describing, deserves at least to know what the outstanding problems are in biology. He ought to be able to answer the question: What are the aims of biology today? Are they the same as they were in the days of Vesalius and Harvey, when to complete the description of the parts of an organism must have been very exciting indeed? Are they the same today as in the days of Linnaeus, when to develop some sound system of cataloguing the variety of living things was a necessary project for the further development of the science?

I surmise that, wherever description and cataloguing have become part and parcel of the college biology course, biology has come to be known as a dull subject for young minds. It is worth speculating whether this very lack of interest has led teachers into the current trend of trying to make biology more appealing, more palatable, more enjoyable to a student body that has become increasingly insistent upon "entertainment," when its interest cannot be aroused any other way. The teacher who is concerned with "selling" biology has probably lost sight of the fact that what stimulates and excites the mind is not a description of the vast body of knowledge we have managed to accumulate (no matter how well organized nor how entertainingly presented), but rather an exposition of what we are trying to understand and how we are trying to do it. The most exciting part of any science is that of its frontiers; it would be a shame to leave the student unaware that such frontiers exist.

When we consider the problems that exist at the frontiers of biology, we find that they are being formulated in terms of autocatalysis, growth and morphogenesis as expressions of chemical and physical events, and the physicochemical nature of mutations. Let us grant at the outset that we know little about these "frontier" subjects. We may even agree that a detailed study of current findings belongs in advanced courses. Nevertheless, *the primary task is still the understanding of why the problems of biologists are being formulated in such terms.* The development of such an understanding is the proper object of a general biology course. It may be asked at this point: Can the college student be made aware of the significance of modern biological theories and concepts? I, for one, would say "Yes," and many of my colleagues with whom I have discussed the matter have also answered affirmatively.

We feel that a discussion of why such a question as the relation of genes to metabolic processes is of paramount importance in modern biology can be accomplished without becoming obscured by a welter of technical detail. But to proceed from a *feeling* about the matter to an actual development of a course that would fulfill the aims I have been describing is a difficult business. It would first require a long, serious, and thorough study of the content of biology, of its few fundamental theories and principles, and of the phenomena that biologists want to be able to explain and how they are being investigated. Then an equally long study of the possible techniques of exposition would be necessary. It may turn out that at the end of such a study it would be recommended that a course in general biology should not be taken until courses in general physics and chemistry are completed. If that should be the case, so be it. We would be wise, then, to alter the curriculum in line with these recommendations, rather than to adopt the alternative of avoiding so-called advanced and controversial and erudite subjects, even if they happen to be at the heart of modern biological thinking.

By the criteria for a general college biology course that I have attempted to outline, all college biology texts I have seen are very disappointing. These texts differ very little from one another basically, and one book can be said, as in the case of *The World of Life,* only to possess the virtues of a finer style of writing or a more attractive format or a better organization of material than another.

What we need in biology today are books like those of Alfred North Whitehead's *An Introduction to Mathematics* and Einstein and Infeld's *The Evolution of Physics.* Admittedly such books represent a tremendous effort of synthesis, condensation, and lucid presentation by outstanding scientists who always kept the general aims of their sciences in mind. But should we not expect an equally tremendous effort on behalf of biology?

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A Return to Medievalism in Science Teaching

> Subject to rules and regulations of the Board of Regents, a pupil may be excused from such study of health and hygiene as conflicts with the religion of his parents or guardian. Such conflict must be certified by a proper representative of their religions as defined by section two of the religious corporations law.

BELIEVE it or not, this is now the law of New York State (Section 324, Chapter 135, subdivision 5, passed 1950). What are the implications of this law for science teaching? One religious group has lost no time. Representatives of this sect, in accordance with the law, have petitioned for the exemption of children from instruction in the units on disease prevention and control, and in three other areas having to do with allied subjects in the curriculum. The Commissioner of Education has granted this petition. A directive has been issued to all superintendents and principals to the effect that

> These children will then be excused from this instruction wherever in the secondary school curriculum those units of study are offered to partially fulfill the health requirement [quoted from letter of Commissioner of Education to superintendents and principals, Aug. 11, 1950].

Thus, children of this particular faith must be ex-

cluded from any science classroom in which this type of instruction is given if their parents so indicate. They are thereby deprived of instruction in well-established scientific truths, which are deemed educationally essential from the point of view of personality adjustment and citizenship in modern society. For example, should not every citizen know that many of our most important diseases are caused by microorganisms; that they are controlled by bacteriological methods, such as vaccination, sanitation, etc.? Can we expect citizens uninformed of these well-established scientific facts to act intelligently in safeguarding the health interests of society? It is our contention that an educational system that fails to give every citizen this instruction is derelict in its duty both to the individual and to society.

Not only will these children be improperly deprived of instruction but, inevitably and more important, *all* children will ultimately be deprived, because the Commissioner of Education directs that

> *A.* Local school authorities are advised to evaluate achievement for pupil credit purposes in such manner as not to penalize pupils who have been excused from the specified units of study.
> *B.* Required sections of the Regents examination as well as the State Scholarship examinations will be constructed so as not to penalize pupils who have been excused from instruction in the specified units of study [Quoted from directive of Commissioner of Education, August 11, 1950].

New York State syllabi are, as a rule, constructed with a view to satisfying the requirements of the State Board of Regents. It is only a short step from the elimination of subject matter from the required part of the regents' examination to the complete elimination of this same subject matter from an already crowded curriculum. It is only another short step to the elimination of this unit of work from textbooks, too, since textbooks are written to meet the needs of the course of study. Thus, we can foresee a situation in which all children are deprived of the opportunity of learning the well-established scientific facts about health.

Even our superior students, our future doctors, teachers, dentists, physicists, chemists, will suffer the same deprivation, since they will omit the study of communicable disease from their preparation for the New York State Scholarship Examinations.

Although the immediate situation is serious enough, a more serious problem for science teaching is in the offing. How long will it be before the officials of other religious groups start to scrutinize the facts taught in science classrooms with an eye to petitioning for the exclusion of "the flock" from instruction in those facts that conflict with their tenets? Since the Commissioner of Education is practically bound by the law to grant such petitions, it is possible to foresee a time when our science curricula will be demolished piecemeal. In essence, this is a form of censorship whereby the various religious groups exercise control over what goes into the curriculum by determining what is to be excluded. Not only do we as science teachers find this form of censorship abhorrent, but we maintain that it is directly contrary to the traditional democratic principle of separation of church and state.

Where scientific laws are established beyond a doubt (with enormously high probabilities), should conflict between such laws and the tenets of religious groups be officially recognized by secular educational authorities or by legislative bodies? What makes a religious tenet? Is it any belief, no matter how fantastic, so long as it is held by a religious group?

Do the interests of society ever make it necessary to ignore the tenets of a religious group for the benefit of the overwhelming majority?

We urge this law of the New York State legislature as required reading for all groups interested in science and in science teaching. We urge such groups to weigh the consequences of this kind of legislation and to take action now. This means educating public opinion and taking political action. In addition, in New York State it means that we must work for speedy repeal.

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Mass Mortality and Dinoflagellate Blooms in the Gulf of Mexico

OBSERVATIONS made by Lund (*1*) showed striking parallels between mass mortality of fishes along the Texas coast in 1935 and the "Red Tide" of Florida in 1946, which was caused by dinoflagellate bloom (*2*). Since then there have been two other suspected episodes in Texas. Recently Connell and Cross (*3*) have brought together many diverse observations on the association of fish mortality and *Gonyaulax* bloom in Offatts Bayou, a small branch of Galveston Bay. Some of the facts presented merit further discussion.

The authors say that when Cabeza de Vaca visited the Texas coast in 1528 he listed a season as the "time when fish die." They leave the inference that this could have been caused by a phenomenon similar to the Red Tide. It should be noted that only a widespread mass mortality would have received the attention of this early explorer, who was traveling under the most difficult conditions, part of the time as a slave to the Indians. Widespread mortalities caused by dinoflagellate blooms are not annual characteristics of the Texas coast. The words of Cabeza de Vaca have been noted before and related to oversalinity of the Laguna Madre and to the effect of the cold "northers" on the shallow bays of the Texas coast. The latter are more widespread and more seasonal phenomena, and it is much more probable that Cabeza de Vaca had the seasonal cold spells in mind.

Offatts Bayou is unique as a small locality with recurring summer mortalities of marine organisms.