national security the country's forest area be increased by 5,000,000 acres. This plan provides for the afforestation of 3,000,000 acres of bare land which has little agricultural value, and for the "dedication" to forestry by the owners, or acquisition by the State, of 2,000,000 acres of existing woodlands in private ownership. The Forestry Commission now owns 1,250,000 acres of land, of which 779,000 acres are plantable and 440,000 acres are already planted. The proposed future program, which would be spread over fifty years, would mean the acquisition of about 2,000,000 acres more for afforestation.

DISCUSSION

THE UTILITY OF MAJOR FOREIGN LANGUAGES IN PHYTOPATHOLOGY

THE check lists, listing literature received by the U. S. Department of Agriculture, published successively as "Botany Current Literature," "Plant Science Literature" and "Bibliography of Agriculture," represent comparable and extensive cross-sections of the world literature in the plant sciences. To determine the trend in numbers of publications in phytopathology in each of the major foreign languages, counts were made of the foreign language papers in this field included in these check lists for the years 1931, 1935, 1942 and 1943. The results of these counts are given in Table 1.

TABLE 1

NUMBER OF PHYTOPATHOLOGICAL PAPERS LISTED IN EACH FOREIGN LANGUAGE

Year	German	French	Russian	Spanish	Portuguese
1931	210	149	67	49	6
1935	209	118	107	42	19
1942	7	2	17	69	41
1943	27	3	2	84	25

The marked decrease in German, French and Russian papers from the levels of 1931 and 1935 to those of 1942 and 1943 is evidently due mainly to total mobilization for military purposes with consequent curtailment of scientific investigation, and to a more limited extent to interference with receipt of journals in America. This decrease is all the more significant when we consider that of all the botanical sciences, phytopathology is most closely linked to war production, a fact that is seen in heightened activity in this field in both Great Britain and the United States during both world wars. These low levels of scientific production are likely to last long after the termination of the war because of a necessary lag in the restoration of a psychological, economic and political equilibrium which will permit and encourage a resumption of research, and because of a deficit of trained scientists.

In contrast, there has been a steady increase in the numbers of Spanish and Portuguese papers, indicating an increase in agricultural research in South America, inasmuch as few of the papers listed originated in either Spain or Portugal. This increase is likely to continue in the future because of the almost certain extensive development of agriculture in South America, because of the encouragement of science in South America by the United States which is evident in many forms, *e.g.*, exchange scholarships, fellowships and professorships, and outright grants to South American countries for scientific purposes, and because of the probable absence of handicaps from post-war adjustments in South America.

In the future, Spanish and Portuguese may become more useful languages to scientists than French, for several reasons: (1) an increase in the quality and number of publications from South America can be expected; (2) the effects of the psychological, economic and political disruption in France are shown by the paucity of phytopathologic contributions from that country since 1940, when hostilities ended in France, and these effects are so deep-rooted that many years may be required before the pre-war level of productiveness can be expected in France; and (3) of the four principal Romance languages used in scientific publication, Spanish, Portuguese and Italian are more closely related to one another than is French to any of the other three, so that familiarity with any one of the first three has broader usefulness than French as a key to the other Romance languages.

Prior to the outbreak of the war, the number of technical papers in Russian was accelerating, whereas publication in French and German had reached more constant levels. The high degree of organization of agricultural research in Russia and the advantages of being a victorious participant in the war, coupled with the pre-war acceleration of research and the great diversity and extent of hitherto unstudied agricultural problems in Russia, all point toward the increasing importance of scientific contributions from that country after the war in comparison with France and Germany.

The present and potential increase in numbers of Spanish and Portuguese contributions from South America and the potentialities of Russian agricultural science following the war indicate a need for the revaluation of the utility of languages in the graduate training programs of agricultural scientists. A practical application of this would involve substitution of

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

J. HARVEY MCLAUGHLIN
OKLAHOMA AGRICULTURAL AND MECHANICAL COLLEGE

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.