

that the event which precedes in time is the cause, while that which follows is the effect. We are quite as justified in saying that the weather to-morrow is the cause of that to-day as in saying the opposite. Any one to whom the logic of this is not self-evident is invited to reread "Alice in Wonderland, or Through the Looking Glass." When we say that two events are causally related, all that we can mean from either the philosophical or scientific standpoint is that there is a high degree of probability that one will not occur without the other.

It is a commonplace of probability theory that empirically determined laws are liable to violation. When the probability of such violation is slight, we are prone to disregard it, but on very much the same basis that we disregard the probability of being killed by slipping in the bathtub. This admittedly may happen, but we continue to take baths and hope for the best.

The "collapse of causality" alleged to result from the uncertainties of quantum theory has been variously received by different segments of the scientific world—with alarm and consternation, with resignation or despair, or with an enthusiasm born of the hope that it offers new arguments for human freedom. It is difficult to see how any of these points of view is justified. The principle of causation is just as valid as ever for practical purposes, while from the philosophical standpoint it never had any validity. Therefore it would seem that matters remain *in statu quo*.

If quantum theory has rendered any service to the cause of free will, it is primarily that of showing that some of the reasons for believing in determinism are not as good as was formerly supposed. At present each hypothesis seems to rest on the somewhat precarious ground that the other can not be shown to be true. Without discounting his own prejudices in the matter, the present writer leans to the view that determinism labors under the disadvantage of requiring a greater number of assumptions in regard to the behavior of unknowns. In other words, the conservative attitude is to emphasize that events which are indeterminable are indeterminate as far as we know. It requires an extraordinary extension of the scientific method to assert what would be true if we knew all the facts in the case.

ROBERT C. MILLER

UNIVERSITY OF WASHINGTON,
SEATTLE

ON "ACADEMIC FREEDOM IN ITALY"

IN SCIENCE for March 25 Dr. A. J. Carlson, head of the department of physiology, University of Chicago, asks American biologists not to attend the next International Congress of Physiology, which is sched-

uled to meet in Rome next August, "unless the brutal and defiant attack on academic freedom on the part of the Italian government is rescinded." The "attack" is the oath of loyalty required by the government from the professors of the Royal universities. I wish to make, in this connection, some statements of facts, which are perhaps not well known, or have often been overlooked in the discussion on the subject.

The Italian universities are classified in three categories, namely, universities entirely supported by the state; universities largely supported by the state and partially by private contributions, and private universities, which do not receive any financial help from the state. The oath is demanded only from the professors (including associates, assistants, etc.) teaching in universities belonging to the two first categories, *i.e.*, from the official instructors maintained by the state. The professors of private universities are, of course, entirely free from such an obligation; a large number of them, however, offered spontaneously to take the oath. As it has been published, twelve, out of a total number of 1,225 professors, refused to take it. Does Dr. Carlson think that the remaining 1,213 took the oath against their conscience? Did he realize that the attitude that he suggested implies an insult toward the very men he seems so anxious to defend?

An oath of loyalty and allegiance to the King, the fatherland and the laws of the state has been required since the time of the constitution of the Kingdom of Italy from every person taking any office in direct dependence on the state. After the advent of the Fascist régime, which represents now the Italian State, the phrase "... and to the Fascist régime" was added to the prior formula. The formulae are essentially the same for every category of officials, but may vary somewhat, according to the specific functions which shall be exercised. For the university professors, the sentence concerning their functions is the following: "... and (I swear) to exercise the teaching function and to fulfill all academic duties with the purpose of forming citizens active, honest and devoted to the fatherland and to the Fascist régime." The entire formula has already been published in SCIENCE (Jan. 15, p. 73), but evidently in the translation the meaning of the Italian word "probo," *i.e.*, honest, has been confused with "prode," *i.e.*, bold.

The statement of a group of Harvard professors (SCIENCE, *ibid.*), namely, "This decree imposes upon all university professors of the Kingdom of Italy—and among all state officials of the Department of Education it is applicable to university professors alone—the obligation to take an oath which implies complete adherence without reservation or discussion to a particular system of political ideas," is thus somewhat misleading, since all state officials are ob-

liged to take the oath, and not all the university professors.

The Fascist régime, so far as the theory is concerned, undoubtedly is to be considered "a particular system of political ideas," as every other régime in the world. Actually, however, it represents the Italian state as recognized by far the greatest majority of citizens. The state requests its officials, who are supposed to apply its laws and to make the citizens respect them, to take an oath of allegiance, as a means of prevention against the danger of maintaining in dependence on it men whose activity is contrary to the safety of the state itself. This is, I believe, the general procedure in every country. In the United States, for instance, an oath of "true faith and allegiance" to the Constitution, implying the condition to "support and defend the same against all enemies, foreign and domestic," and to be taken "without any mental reservation or purpose of evasion" is required from "any person elected or appointed to any office of honor or profit in either the civil, military or naval service," and, apparently, whatever his personal political ideas may be. Furthermore, examples of states directly defending themselves against professors who are supposed to exercise dangerous political propaganda are very common everywhere, and are well known.

There is not in Italy any limitation whatsoever to discussion and research work in any particular or general biological theory or field; also no restriction from either the civil or ecclesiastical authorities, and this is not the case in every country. Therefore, there is no reason whatever for supposing that a scientific discussion in the field of biology could not enjoy the utmost freedom. A refusal to attend the physiological meeting would only result in a boycott, on the part of American biologists, of the hospitality that the Italian scientists (whose own consciences have al-

lowed them to take the oath) are preparing for their colleagues of the world.

GIUSEPPE MONTALENTI

ASSISTANT PROFESSOR,
UNIVERSITY OF ROME
RESEARCH FELLOW FOR 1931-32,
UNIVERSITY OF CHICAGO

ACADEMIC FREEDOM IN SPAIN

DR. CARLSON'S proposal to boycott the International Physiological Congress at Rome as well as Dean Pound's protest to the League of Nations because of the attack on academic freedom in Italy suggests that some similar action be taken by American educators in protesting the much more brutal attack on this same right by the Spanish government in regard to the Jesuit Order. For, whether one agrees with the aims of this teaching body or not, the principle at stake is the same, namely, academic freedom, which has suffered a serious blow not only by the law forbidding members of the Society of Jesus to teach in Spain but by the outright confiscation of their twenty-six colleges serving 14,599 students. Among these institutions were many which were doing notable work in science, especially the Chemical and Biological Institutes of Sarriá (Barcelona) and the Engineering Institute in Madrid.

Particularly obnoxious was the proposal of the government to Father Rodés, director of the Observatory of the Ebro, one of the world's few stations for the study of terrestrial magnetism, to continue his work until they could prepare a staff to replace him and his assistants.

Those who have found fault with Spain because of its backwardness in things scientific will resent this further handicap to progress in science and will add a protest against it to the one against the attack of the Fascist régime on academic freedom in Italy.

SPRING HILL COLLEGE

P. H. YANCEY, S.J.

SCIENTIFIC APPARATUS AND LABORATORY METHODS

A METHOD FOR WASHING CORPUSCLES IN SUSPENSION

THE original fluid may be replaced and corpuscles washed while still in suspension during centrifugation. This is accomplished by placing the suspension in a conical chamber (A). During centrifugation, the replacement fluid is introduced at the outer and narrow end of the chamber while the replaced fluid is forced out at the inner and wider end. The chamber is so designed that, when properly operated, the rate of flow at the narrow end is too rapid to permit the settling and packing of the corpuscles, while at the wide end it is too slow to carry them out with the replaced fluid. The corpuscles, therefore, remain suspended in the middle of the chamber.

TECHNIQUE

The conical chambers (A) are filled and inserted in the centrifuge head. These are so designed that all connections are made automatically as they are placed in their guides. An injector tube (G) from an inverted flask (I) containing the replacement solution is clamped in position in the center of the intake chamber (E). The position of the mouth of this tube regulates the height of fluid in the intake chamber.¹ A clamp on the rubber connection (H)

¹ When only one conical chamber is used or when accurate distribution is not essential, the jets (F) may be replaced by full sized glass tubes and the rates of flow of replacement fluid regulated by a jet or valve before it is introduced into the intake chamber. In this case