

# Biology Teaching in the Catholic School System: An Historical Survey

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The immediate reaction of my audience on reading or hearing the topic of my paper will be twofold. To many the question will arise: "Why the Catholic school system?" And to those of you affiliated with the Catholic school system the reaction: "Perhaps he will inform those of the public school system what the Catholics are doing" may be one of anticipation or apprehension.

In answer to the former question I answer that the history of education in the United States is the history of public *and* independent schools. We are forced to admit that the church-related and parochial schools plus the public schools make for what William Brickman calls "a dualism in the educational enterprise of our country." Both school systems have developed together, although at different rates and to vastly different sizes. But such a dualism has resulted in strength rather than weakness. Those who attend the country's independent schools have not only enriched the country with their particular talents, but they have also added an additional aspect to the pluralism of the American people. Such pluralism is characteristic of our national character. It has contributed to our national purpose and greatness.

This then will be a paper discussing the independent school system. Why the Catholic school system? Because it comprises the largest element of the independent school system, an element under the control of a religious denomination. Today 14,000 Catholic schools enroll 6.5 million students, which is 13 percent of the total student enrollment in the United States.

And to those connected with the Catholic school system, it is my hope to be able to inform those of the public school system (and perhaps even some of the Catholic school system) what the Catholic schools have done in the area of science education. I am anxious not to insist on a total white-

wash of our institutions, but to present an objective picture of what the Catholic schools have done, are doing, and would like to do in the field of science education.

In the brief time allotted to me I plan first to briefly sketch the Catholic philosophy of education and then demonstrate how the curriculum content of our schools has evolved to fulfil this philosophy. My discussion will be limited to secondary and higher education as it is found in the United States. Stress will be placed on biology education, although mention will be made of the other sciences. Such a discussion must also include some description of the development of the Catholic school system itself, since a history of the curriculum necessarily reflects the conditions under which the schools have developed.

The aim of education is to prepare the student for life, to train him to properly take his place in the community as a scholar and a citizen. As a citizen he will serve his community in the role of lawyer, a teacher, a plumber, a minister, or any of the multitude of occupations that society needs to function as a community. But the needs of a community change. Today we need nuclear scientists, computer technicians, and elevator operators. A hundred years ago such occupations did not exist.

Therefore the education of the community must change with the needs of the community. The type and quality of education offered in our modern schools of today differs considerably from that of the little red school house of yesterday. Formerly our education seldom lasted through the elementary level; now we exceed the secondary level, on into college, and in many cases into the university degree. All of this is required to fulfil the aim of education in training the student for life, to take his place in the community.

The Catholic philosophy of education likewise is based on the principle that the function of education is to prepare the student for life. But the Catholic educator considers his task incompletely performed unless a knowledge of God and our duties to Him are also included in the educational program.

From this it can be seen that the Catholic school is neither a carbon copy of the public school, nor is it an "all-week Sunday school" where the students are drilled for six hours daily in their catechism. On the basis of such an image anyone might believe that the real objective of Catholic education is indoctrination pure and simple. While Catholic education does have a supernatural foundation and seeks to infuse the entire curriculum with Christian values, it still is concerned with the development of the student as a scholar and citizen. This means that the content of the subject matter taught must be substantially the same as that taught in the public schools. The only difference is that religion is present in every Catholic curriculum. But this presence of religion does not alter the fact that the Catholic student is expected to know what the public school student knows when he takes a uniform state examination, a college entrance, or a graduate record examination.

In brief, the Catholic schools, as well as the Protestant and Jewish schools, are engaged in the work of education, just as the public schools. Like the public schools we are involved in community affairs and perform a public service by educating Americans for a useful life in the community.

But how have Catholic schools educated their students to take their place in the community? History tells us that the first schools within the boundaries of the United States were established by Franciscan missionaries in New Mexico as early as 1516. The emphasis here was on vocational training, the essentials for survival on the frontier—reading, writing, and the necessities of arithmetic. It is unlikely that any of these early schools ever attained secondary school level, but if the aim of education is a preparation for life, it can definitely be said that these early establishments made a fair beginning toward attaining that objective.

At the end of the 17th century the Franciscans were joined in their task of education by the Jesuit Fathers and the Ursuline nuns. Because of the religious persecution that confronted Catholic immigrants in the colonies, the Jesuits began their early schools in Maryland and Pennsylvania where antagonism to Catholicism was less severe.

Here too the schools were preparing their students for life, but it was not for the immediate life of the community, but a life of future learning. The schools were mainly college preparatory institutions, and the education was for the more talented pupils who would enter the European universities. Thus the curriculum was modelled after the "Gymnasium" or "Lyseum" where the emphasis was placed on training in the classics, with some attention to history and mathematics.

The girls' schools or academies on the other hand, were not college preparatory, since girls did not go to college. Their aim was to train the young graduates immediately for life, "to form young ladies in virtue, ornament their minds with useful information, render them both amiable and attractive, not only in the family circle, but in society as well. To achieve this end their curriculum lists training in lace work and painting, harmony, sewing, and botany. This early instruction in a field of biology was described as "descriptive and pleasant" and was concerned with the recognition and classification of plants; "to gather, examine, preserve, and arrange botanical specimens." The young ladies took their place in the community as nature lovers.

When Georgetown college was founded in 1791, seventeen other non-Catholic colleges had already been established in this country, beginning with Harvard College in 1636 and ending with the College of Charlestown in 1785. It is interesting to note that all but one of these colleges were sectarian in orientation and their primary function was to train a learned clergy, a ministry that had all the advantages of classical education plus specialized study in their own denominational theology. Thus the Codex of Yale University contained the following rescript: "The original end and design of colleges is to instruct and train-up persons for the work

of the ministry. The great design of founding this school is to educate ministers in our own way."

The education for the life of the ministry at Georgetown gave Latin principal place on the curriculum. Time was also given to geography, some mathematics, the elements of chemistry and physics, and natural philosophy. Lectures in natural philosophy, which might be considered the earliest attempt at biology, consisted in a cursory view of nature as seen in the animal, vegetable, and mineral world. Its purpose was to point out the harmony of nature and its relation to moral behavior, or as an introduction to a common textbook states, "to exalt the glory of God through the wonders of nature."

During the next half century 18 other Catholic colleges were founded, and while Georgetown and these other schools were carrying on a valiant struggle for their institutional lives, a new dimension was injected into the non-Catholic world of higher learning. Laymen, now being asked for their money and their sons to support these schools, could not understand why they should need ministers, steeped in the intricacies of Latin and Greek, to proclaim the explicit word of God. At this time also the denominational line of distinction between the various religious sects began to wear thin, and with this the religious allegiance of the schools tended to wear away. The colleges continued in their quest to achieve status as centers of learning, but now their religious orientation disappeared.

The Catholic schools on the other hand continued in their religious determination. This can primarily be explained by the fact that most of the history and growth of Catholic education is written around the evolution and growth of religious communities. For example, of 84 contemporary Catholic colleges that were founded for men, 73 are presently conducted by religious communities and 11 are directed by bishops or priests. Moreover, whereas secular education was receiving its stimulus from outside, Catholic education was being formed from within the Church. In 1829 representative bishops from the United States met at Baltimore and promulgated the initial church law in

regard to education. "We judge it absolutely necessary that schools should be established in which the young may be taught the principles of faith and morality while being instructed in letters." Following this counsel large numbers of Catholic schools came into existence in response to the tremendous growth in the Catholic population which accompanied the tide of immigration in the middle 19th century. The primary motive for founding these schools was the conviction of the Church's responsibility to provide for the intellectual culture of the Catholic community.

The curriculum of the schools continued to present a steady diet of Latin and Greek since the classical curriculum was still considered venerable. In the secondary schools instruction was given in natural history, but this was not considered fundamental to the school curriculum. Its purpose, as can be seen in the introduction of a common textbook, *The Philosophy of Natural History*, was "to provide a perpetual and inexhaustible source of many pleasures, to occupy agreeably the leisure hours of life."

On the college level the natural sciences were regarded with disdain, mistrust, and misunderstanding. But as more and more students began to embark on a career of medicine a few of the progressive schools offered chemistry. But even this was contested by the humanities' professors who regarded science as a type of advanced manual labor and therefore unworthy to be included in a curriculum that trained the mind. Thus, although Catholic schools continued to educate their students for what they thought was life in the community, they were convinced that this should be done through a classical curriculum. As one college catalogue expressed it: "The classical course is calculated to develop and train all the powers of the mind, rendering it able to understand and appreciate all branches of learning. It serves as a foundation for special training in any branch which the student, with his mind trained and matured, may decide to take up."

It was not until the late 1860's that some colleges built a scientific curriculum without Latin and Greek. A survey of Catholic colleges in 1866 shows that 66% offered a course

in physics, 58% natural philosophy, 57% chemistry, and 20% a specialized course in botany. By maneuvering the various elements of the curriculum it was possible to have two courses—classical and scientific. Generally it was a combination of classics and science. In some colleges it was a carefully arranged course. During the Civil War, for example, Notre Dame added a complete physical and natural science program to its curriculum, with specific courses in physics, chemistry, geology, botany, and zoology. Georgetown College in 1879 demanded a two year course in chemistry as a requirement for the A.B. degree, and a two semester course in physics for seniors. Courses were also available in botany and zoology, but no definite program was offered. Classes met three times a week for thirty-five weeks. Lectures were illustrated with experiments by the professor and a scientific paper plus written and oral examinations in the sciences were required for graduation.

Georgetown's program was, of course, the exception rather than the rule. In most colleges few distinct courses in the various sciences as we know them were offered. Instead students gained most of their scientific knowledge from the course in natural philosophy where the physical sciences were taught as means rather than as an end in themselves. Science was examined in terms of its contributions to the resolution of man's basic problems. Occasionally the course would be highlighted within frequent lectures on scientific topics as can be exemplified by St. Louis College whose science program in 1884 featured special lectures on "The Evolution of Matter," "Fossilized Matter and Evolution," and "The Formation of the Universe."

As the curriculum began to expand and as colleges began to introduce more scientific courses, both laboratories and scientific equipment became necessary. It was the day when colleges rated their scientific progress by the size and variety of their museum cabinets. For example, the catalogue of Loyola College of Chicago in 1877 boasted of its recent addition of medical plants, while Notre Dame in 1876 listed 4000 species of birds, stuffed quadrupeds, including a buffalo, mountain sheep and antelope, quantities

of shells and salt water fish, and a collection of skeletons—human, monkeys, horses, a wolf, and many birds. The following year Notre Dame's museum was destroyed by fire.

When state support and control of education became an established fact, public schools grew in number, prestige, and organization. Catholic schools, on the other hand, handicapped by many problems, mostly financial, spread and developed slowly. In time, Catholic educators developed an inferiority complex, due to the priority of the public school system which was training the leaders who were dominating the thought and policy of education. Nevertheless Catholic schools wanted to be influential, and to do this they tried to imitate the public schools.

It had become apparent by 1875 that Latin and Greek were no longer in high esteem; that the public put a much greater value on the physical sciences and branches of knowledge which would contribute to the material progress of society. But in trying to meet the needs of the times, in attempting to reconstruct their curriculum to fit the scientific pattern taking shape in America, Catholic colleges, as well as many non-Catholic colleges, failed. They failed because they had little aptitude for research and because they had neither the faculty nor the facilities to meet the scientific demands of society.

But the schools indeed tried. They added specialized and attractive courses to their curriculum, but then haphazardly appointed teachers of dubious qualification to teach them. Teachers of classics and philosophy suddenly became experts in science and technology, under the mistaken assumption that anyone could teach anything as long as he had a textbook. This academic sleight of hand in decking out curricula in the dress of science did not go undetected. Almost as soon as the colleges initiated such programs both the programs and the colleges began to deteriorate. Both Catholic and non-Catholic colleges have been guilty of this lack of intellectual responsibility. It is to our shame that between 1871 and 1910 118 Catholic colleges were established, of which only 26 remain today.

Nevertheless society was committed to progress in the area of science. From abroad came glowing accounts of the work of German universities and their devotion to science. And so in order to take the place left forfeit by the American college, American leaders proceeded to establish in this country the German-type university, a university whose primary interest was science and research. The first such university in the United States was Johns Hopkins, established in 1876. This was followed by the Catholic University of America in 1884.

The dedication to research at Johns Hopkins was a source of inspiration to other American colleges which were encouraged to establish graduate departments and to refurbish already existing departments. Devotion to science brought endowments from industry, and by using these resources prudently and productively the universities proved their stature and demonstrated that gifts for university expansion and research could be used effectively.

But Catholic colleges at this time had neither the faculty nor the facilities to embark on real university studies. Whereas the interest of non-Catholic graduate departments centered on science and its application to life, Catholic universities stressed programs in theology, philosophy, and the humanities. At a time when the non-Catholic schools began to marshal their resources for the support of research, Catholic colleges acted as if science and research did not exist.

Lack of finances was of course one reason for this neglect of science. But there were other reasons. Mention has already been made of the dedicated allegiance of certain schools to the humanities. Mention must also be made of the conflict between science and religion that raged through Catholic intellectual circles at this time. The Catholic Church took the wrong turn as far back as Galileo, and while the roadmaps have been officially corrected since, the sorry experience has caused many in the Church to view science with suspicion.

One of the curious phenomena in the history of human thought is the persistence with which certain individuals have maintained the superstition that scientific truth opposes

the revealed truth of religion. Among these ill-informed, or rather, ignorant people must be included many of the clergy, scientists, and educators. Their private and public pronouncements have made it clear that they have amazingly little knowledge of science and still less knowledge of religion.

As a result, when Darwin's evolutionary theory was propounded in the 19th century it immediately encountered the hostility of these Christian "defenders of truth." *The Origin of the Species* was published in the year in which the temporal power of the Pope began to crumble. *The Descent of Man* synchronized with the Italian occupation of Rome. These events, coupled with the theory of evolution, were construed as different aspects of a movement inimical to religion. Instead of being discussed soberly and with a concern for evidence and possible inferences from it, evolution was turned into a religious war. The Church became fearful and apologetic in its attempts to see how scriptural and theological teachings meshed with the discoveries of science. It caused fear that increasing our knowledge of the material world was hostile to revealed knowledge of the origin and destiny of man. The battle has since subsided, but it has caused Catholic learning to suffer immeasurable losses, and is one of the main reasons why Catholic colleges fell behind other colleges in scientific respectability.

It has taken thirty years for Catholic colleges to recover, to realize that faculty, facilities, and finances are necessary for the success of their graduate departments. Since 1930 Catholic schools have proceeded slowly, even laboriously to develop their scientific departments. Most schools already had programs in chemistry and physics. These were improved. In biology, starting with the humanities as the foundation, colleges began by adding the essential courses for the pre-medical degree. Once an adequate undergraduate program in the sciences had been established the schools conservatively added more specialized courses and have not improved to the point where our standards are good and our quality high through the master's degree.

The problem of evolution affected high school biology only indirectly. Administra-

tors were more concerned with the problem of increasing enrollments and the diversity of interest of the students. The onset of industrialization and urbanization forced the schools to realize that they had other commitments than to supply students for college; that they must also supply the training and education for those who would leave the school and enter immediately into the life of business and industry.

In 1893 the Committee of Ten demanded that "at least one-half of the time of the high school should be devoted to nature studies." Such demands went largely unheeded, but Catholic schools did strive to meet the demands of their students. Most Catholic schools were offering courses in physics and chemistry. Natural history had begun to disappear from the curriculum and was being replaced by specialized courses in botany, zoology, and physiology. Few Catholic schools could offer all three, most offered a year of botany, many a semester of botany, followed by a semester of zoology. They also tried to provide the students with the rudiments of a laboratory. But the courses were not popular. Lectures required the students to "name parts, give functions, arrange in order, and define terms." Laboratory consisted in the cutting, sectioning, examining, and drawing the rigid bodies of pickled specimens.

During the first half of the 20th century the Catholic schools followed the public schools and unified courses of botany, zoology, and physiology into a course of general biology. During the depression years our biology emphasized health and sanitation, conservation, and an appreciation of nature. During the war years the stress was on hygiene, food, and disease. The tendency was to teach biology, not as a science, but as a way to pleasing hobbies or a series of practical technologies.

This was the time when science education witnessed the committees and subcommittees, the commissions and conferences which met to reexamine, rethink, and reorganize the basic issues, values, methods, and objectives of the science curriculum. The result of their many discussions and reports was that the science teacher was not doing his job—a fact of which most teachers were already

well aware. Much was said about *what* should be done, little mention was made on *how* it should be done. As a result there was little actual agreement as to what should be taught. Teachers did not understand their goals and the procedures necessary to achieve them. As with the colleges many Catholic high school teachers were still unable to realize how science, taught as science, could fit into the education of the whole man. They held the conviction that scientific knowledge was knowledge for specialists, and not needed by the ordinary educated citizen. Still others feared that the study of science would cause their students to lose their faith (as if science were any different from other studies in this respect).

We were weak in our laboratories. Few Catholic schools had the large, well-equipped, well-maintained, and well-used laboratories that one found elsewhere. This could be explained by the problem of financing a laboratory. It costs more to teach science properly than it does to teach Latin, and thus many Catholic schools found the teaching of science a hardship.

As for teachers, except for a few large institutions, many of our schools were understaffed with poorly prepared (and in the case of laymen, underpaid) teachers. Many schools had one-man departments, and some had the same teacher doubling in two sciences at a time when it was impossible for one man to be sufficiently well grounded in one science, much less in two. Many teachers never had special training in the fields of science that they were teaching. Many were self-taught or untaught. Or if they had a good preparation, they were so loaded down with teaching hours, or much worse, with administrative and extra-curricular duties, that any question of doing an adequate job of teaching was impossible.

Such a litany of educational ailments was not indigenous alone to the Catholic schools. The public schools were suffering from much the same ills. But within the last 15 years the educational scene on the high school level has changed, and it has changed for the better. Scientific breakthroughs symbolized in biotics, atomic fission, DNA, and space biology have made it apparent that no longer can an informed person be ignorant about

basic scientific principles or recent technological developments. Catholic educators are realizing that science education is not only indispensable to a well-educated man, but it is now a necessary ingredient to the whole system of liberal education.

Of course this does not mean that we will convert our schools into institutions devoted exclusively to science. In this respect we will never completely underplay the humanities, since both science and the humanities are necessary for the education of the whole man. Rather our objective is to integrate excellence in the humanities with a modern up-to-date science program, ridding our curriculum of what is inert and replacing it by the significant and newer concepts of modern science.

It is true that under the present conditions we are not in a position to do much experimenting with the curriculum. This however may work to our advantage, not to our detriment. As new subjects are tried and proved of value in the laboratories of our well-financed public schools we will be ready and anxious to adopt them. Participation of Catholic schools in introducing the BSCS program has in fact exceeded the public school participation. This can partially be explained by the comparative ease with which an individual Catholic school can adopt a new program, in comparison to the red tape of local and state school boards that the public school teacher must battle.

In the Catholic schools a teacher is generally permitted to select his own textbook, with subsequent approval by the principal or department head. Although there is a series of Catholic textbooks for practically every school subject, the policy today is for the teacher to choose that text which, from his own and the students' ability, he judges best. The belief of the Catholic biologist today is that textbooks which are *not* Catholic do not present any real difficulty for their students. Admittedly the work of many non-Catholic scholars is far superior to that of Catholics, and students should be given the benefit of their research.

There has also been a regeneration in teacher preparation to meet the demands of the new curriculum. At long last superiors of religious communities have realized the ne-

cessity of giving their teachers time and opportunity to obtain the necessary specialized training for the proper teaching of science. Many are striving to equip their teachers with a master's degree. Others are making use of summer institutes, in-service programs, and refresher courses. Still others are advancing toward the doctoral degree. We are further implementing our faculty with necessarily dedicated laymen. Salaries, in most cases, do not equal those in secular schools, but the situation is improving.

An encouraging number of our teachers are members of some professional science group. Membership in state organizations is more common than membership in national organizations, although Catholic representation in the National Science Teachers Association and the National Association of Biology Teachers is increasing. Unfortunately few Catholic teachers have ever held offices in a national organization, and in general active participation beyond the state level is practically non-existent. Such reluctance to make our presence felt at the meetings of national associations cannot be due to lack of competence or ability, since we do show considerable activity on state and local levels. But it is encouraging to note that a representative number of articles by religious personnel have appeared in recent issues of national journals, which would certainly indicate a fresh and active professional spirit.

Catholic high schools are also taking a more active part in national competitive examinations and science activities. With Catholic high schools enrolling approximately 11% of the total high school population, they have in the last five years earned from 5% -15% of the national scholarship awards in the annual Future Scientists of America program, while in the honorable mention listings they have merited from 18%-24% of the awards. In this respect it is interesting to note that there is an increasingly wider spread of schools participating in these competitions and the awards are not being won by just a few schools with a heavy science curriculum.

On the college level the National Science Foundation Fellowship Program is considered by many to be a gauge for rating a particular school's science standing. With Catholic

schools enrolling 6% of the total college population, the best they have been able to do is 3.2% of the awards. It must be remembered however, that only a small number of our science majors continue into graduate work as opposed to the professions. Most of our biology students are enrolled in pre-medical or pre-dental programs. Most of our physical science students graduate into engineering schools. As a result few of these graduates take these competitive examinations, and therefore it is unfair to compare or criticize Catholic colleges because of their poor representation on such examinations and competitions. In general Catholic graduates who do continue their studies in non-Catholic universities are found to have an adequate undergraduate background in science to meet the requirements of advanced study.

This then is our story. It is one of success and failure. Some of the failure has been forced upon us in the long rub and wear of religious strife. But we must admit it frankly, much failure has been our own fault, often enough through laziness and lack of vision, sometimes through abysmal mediocrity and just plain bad teaching. But we have acknowledged our shortcomings and have taken steps to improve. Of course it would be false to say that we no longer have weak and struggling institutions among us. Of course we have. But we also have many schools, large and small, of which all American educators should be proud. We no longer are the unhappy stereotype of a feeble academic institution with an unsophisticated and isolated faculty and doctrinal commitments that frustrate the scientific method. The science

education in most of our high schools is on a level with that of the majority of public schools. Our colleges are capable of providing a good science background for those continuing on into professional schools or the graduate schools of the superior public universities. We therefore have grounds for satisfaction, but not for complacency. While we will still hold fast to all that is good in our liberal disciplines, we must continue to work overtime to assure to science the place it deserves on the campuses of our Catholic schools.

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### Editorial Note

Dr. Philip Goldstein, author of our *In My Opinion* article for this issue, has further comments about the material presented. He hopes that you will be willing to express your comments, whatever they may be, directly to him at his address at 20 Cheltenham Street, Lido Beach, New York 11561.

The quotation from Dr. Dubos gives a very inadequate picture of his views. However, some of the further references which you may wish to read are: *Logic and Choice in*

*Science*, Proc. Amer. Philosophical Soc., Vol. 107, No. 5, October, 1963, pp. 365-374; *Environmental Biology*, BioScience, Vol. 14, No. 1, 1964, pp. 11-14; *Humanistic Biology: The American Scholar*, Vol. 34, No. 2, Spring, 1965, pp. 179-198; and *Science and Man's Nature*, Daedalus, Vol. 94, No. 1, Winter, 1965, pp. 223-244.

Much of Dr. Dubos' opinions are also expressed at greater length in a book to be published in the Fall of 1965, *Man Adapting*, by the Yale University Press.