ine, while stimulation of the hypothalamus results in a variable ratio of noradrenaline to adrenaline that depends on the location of the stimulus. The implication that there are specific centers in the brain for the release of adrenaline or noradrenaline from the adrenal medulla raises the question of their function.

Chapter 12 is an account of the urinary excretion of noradrenaline and adrenaline normally and during various diseases and physiological situations. Tumors of adrenal medullary tissue and the evidence that the main pressor substance in the chromaffin cells of these tumors is noradrenaline are described in chapter 13.

Of particular interest to the physician and to investigators in cardiovascular research is the last chapter, which describes the therapeutic implications of the ability of noradrenaline to raise blood pressure without materially increasing the cardiac output. Many potential uses, including the support of blood pressure in certain types of shock and in operative and postoperative hypotension, are cited.

The difficult task of bringing together a huge mass of scattered data has been superbly accomplished, and the result is a book that is simply and interestingly written. The unsolved problems in the field are clearly and provocatively defined, and the plethora of suggestions for future research will be appreciated by young investigators. It cannot fail to be of interest to the biochemist concerned with the biochemistry of function, and it is virtually indispensable to the physiologist and pharmacologist working on fundamental mechanisms of the autonomic nervous system and to the physician who is curious how drugs interact with the nervous system.

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The Changing Universe. The story of the new astronomy. John Pfeiffer. Random House, New York, 1956. 243 pp. Illus. $4.75.

This is the first popular-level book on radio astronomy, and it is a good one. In fact, it is very good. The author has taken unusual pains to become thoroughly conversant with this new science, aided by two successive Guggenheim Fellowships. He has visited many of the radio astronomers in England, Netherlands, France, Canada, and the United States. He has used every available opportunity to talk with Australians visiting this country and has corresponded extensively with most of the others. In one way or another, he has been in contact with nearly 100 scientists working in this field.

Pfeiffer begins by telling the story of Karl Jansky's discovery of "cosmic static" in 1931 at the age of 26, and of his failure to secure support for continued pure research at Bell Laboratories. "Rarely in the history of science has a pioneer stopped his work completely, at the very point where it was beginning to get exciting. Yet Jansky did just that . . ." Industry has developed a more enlightened attitude toward pure research during the past 25 years, but this has not prevented us from lagging far behind other countries in the development of radio astronomy. It is noteworthy that the first large research facility to be supported by the National Science Foundation, and with specific Congressional approval, is a Radio Astronomy Observatory to be located near Green Bank, West Virginia.

The book continues with Grote Reber's pioneer researches, all paid for out of his own pocket and done on his own time. In 1937 Reber built in his backyard a radio telescope 31 feet 5 inches in diameter, and in October 1938 he made his first successful observations. He confirmed Jansky's discovery of the Sagittarius source, and he also found other sources in Cygnus, Cassiopeia, and elsewhere. He also found that radio waves are not coming from the brightest stars one can see in the sky. "The implication of this notion is sensational. It means that the universe contains things never before observed. There are unique objects in the radio skies, objects whose light—if any—is too faint to see and which we can know only through their radio waves."

Wartime developments in radar and electronics have been helpful in accelerating the advance of radio astronomy. Reber tried to detect radar signals reflected from the moon, but without success. Signal Corps engineers did this with ease after World War II, using more advanced equipment.

The remainder of the book describes results from all branches of radio astronomy: solar, planetary, meteor, galactic, extragalactic, and the radio sextant. The concluding chapter, entitled "The future," describes some of the equipment now in the planning stages and ends with a discussion of the cosmologic problems that may be solved with the aid of radio astronomy.

The drawings of Sol Ehrlich add much to the attractiveness of the book. However, an old-fashioned optical astronomer, such as I am, cannot accept the implication of the drawing on page 220, which shows the Palomar Observatory draped with cobwebs. The apparent division between radio astronomy and optical astronomy is an artificial division due to technology, and it is all just plain unmodified *astronomy* as far as the basic problems and goals are concerned. A more likely picture would show two Palomar Observatories working twice as hard trying to keep up with the new problems being brought in by radio astronomy.

FRANK K. EDMONDSON
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New Lives for Old. Cultural transformation—Manus, 1928–1953. Margaret Mead. Morrow, New York, 1956. 548 pp. Plates, $6.75.

"The mid-twentieth century is an emergency for humankind . . . . Peasant, feudal, and primitive economies [are] crumbling before the onset of new ideas and new technologies. Traditional faith and traditional practice [are] disappearing. What [is] happening to those who [are] asked to skip centuries in the way they ordered their lives? How [do] these rapid changes inevitably involve those individuals who [live] through them in disturbances of personality which would leave their mark on society for many generations to come?" Accepting the challenge of these facts and questions, Margaret Mead decided that ". . . the most pressing problem, in the range of problems which anthropology was equipped to attack, seemed . . . to be how change occurred within a single generation." And so deciding, she spent 7 months living with "a people who have moved faster than any people of whom we have records, a people who have moved in fifty years from darkest savagery to the twentieth century, men who have skipped over thousands of years of history in just the last twenty-five years" —the Manus.

This was not her first experience with this small group of Melanesians; 26 years before, she had lived with them and consequently had written *Growing Up in New Guinea,* a standard reference for social scientists in particular and for a startlingly large lay audience in general. It was indeed a felicitous circumstance that such a careful scientist and lucid writer should have been an intimate observer of this profoundly important human "quantum jump" both before and after its occurrence.

And what has been this change? "Today they are friendly, where formerly they would have been harshly competitive; they are actively concerned with the prevention of types of behavior which they would formerly have regarded as natural and desirable; they are relaxed and unworried where they would formerly have been tense; they are rearing their children with a kind of indulgence

which would have been unheard of twenty-five years ago." This short summary, of course, does no justice to the review and analysis of old and new Manus behavior, values, and material ways of life which the book provides in fascinating detail.

But the detail is not the primary purpose of Mead's study. Rather her purpose is to use these "before-and-after" data to test and expand the theories of present-day social science regarding the interplay and interrelations of personality, character, and social organizations and institutions in order to better understand the process of social change and its consequences for mankind in these times of change.

"The Manus experiment itself is unique. The Manus were a people most favorably inclined toward change, conscious that cultural forms differed and could be changed, infused by their upbringing with an aspiration congruent with the more universal and humane forms of Western democracy, with the rare accident of a very gifted leader, and the unique experience of having a million men, members of a modern society intent on their own affairs, enact a large part of the pattern of Western democracy before their eyes." But all experiments are unique; it is the understanding of the variables and parameters which provides the basis for generalizations and new insights. And so too here. What in the upbringing of the Manus made them receptive to democratic values? What inclined them toward change? What were the characteristics of the leader, Paliau, —"speaking in a language which was not his mother tongue . . . [leading] a stranger people whose spirit he admired extravagantly . . ."—what were his characteristics which played an absolutely crucial role? Why was the advent of the American army basic to a basic change in the Manus?

The answers are complex and by no means only in the historical sense of complexity. They are complex because of the complexity of the dynamics of the interplay between persons and their social order. And it is precisely because Margaret Mead utilizes our *systematic* understanding, as we have it today, of these processes that this unique Manus experiment provides generalizable knowledge that is applicable to other circumstances of social change in being and yet to come. For example: "Whenever a people wish to take over some invention or discovery or practice of another people, the real alternatives should be seen as between taking over the new idea in the most abstract form possible, so that it may be incorporated within the old pattern with a minimum of change, or else taking over as much of the culture in which the new idea is imbedded as possible." There are convincing reasons for this argument which can only be adequately (as contrasted to "commonsensely") understood after reading her book. They are so convincing that it behooves, for example, those who plan to bring atomic power to other cultures to plan, even more carefully than they plan their reactor designs, their social designs.

By writing *New Lives for Old* in the way she has, Mead has made a twofold contribution; not only has she substantially added to our understanding of the process of social change and to an understanding of the techniques which will help facilitate it in a humanitarian and stable manner, but she has provided an additional important by-product for realizing our own efforts to create for ourselves new lives for old. Our own social change—if it is to be salubrious—depends in significant part on the mutual understanding of our natural and social scientists.

Mead has deepened this understanding by providing a convincing refutation to the often smug assumption on the part of many "natural" scientists that the social sciences are after all a fuzzy collection of insightful, but still common, sense. Her careful reexamination of her understandings, misunderstandings, and ignorance of the significance of her 1929 data in the light of 1955 theory, and her careful application of the factual knowledge on personality and social dynamics accumulated in the intervening years, are in the best scientific tradition. There can be few readers indeed who will continue to perceive her exposition of the nature of social change, in terms of the relationship between social institutions and personality, as less than scientific in manner and means. As always in science, her conclusions are incomplete, and new unanswered questions emerge. But her enthusiasm and optimism, as they have in the past, will stimulate others to join her in the search for more and better answers.

DONALD N. MICHAEL
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The Pursuit of Science in Revolutionary America, 1735–1789. Brooke Hindle. Published for the Institute of Early American History and Culture, Williamsburg, Va., by the University of North Carolina Press, Chapel Hill, 1956. 410 pp. $7.50.

Science in the British colonies of America, and its continuation during and after the Revolution, long a neglected subject, has received considerable attention during the last quarter of the century. The objectivity of the research itself has not been without a certain subjective end: it had to be shown that the colonies were not, as was sometimes believed, only an intellectual backwater of the growing empire, but that they could hold their own with the mother country itself. Monographs are now plentiful, books have devoted chapters to some aspects, and our respect for colonial science has increased. The early antics of the American Philosophical Society and Bartram's travels have become as recognized and entertaining a part of American history as the Boston Tea Party. But a full study in book form was missing, and this gap has now been admirably filled by Brooke Hindle's book.

Hindle has not just compiled a book out of the existing monographs. He has gone over the whole field anew, searching at the sources, reading unpublished, as well as published, forgotten, as well as remembered, material, extending his studies into the first years after the Revolution. The source material consulted in different libraries is impressive. Years of work have gone into the gathering alone.

His final year is 1789, a convenient date to separate the mercantilist from the industrialist period. We are now able to see in detail the story of British colonial and revolutionary science unfolding, and make the acquaintance of the "natural history circle," the naturalists and physicians, teachers and travelers, experimenters and theoreticians of the period. We meet Bostonians, Philadelphians, Charlestonians, the circle around Franklin, Rust and Bartram, the founders and early members of the American Philosophical Society and of other clubs. Due emphasis is placed on the transit of Venus of 1769, the first organized scientific effort in the colonies, and in which their astronomers showed that they were worthy colleagues of their European associates. The last section of the book. "The new nation," lets us have a look at the physicians during the Revolutionary War, the attempts at natural history and natural philosophy in the young republic, and includes the early experiments with steamboat and balloon. There are many and interesting illustrations.

This book is truly an achievement and throws new light on the forces that made American intellectual history. Will the manner in which the author conceived his task always satisfy his readers? I, for one, with all appreciation for the precious wealth of information contained in the book and its careful arrangement, would gladly have missed some of the minor facts in order to obtain a better understanding of the true highlights of this American science, of those works that were real contributions to the world's science or technique. Such contributions