Some one may say that many students are not adapted to such open arrangements as this—I agree that they are not, but I would also add that they have no business here and the community would be indebted to us if such persons were unable to crawl into the medical profession. No one should be carefully checked for attendance, quizzed and drilled on lectures and texts and watchfully guided through laboratories and clinics for four years, and then be suddenly let go to stand on his own feet and independently treat the sick and dying.

The champions of fairness to the weak and deficient student have had far too much influence in the moulding of methods and arrangements in the medical faculties. This vision of fairness should be a little more far-sighted and look away to the lame doctor attempting to treat the crippled patient at the other end of the line. There might be a picture hung beside the rear exit door of a medical school showing a bungling, inefficient person pretending to cure a sick patient, and for those admiring symmetrical hangings an appropriate sister painting could portray the proverbial blind leading the blind.

No, there can be no welcome here for bungling, sloppy-minded or incapable persons—the medical college is not the place for them. And a consideration of such persons should not enter into the design of our educational policy. The policy must consistently avoid penalizing the able student in order to salvage the unable; it must be built only for him who stands.

We do not propose a simple turn-back to the old open system of ante-bellum days which so many of us experienced. This would get us no further along. But we do urge as the essential elements in human education open-mindedness and intellectual tolerance. Education in all fields of science should break down prejudices, promote tolerance and force with unerring determination the quest for natural truth. This has never been approached on any system of standardization. Uniformity and standardization immediately establish a prejudice against deviation and false ideas of perfection arise. Tolerance and truth have little sanctity in such a communion.

We here have aimed to have an institution in which an understanding of life may grow. The consideration of facts as we know them and the search for new facts is to be our daily privilege. To differentiate fact from fancy and to become adamantine in our determination to make no mistake between them is to be our discipline. Human minds frequently accept wide categories of things as facts. But the free admission of half-established findings to the realm of facts is the most befogging reaction of the brain. The more cautious one becomes in accepting an apparent fact the more reliable he becomes as a scientific scholar.

The struggle for truth must be consistent and universal. And self-deception must be as fully and as carefully avoided as the deception of others. No one can deceive himself without sacrificing his only method for obtaining the truth.

To these aims and to your part in their accomplishment the faculty of Cornell Medical College heartily welcomes you!

HOW THE COLLEGE CAN AID THE OYSTER INDUSTRIES[1]

By Dr. DONALD W. DAVIS

PROFESSOR OF BIOLOGY, COLLEGE OF WILLIAM AND MARY

THE story is told of Alexander the Great that as a young man he watched the efforts of his father's subjects to tame an exceptionally fine horse, and noticing that the horse shied at its shadow and obtaining permission to attempt to ride him he faced Bucephalus toward the sun and forthwith had him under full control. The obvious moral to this tale for the two organizations meeting here to-day is "know your oyster." It is possible that some of the many unexplained difficulties encountered by the oysterman are due to the oyster shying at its shadow, and only an observant Alexander is required to orient him properly. But, unfortunately perhaps, the oyster in the earlier stages of its life cycle is very small and elusive, difficult to find and to see without special aids. Furthermore, the source of the shadows interfering with our control of the behavior of the oyster are obscure. Its food is exceedingly minute, and the physical and chemical balance in its surroundings necessary for its complete and rapid development is most delicate. So that knowing your oyster adequately for satisfactory control requires use of the microscope, the test-tube, the salinometer, the balance, the kymograph and most of the rest of the physical, chemical and biological equipment of our biological laboratories. It requires also the mind trained in interpreting the revelations of these aids

[1] Read before the annual convention of the National Shellfisheries Association, Sayville, Long Island, August 19, 1930.

to our senses. I do not wish to suggest that such a personality as that of Alexander the Great is required to solve our problems and to apply the knowledge thus acquired to the business of oyster production. Barring the few who have defects of eye or hand or mind that positively and seriously interfere with the use of one or more of these instruments in the prosecution of observations or experiments, any member of this audience can train himself to do this work if he has the will and the time to do so. That is, by and large any member of this group may if he will qualify himself as a biologist for the study of oyster problems. In doing so he will study physics and chemistry, the structure and behavior of the oyster and its relatives, its food and its enemies; he will need to practice in the use of the experimental method and its tools. In a word, he will find it necessary to go through just such a program of rigorous training as is provided in our schools and colleges for the training of young men for scientific work in various fields, I would not be so foolish as to urge that every member of the organizations meeting here make this attempt. Actually and for numerous good reasons very few will do so. Obviously, for most of those present the important thing is to see and to know the work of the biologist sufficiently to utilize the particular skill he has acquired in the solution of problems to which that skill is requisite.

The problems to which the biologist interested in oyster production addresses himself are of three kinds. One is that of original discovery, of research, finding new significant aspects of the life history of the oyster or of its food or of its enemies or of the relations to other features of the environment. This is comparable with the discovery of new processes in a chemical industry on which modifications of procedures may be based. Studies of this sort make possible profitable application in regions far from the place where the research was done. Another kind of problem is concerned with adaptation of the results of fundamental research to local situations. A few bushels of experimental demonstrations may save boatloads of losses. This type of study involves much the same methods as the first and leads to further research of the first type. It also points toward the third type of study. This may be referred to as control study, routine tests of conditions for which standard procedures have been established by studies of the preceding types. These tests should be made as widely as possible in oyster-producing areas as checks on established methods and as guides to current local practice. These tests also may lead to further studies of the other types. Parenthetically it may be readily admitted that oysters may be produced with profit without such services as I have indicated. We all know of persons who are successful in various activities in spite of their disregard of modern aids and methods—from the sailor who senses his channels and needs no buoys or lights to the cook who skilfully judges the amount of various ingredients and scorns to weigh or to measure. But the number who develop such skill is too small for present demands, and the losses by these methods from the failures of the less competent are too great for our times. We are committed right fully to the plan of marking our channels and providing our kitchens with scales and measures. Surely the oyster industry is not one to be exempt from the need of such aids. Judgment is, and will always be, a most important factor in oystering. The work of the biologist in the oyster industry is not to render judgment unnecessary but to provide a significant basis of information on which more reliable judgment may be based.

It seems clear, then, that in oyster production there are unsolved general problems and local situations requiring investigation and control by men trained in the use of scientific methods. The function of the college and the university in conducting such studies and in training men for such work is better recognized in some other industries, but that they have their part in our industry is unquestionable. The presence on this program of papers presenting results of just such studies as I have suggested by men working at universities or trained in them and the presence of other speakers representing institutions noted for their contributions to this and other industries abundantly evidence the aid these institutions may give to the oyster industry. Lest I do injustice by omission or emphasis in the more complex situation within our industry let me cite by way of illustration of the closeness of the universities to industrial investigations the series of studies on fresh-water mussels. Some of you doubtless heard M. M. Ellis review this series before the American Fisheries Society a year ago in Minneapolis, and others have read his address published in the *Transactions* of that society. In 1866 the German zoologist, F. Leidig, then at Tübingen University, demonstrated that larvae of the fresh-water mussel live parasitically on the gills of certain fishes. Lefevre and Curtis, of the University of Missouri, artificially infected fishes with mussel larvae. Arey, of Northwestern University, studied the relation of the larvae to the tissues of the host. Now Ellis, of the University of Missouri, carrying further the series of investigations, has succeeded in raising mussels without intervention of the troublesome fish host and has given new promise to a seriously depressed industry. These men are all university trained and all have carried on their work while

serving in a university connection. It would be unfair as well as ungracious to fail to mention in this connection the essential part played by the U. S. Bureau of Fisheries in these studies. If I am not mistaken all except one of the American investigators mentioned has carried on his mussel work under part-time appointment of the bureau. The stimulating and coordinating function of this and other agencies outside of the academic institutions as well as their function in actual conduct of investigations must be fully recognized.

It is not my purpose here to discuss in detail the part to be played by different agencies in promoting the studies suggested. Some may best be prosecuted by the colleges or universities or by men in their services. In other cases it is better that governmental agencies directly employ investigators, while more and more it is to be expected that those engaged commercially in the industry will cooperatively or individually find it to their advantage to employ full-time men on their particular problems. Examples of all these methods are familiar to you all, and selection of a favorable relation for any particular need and budget possibilities should not be difficult. In presenting the possibilities of usefulness to the oyster industry of the colleges and universities I should, however, point out certain advantages of having researches in the interest of the oyster industry in close touch with college or university. In the first place, in these institutions much in the way of overhead expense is already taken care of and need not be a charge on the investigation; much equipment is already supplied and much in the way of advisory and consultative service in various departments is available at little or no cost. Again, the service of student apprentices or assistants can usually be obtained at small expense. By such relations the institutions are stimulated to offer courses needed for improved training of these assistants and of others whose interest is stirred by their work. These intimate relations result not only in more and better trained men in general but trained men with some interest and acquaintance in the specific problems of the industry. I think it is not too far afield to claim even that there is actual if not measurable advantage to the industry through contacts of those interested in it with those in the colleges not otherwise in touch with this particular industry. The oyster industry has often suffered from the lack of sympathetic acquaintance on the part of those, constituting the great majority of the citizenship of the state, who live beyond the limits of tidewater. Anything that contributes, as I maintain the college and university do when carrying out studies in association with a great industry, to dissemination of a sympathetic interest and acquaintance with its problems is far from negligible. I believe many of us could testify as to the broadening effect on our interest and sympathies of such college and university contacts.

Now while I recognize well that the independent spirit of those in the oyster industry makes the suggestion peculiarly little needed, it may avoid misunderstanding in some quarters for me to point out that the undertaking of studies of value to the oyster industry by academic institutions or by men in their service is usually possible only when agencies concerned in the industry contribute more or less of the expense of the investigation. The colleges and universities already have a full program, and their staffs are in general well loaded with previous undertakings. If those engaged in an industry themselves recognize no need of services from these institutions, that industry stands small chance of having the institutions or individuals belonging to them, unasked, step in to formulate and solve their problems or to set specifically about training those who will. The relation is one dependent for success upon close cooperation and a pooling of facilities and resources in order to accomplish objects of value from the standpoint of both industry and education.

But in listing the offerings of academic institutions to the oyster industry, I should not confine myself to that large phase of the industry concerned with production. Rapid advances in means of distribution, in methods of preservation, packaging and handling have brought into prominence problems connected with these aspects of the industry, and here too specialists for investigation and control are demanded. For these too the colleges have provided fundamentally trained men. They will doubtless be called upon to supply technologists more fully trained and in greater numbers in the future.

With the increase in size of the units engaged in production and distribution, with closer cooperation among the units concerned and with heightened interest of the state and national governments in stimulating and coordinating the activities of this and related industries, the demand for qualified administrators is advancing. The trained administrator (whether trained wholly in service or in part in an academic institution) is one who, while not necessarily skilled in the various techniques, is broadly acquainted with the methods in use and with their possibilities of development, familiar with types of organization and with business procedures. Various elements in this training are now given in the colleges. Coordination and extension of the training along this line may be accomplished.

Various limitations prevent my taking up in detail the academic facilities for training men along the

lines mentioned, but, in closing, I want to make one further suggestion. Young men already possessing close acquaintance with oyster industries are going to college and on into graduate work of the universities. Other things being equal, they start with great advantage over other men who may take the training I have mentioned as marine biologists, technologists or administrators in the oyster industry. I believe that they may well plan to get in college and in the university, among other objects of their desire, knowledge and training of special significance to them in connection with a life devoted to the commercial oyster industry. Let us have in the institutions as much as may be of your problems to set before the young fellows who will go into the oyster industry. For success in the future, they must go into various aspects of the business equipped to see deeper than oystermen have seen, to know more fully than they have known. Give these fellows the best that practical oystermen can give them and send them to college with the will to see and to know—and among us we'll make another generation of real oystermen.

OBITUARY

RECENT DEATHS

DR. HERBERT H. DOW, president of the Dow Chemical Company at Midland, Michigan, died at the Mayo Clinic on October 15, at the age of sixty-four years.

DR. HENDRIK ZWAARDEMAKER, professor emeritus of physiology at Utrecht, died on September 19, at the age of seventy-three years.

ALEKSY ALEKSANDROVIC KULJABKO, professor of industrial physiology, died at Moscow on August 6.

MEMORIALS

THE forty-fifth annual convention of Tau Beta Pi, engineering fraternity, in session at Lehigh University on October 11 dedicated a memorial to Dr. Edward H. Williams, Jr., its founder. This marks the forty-fifth anniversary of the founding of the fraternity at Lehigh in 1885. Dr. Williams was professor of mining engineering and geology at Lehigh when he founded the organization, retiring several years ago. The memorial, which will consist of a bowlder with a bronze tablet, will be placed in front of Williams Hall on the campus, which building was the gift of Professor Williams many years ago.

AT Colgate University the new chemical laboratory, built at a cost of $500,000, will be dedicated on October 31 and November 1. Funds for the erection of the building which is named in honor of Professor Joseph F. McGregory came from Dr. James C. Colgate, chairman of the board, and from the estate of Miss Evelyn Colgate. For forty-three years Professor McGregory was head of the chemistry department at Colgate.

IN memory of the late Stephen T. Mather, first director of the National Park Service, an oak tree was planted at the old Mather homestead at Darien, Connecticut, on October 19. Planting of trees in honor of Mr. Mather has been carried on throughout the country, singly and in groves, in widely separated portions of the country. One memorial forest of 10,000 trees was planted by the State of New York. In each of the national parks a single memorial tree was planted on July 4, Mr. Mather's birthday, by uniformed park rangers. Plans are also under way for plantings in the southern states when weather conditions are most favorable.

THE *Journal* of the American Medical Association notes that a group of physicians of the region about Pau (Basses-Pyrénées) celebrated recently, in that city, the memory of their compatriot, Dr. Duboué, and had affixed to his home a tablet setting forth the stages of his career. The ceremonies were presided over by Dr. Doléris, member of the Academy of Medicine and a native of this region. He recalled that Duboué, in addition to his research on typhoid and cholera, had been the first to discover that the virus of rabies finds its way from the initial wound to the brain by way of the nerves and not through the blood stream. His work was published in 1879. It was two years later that Pasteur read to the academy his own work on rabies, in which he recognized the priority of Duboué.

SCIENTIFIC EVENTS

THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

THE British Association for the Advancement of Science has recently concluded a most successful meeting at Bristol, at which discussion has taken place as to the arrangements for the centenary meeting, to be held in London, with the gracious approval of H. M. the King, patron of the association, and under the presidency of General Smuts.

The association during its first century of existence may claim to have established itself, first as a national and more lately as an imperial institution. Its council is of opinion that, despite the steady support which it receives from its members, and the generosity