GENERAL SCIENCE-EDUCATION

Science Talent Problems

The number of veterans returning to college for further scientific training is not as great as supposed. We must assure higher education for our ablest youth.

By DR. M. H. TRYTTEN

Director, Office of Scientific Personnel of the National Research Council

Address given before the Educational Conference of the Fifth Annual Science Talent Institute, March 5, 1946.

➤ I AM SURE that any one who has ever been a teacher can understand my pleasure at being privileged to speak about the brilliant group of scientific quiz kids who represent this year's winners of the Science Talent Search. People sometimes wonder what it is that keeps teachers in the profession when it would be in most cases easy to secure less exacting and more remunerative employment. I think it is wholly the real human satisfaction in helping in the development of minds such as these. There is no thrill quite like that of seeing your students grow into able, useful and successful working members of their profession. It is the promise of that, I believe, which gives us all joy in these young people today.

I think that at no other time has the Science Talent Search seemed so significant or symbolic. We have just finished a war in which science was not only dominant but decisive. I have often thought how interesting it would be if we could set up some kind of balance sheet to measure in terms of manpower the contributions of science in this war. Let us suppose, for example, that some supernatural being had come to our leaders in 1941 and taken them to a high place from where they could have seen the whole remaining course of the war in clear perspective. Suppose this being had then stated that he was going to remove all the radar developments of the next years from the picture but that he would in recompense grant the equivalent manpower supply to balance. How many men do you suppose would have been necessary? Take for example the radar fire control equipment which more than any factor gave us an overpowering advantage in naval combat. Or the navigation aids which made maneuvering at night at high speeds possible. Or the radar antiaircraft equipment; or the plane and ship and submarine locators; or dozens of other instruments which gave us such an astonishing advantage in almost all phases of combat. I think our leaders would have simply said there is no measurable equivalent. Because not only is there the brilliant performance of the present but the rich promise of uncounted years in the future. Hundreds of thousands of men mean little against such power. And then what of the manpower equivalent of the proximity fuze? or DDT? or of anti-malarials? or of the atomic bomb?

The question may seem a bit fantastic, and yet it is not as the following example will show. In the winter of 1943-44 the Manhattan District project found it necessary to expand its activities enormously to meet the challenge of the race against time. They needed great additions of scientific manpower. It was evident, however, that there was no supply of manpower in reserve. Throughout the war our policies did not permit of manpower reserves. A man was either indispensable to an essential project at the moment or he was inducted. As a result there appeared to be no available source of men. However, it happened that in the recruitment throughout the army of candidates for the ASTP a number of highly trained persons had been assigned to it and had thereafter been collected in so-called 9-A pools. There were several hundred of these who were made available and assigned to the atom bomb project to work in their laboratories as their military assignment. General Groves has said that "there are men without whom we could not have done this thing." I think it is worth while pointing out that this means that these several hundred men were, according to this statement, the difference between success and failure of this project. Here, then, in several hundred individual decisions, some one did make the mistaken decision that each of these men was of more value as an unassigned soldier than as a scientist. Only the good fortune that these men were not sent overseas before being assigned to the Manhattan District project permitted the nullification of these errors of decision and thus assured the acceleration of the atomic bomb project to success.

No one would seriously attempt to evaluate the worth of the atom bomb project as less than a few hundred unassigned soldiers. Yet, in fact, that was the accumulated effect of these several hundred individual decisions in the inductions of these men.

There is, however, plenty of evidence that the profound implications of the scientific contributions to our military strength during the war have created a desire in the United States to exploit further the possibilities then opened up. The services are very much alive to the need for sound scientific programs. This is shown in plans for extensive new laboratories and additions to old laboratories. The services are being reorganized to give further scope to scientific work. Extensive training programs are being expedited to create a corps of scientifically trained officers. And the services are planning to support basic science research in the universities and colleges of the land. Industry has sharply increased its role in research. New laboratories have been announced by a number of very large users of science. Most of our companies are either planning increased research activities or are seeking access to established research facilities. Universities and colleges are displaying unprecedented interest in their science departments. And the government, generally,

HOBBY NIGHT—Marilyn Rohrer, extensive collection of brains; Stephen Arnold, cosmic ray counting apparatus; Jules Kernen, results of ecological study of the flora and fauna of a vacant lot. Second row: Josephine Raskind explains her exhibit of the embryological development of Physa to Richard Lewontin; Joan Lines, sample of casein and information about other types of plastics; Elizabeth Laufer, topographic map of her school. Third row: Arthur Sicular, production of direct, constant voltage by induction; Abraham Schweid, miniature bacteriological laboratory; Gordon Newkirk, photographs of the moon he took through a six-inch reflector. Bottom row: John Champeny, reflecting astronomical telescope; Gilbert Seely, homemade spectroscope; Harold Zirin, eight-inch equatorial reflector telescope; Neal Kindig, natural forms of gypsum and plaster and cement test blocks.



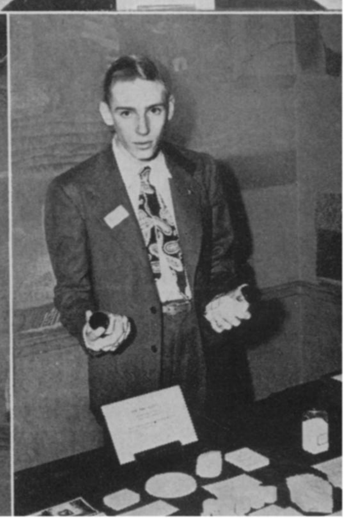


ETHYL CELLULOSE
CELLULOSE ACETATE
POLYVINYL CHLORIDE
POLYSTYRENE
CASEIN
CELLULOSE ACETATE BUTYRATE
LUCITE
ETHYL METHACRILATE
POLYVINYL BUTY



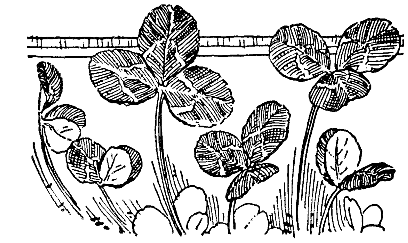




BOTANY LINGUISTICS

NATURE RAMBLINGS
by Frank Thone



What Is a Shamrock?

➤ IRELAND'S SHAMROCK, probably the most-disputed plant in all botanic history, is really a yellow-flowered species of clover, Rev. Hugh O'Neill, professor of botany at the Catholic University of America, has decided after a careful re-examination of all available linguistic evidence. It is not, as frequently asserted, either the oxalis or the common white clover.

The notion that the shamrock was an oxalis apparently got started by Renaissance English writers. In Campion's History of Ireland, written in 1571, the shamrock is described as a three-leaved plant, sour-flavored, that grew along with watercress in woody places and was used as food. Only one plant fits that description, the wood-sorrel or oxalis (*Oxalis Acetosella*). This plant is also common in the United States.

The proper Gaelic name for the oxalis, Father O'Neill found on further searching, is not *seamrog* (pronounced "shamrock") but *seamsog*. The confusion may have arisen from the fact that in the Gaelic alphabet the characters for "r" and "sh" look very much alike. This very natural mistake, apparently made by an early English writer, was perpetuated for a long time, so that the oxalis became entrenched in English literature as the shamrock.

In Irish literature, Father O'Neill states, *seamrog* always means clover; the words for oxalis are *seamar coille* and *seamar gear*. A very early Celtic clover-word was *seamar*—the *-og* ending was picked up later.

Two kinds of clover that grow in Ireland have been contenders for the honor of being the true shamrock: the common white clover (*Trifolium repens*) and a yellow-flowered species known to botanists as *Trifolium dubium* v. *minus*. The overwhelming majority of Irish people, Father O'Neill states, favor the yellow-flowered plant, though the other species still retains its champions.

As independent confirmation, Father O'Neill cites an investigation made only a few years ago by a Benedictine scholar in the Glengarry region in Scotland where a few old people still speak the "old language". These elderly Gaelic-speaking Scots, born before 1850, all knew clover, and only clover, as *seamrog*, or shamrock.

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is quite concerned about its place in the furthering of science. There are for example two bills to be brought out in the Senate—one to create an ambitious science research foundation under Federal auspices and another to set up a Federal atomic energy research program. There seems every evidence that we are alert to expanding our physical facilities and providing the necessary funds.

With regard to scientific manpower, the story is different. There is, and will be for some time, a shortage of such personnel. Throughout the war we began cutting down on training in some fields as early as 1940. From then on progressively the flow of trained manpower in the sciences was reduced. The resulting deficit is large and will be costly. That, of course, is past history and is well known.

The unfortunate aspect of the situation is that no positive recovery measures have been adopted.

The general attitude is that the present great flood of veteran students now on the campuses and about to return to them will quickly fill up the ranks of trainees in the sciences. There are, however, some very obvious limitations here. In the sciences the number of students who can register for advanced work is limited to those who have finished the preparatory work. The seniors who are now enrolling must once have been juniors, and the graduate students must once have been seniors. At present in the science graduate schools and in the sophomore, junior and senior classes in the sciences, the enrollments must be limited to those who left college for the services with unfinished courses, and in view of selective service history which began the pinch on enrollments at the freshman class and progressively rose through the years, there are not as large a number of returnees as is generally supposed. Information in my hands is incomplete, but it indicates that the graduate schools by and large are not full in most sciences in spite of scholarship programs and the release for advanced study of wartime research workers.

In a sampling of 57 universities, for example, the graduate enrollment in chemistry in the first semester was about 50% of the average for the immediate prewar years. Even with an additional 7% increase due to veteran enrollment, only 57% of the prewar average is indicated in the second semester. In the fields such as physics, mathematics and geology the graduate schools are similarly not crowded with G.I.'s to judge by returns from a sampling of institutions immediately preceding the end of the first semester. Results showed enrollments in physics as 16%, geology as 30% and mathematics as 12% of a normal prewar graduate enrollment. The non-veteran enrollment in these graduate schools in these fields was considerably greater, being in physics 83%, in geology 30% and in mathematics 100% of prewar norms. These higher enrollments are in large part made up of those students who were on war research and are now deferred to finish their training. In the undergraduate classes where no deferments are now granted in general to non-veterans and where the enrollments are therefore confined to veterans and physically disqualified students the enrollments are very low as is indicated by data collected. A sampling of enrollments of seniors in about 60 institutions at the end of the first semester gives in percentages of normal prewar enrollments, the following figures: in physics, veterans 9%, non-veterans 28%; in geology, veterans 10%, non-veterans 20%; in mathematics, veterans 11%, non-veterans 18%. The corresponding junior enrollments are in physics, veterans 12%, non-veterans 36%; in geology, veterans 25%, non-veterans 21%; and in mathematics, veterans 13%, non-veterans 18%. More complete canvasses are needed and will be obtained for the second semester as soon as possible. But the results quoted indicate quite definitely that there is not yet any sufficient flow of science students in the colleges to even approach the prewar numbers. And the existence of war time deficits should call for even much increased numbers.

To achieve a full program of training in the sciences so as to meet the great unfolding challenge of the future, to provide for our welfare and security and to lead the world to a higher level of comfort and stability through a higher technological standard of living, we should have a program as full and carefully drawn as any on the physical and financial side. It should be designed to bring back to the campuses to complete their training all those whose courses were interrupted, including those not yet discharged from the services, and it should provide for selection and training of our ablest youth. Above all, it should be a well-rounded program which should set as its goal the provision of well-trained and adequate leadership in all fields, not only scientific but also in such fields as the social sciences, the humanities and the fields of social and ethical leadership. America has come face to face with the need to assure higher education for its ablest youth. We need a program of selection and training of our best brains. It will be fatal to avoid the challenge. I am glad the Westinghouse Science Talent Search so ably dramatizes the need for this and points to the method to be used in its realization. I am very happy to have had this small part in this great undertaking.

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PUBLIC HEALTH

Vaccine Can Increase Food

Developed to defend the United States and Canada against germ warfare, it can provide more nourishment for a hungry world.

By JANE STAFFORD

➤ MORE FOOD for a hungry world, particularly those regions most frequently visited by famine, can come from a vaccine developed to defend the United States and Canada against germ warfare.

The vaccine is for protection of cattle against rinderpest, or cattle plague. This highly fatal cattle disease has never existed in the United States or Canada and is now non-existent in the Western Hemisphere.

Even before those mysterious paper balloons from Japan began descending in regions close to the great cattle-grazing areas of western United States and Canada, however, military authorities were seriously concerned over the possibility of the virus of this disease being introduced by accident or by enemy action. If that had happened, the disease would have spread like wildfire through the herds. Lack of any previous contact with the disease makes our cattle highly susceptible to it.

To fight this war disease threat, a joint U. S.-Canadian commission was appointed by the Secretary of War and the Canadian Minister of National Defense. Members of the commission were: Dr. J. Craigie of the University of Toronto; Dr. R. E. Dyer, director of the U. S. National Institute of Health; Dr. E. B. Fred, President of the University of Wisconsin; Brig. Gen. R. A. Kelser of the U. S. Army Veterinary Corps; Dr. C. A. Mitchell of the Canadian Ministry of Agriculture; Prof. E. G. D. Murray of McGill University, Montreal; Dr. J. B. Reed of Queen's University, Kingston, Ont.; and Dr. H. W. Schoening of the U. S. Department of Agriculture.

On Grosse Isle in the lower St. Lawrence River, isolated island site of a former quarantine station, this commission early in 1942 assembled a group of scientists and technicians and gave them a two-part mission. First part was to prepare a vaccine to provide rapidly the means of surrounding an epidemic, should it occur, with a ring of immunized animals. The second part was to develop a more efficient or cheaper vaccine against rinderpest than those then available.

Almost a year before an atomic bomb dropped on Hiroshimo, the scientists were able to report: Mission accomplished. Now, with the war over, the first victims of Jap aggression will get the peacetime benefits of the mission.

The commission turned over to UNRRA one million doses of the vaccine for use in China. This will be shipped as soon as personnel and facilities can be established there for doing the vaccinating job, Dr. Irving G. Cashell at UNRRA headquarters states. Rinderpest is the Number One cattle disease in China today, Dr. Schoening told me. This plague attacks cattle of all kinds and interferes with agriculture because cattle are used in China as draft animals and beasts of burden. Rinderpest epidemics cut down the supplies of both meat and crop foods. UNRRA has a report of a severe one in one locality in China now, and the disease exists there always.

The vaccine which in time should free China and also India and Africa of this plague and famine threat was developed at Grosse Isle by the following scientists: Capt. James A. Baker, V. C., U. S. Army; Capt. H. K. Cooper, V.C., U. S. Army; Capt. Henry Griffiths, General List, Canadian Army; Lt. Col. M. W. Hale, V. C., U. S. Army; Capt. Dubois L. Jenkins, V. C., U. S. Army; Maj. Fred D. Maurer, V. C., U. S. Army; Capt. Thomas C. Robey, V. C., U. S. Army; Comdr. Richard E. Shope, M. C., U.S.N.R.; and Maj. R. V. L. Walker, P.L.D.G., Canadian Armored Corps.

Rinderpest, though it does not attack man, has been one of the most important maladies of livestock from earliest times. It has caused tremendous losses of cattle, killing from 70% to 100% of the animals in various epidemics. Several hundred years ago it spread from its earliest home in Egypt to European countries, where it raged almost constantly until the 1870's.

Extensive outbreaks were always associated with wars. In one three-year period one and one-half million cattle were stricken. The disease broke out in Belgium in 1921 after the first World War, but was eradicated. It still exists in Asia, India and East and South Africa, though in South Africa the well-organized veterinary police are able to keep it under a certain amount of control.

The Philippines, also, have been affected by rinderpest which attacked the carabao, important draft animals there. It was in the Philippines that Gen. Kelser, who was a member of the joint U. S.-Canadian commission, developed a vaccine against the cattle plague.

This vaccine and another similar one were made from the rinderpest virus obtained from cattle and inactivated by chemicals, such as formalin. It successfully protected animals, but only relatively small quantities could be made, since it had to be obtained from cattle. It also carried the danger of containing germs of other diseases that might have been present in the cattle from which the virus was obtained.

The scientists at Grosse Isle therefore turned to fertile hen's eggs, which have been used for production of yellow fever, typhus fever, influenza and other vaccines. They had some failures at first, but finally succeeded in growing the virus on the eggs in such a way that it lost most of its disease-producing power but kept its ability to give the cattle resistance to rinderpest.

In one crucial trial, 10 vaccinated and four non-vaccinated calves were put into the same pen where for 23 days they milled around together, drinking from the same water trough and eating from