tative program of war services dealt with such matters as the codifying for immediate use of existing information on plant disease prevention, an expanded extension service, redirection of current research programs toward emergency uses and increase of special emergency experimentation, reexamination of long-time basic research projects, intensification of plant disease survey work, tightening of plant quarantines and the holding of regional conferences as a basis for developing coordinated action and research programs to meet war needs in the different areas. Reports were received from several states which indicated that already energetic work was proceeding within the experiment stations to reconstruct their departmental research programs to meet war emergency needs.

The Genetics Society of America adopted resolutions referring to the continuity of fundamental research, now destroyed by war in almost all parts of the world, as "probably the most important investment that can at present be made for the benefit of the post-war period." It urged upon Congress and the Federal Government "the importance of safeguarding the continued prosecution of fundamental research by those institutions which are now supported by Federal funds."

The sociological discussions in New York City centered very definitely around the war situation. One session dealt with rural population and national defense, and another with an agricultural program for defense and the post-war period. Rural health received emphasis in a number of programs, notably in an appeal by Dr. M. L. Wilson, of the U. S. D. A. Extension Service, for a wide use of our knowledge of nutrition in carrying out agricultural policy and by Miss Dorothy Dickens of Mississippi on the family and national defense. There was also a session on rural institutions and national defense, in which the school and the church received special attention. Still another set of papers dealt with the integration of social research in the Americas and cultural barriers to American solidarity. Much interest was shown by the rural sociologists as a group in the organization of their research for maximum effectiveness on a war-time basis and the need of making readily and widely available whatever findings could be synthesized and applied in emergency production.

The entomological meetings at San Francisco naturally drew their attendance largely from the western states, but the problems considered in the various papers and conferences represented the major phases of national entomological effort. One of the most profitable sessions of the economic entomologists developed in the extension section where the entomologists' place in national defense was discussed. It was pointed out that 32 entomologists are following their profession as commissioned officers in the armed forces, 10 of whom are in the Navy and 22 in the Army. In other instances, professional entomologists are cooperating with military authorities in sand-fly and mosquito control, location of camps, etc. The need for adjustments of long-time research projects was mentioned. It was pointed out that large-scale operations are probably essential during the present emergency. Several authorities on insecticides mentioned the shortage of various essential materials. For example, many of the oils needed in the West are now going for aviation purposes; rotenone can no longer be obtained in quantity; enough arsenic is difficult to get at the present time. The association reaffirmed its desire to be of service in any way possible during the present state of emergency and expressed its willingness to cooperate with other groups with which its service may be coordinated.

Thus regardless of the place of assembly or the field of special interest, we find agricultural science mobilizing to render a maximum of assistance. In these meetings plant pathologists in Dallas, rural sociologists in New York City and economic entomologists in San Francisco alike demonstrated the solidarity of the personnel engaged in agricultural research in the nation and by typically democratic procedures indicated distinct progress in reorganizing their work to meet the new conditions and needs.—*Experiment Station Record.*

SCIENTIFIC BOOKS

DARWIN AND OUR INTELLECTUAL HERITAGE

Darwin, Marx, Wagner. Critique of a Heritage. By JACQUES BARZUN. xii + 420 pp. Little, Brown and Company. 1941. $2.75.

A BOOK about Darwin, Marx and Wagner all at the same time will cause some lifting of eyebrows. The author explains the juxtaposition of names in the first sentence of the preface: "This book has not three subjects, but one. That one is simply the prevailing form of our thinking in an age of materialism and machinery." Darwin, Marx and Wagner were in some way responsible for, or at least have symbolized the advent of, the current ideas in their respective spheres—science, social science and art. "Through their efforts, feelings, beauty, and moral values were shown to be illusions for which the world of fact gave no warrant." And "when the layman carries his thoughts beyond what he can see and touch, mecha-

nistic materialism becomes a menace." The present world catastrophe is the upshot.

The author is neither a biologist nor an anti-evolutionist. He is an outstanding historian and philosopher interested in the development of the intellectual climate of our time. Asking Professor Barzun's forgiveness, we shall consider only the part of his book dealing with Darwin. To many a biologist his treatment of Darwin will seem irreverent to the point of blasphemy. But the author's arguments can not be shrugged off so easily. Darwin's theory of evolution has gained a general acceptance, while theories of his predecessors had failed to do so. We have been taught that the cause of Darwin's success lies in the mass of evidence carefully marshalled by Darwin in support of his views. The author does not deny this explanation. However, he points out that the intellectual tastes of Darwin's age were peculiarly favorable for adoption of just that kind of a theory. "To scientists and laymen alike, the appeal of natural selection was manifold. It had the persuasiveness of 'small doses'; it was entirely automatic, doing away with both the religious will of a creator and the Lamarckian will of his creatures; it substituted a 'true cause' for the 'metaphysical' sort of explanation; lastly, natural selection was an exact parallel in nature to the kind of individual competition familiar to every one in the social world of man." In a period of imperialistic expansion the theory of natural selection lent itself to misuse to confer a semblance of respectability on dastardly political doctrines. "Darwin did not invent the Machiavellian image that the world is the playground of the lion and the fox, but thousands discovered that he had transformed political science. Their own tendencies to act like lions and foxes thereby became irresistible 'laws of nature' and 'factors of progress,' while moral arguments against them were dubbed 'pre-scientific.'"

It is to be regretted that Professor Barzun did not confine himself solely to historical criticism and could not resist the temptation to judge biological theories on their scientific merits. The theory of natural selection has certainly been debased, but it happens to be, in its modern form, a description of a well-established agent of evolutionary change. It does not require life-and-death utility of the evolutionarily effective variants, it is perfectly compatible with the "orderliness in the facts of heredity and variation," and it is certainly much more than "the right wrong idea" to convince the uninitiated in the truthfulness of the proposition that organic evolution has taken and is taking place. No references to authorities, however well chosen, can discredit natural selection in its proper sphere. In the reviewer's opinion the author's emphasis on the fact that Darwin was by no means the first evolutionist, and that he has, probably unconsciously, used certain ideas of his predecessors without proper acknowledgment, hardly detracts much from Darwin's stature as a scientist. After all is said and done, it is Darwin who has advanced the first evolution theory which has on the whole withstood the experimental tests imposed on it and which has developed into the modern edifice. True, it has changed greatly in the process, but so has physics since the times of Galileo and Newton.

The usefulness of the book of Professor Barzun stems from the fact that, as he correctly remarks, "science is not only man-made but man-used." Neither a biologist nor a layman can be disinterested in the uses to which the product of the scientific work is put. In this realm the evaluation can best be made by a historian. The brilliantly written and thought-provoking book of Professor Barzun will certainly repay a careful reading and contemplation.

TH. DOBZHANSKY

COLUMBIA UNIVERSITY

SPECIAL ARTICLES

GROWTH STIMULATION BY SULFANILAMIDE IN LOW CONCENTRATION

THE bacteriologist is well acquainted with the growth-stimulating effect of toxic materials in low concentration. Probably the best-known substances in this respect are the toxic cations on which extensive exact quantitative studies have been made.[1] But a wide variety of dissimilar substances have been noted to show the same stimulative action. Fred[2] has recorded observations on ether and salvarsan. Rahn[3] quotes Hofmann, who studied the phenomenon for lysol, atropin, saponin, malichite green, etc. More recently Beckwith and Geary have reported on indol-3-acetic acid.[4] There are a great number of other published observations.

Inasmuch as no such work has been reported in connection with sulfanilamide or other therapeutically significant sulfa drugs a study of sulfanilamide was undertaken.[4a] A qualitative method, the agar cup plate

[1] Margaret Hotchkiss, *Jour. Bact.*, 8: 141, 1923.

[2] E. B. Fred, *Zentralbl. f. Bakt.* (abt. 2), 31: 185, 1912.

[3] O. Rahn, *Physiology of Bacteria,* 1932, Blakiston, Philadelphia.

[4] T. D. Beckwith and E. M. Geary, *Jour. Inf. Dis.*, 66: 78, 1940.

[4a] Since submitting this paper a study has appeared (SCIENCE, 95: 104, 1942) by H. A. Johnson reporting stimulative action on luminous bacteria. The present data can be interpreted to support Johnson's hypothesis that sulfa-drug action is related to general theories of