ing pertinent word from Dean L. E. Call, of the School of Agriculture of Kansas State College, in which he acknowledged my "letter of April 13, reporting on the yield of maple syrup from unpastured and pastured maple groves. The contrast is striking and is in complete conformity with the results that my brother has obtained where he has been protecting his grove from cattle for the last seven or eight years. Not only has the yield of sugar increased in his grove, but the condition of the trees is much better than it was at the time he started the practice. I spent a few days on his farm last August (the farm where I was born and raised) and I had never seen the maples in more thrifty condition than they were last summer."

PAUL B. SEARS

OBERLIN COLLEGE

THE MERITS OF ABSTRACTING JOURNALS

AT the present time there are circumstances that give a special importance to abstracting journals. Part of the world's scientific literature, including some of the most used journals, is no longer accessible. Reprints of the articles are not distributed, and it has been difficult or impossible to find out what the publications are. As time has passed, since the beginning of the war, some sources have been found for certain otherwise unobtainable publications; but the limitations that exist preclude direct use of this by the ordinary scholar who is not fortunately situated.

In English and American serial publications titles and abstracts of some of this literature are appearing. They are scattered, often, in specialized bibliographic journals, and the coverage is necessarily incomplete and sporadic. Bibliographic agencies are in the best position to learn of and to make use of sources of the publications, if they are available anywhere; and by publication of titles and abstracts those agencies can provide information that could be obtained otherwise only with much difficulty and expense.

Biological Abstracts is the only comprehensive abstracting journal for biologists in English; its significance to biologists can not be too much emphasized. Organization of the results of contemporary studies into compact, easily consulted form is one of the most important services that can be given to students and investigators; and an extensive index like that which is prepared for *Biological Abstracts* is a very valuable guide to this organization. In doing justice to the literature of the world on a subject, the specialized abstracting journals have an advantage in that their energies and facilities can more easily be adequate to cope with their undertaking. The main difficulty that hampers the work of such comprehensive journals as *Biological Abstracts* is that so much more in energies and facilities is required that it is difficult to provide. The accomplishment realized in that journal, however, in the relatively few years it has been published, shows that the energy and interest are abundantly present in its staff and in the large number of biologists who collaborate. There is clear understanding, too, of the problems that need to be solved, and elimination of imperfections awaits only the provision of increased support.

The interests of all who make use of the results of research in science will be furthered if the support of established abstracting journals is made sufficient not only to continue and improve the permanent values of organization of reports, but also to carry on to the fullest extent possible the dissemination of information concerning current scientific research in nations with which free communication is at present absent.

HAROLD KIRBY

DEPARTMENT OF ZOOLOGY,
UNIVERSITY OF CALIFORNIA,
BERKELEY

QUOTATIONS

SCIENCE AND SOCIETY

IN war Britain has learned that to neglect science is to court disaster. Before the war scientific research was far too commonly regarded as an activity remote from life, the practitioners of which could not be expected to make important contributions to solving the country's manifold industrial, social and human problems. Too little public or private money was spent on research. Expenditure on agricultural research, for instance, amounted to only a fraction of 1 per cent. of the value of the total output from the land, although a more generous endowment would have repaid itself economically many times over. Or, to take another example, research into the physical and psychological requirements of health in industry was hampered by lack of public interest and dearth of funds. Even more serious was the failure in far too many spheres of life to turn to practical ends the new knowledge which men of science were accumulating.

The basic facts about vitamins and food values were already well established when the Medical Research Council published its important report on "Vitamins: A Survey of Present Knowledge" in 1932. But very little was done, until the outbreak of war, to educate the public to a better appreciation of food values or to develop a food policy designed to counter

the widespread malnutrition which was known to exist. Again, in a different field, there were undoubtedly unnecessary delays in the practical utilization of new inventions. Pre-war official investigations of the history of a number of the most important American inventions showed that from thirty-three to fifty years usually elapsed from the time of the first working model to the time when the invention had come into general use. There is little reason to doubt that the experience of Britain has been similar. It is understandable therefore that many scientists and technicians before the war increasingly came to feel that they should be "on top" rather than "on tap," since the "tap" was only too often not fully turned on.

Britain at war can not afford to dispense with science. It is at last safe to say that science has been granted a great measure of the recognition and facilities it requires. Great improvements in productive techniques, in the quality of war materials, advances in the design of aircraft, tanks and shipping, the development of radio-technology and many other devices, all testify to this. Thanks to the U-boat and to Lord Woolton and his scientific advisers, the public has taken tremendous steps forward in its nutritional knowledge. It is possible to believe that there is less malnutrition in Britain to-day than before the war. These are only some of the respects in which war-time necessity has compelled a better utilization of scientific and technical capacity. As a letter published on this page this morning points out, the neglect of the scientist and technician which was tolerated before the war will be as intolerable in the future as it would be now. The nation needs more science, in peace as in war, and must be prepared to pay for it. While science can not offer a utopian "age of plenty," Sir Robert Pickard, Professor Findlay and Sir Lawrence Bragg rightly insist that, in order to maintain and improve Britain's future standards of health and well-being, "scientific and technological research will be required on a scale not yet envisaged." If this fact is squarely faced and acted upon, and provided that experts are freely and fully consulted, few will disagree with our correspondents' judgment that a democratic community can not allow to the scientist, as scientist, a "position of exceptional authority in deciding the policies of governments." It is when the expert is ignored or frustrated that he becomes a "technocrat."—*The Times,* London.

SCIENTIFIC BOOKS

THE WORLD OF THE PHYSICIST

From Copernicus to Einstein. By HANS REICHENBACH. Translated by RALPH B. WINN. 123 pp. New York: Philosophical Library. 1942.

A PHYSICIST would infer from the title of this book that it would give a survey of all the great discoveries, all the great contributions leading us to our present knowledge of the physical universe. For in the time of Copernicus the world of the physicist was without form and void and darkness covered the deep mysteries of nature. During these 400 years light has entered. How the universe has grown as light supplied by a host of workers has at length allowed us to see vast bodies at distances "farther than ever comet flared or vagrant stardust swirled" or to penetrate into the inner recesses of particles in which masses and distances are measured in micro, micro, micro units. But the 123 pages of this book would hardly be adequate for the unfolding of the story. Its purpose is "to serve as an introduction to the great problems of space, time and motion. More definitely, it is concerned with the development (and glorification) of the theory of relativity. Its methods are very simple. No mathematical formulae or operations, no computations of any kind are introduced. It starts with the revolutionary view introduced by Copernicus—the earth does not stand still. The conservatives fought against his view. It belied the testimony of our senses. "So too do the revolutionary views introduced by Einstein."

From the consideration of motion and gravitation the book proceeds to the problems of light. What is light? Is there an ether? What did the Michelson and Morley experiment prove? According to the author it proved that there is no ether. And Einstein seized this result, "one of the greatest experimental precision." Thus "Einstein's theory of relativity, the most magnificent achievement of modern physics, was suggested by the closest adhesion to experimental facts" (p. 51). Unfortunately, however, it would appear that the author has never seen the interference fringes in a good interferometer and he has an extremely hazy view of the phenomenon of interference, for in explaining the Michelson and Morley experiment he states that "the belated arrival" of one of the beams "could be proved by the appearance of shadow bands." "Yet the surprising result was that no shadow bands appeared at all: there was no retardation of the ray" (p. 55). Shades of Michelson, Morley, D. C. Miller! The fact of course is that the interference fringes (shadow bands) were marvelously clear. What was looked for was a side shift of the fringes as the instrument was rotated so that the East-West arm became the N-S and *vice versa.* In the Michelson and Morley experiment no appre-