williams points out that in these species there is a prolonged embracing of the female, beginning before the moult, and only after this is the spermatophore placed.

List of the Rhode Island Copepoda, Phyllopoda and Ostracoda with new species of Copepoda. Thirty-seventh report Commissioners of Inland Fisheries of Rhode Island, pp. 67–79, 3 plates, 1907. This enumerates 41 copepods, 10 phyllopods and 2 ostracods as occurring within the waters of the state, two of the copepods being new.

The stomach of the lobster and the food of larval lobsters. Thirty-seventh Report of the Commissioners of Inland Fisheries of Rhode Island, pp. 151–180, 16 figures, 1907. This is a paper which should be accessible in all laboratories where the lobster or cray-fish are dissected by students, for it describes in detail the structure of the stomach, its walls, muscles, straining apparatus, etc. A new conception of the function of the gastroliths is advanced—these are stores of lime which serve to harden the gastric teeth so that the animal can devour its cast shell, this being utilized as a source of calcareous matter for hardening the rest of the skeleton. It is shown, also, that a large proportion of the food of the young is afforded by the Copepoda.

The structure of cilia, especially in gastropods. American Naturalist, volume 41, pp. 545–551, 2 figures, 1907. In a larval gasteropod cilia were found which showed the structural and physiological relations better than usual. From a study of these Dr. Williams was led to support the generally accepted theory that all protoplasmic processes (pseudopodia, cilia, flagella and the suctorial tenacles of Acinetaria) are formed on the same plan. Each consists of a contractile protoplasmic sheath with a fluid or solid core. The differences between the various kinds are brought about by the differentiation of contractile and non-contractile portions, differently arranged, in the protoplasmic sheath.

The later development of the notochord in mammals. American Journal of Anatomy, volume 8, pp. 251–284, 20 figures, 1908. This paper discusses not only the notochord after its formation, but the origin of the vertebral column as well. It is pointed out that the sclerotome does not segment as such, and the develop-

ment of the looser and denser sclerotomic tissue is traced up to the formation of cartilage. The notochord at first enlarges intravertebrally and finally disappears in this region with the ossification of the centra. The intervertebral portions are traced into the nuclei pulposi of the intervertebral discs. The cytomorphic changes of the notochordal tissue are also followed.

The anatomy of the common squid, Loligo pealii Lesueur. Brill, Leiden (Holland) 1909, 82 pages, 16 text figures and 22 figures on 3 plates. This is a very complete account of the structure of the squid, which, unfortunately, is published in a very small edition and so cannot have the use which it should have in our laboratories. It is a most careful piece of work, but is incapable of any adequate summary in a limited space.

The somites of the chick. American Journal of Anatomy, volume 11, pp. 55–100, 1910. This is closely allied to the notochordal paper just alluded to. It defines the parts of the somites, and traces the fate of the several parts in somites from the occipital, cervical, trunk and caudal regions of the chick, thus affording a secure basis for meristic homologies.

The intertubercular or bicipital foramen of the humerus of the guinea-pig. Science, N. S., volume 36, p. 192, 1912. This describes a foramen at the head of the humerus for the passage of the tendon of the biceps muscle which was found completely inarched in 17 humeri and almost enclosed in 25 more, out of a total of 125 skeletons.

For the past two years Dr. Williams has been engaged upon a detailed account of the anatomy of the guinea-pig, designed for those laboratories where this useful animal is made the basis of other investigations. The part relating to the skeleton is practically complete and it is hoped that it may be published soon. For its illustration he had made most careful drawings, executed in a truly artistic manner. For this purpose Dr. Williams mastered the technique of oil monochrome. He had made considerable studies of other parts of the guinea-pig, especially certain portions of the nervous system. As indicated above he had done considerable work upon Myxine, but for the past two years this had been set aside for the guinea-pig.

J. S. KINGSLEY.