

LECTURES ON BIOLOGY

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Lectures on Biology by R. W. Shufeldt

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R. W. SHUFELDT

**LECTURES
ON BIOLOGY**

Lectures on Biology.



BIOLOGY

- I. Its History and Present Domain.
- II. Its Relations to Geology.
- III. Its Value as a Study.
- IV. Its Growth and Future Influence.

BY DR. R. W. SHUFELDT.

1892.

PREFACE.

As the writer states in the leading paragraph of the first of the four lectures here offered, they were delivered in response to an invitation of the Right Reverend Rector Bishop Keane, of the Catholic University of America, and addressed to the faculty and students of that institution and an audience of ladies and gentlemen coming principally from the city of Washington, D. C., and gathered in the public lecture hall of the University, that seat of learning being situated but a few miles from the aforesaid city.

The lectures were delivered in the order they are here printed, and upon the four Thursday afternoons in the month of January, 1892, between the hours of four and five o'clock.

The author of them not being a Roman Catholic in any sense of the word, nor even an acceptor of the fundamental requirements of the Christian faith, it was a matter of no little surprise, and, it may be added, of gratification, that he was the recipient of a call to undertake such a task, coming, as it did, from such a quarter. Surprise, from the fact that all history goes to show that Catholicism has been—ever since the dawn of learning—the open and avowed enemy of all science and scientific progress; and gratification, principally due to the evidence that, perhaps, the day was drawing nigh when even Catholics were, at last, prepared not only to listen to the teachings of science but to feel the truth of them. My sense of gratification was the further intensi-

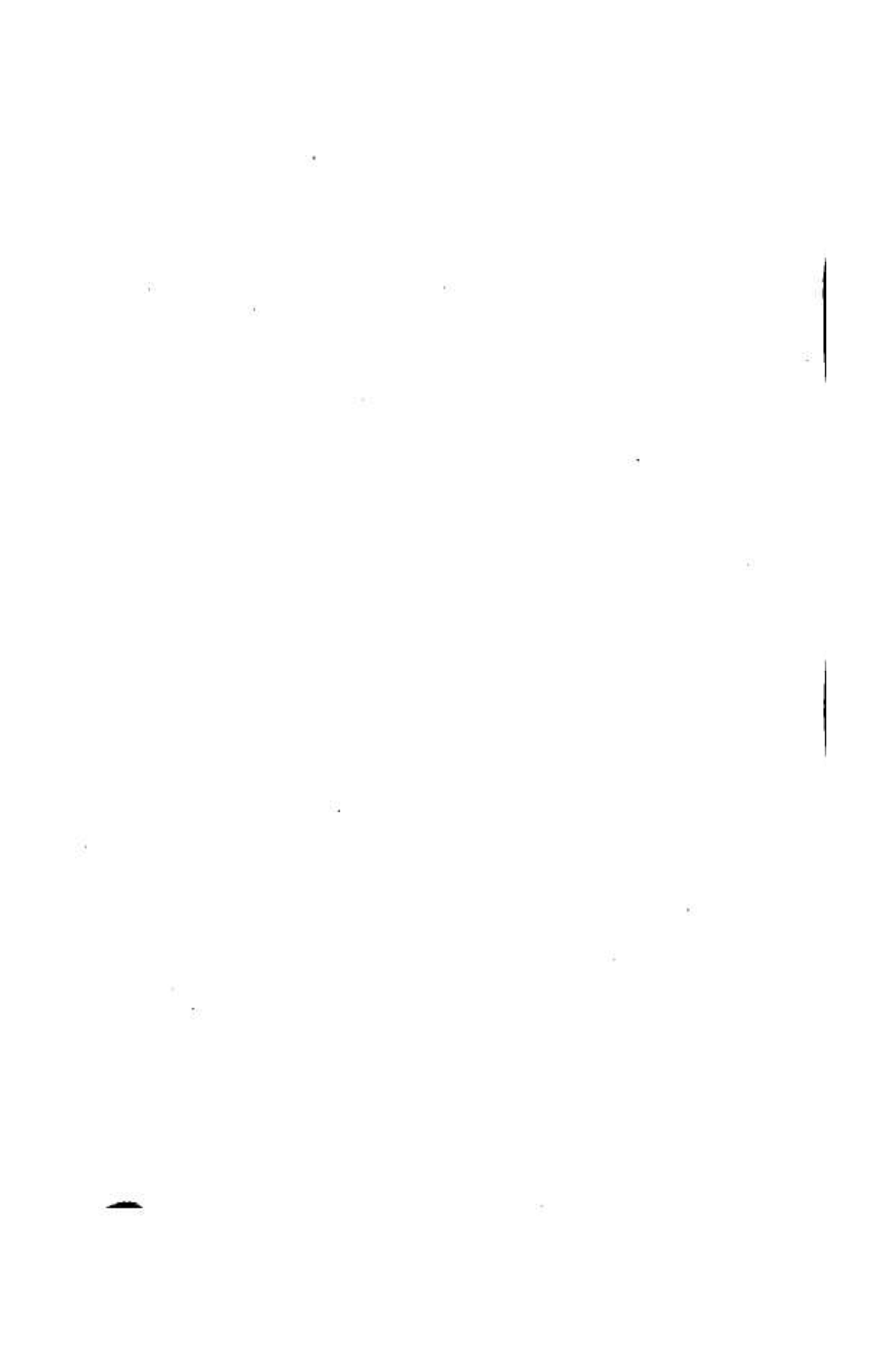
fled by the knowledge of the fact that the University had completed all its plans to erect upon its broad grounds an expensive and substantial college, equipped with faculty, library and modern laboratories, in the halls of which were to be taught to Catholic students the various branches of the biological sciences.

Later in the present preface, however, it will be necessary for me to show that the pleasure, to which reference has just been made, did not remain an unmixed one throughout all my relations with the University and her Washington press exponents; and, as such subsequent slight jars as did occur undoubtedly are significant and have their lessons for us, they will be briefly dwelt upon in the present connection, robbed of all passion and all personality. So far as the lecturer was concerned he was invariably treated with the utmost courtesy on all occasions, by everyone having anything to do with the University, and for that his sincere thanks are here tendered. The first lecture was received by both faculty and divinity students with very general and marked approval. Not so, however, the second one, and still less, the remaining two. They were disapproved, and upon the best authority the writer learned that he was roundly denounced as a "heretic" and a "pagan," by one or two of the students in their discussions of the lectures after the same had been delivered. In one instance, it required the action of the rector to quell the feeling; especially in the case of one student, who openly expressed himself in words to this effect: "That had the lecturer lived in a former century he would have been burned as he well deserved to be." At the latter part of the last lecture, one of the "Fathers," a member of the faculty, was seen to place his fingers in his ears rather than be corrupted by listening to my heresy. When one thinks for a moment how the dreaded Inquisition dealt with anatomists, "in a former century," such acts can, by the writer, only be construed as the very greatest compliments that possibly could have been meted out to him.

Cardinal Gibbons personally requested that the lectures be published in *The Catholic Mirror*, of Baltimore, Md., and the first two did appear in that paper. Only approved portions of them, however, were thus allowed to see the light, and for some reason—not given—the last two were not printed at all. Another paper, *The Catholic News*, of Washington, undertook to publish them in full, and, as in the case with the *Mirror*, the first two did come out, though my remarks upon the influence of the Inquisition on the labors of early writers in anatomy were carefully suppressed. This newspaper likewise was unable to publish the last two lectures, and, after the appearance in its columns of the first one, its editor was careful to preface each portion as it appeared in part with the following caution, printed in brackets: "The University assumes no responsibility for opinions advanced by lecturers in the public courses."

After a careful second reading of my "opinions," I have been totally unable to discover a single statement that cannot be most amply sustained by the very best of evidence, and doubt whether any fair-minded and intelligent Roman Catholic can do otherwise.

So much for the history of these lectures, which are now for the first time presented in full to my readers. In most cases science has long been familiar with the facts they set forth; not so, however, I fear, the vast hosts of Catholics in this country, both laymen and clergy. So it is to them, especially, that I dedicate my labors, with the profound hope that they may read and comprehend the truths I have endeavored to convey.



I.

Its History and Present Domain.

In 1891, when the eminent head of this University, Bishop Keane, extended to me the distinguished honor of an invitation to deliver during the course of the present Winter four consecutive lectures, upon any subject that I might be pleased to elect, I was, for a time, in a degree doubtful in my mind as to what department of science I should make application for material to meet so important a duty.

Upon glancing at the subjects of lectures delivered from this chair during former Winters by my most able predecessors and upon inquiry, I discovered that the largest attendances had rewarded those who had brought before you some matter selected from man's civic history or from his literature, and it was urged upon me to adopt some similar course. But the idea by no means coincided with my own views in the premises, for, I argued, in the first place, had the University any such plan in contemplation it would never have asked a biologist to carry it out, however well he may have accomplished it; and, in the second place, I felt I was called upon to face not only an audience coming from one of the greatest scientific centers that marks our civilization, but, in addition thereto, a faculty and their pupils which represent an institution which promises to be in its methods and aims one of the broadest seats of learning throughout all this broad land. Under such circumstances it devolved upon me to select for your consideration the craft to which I have devoted more than twenty of the best working years of my life, and still, in so selecting, would invite you into fields that not only are pregnant with interest, but offer their full measure of instruction, to say nothing of the influence that instruction has upon all human pursuits and the practical ends of everyday life.

When properly interpreted and applied, the science of

biology will meet what I have just claimed for it, and it is to its study that I now invite your attention.

Biology, at the present time, has come to include that group of sciences which have to deal with all those phenomena which are exhibited on the part of living matter, and, as so defined, is sharply marked off from what may be termed the abiological sciences; as for example astronomy, chemistry and physics.

A moment's thought will make it clear that such a definition as the one just given will not only include the study of man and his works, both past and present, but likewise such special studies as, for instance, the science of sociology and the science of psychology. The last named, however, is usually considered but a department of physiology, and the first but those phenomena exhibited on the part of men in society, or, perhaps, I had better say, that science which deals with human society.

As thus drawn then at the present time, the line of demarcation between the biological and the abiological sciences is quite a hard and fast one, for, as yet, we are ignorant of any link that connects living and not-living matter.

Botany, in its widest sense, falls within the scope of the biological sciences, as does most assuredly anatomy, although in the case of the latter the student in that department deals mostly with dead matter or the cadaveric remains of animals: such remains, however, once possessed life, which is more than we can say for such an object, for instance, as a crystal or a meteorite.

Naturally, one may now ask, how about palaeontology? that science which treats of the fossil remains of animals inclosed within the crust of the earth or occurring upon its surface, but in any event so closely linked with the abiological science of geology.

Well, it is, also, strictly speaking, one of the biological sciences; and, in my estimation, but one of the departments of morphology. Apart from vegetable morphology, animal morphology includes not only palaeontology but that entire group of studies which formerly were classified under anatomy and comparative anatomy; in other words, animal morphology takes into consideration the study of the form and structure of all animals, whether dead, living, fossilized, or whether existing or extinct. Human anatomy is then a subject that falls within the purview of the morphologist.

All studies biological are more or less dependent upon each other, as the history of all animated nature is ex-