PLOUGHING UNDER THE SCIENCE CROP

IT is possible that Dr. Campbell in his recent address[1] has begged the question. The "small group of extremists" whom he mentions, advocate, not "the taking of a holiday in scientific research," but a slowing up of research efforts in order that there may be time to discover, not new things, but the meaning of things already discovered. To some the physicist and the chemist seem to be traveling so fast as not to heed or care where or how or why they are going. Nor do they heed or care what misapplications are made of their discoveries.

Indeed, not only in industrial scientific laboratories but also in some, at least, of the laboratories connected with educational institutions, the chief aim of scientific research is to enable those who already receive an undue share of the wealth produced by industry and research, to appropriate a share still larger. And there is a constant and increasing demand from educational institutions for more funds to be used by their scientific laboratories for more research for more applications for more profits for more segregation of wealth.

Is it not time to remember that there are other sciences, psychology, economics, sociology, upon the development of which the welfare of mankind depends far more than upon the development of physics and chemistry? And to remember that the development of that group of humane sciences would serve to prevent the misapplication of the discoveries of the physical sciences to the hurt, the destruction, the degradation of mankind?

Physics and chemistry boast of the improvement in man's material welfare brought about by their discoveries. True; but for thousands who are so benefited there are millions who are not, because of the distribution of wealth. These can not have even the material benefits of physical science because they can not afford to pay for them. Psychology, economics, sociology, philosophy, if adequately endowed, could alleviate these evils; could, possibly, eliminate them.

The "small group of extremists" demands a readjustment, a realignment, a redistribution of "research" and of "progress," so that man's progress shall be that of a man, not that of an octopus stretching out first one arm, then another; shall be a homogeneous progress of society as a whole; shall be a progress, material to be sure, but to an even greater degree spiritual. These are the things which the "small group" of enthusiasts, idealists demand, even if physics and chemistry must, therefore, for a time be dormant. Perhaps a "rest period" would greatly benefit those sciences themselves.

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QUOTATIONS

SCIENCE IN THE NEWS

IN the remarks preliminary to his recent address on cosmic rays Dr. Robert A. Millikan expressed some views about newspapers, his fellow-scientists and the present generation. It is almost inevitable, he said, that any new field in which there are many workers should appear to the public, and even to many of the workers themselves, to be in a state of hopeless confusion. This, he thought, is because the individual workers, unrestrained in a new field by a body of established fact, tend to set up hypotheses that seem to fit their particular experiments or their particular theories, and are themselves ignorant of, or at least incredulous about, the findings of others, so that "the public soon loses itself in a maze of incompletely understood and apparently contradictory statements and opinions, and knows not whom and what to believe." This situation, he continued, "is not improved by the existence of the daily newspaper, which, as its very name implies, is under a greater pressure to find for its pages something that is new rather than something that is true." He ventured the prediction that the present age, because of "its craze for the new regardless of the true," will be looked back upon by our grandchildren with "amazement and ridicule."

It is unusual to hear the daily newspapers criticized for printing too much news about science. The more common criticism is that they devote a disproportionate space to scandals, murders and sports, and neglect the world's constructive cultural achievements. Dr. Millikan's criticism serves to direct attention to the increasing amount of attention that the newspapers have been devoting to science, which implies a growing interest in science on the part of their readers.

Dr. Millikan ought to be the last man to deplore such a development. His statements seem to indicate that he does not believe that the newspapers ought to confuse their readers by printing news about controversial hypotheses, but this is to imply either that the newspapers should themselves set up as judges of the truth of scientific theories, refusing to print anything about new theories that they did not agree with, or that they should not print any scientific news until it had got past the controversial stage. It would be very difficult to say when this point had been reached, if it ever was, and the probable result would be to cut

[1] SCIENCE, 80: 2085, December 14, 1934.

down scientific news to the merest fraction of the present amount, or to print only such things as the multiplication table.

Dr. Millikan's own definition is that an opinion becomes established in physics "when nine-tenths of the informed and competent workers in the field are in agreement upon it," and adds that there will always be a certain percentage of people who will vote "no," and that "for no reason whatever except that they are built that way." The newspaper, however, can hardly be expected to stop to take a census before it publishes anything about a scientific theory or discovery. If it did so it would not only abandon its primary function of informing the world—including the scientists themselves—of the discovery, but it would be shutting off the views of the dissenting 10 per cent., and the history of science certainly does not show that this dissenting 10 per cent. has always been wrong.

The function of the newspaper is primarily to report what the leading scientists do and say. If they contradict each other, and there is confusion, the newspapers merely picture the confusion and do not create it. To the extent, however, that newspaper reports emphasize the contradictions among scientific theories, they increase the pressure on the scientists to eliminate these contradictions.—*The New York Times.*

SCIENTIFIC BOOKS

THE ARCHITECTURE OF THE UNIVERSE

The Architecture of the Universe. By W. F. G. SWANN. ix + 428 pp. The Macmillan Company, 1934. $3.75.

ALTHOUGH "The Architecture of the Universe" is somewhat similar in subject-matter to several other books that have appeared in recent years, it is a refreshing and original work. Its twelve chapters are devoted to such subjects as the nature of matter, modern atomic theories, space and time, dimensions, the restricted and general theories of relativity, vital processes and science and theology. The author does not presuppose extensive scientific training on the part of his readers, and consequently refrains from using the technical language of the specialist, yet he goes deeply into the fundamentals of each of the subjects he treats. Indeed, I have read no other semi-popular discussion of these subjects that presents them so adequately and satisfactorily.

In style, the book of Dr. Swann is quite different from others in its field. There is in it no striving for the sensational, no parading of the paradoxical, no mixing in of the mystical. Instead, with refreshing balance and candor, the author presents science as a sane, orderly body of doctrine developed for interpreting experience. Science as he presents it has the fine spirit we associate with the names of Archimedes, Galileo, Newton and Darwin. I can not easily overemphasize the excellence of these praiseworthy qualities of his exposition. But in mentioning them I am likely to convey the impression that the book may be dull and monotonous. As a matter of fact, it is sparkling with wit and humor, extraordinarily rich in figures of speech and extended comparisons, and livened with many fine passages. The extended comparisons or parables are not only apt but often very interesting. If they have a fault, it is that in some cases they are so long and so entertaining that the reader is likely to forget that they are only illustrations of an important and difficult scientific principle or conclusion. An example is the parable used in discussing the second law of thermodynamics.

The author has attained exceptional sparkle and variety of exposition by a remarkably successful use of an interesting device. He often sets up a discussion between himself and the reader, all expressed in direct quotations. Under this method he does not limit himself to stating his own conclusions; the reader, too, expresses his opinions, his misconceptions, doubts and antagonisms, and the author answers him. This method, of course, is not new, for it was employed by Plato and Galileo and many other writers. But Dr. Swann has used it with rare skill, being eminently fair in permitting the reader to have his say and equally fair in his replies, and illuminating all with wit and apt figures of speech.

It is not possible within the limits of space available for a review of the book to outline comprehensibly any of the particular discussions Dr. Swann has given. I must content myself with saying that his remarks upon the second law of thermodynamics, the principle of indetermination, vital processes and even the relationship between science and theology are particularly penetrating, balanced and convincing. If any of these subjects were to be omitted, I should choose the last, partly because from its nature it does not lend itself to very definite conclusions. The author does not, however, indulge in any such amateurish attempts to rest theology on science as have frequently appeared in recent years.

"The Architecture of the Universe" is a splendid book which I strongly recommend to those who desire to get a real understanding of the heart of science to-day and who are willing to devote considerable careful thought to attaining that goal.

F. R. MOULTON