floors. It has generally been considered that these features hang so high above the valley bottoms because the large Pleistocene trunk glaciers wore down their valley bottoms much faster than did the small tributary glaciers. It appears, however, that this is not the full explanation.

Bordering the east front of the mountains there are, 1,000 to 2,500 feet or more above the intervening glaciated valley bottoms, remnants of old high-level piedmont benches which, near the mountains, are capped with much-weathered glacial drift, some of which is cemented to hard tillite. At corresponding levels farther out, similar bench remnants are capped with coarse, non-glacial stream gravel. When this ancient stream gravel and this old, weathered, early Pleistocene till were deposited the mountain gorges and the outer valleys were not so deep as now by 1,000 to 2,000 feet or more. If normal stream gradients, corresponding to the smooth, sloping bench tops, be projected back up the gorges to their heads, it is seen that many of the cirques, hanging side valleys and bench remnants are at heights corresponding in general with these projected old trunk valley bottoms. This relationship suggests that the tributary, V-shaped gulches and headwater hoppers which were later reshaped and enlarged by glaciation were genetically related to the positions of the late Tertiary or early Pleistocene valley bottoms. Down these valleys and out onto the smooth gravelly piedmont, the great early Pleistocene glaciers advanced, deposited their load and melted back up the valleys.

As a result of renewed regional uplift the streams then trenched the U-shaped early Pleistocene valley bottoms and cut V-shaped inner gorges to considerable depths before the last, or Wisconsin, stage of glaciation came on. Just how many interglacial stages there were in the region of Glacier Park is not definitely known; there were probably at least two. Each time the glaciers readvanced they deepened the valleys somewhat and they broadened the valley bottoms very notably by plucking and scouring away the lower side slopes. The broadening of the inner gorges by the readvancing glaciers was probably facilitated by the narrowness of the projecting craggy spurs between the numerous tributary gulches.

Such interglacial stream erosion both east and west of the Continental Divide undoubtedly accounts for much, if not most, of the Pleistocene valley deepening. The shapes of the inner gorges, the projecting spurs between the tributary gulches and the thin bedding and fractured condition of much of the sedimentary rock composing the mountains particularly favored the work of the glaciers in plucking masses of rock and wearing away and oversteepening of the lower side slopes. It seems to have been such a combination of alternating stream and glacial erosion which accounts for the lateral benches, hanging cirques and short tributary glaciated valleys being left so high above the bottoms of the trunk valleys down which the last of the Pleistocene glaciers advanced. Since the last of these great glaciers disappeared, the streams have accomplished relatively little erosion. There has been some, but not a great deal of, enlarging of the cirques by the small glaciers of Recent time.

WM. C. ALDEN

GRAZING VERSUS MAPLE SYRUP

THREE years ago at the request of A. C. Norris, an alumnus of Oberlin College, Miss Elaine Hoff, a graduate student in the department of botany at Oberlin College, undertook a cooperative study of maple groves in Lorain County, Ohio. Her analyses indicated that the quality of these groves was suffering from the fact that they were being used as pastures. One grower, R. E. Campbell, then fenced a grove containing 500 trees and excluded cattle, sheep and horses from it. An additional leased area gives a total of 1,425 trees covering about 225 acres which were protected or very slightly pastured. In the intervening two years, wildlife and tree seedlings have increased, and there have been some indications of increased sugar production, but it was difficult to obtain precise yield data. During the season just ended, however, the 1,425 trees which were protected from grazing produced an average of nearly 1 quart of syrup per tree against approximately 1 pint per tree from other groves in the neighborhood which have remained pastured. Furthermore, the unpastured area produced a yield of 40 barrels of sap after flow had ceased in the pastured woodlands. Previous to protection, the sap flow was no better than that of other pastured groves in the area. The 1943 yield represents an increase in gross income of $570 for the unpastured area. The area, rented for pasture, would have brought in less than half this amount.

While this test may not be conclusive, it is certainly significant, particularly in view of the fact that one of the most serious sources of economic waste in the North Central States is the grazing of woodlands and consequent destruction of undergrowth, including seedlings. Data accumulated by the Ohio Experiment Station indicate that an ungrazed, properly managed woodland can be quite as profitable as any acreage on the average farm. Other data indicate that enlightened practices of pasture management will yield nutrient values sufficient to reduce the area of feed crops and make unnecessary the use of woodlands for supplementary grazing.

Since writing the foregoing, I have had the follow-

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