maintained itself. The sense organs of every animal are so constructed that the realities they grasp are adequate for their inherited needs. For truth in dealing with external things is not primarily understanding of the things themselves but rather of their relation to us.

The power to summon up adequate truth from our realities is called common sense. Science is only common sense expanded and verified and applied to a wider range of objects. With its instruments of precision (mind, memory, logic, mathematics, and its accessory tools) it goes beyond the obvious into the hidden complexities of truth. The final test of truth is its "livableness," the degree to which we may trust our lives to it or to the methods by which it is won. It is not merely "workableness," for an idea false or incomplete may be workable in a degree. Many elements of sciosophy are workable, if not put to an acid test. That one man or ten million men get along with an idea or a dogma does not argue its soundness, unless these men have successfully translated it into action.

The purpose of science is in the main threefold: first, to help humanity by its control of sanitation, conservation, and the use of the forces of nature—this is applied science; second to furnish a sound basis for the conduct of life—this is the art of ethics, and right living can fall back on no other authority. We may not trust to impulse or instincts, for the power to control and to discriminate among these is the function of intelligence. We can not trust to religion, for the sentiment of fear, awe, reverence and duty is sadly bound up with superstition. Superstition is believing or trying to believe what we know is not true. It is for science to combat superstition and to disentangle religion from its meshes.

The third function of science is to widen the human mind. Its span is the universe, dealing as well as may be with the infinite great as with the infinite little. We can reach a small part, not a fraction but a tangible fringe of a universe in which there is neither great nor small. We find in it endless change, but every change is orderly. So far as we can see "nothing endures save the flow of force and the rational intelligence that pervades it." This intelligence we can not describe, nor circumscribe. We can not speak of it in any terms of human experience, and to try to do so shows only the narrowness of our conception. These words are attributed to Mencius in China thirty centuries ago. "He will appear without showing Himself, effect renovation without moving, create perfection without acting. It is the law of heaven and earth whose way is solid, substantial, vast and unchanging."

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MEDICAL EDUCATION AND CULTURE[1]

IN a recent discussion of medical education there occurred the phrase, "This culture business." It is a challenge in its implied scorn. It questions the intimacy of relationship between education and so-called culture and suggests that the more widely they are separated the better it is for education. As to real culture, that comes only from a scientific study of man and the world around him.

In view of what William James called "the fluidity of the facts," it may be worth while to accept the challenge, or at least to think about accepting it.

What have men of science to do with culture, and what is culture to them? Not only of men of science, to whom the method of science is as the breath of their nostrils, but of doctors, teachers, there is asked the question, "What has culture to do with education?"

No attempt will be made to give a new definition of culture, nor to catalogue what others have said about it, but the words of Whitehead are both apt and beautiful. In his presidential address to the British Mathematical Association on the "Aims of Education," he says, "Culture is activity of thought and receptiveness to beauty and humane feeling."

Now culture may be looked upon from two points of view. It may be regarded as the end-product, the result of endeavor; or it may be regarded as the process, which, in so far as process determines result, determines what is to be attained. It is to culture as a process that consideration will now be given.

In moments of depression, one may feel as if some of the present-day methods of teaching are like feeding the dog. The dog is given a bone, in the form of a lecture to the student. If, later, the disfigured bone is recovered with some inconvenience and perhaps risk, the lecturer has in the examination paper a scarcely recognizable fragment of what he intended to convey to the mind of the pupil.

But the mind of the pupil should be fertile. Ideas thrown into it should germinate, grow and bear fruit. The seed should fall on good ground, ground that has been well prepared. It is true that in a general scheme of education the rocky ground and the shallow soil have to be considered. But by the end of two years of college work, the present minimum requirement for admission to the medical school, the processes of selection may be expected to eliminate most of the candidates who are naturally unfit. If the processes of selection are just, and they need careful revision from time to time, and the educational

[1] Read at the meeting of the Council on Medical Education of the American Medical Association in Chicago, March 3, 1924.

processes are adequate, the students who are admitted to the medical school may be regarded as the desired good ground.

At this point, a question may be raised. Is the seed good? Is there not much chaff? This is a serious problem to which at some time there will have to be given careful attention. If the seed is good, is it of the right kind? For example, there is confusion of purpose in the medical curriculum as it is now arranged. The teaching of anatomy furnishes an illustration. Formerly anatomy was taught chiefly by surgeons. Recently it has passed more and more into the hands of men whose major interest is in human and comparative anatomy, histology, embryology and closely related branches of biology. As a result, these sciences have grown rapidly and cover a wide field in which the interest of the medical student is limited. At present the physician in training devotes time and attention to too much anatomy outside of what is needed in the practice of medicine; but already there is a movement to correct this misplaced emphasis.

Culture, then, may be regarded as the process which produces in the pupil, the student, a condition of fertility of mind, of richness of imagination, in so far as this is produced or affected by conditions external to the individual himself.

There is no question that fertility of mind is needed, not alone in medicine, but in every walk of life. Men of great, controlled, disciplined imagination are sought everywhere. Thomas Edison complains that he can not get men of imagination in his business; and Henri Poincaré, in his discussion of the part that hypothesis plays in science, has indicated the rôle of the imagination in the most majestic of sciences, mathematics.

What is the relation of culture to education? It is appropriate to use almost the exact words of John Henry Newman, who, after the manner of the Schoolmen, distinguishes between the integrity and the essence of the university, and reply that while the integrity of education consists in discipline, its very essence is culture.

How can medicine be taught culturally? In the best sense, it can not be taught in any other way. If the human mind is brought in contact with things intellectual, it is nourished by them, it grows and bears fruit. It is this basic fact that determines the method. As President Gilman said, "Every study is liberal, if it is pursued in a liberal spirit."

Again the teaching of anatomy furnishes a convenient illustration, for it is acknowledged to be fundamental and the principles involved are identical for all the sciences.

How can anatomy be taught culturally, so that it shall be to the student a source of inspiration, of power; as Keyser has so well put it, wooing his loyalty, revealing to him the guardian angel of science, that ideal of excellence, with the abiding sense of the authority of its standards?

In the first place, anatomy should be taught as it is. But what is it? It is a living, growing science, with a history, an evolution not yet completed; with a past, a present and a future; comprising problems that have been solved, problems now in solution, problems that await solution, perhaps only at some distant day.

Too much is attention directed to text-books, of which Minot said, "When knowledge is dead, we bury it decently in a book"; and to mechanisms which, worn out and exhausted, would be thrown away if it were not for the dissecting room. And of course investigation is necessary. Anatomy can best be taught as a living, growing branch of knowledge by one under whose hands it grows.

In addition to this evolutionary or historical point of view, there is the biographical point of view. The problems of anatomy are problems to persons. The stories of the lives of the men who formulated, attacked and solved the problems are among the stimulating influences of our lives. They open wide vistas to the eyes of the student.

John Hunter is an example; anatomist, physiologist, pathologist, surgeon and above all experimental biologist. "Don't think; try," was his dictum. It might well be said all living things were his province. At a time when he was struggling against the disease which later proved fatal, in a letter to a friend in Africa, asking for many things, he wrote: "If a Foal Camell was put in a tub of spirits and sent, I should be glad. Is it possible to get a young tame lion, or indeed any other beast or bird?" *Or indeed any other beast or bird!* How can one read the story of Hunter's life and not be uplifted by the picture of his marvelous and vehement energy?

The third point involves a paradox. It is that if anatomy is to be studied culturally, it can not be studied by itself. For culture implies interpretation and significance and values; relation to other things and to other branches of knowledge. In the medical curriculum, this means at least correlation of courses; the relation of anatomy to physiology and to pathology and to clinical medicine; the relation of structure to function, whether in the gross or in the ultramicroscopical molecule or atom. But it is not enough to concede that correlation is advantageous. Correlation is more than advantageous, it is vital in teaching.

Professor Whitehead puts the whole matter briefly. He says, "Theoretical ideas should always find important applications within the pupil's curriculum. This is not an easy doctrine to apply but a very hard one. It contains within itself the problem of keeping knowl-

edge alive, of preventing it from becoming inert, which is the central problem of all education."

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SCIENTIFIC EVENTS

RESOLUTIONS ON THE DEATH OF DEAN CONANT WORCESTER

MR. DEAN CONANT WORCESTER, first secretary of the interior of the Philippine Islands and the man responsible for the founding of the Bureau of Science, the Philippine General Hospital and the College of Medicine, Manila, died in Manila on May 2, 1924. Before going to the Philippines Mr. Worcester was assistant professor of zoology and curator of the museum at the University of Michigan. In view of his contributions to science, representatives of the Philippine General Hospital, the College of Medicine and the Bureau of Science met and passed the following resolutions:

WHEREAS, It has pleased Almighty God in His wise and inscrutable Providence to remove from among us Dean Conant Worcester;

WHEREAS, At best we can do little at this time to indicate our real appreciation of him as a man and as a worker for the best medical and other scientific interests of the Philippine Islands; and

WHEREAS, It was largely through his efforts, as Secretary of the Interior of the Government of the Philippine Islands, that the Philippine General Hospital, the Bureau of Science and the College of Medicine were established, Therefore be it

Resolved, That we, members of the Philippine General Hospital, Bureau of Science and College of Medicine, of Manila, Philippine Islands, do hereby express our deepest sorrow for the death of Dean Conant Worcester; and, be it further

Resolved, That he holds a place of highest respect, admiration, and appreciation in the hearts of all of us because of the great good that he did as Secretary of the Interior in organizing the Philippine General Hospital, the Bureau of Science and the College of Medicine; and, be it further

Resolved, That we extend our sincerest sympathy and condolence to his widow, son, daughter and other relatives; and, be it further

Resolved, That these resolutions be engrossed and sent to his widow, and that copies be filed in the archives of the Philippine General Hospital, the Bureau of Science and the College of Medicine, published in the newspapers of Manila, in the *Philippine Journal of Science,* in the *Journal* of the Philippine Islands Medical Association, and in SCIENCE, the official organ of the American Association for the Advancement of Science, of which he was a member.

For the staff of the Philippine General Hospital: Fernando Calderon, Jose Albert, J. I. Abuel, F. E. Jayme.

For the staff of the Bureau of Science: Wm. H. Brown, Leon Ma. Guerrero, R. C. McGregor, G. M. De Ubago.

For the staff of the College of Medicine: Fernando Calderon, Liborio Gomez, Arturo Garcia, D. de la Paz, Jose Albert.

At Manila, Philippine Islands, this fifth day of May in the Year of our Lord One Thousand Nine Hundred Twenty-four.

FOREST SERVICE RESEARCH CONFERENCE

A CONFERENCE of great importance and promise to the cause of better forestry in the United States was recently concluded at Madison, Wisconsin. There the federal research workers in forestry gathered from all the Forest Service Districts and Experiment Stations throughout the country and discussed their problems, methods, results and proposed projects for a period of two weeks. Meeting with the research men were also several of the administrative men from the National Forest Districts. In this way the scientific findings of the research men were discussed in the light of practical experience by those whose chief function is to make application of research results.

Three general subjects were considered in all their detailed ramifications, namely:

(1) Research results in the study of forest fires, their control, prevention and prediction;

(2) The technique of measuring and estimating the growth and yield of timber of various types under the widely varying forest conditions in the different sections of the country;

(3) The standards of forest practice for the various regions which are necessary to keep forest lands productive. This subject was considered from two standpoints, representing different levels of attainment.

(a) The minimum requirements in forest practice which are necessary to prevent forest devastation. By their very nature these requirements represent the least that should be expected of all timberland owners.

(b) Desirable forestry practice, a standard now prevailing on the National Forests because of their being under the control of the Forest Service. This is a standard which should eventually prevail on private forest lands as well.

To the workers in other branches of science who may consider forest fires as accidental disasters of spasmodic occurrence whose prediction is beyond the wisdom of man, it will be decidedly illuminating and interesting to look into the laboratories of the Forest Experiment Stations and note the methods used in studying fire phenomena. Even in the case of forest fires caused by lightning (and there were 2,323 such in 1922 on the National Forests alone—practically one third of the number of fires started on the National Forests in that year) the Forest Service research workers are ruthlessly prying into the secrets mother Nature has heretofore hidden away in her pri-