SCIENCE NEWS

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WORK OF THE NATIONAL RESEARCH COUNCIL OF THE NATIONAL ACADEMY OF SCIENCES

SCIENTISTS of the United States are making their knowledge and experience available for the war effort through committees of the National Research Council of the National Academy of Sciences. A great stock of information already in existence has been thus pooled, and has been placed on record in well over a hundred reports furnished to the War Production Board and its predecessor organizations. Directions which new research should take have also been indicated.

Especially important has been the work of the Metals and Minerals Advisory Committee, of which Clyde Williams, director of Battelle Memorial Institute, Columbus, Ohio, is chairman. This committee has already turned in well over a hundred reports. About half of them are on metals substitution and conservation, a little less than half on ferrous minerals and ferro-alloys, with several additional reports on tin smelting and reclamation and on non-metallic minerals.

A very considerable proportion of the reports are concerned with three "bottleneck" metals, aluminum, magnesium and manganese. The first two are basic materials for aircraft, the third is a key material in modern steelmaking. With all three, our present difficulties arise largely from the fact that before the war the respective industries naturally utilized only the highest-grade sources, which were most easily worked. Now, however, these "cream" sources are not sufficient to meet the enormously expanded demand, and scientists are called upon to tell what may be done about realizing values from some of the "skim-milk" ores.

Other investigations of the committee range through the whole alphabet of the minerals, from antimony and asbestos to zinc and zircon. In some cases, rarer and more costly metals may become replacements for those that are more abundant and cheaper in normal times; as in the substitution of lead-silver solder for the old familiar lead-tin solder, thus releasing tin for use where it is more urgently needed.

This set-up of a national clearing-house for scientific ideas and information in a nation at war continues a tradition that goes back to the administration of President Lincoln. In 1863 he chartered the National Academy of Sciences as a means of making the then existing scientific resources of the country available for the use of the Federal Government.

During the first World War the National Research Council was organized as a committee of the academy, to carry on the same kind of work in the vastly more highly developed fields of science that had come into being since Reconstruction days. The council continued in existence during the interim between the first and second World Wars, and now again attacks the task, with greatly expanded personnel and facilities.

THE COMMITTEE ON TECHNICAL DEVELOPMENT

THE Committee on Technical Development, a new body for the promotion and correlation of research in general industrial production, is now taking shape within the War Production Board, under the guidance of Maury Maverick, chief of the Bureau of Government Requirements. It is intended to operate along lines parallel to the work of the Office of Scientific Research and Development and the National Inventors Council, supplementing, though not duplicating, their efforts. An appropriation of $100,000,000 is being asked for, to finance the work of the committee. Associated with Mr. Maverick in the new project are a number of research men and administrators, including Dr. Charles I. Gragg and Dr. C. C. Hill, Jr., both of Donald Nelson's organization.

As the research men picture their task, it involves several separate steps for each of the industrial problems with which the country is faced to-day. First is a survey of the problem itself, a determination of its magnitude and of all the factors involved that can be discovered. This is done largely by calling in groups of representative industrialists, engineers, and government and university research workers who know about various phases of the problem.

Having thus outlined a particular job, the next thing is to lay it out as a research project and find places where existing laboratory facilities will permit rapid work. This is very likely to involve a breaking down of the project into sections, and "farming out" the sections to universities and technical schools which have the necessary apparatus and personnel not yet employed on war research jobs. In this part of its work, the Committee on Technical Development would be functioning along lines analogous to those of the Smaller War Plants Corporation of W.P.B., in procuring the completion of jobs by sub-contract.

After the laboratory research stage comes the pilot plant, where processes until then done only by spoonfuls in test-tubes are expanded to middle-sized batches—say a couple of hundred pounds—in relatively small kettles or retorts, similar to those of factories, only not so big. Here is where the jobs graduate from "pure" chemistry into engineering chemistry, where "bugs" are discovered and eliminated.

Finally, after the pilot plant has carried the task so far as it can, it goes to the full-scale industrial plant for regular commercial development. The interval between pilot plant and factory is the "slip 'twixt cup and lip" where many a hopeful research project has died, and been embalmed in neatly bound research reports that only gather dust on library shelves, instead of rolling dollars in bank accounts and payrolls. One of the big jobs of the Committee on Technical Development will be to help practicable research results to become practical and real in the marketplace.

Even before formal organization and financing, the committee has made a number of beginnings. One hitherto neglected possibility of natural rubber has been turned up in the strangling-fig vines that grow wild in southern Florida and the West Indies. Little is known about it as yet; it is one of the research tasks that will have to be done from the ground up.

Agar, a vegetable jelly made from seaweed and indispensable in bacteriological and medical research, has always been imported from Japan. Small American manufactures of this substance have been of good quality but insignificant in quantity. New seaweed sources that may help ease us out of this bottleneck have been turned up on the Florida coast.

Silk is still needed for certain military purposes; nylon, rayon and other substitutes have not proved wholly satisfactory. We have abundance of mulberry trees, a seed-stock of silkworms—and thousands of Japanese women in internment camps who would be glad of a chance to undertake their traditional job of unreeling the cocoons to earn a little money.

These are only samples of the thousands of projects awaiting formal organization of the Committee on Technical Development. The work that can be expected of it should not only aid materially in winning the war but in stabilizing the peace.

ALUMINUM FROM CLAY

A REPORT officially released by the National Academy of Sciences states that aluminum from clay may get War Production Board approval. At least the Board is considering several processes involving not only clay, but alunite, low-grade bauxite and other domestic sources in the event that our supplies of high-grade bauxite from British and Dutch Guiana, which has accounted for 60 per cent. of our whole supply, may be greatly diminished or wholly cut off by the U-boat warfare in the Caribbean Sea.

These processes have been investigated for more than a year by the National Research Council of the Academy, and a report has been made at the request of the WPB by Dr. Zay Jeffries, chairman of the Metals Conservation and Substitution Group of the Advisory Committee on Metals and Minerals.

All the aluminum in this country has been made until now from high-grade bauxite (containing less than 7 per cent. of silica) by the Bayer process, which is the cheapest way, provided high-grade bauxite is available. But this process does not extract all the alumina (aluminum oxide) from even the best of ore, and the poorer the ore, the greater the waste and the greater the expense for chemicals.

The clay processes can be used in two ways, the committee found. Aluminum oxide (alumina) can be extracted directly from the clay, or silica can be partially removed from high-silica (low-grade) bauxite to convert it to low-silica bauxite which can then be treated by the Bayer method. In either case the metal is then extracted by electrolysis.

The tailings, thrown out by the Bayer plants, called red mud on account of its color, can be considered as clay, the committee pointed out, and the clay process applied. They recommended that clay-reducing plants be added to existing Bayer plants. High-silica bauxite can then be fed to the Bayer plant which will remove about 70 per cent. of the alumina and the clay process applied to the tailings will get most of the rest.

In particular the committee recommended that the clay process be applied to the millions of tons of red mud that has accumulated during the past thirty or more years at the East St. Louis plant of the Aluminum Company of America. This mud contains as much alumina as is contained in 1,000,000 tons of bauxite. It also contains large quantities of lime and soda, materials used in both the Bayer and the clay processes. The proportion of alumina to silica is higher than in kaolin clay which is almost pure aluminum silicate. It is good aluminum ore. It is already mined and pulverized, and contains a part of the materials needed for its own reduction.

There are two kinds of clay process, the acid and the alkaline. The committee favors the latter which consists in the main in mixing the clay with lime and soda, sintering and washing. The Tennessee Valley Authority has been experimenting for the past five years with an acid process applied to white kaolin clay, but the committee finds that the alumina it produces is not as yet sufficiently pure. However, the TVA is continuing its investigations and hopes to perfect the process.

Finally alunite or alum stone, a common mineral, is another source of aluminum. The reduction requires sulfuric acid, a substance for which there are enormous other demands in the war effort. But the stone is composed mostly of potassium-aluminum sulfate, so that the acid can be made from the sulfur present in the mineral.

Next to low-silicon bauxite the best ore for aluminum is high-silicon bauxite, and the best use of the clay process is in connection with a Bayer plant. Meanwhile search for new domestic sources of bauxite should be vigorously continued. There are no known deposits in Mexico or Canada.

JAUNDICE AND YELLOW FEVER VACCINATIONS

DANGER of jaundice breaking out in the Army among troops vaccinated against yellow fever is now over, in the opinion of the Surgeon General. Full information about the jaundice outbreak is now released for the first time, although this and other press services and newspapers of the nation have known about the outbreak for some time, but withheld the information at the request of Army authorities pending results of the scientific investigation which started when the first cases occurred.

Contrary to rumors circulating for some weeks, no case of yellow fever has occurred in any of the troops. The sickness was catarrhal jaundice, an ailment that occurs in civil life and for which no specific germ cause has been identified. Since March 1, there have been 28,585 cases of catarrhal jaundice in some of the men vaccinated against yellow fever. There were 62 deaths. This is a rate of one death to each 461 men who got sick, not one in 461 of all vaccinated. The numbers of deaths and of cases of jaundice were not large enough

to affect the war effort nor were they large enough to change the low death and sickness rates for the Army as a whole.

Jaundice occurred only in men vaccinated with certain batches of yellow fever vaccine. The vaccine was made from chick embryo pulp which had been suspended in normal human blood serum. This type of vaccine had been used for a million vaccinations before the jaundice cases developed among troops getting the vaccine.

The human blood serum was used because it keeps the vaccine active longer when it is stored before use. The unidentified germ of catarrhal jaundice may have got into certain batches of vaccine from this serum. The point is not yet definitely proved, but acting on the possibility, the Surgeon General has ordered all yellow-fever vaccine for the Army to be prepared with water instead of the human serum.

This change was made on April 15. Cases of jaundice have been definitely decreasing in numbers for the last three or four weeks. Peak of the outbreak apparently came during the week ending June 20, when 2,997 admissions were reported during the week. The peak in number of cases occurred after the vaccine had been changed because it takes some time for the disease to develop. The cases reported were among men who had been given the human serum vaccine before April 15.—JANE STAFFORD.

JAPANESE BEETLES

JAPANESE beetles are swarming over the great power dam at Conowingo, between Baltimore and Philadelphia. They're all over the roadway that crosses the huge concrete structure, thousands upon thousands of them.

Nobody knows why the beetles should be so numerous over the dam, except that they are pretty numerous all through their Middle Atlantic coast range this year. It is possible that mass flights of them, crossing the water or flying up air currents toward the dam, become tired and settle down to rest. All explanations that have been hazarded thus far are frankly guesses.

A real threat is the danger to the elms in ever-widening radius around New York City from the fungus plague that has been misnamed Dutch elm disease. (It didn't come from the Netherlands but from Central Europe.) Due to war-time economies in appropriations, and in particular to the dissolution of the C.C.C. and drastic cuts in the number of W.P.A. workers, it is not possible for public agencies to do any work within the area known to be infested. All that is being done this summer is scouting along the edges of the infested region, to find any new spreads of the disease.

The beetles that disseminate the fungus are breeding, flying and getting into new trees now, and they will be most active during all of August. Since federal aid in the elm disease campaign is lacking, local communities and private individuals who value their elms will have to look out for themselves.

Grasshoppers and chinch bugs are reported active in parts of the Midwest and Plains regions. The long, cool spring held them in check somewhat, but with the coming of warmer, corn-ripening weather they are asserting themselves. There is enough arsenic-poisoned bait to last out this summer's anti-grasshopper campaign, but since arsenic is an essential war material, used in khaki dyes and for other industrial purposes, it is unlikely that there will be any for use next summer. The best bet is to reduce this year's infestation as thoroughly as possible, so as to cut down the number surviving to lay overwintering eggs in the fall.

ITEMS

MANUFACTURERS of war equipment have been asked by the War Production Board to start immediate programs for salvage of the "over-spray" of the paint spraying process, from which 100,000,000 pounds of essential chemicals can be recovered, according to estimates of the Chemical and Textile Units of the WPB Conservation Division, based on a nation-wide salvage survey of the paint situation. Army tanks, trucks, jeeps, and other military machines must be mass spray-painted with the familiar olive drab. Millions of shells must have a protective coat of nitrocellulose lacquer enamel. It is estimated that about 30 per cent. of the materials used can be recovered from the sludge of the over-spray. Pigments, glycerine, oils, resins, gums, chlorinated rubber, cellulose and plasticizers are some of the materials that can be recovered by tried and tested methods, and the cost of the painting can also be reduced.

MILK-FED chickens may yield place, on premium market and restaurant listings, to soybean-fed chickens, at least for the duration. Soybean oilmeal is recommended as a substitute for dried milk in poultry rations, as increasing quantities of the latter food are sent overseas in Army supplies and lend-lease exports. The recommendation is made in a committee report of the National Research Council. In addition to replacing the milk proteins, soybean oilmeal is also a good source of riboflavin, one of the necessary vitamin materials ordinarily supplied in milk, the report states.

THAT hatchery raised trout can be distinguished from those that were hatched and grown entirely in the wild by examining their back fins, has been discovered by C. N. Feast, director of the Colorado Game and Fish Commission. Trout grown to legal size in a hatchery, he says, have dorsal fins somewhat degenerated through crowding. When they are released into the roomier waters of streams, the fins develop to full size, but are always malformed, and their cartilage structures are always cracked. This does not detract from the fish's health, gameness or flavor, but does form an identifying mark. Using this means of detecting hatchery-raised fish, Mr. Feast cruised the Gunnison, one of Colorado's best known streams, and found that 80 per cent. of the trout in it are hatchery-raised, a result of the commission's policy of raising its fish to full legal size instead of releasing them as fingerlings. Despite the war, there has been only a slight decline in number of fishing licenses. The decrease has probably been mainly among out-of-state fishermen, who find it more difficult to get to their favorite angling streams than in normal times.