exposition. The final chapter explores the present state of knowledge of human evolution.

The teacher will find this small volume an invaluable reference on his own bookshelf. Although presented as introductory material for the unspecialized student it nevertheless provides a balanced and authoritative treatment of human origins. It is well adapted to fill a gap frequently found in the preparation of many biologists.

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THE NAVAHO, Clyde Kluckhohn and Dorothea Leighton (Rev. Ed.), 355 pp., The Natural History Library, Doubleday and Co., Inc., Garden City, New York, 1962.

In my opinion this is one of the significant books for our times, not only in what it says but sometimes for what it does not say. Every Peace Corps member should be required to read it; every person who must deal with people will find in it most helpful information on the way sensitive and proud react.

If one likes to "bleed" over the plight of "primitive" peoples being displaced and destroyed by "civilization," this is also the book. Few other groups ever had a worse time than the Navaho. But one also finds new perspectives on the causes that produce and maintain the continuing plights of people which have become so evident over a vast part of the earth. At the moment we are deeply involved with a "primitive" enclave called Appalachia. If the Judaeo-Christian ethic is really part of our civilization as our coins and stamps declare, we must do something about both the Appalachians and the Navaho; and in so doing, it is extremely important to us to remember that peoples, however "primitive," already possess a culture which has allowed survival over many millenia. They have their own myths, their own folklore, and their own folk medicine. It should not be particularly amazing to us that they frequently refuse to accept our myths, our folklore, and our folk medicine but prefer to continue in the old ways in squalor and poverty.

The Navaho, originally published nearly twenty years ago, grew out of a failure. From the calamity of Fort Sumner up to 1933 the Navaho made a remarkable recovery. In fact they succeeded too well in recovering from a population low of 15,000. By 1933 they had reached 50,000 and the reservation was overcrowded despite its seemingly vast extent. Today the problem is even more severe with the Navaho numbering over 90,000 and with no place to go.

By 1933 the overpopulation of the reservation had produced serious problems of land use and resources, and the U.S. Office of Indian Affairs began to marshal the resources of many physical and social sciences to meet the crisis. Ecology, agronomy, medicine, education, and other fields were asked to contribute.

"The government's program," say the authors, "has been without doubt one of the closest approaches yet achieved to an intelligent, planned, and integrated application of scientific knowledge to the practical affairs of a whole people. In some ways the results of this experiment have been gratifying, but in others they have been disappointing in terms of the knowledge, skills, and resources expended. Where was the flaw?"

Kluckhohn and Leighton go on to say that the central hypothesis of their book is that the "incomplete success" of the Navaho assistance program was in an important degree due to the lack of understanding of certain human factors. Problems of human relations and the psychological processes and assumptions of the Navaho were largely ignored. In other words, the plans were based on our assumptions backed by the myths, folklore, and medicine peculiar to our culture. The result was not only partial failure but caused considerable bitterness on both sides.

"The writers of this book believe that the Navaho Agency has been too exclusively concerned with material things, with externals. Issues have been seen too little in the light of the life experience and patterned attitudes of the individual Navaho. All the so-called 'intangibles,' the human factors have been left too much out of account. Though the policy-making group in the Indian Service has certainly been aware of these factors in theory, too often administrators have forgotten that to change a way of life you must change people, that before you can change people you must understand how they have come to be as they are." This is not a simple problem.

Other factors, of course, were involved in the Navaho situation as Kluckhohn and Leighton admit. The Navaho country is beautiful but poor for agriculture. Nature and overpopulation had created a situation in 1933 so that 12% of the land could be described as total waste, 30% would profitably support less than one sheep to 50 acres, 20% could support one sheep on each 17 to 25 acres, and only 16% could support a sheep on less than 16 acres. The Navaho sheep, like Elton's fanciful Himalayan antelopes, must have had to run all the time in order to get enough to eat.

The main interest in the Navaho situation, from a biologist's point of view, is the insight into the adjustment of the people to the environment, or what some call human ecology. The

life adjustments were originally good, and, in fact, must have been very good even after 1868. The failure in the early decades of the 20th century was spectacular. The *hogan*, in the old days a centrally heated mansion compared with the *tepee* of the plains Indians, became a symbol of poverty and disease. The Navaho was a thorn in the conscience of the newly developing "affluent society."

Most of the programs initiated by the Indian Service seem to us very logical. They involved, in the main, good stock and animal husbandry practices, erosion control, and sound medicine. But it would be difficult to explain to many an Indian farmer that you were going to double his meat harvest by killing half of his stock and making some minor adjustments in his breeding arrangements. Imagine the difficulties in communicating with a man whose stock practices involve:

"Early in the morning we take the sheep out of the corral. I sing a song and open the gate. When the sheep are half out my song is half finished. When they are all out I stop my song. They eat grass all day. They mustn't eat loco weed or they go crazy and run all around. If they eat sagebrush, I mustn't give them water or they will get blown out. At first they hold their heads and tails up and I must keep them quiet for one or two hours. Then when their stomachs are big, I punch them until they throw up. (Don't some people put needles into their stomachs?) Yes, sometimes they put a knife in to let the air out but that is not good. The flies get on the cut and generally they die. They get blown up if they eat milkweed in the spring even without water. But oats don't get blown up. This tears out their guts. If you open them up you find their guts are torn. Then there is owl-foot weed. If they eat that they throw up and die. When you are out herding there are songs for the protection of the sheep and to make them increase." (Transcription of field notes, p. 70.)

The medical program has worked better than many others, perhaps as the authors say because, "Illness is a matter of much concern to the Navaho, and he is perhaps more willing to try new methods of healing than new methods of raising sheep." But the tendency to separate health and other matters bothers him. As one headman said, "We shall all be very healthy and die of starvation."

Also, the impersonal scientific perfection of Western medicine is as much a matter of concern to the Navaho as it is to some of our own people. The attitude of the "unacculturated" Navaho is reflected in this passage:

"You go to a hospital and maybe once a day the doctor comes around and he stays three, maybe five minutes. He talks a little bit but he asks you questions. Once in a while they give you a little medicine, just a little of it. About the only thing they do is to put something in your mouth and see how hot you are. The rest of the time you just lie there. But the medicine men help you all the time—they give you lots of medicine and they sing all night. They do lots of things all over your body. Every bit of your body is treated." Some Spanish Americans go to the Navaho medicine men, but the "Anglos" largely eschew their services.

Despite the partial failure of the programs of the Indian Service the Navaho condition has improved since the 1940's. The tuberculosis rate has fallen although it is still nearly eight times that for the U.S. population at large. In general, material conditions have changed for the better. Fewer sheep have meant more meat and wool. Better erosion control and farming methods, together with irrigation and other improvements, has generally upgraded the Navaho community. There is still much to do materially and even more in the area of the "intangibles."

The changes in the Navaho way of life are less easy to assay than the changes in his material condition. His life view differs in many respects from that of the ordinary American. Marriage, sexual relations in general, inheritance laws, and views on inheritance and property rights all differ between the two cultures. The tendency, in general, seems to have been as Arnold Toynbee observes for the "weaker" culture to absorb the less significant elements of the "stronger." The Navahos have accepted Western clothing, soft drinks, alcohol, automobiles, and in part at least, a capitalistic economic base without much understanding or acceptance of the underlying principles. "Instead of a patterned mosaic," say the authors, "the Navaho culture is becoming an ugly patchwork of meaningless and totally unrelated pieces."

"The introduction of the white type of individualism without the checks and balances that accompany it leads to the failure of collective or cooperative action of every sort. The substitution of paid labor for reciprocal services is not in and of itself a bad thing. But there is not a commensurate growth of the white sort of individual responsibility. There tends to be a distortion of the whole cultural structure which makes it difficult to preserve harmonious personal relationships and satisfying emotional adjustments. Widespread exercise of escape mechanisms, especially alcohol, is the principal symptom of the resultant friction and decay. Human groups that have different cultures and social structures have moral systems that differ in important respects. The linkage is so great that

when a social organization goes to pieces morality also disintegrates."

Much of the old Navaho culture is still intact because segments of the population still do not speak English. "The solutions which the people (the Navaho) have worked out through countless generations of trial-and-error learning must have some message, some meaning to other groups of our common humanity who have met the same issues in different contexts and worked out other answers. The effects which the special Navaho situation and the traditional Navaho solutions have had upon personality development illumine processes which are in some sense universal."

What do the Navaho have to say to us? Are they merely a bestial "primitive" people tending to polygamy, intractible and inelastic in the face of modern civilization, or do they have solutions to problems which would help us in other areas? Surely out of their wild-flower strewn deserts, their blue mountains, and their blazing noons they have gained more to contribute to modern man than the tinkling of Navaho silver or the carmine of a Navaho rug. Read their myths and listen to their songs. Perhaps they have a message for us when our whole world glows red in the sunset from the gulleys of senseless erosion.

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LABORATORY TECHNIQUE IN BIOLOGY AND MEDICINE, 4th Ed., Victor M. Emmel and E. V. Cowdery, xxxiv, 453 pp., $15.50, Williams and Wilkins, Baltimore, 1964.

For any biologist who is doing research, directing research, or teaching about research, this book can be reviewed in two words, "Get it." For a book as expensive as this, however, a discussion of its contents and use is in order for the benefit of readers who have not used earlier editions.

This book may not have all of the answers to "How do I do it?" questions regarding laboratory techniques, but it has enough of them so that it should be the first place to look. The information is presented as a dictionary of names of methods and structures. A given subject may have a one line cross-reference, or it may have a discussion that runs to as much as six pages. The longer articles are signed and dated. Almost all of the information is documented by brief references to the most recent adequate account of the method. When unusual reagents or apparatus as described, a commercial source is often given. Throughout the text there are cross references in bold face type. Thus under the *Feulgen Reaction,* there is a reference to the original paper, a brief discussion of the use and theory of the method, cross-references to "Schiff's Reagent" and "Nucleic Acids," five additional references to the literature, the recommended hydrolysis times for 18 different fixatives, and a nine-step description of the recommended procedure.

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Microbiology

ELEMENTARY MICROBIOLOGY, Orville Wyss, O. B. Williams, and E. W. Gardner, Jr., 318 pp., $5.95, John Wiley and Sons, Inc., New York 16, 1963.

This book is written for a terminal course in microbiology, presented to students who want some broad understanding of the subject. The book is unusually well illustrated, and its organization lends itself to the purposes which the authors had in mind.

However, as in most cases, this book is mainly concerned with the subject of bacteriology. The penchant of bacteriologists at the present time to label themselves as microbiologists, albeit a defensible move, is not reflected in the courses of study which they teach. This book is such an example because other microorganisms are mentioned briefly, at best.

There is an emphasis on the current applications of microbiology to food, industry, and soil. The chapters on disease are quite inclusive, and the general tone of the book is one of current and up-to-date knowledge. This will be a fine book for reference purposes in the high school laboratory, and most importantly, it meets the purposes for which it was intended in the elementary microbiology course.

LABORATORY MANUAL FOR ELEMENTARY MICROBIOLOGY, Orville Wyss and Curtis Eklund, 101 pp., $2.95, John Wiley and Sons, Inc., New York 16, 1963.

A brief manual prepared for college students enrolled in a survey course in microbiology. This manual which is almost devoid of illustrations is organized to satisfy three basic aims. These are: (1) to provide practice with the basic tools of the microbiological laboratory, (2) to review some of the classical experiments in the field, and (3) to open avenues for student research. The manual lists activities for 15, 3-hour laboratory periods. The presentation mandates a prelab and demonstration of techniques session by a competent laboratory instructor. Students desiring to use this manual to work on their own would find it very difficult in that the text wants for description or illustration of many techniques. Occasionally a novel or unique way of