Spanish (Portuguese) or Russian or both for one or both of the members of the traditional German-French requirement.

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THE THREAT TO PURE SCIENCE[1]

AT a time when the allied victory for the cause of freedom is not far away, there is a growing danger to intellectual freedom throughout the civilized world. Although the activities of most of mankind are such that intellectual freedom is but an abstraction to them, nevertheless it must be remembered that freedom, like peace, is indivisible and that ultimately even the four freedoms would be endangered were intellectual freedom to go. Specifically, it is the danger to freedom in science that I write of. This danger arises from the totalization and socialization of science which is growing throughout the entire world. In Russia, it has already been achieved by the State; in England, the movement is strong—possibly due to the intellectual consciousness of the English Labor Party and Socialist societies—and in this country, paradoxically enough, it is the ever-increasing employment and importance of physicists in industry—the professionalization of physics—that will ultimately destroy freedom in science. A society founded on technology, and free from want, may be able to give comfort and satisfaction to its citizenry, but it would lack those distinguishing qualities that go to make a civilized and cultured society.

There is a good chance in the near future for some governmental control in science. Only the great industrial nations will be able to wage war in the future, since industrial advancement as well as advancement in the machines and instruments of war depend, in the main, on directed research. The profession of medicine is already well on the way toward socialization.

The socialization of medicine offers no direct danger to intellectual freedom since the great majority of practitioners, being professional men, have neither time nor inclination to engage in research. Furthermore, as professional men they have no interest in pure science. Not until a scientific discovery or advance has gotten to the stage where they can use it, does it concern them. And then they are only concerned with its use and not with the scientific principles involved. However, it is different in physics. Here the industrial or professional physicists employed by corporations do pursue research in physics. But their research is directed toward technological achievement. The basic science of physics is becoming a servant of the industrial corporation and society. Already the American Institute of Physics is seeking to define "the profession of physics" and it is this professionalization which is inviting government control. As long as physics was confined to the university there was no danger of this. The average teacher of physics at a college or a university, though not necessarily a research scientist, has felt, on the whole, a moral responsibility to uphold pure science. But I doubt whether the majority of the industrial physicists, not being in a university environment nor under the influence of the traditions of a university, feel that way. The interests of the industrial—the professional—physicists may not always be the same as those who consider the freedom and autonomy of pure science paramount.

The ever-increasing employment of physicists by the industrial corporations of this country accelerates the social impact of the physical sciences, and society begins to look around for some social control. The technological aspect of physics looms to undue importance before the public.

An eminent English economist has recently said that "the man of science should be on tap but not on top." This statement sums up the totalitarian view very nicely, as it does the position of the professional physicist in society. It looks upon the great man of science not as a creative spirit who achieves those virtues unique with man—reason, detachment and understanding—but as somebody to be used by society when the need suggests it.

Science is an intellectual activity—its very nature is not practical. It has an intrinsic goodness, for it brings us an enrichment of living and gives us a glimpse of the infinite complexity and fascination of the universe. Because the pursuit of truth and the passion for understanding give a dignity and nobility to man, its value can not be measured by any material standard. If man is not to live by bread alone, pure science must remain free, autonomous and supported for its own sake.

ALEXANDER W. STERN

A PLEA TO RAMAN SPECTROSCOPISTS

IN abstracting Raman data for the "Annual Tables of Physical Constants" it is necessary for the abstractor to have for each compound the empirical formula, the Geneva name—if it is an organic compound—and information as to whether the spectrum was obtained with the sample in the solid, liquid, or gaseous state; or in solution in a given solvent at a given concentration.

Frequently this information is either not given in the paper or is given in such a manner that consider-

1 See address by Professor P. W. Bridgman, SCIENCE, February 12, 1943, and his article on "The British Society for Freedom in Science," in SCIENCE, July 21, 1944.

able time is required to interpret it. For example, in one 1944 paper about three hours were required to find the necessary information for only six compounds. Since hundreds of compounds are to be abstracted, this becomes a slow and tedious task.

It seems that it would be relatively easy for the authors, who are familiar with the compounds upon which they are reporting, to give the aforementioned information in their papers, preferably in connection with the table of data. If this were done, the data could be abstracted much more easily and quickly.

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ANOTHER MASTODON FOUND IN OHIO

WITHIN the last few weeks, the skeleton of a mastodon was found on the farm of Carl Work, located about 2 miles northeast of Jackson, Ohio, and approximately 12 miles from Wooster. The bones were found protruding from the bank of a drainage ditch. The skull with the two tusks, the neck vertebrae and a number of ribs were unearthed. The entire skeleton was not present and apparently the rear portion of the animal had been removed, either during the excavation of the ditch or subsequently by erosion. The tusks, which are complete, are three feet in length and 4 inches in diameter at the base. The teeth are in excellent condition. The bones indicate a small animal. The material in which the skeleton was embedded is a muck deposit. An examination of the soil at the depth of three feet, which was the horizon of the skeleton, indicates that it is a layer of peaty material covered by sandy loam. The fact that it is a flat stretch of land, which was originally so poorly drained that a drainage ditch was necessary, combined with the evidence of a peaty formation, indicates that at one time the area was a swamp. Doubtless, at some time after the great Ice Age, this animal was mired in the bog and died there. A few years ago, parts of another mastodon were found in bog deposits near Benton, Ohio, located not far from the spot where a giant sloth was unearthed. The latter, found at a depth of five feet, was embedded in marl and peat in an area known as "The Plains" south of Millersburg, Ohio.

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SCIENTIFIC BOOKS

PUBLICATIONS OF THE MATHEMATICAL TABLES PROJECT

Table of the Bessel Functions $J_0(z)$ and $J_1(z)$ for Complex Arguments. By the Mathematical Tables Project, under the sponsorship of the National Bureau of Standards. xliv + 403 pp. New York: Columbia University Press. 1943. $5.00.

Tables of Lagrangian Interpolation Coefficients. By the Mathematical Tables Project. xxxvi + 392 pp. New York: Columbia University Press. 1943. $5.00.

Table of Circular and Hyperbolic Tangents and Cotangents for Radian Arguments. By the Mathematical Tables Project. xxxviii + 410 pp. New York: Columbia University Press. 1943. $5.00.

Table of Reciprocals of the Integers from 100000 *through* 200000. By the Mathematical Tables Project. viii + 201 pp. New York: Columbia University Press. 1943. $4.00.

FOR the prosecution of the American war effort, in which mathematical research is playing such a fundamentally important role, it is difficult to imagine any more important event than the organization early in 1938 of the computing group under the direction of Dr. Lyman J. Briggs, director of the National Bureau of Standards. With Dr. Arnold N. Lowan, the able technical director of the group, many manuscripts of fundamental mathematical tables were prepared. And the nucleus of the original great group is still very active while dealing with problems of the Applied Mathematics Panel of the National Defense Research Committee.

Up to the end of 1942 the Mathematical Tables Project had published 15 bound volumes. To these are now added four volumes, the first to be published by the Columbia University Press. The first three of these are of particular importance.

The table of Bessel Functions $J_0(z)$ and $J_1(z)$, for complex argument, $z = re^{i\phi}$, has the range $r = 0(.01)10$; $\phi = 0(5°)90°$; to 10 places of decimals. For $\phi = 0°$, the table is really of $J_0(r)$, $J_1(r)$ for every hundredth of a unit of the argument. For $\phi = 45°$, we have the most extensive table of ber, bei, ber′, bei′ functions yet published. The same may be said of the tables of $I_0(r)$ and $I_1(r)$ for $\phi = 90°$, although Aldis in 1899 published a 21-place table for each tenth of a unit 0 to 6, and an 18-place table for each unit 6 to 11. Except for Dinnik's trivial and highly erroneous three-page table of 1922, this volume contains the first table of the kind. We understand that the Project has prepared similar tables of $Y_0(Z)$, $Y_1(Z)$.

The volume of tables of Lagrangean Interpolation Coefficients will be welcomed by all users of tables, and especially by those computing with machines. The main part of this volume is occupied with 9 tables