or ridge. After a careful consideration of the problem of suture-closure, Dr. Weidenreich records the suspicion that growth and aging took a more accelerated course in *Sinanthropus* than in *Homo sapiens*. Sexual distinctions in size may have been a little more pronounced than in modern populations.

The species is viewed as lying on the direct line of ascent to modern man, with certain characters suggesting Mongoloid affinities. Dr. Weidenreich does not share the rather widely held view that the modern races are relatively recent variants from a generalized *sapiens* stock. Instead, he regards present human varieties as the product of already existing racial variations among the earlier hominids.

Taking exception to the views of Gregory and Hellman that *Dryopithecus* represents the stock from which both the human and anthropoid branches were derived, Weidenreich expresses the belief that the dentition of *Dryopithecus* and related forms betray specializations already suggestive of the anthropoid rather than the human line. Just as seriously, he has considered and rejected his own earlier views upon *Homo soloensis*. On the basis of more extended information, he now regards this form not as an Asiatic Neanderthal, but as an even more primitive variety lying in an intermediate position between the Pithecanthropus and Neanderthal stages.

Dismissing *Eoanthropus* as an "artificial combination of fragments," Dr. Weidenreich feels that our accumulated remains are now sufficient to establish a reasonably clear line of ascent to modern man. Furthermore, he regards this line as unbroken by extreme saltatory variations. The existence of more advanced forms, anatomically, in early geological periods which also reveal the presence of more primitive hominids, is explained on the basis of retardation in some areas, more rapid advance in others. Thus the living Australian he would regard, not as an archaic Pleistocene survival, but young in the sense that he has more recently attained a status through which the more phylogenetically advanced types have already passed. It remains to be seen whether the recently reported Keilor skulls suggesting, according to reports,[1] great antiquity for the Australoid stock, will force a reconsideration of this view.

Obviously some of Dr. Weidenreich's opinions will be challenged. The theory expressed above, for example, is capable of political distortion and has social implications which will not be well received in some quarters. To say this, however, does not prove Dr. Weidenreich's theory to be wrong, and certainly he offers it objectively, with no thought of stimulating racial disparagement. In seeking for an explanation of undoubted discrepancies between anatomical status and the geological age of more or less simultaneously existing Pleistocene forms, Dr. Weidenreich has fallen back inevitably upon an explanation, which, if true, might by indirection be taken to imply racial "childhood" for certain existing peoples. The mental implications of this view are not discussed, but they are too iconoclastic from the standpoint of the sociologist to be ignored.

The possibility of inequalities in the speed of development of various human types will be certain to add fuel to the controversy over racial superiority. Without attempting to assay the argument here, let it be pointed out that Dr. Weidenreich himself slyly comments that the European *sapiens*, on the basis of geological evidence, "must either be older or its later development must have been somehow more retarded than is the case with the Southeast Asiatic line. . . ." This good-humored remark should, I think, prove ample protection from charges of partiality toward the European branch of mankind.

Irrespective of some of the author's more tentative ventures into the unknown, the amount of anatomical detail available in the compass of this single volume makes it a priceless acquisition for the paleontologist and comparative anatomist. The book is more than a study of *Sinanthropus*. It is a vast and painstaking review of the whole subject of human evolution enlivened by an extremely thorough and original mind.

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REPORTS

WARTIME INVESTIGATIONS AT THE MELLON INSTITUTE. II

SCIENCE SERVES SYNTHETIC RUBBER

The production, purification and analysis of butadiene and styrene have been investigated searchingly by the multiple industrial fellowship on tar synthetics, and the fruitful results have been put in industrial practice at Kobuta, Pa. No success here has had a stronger spur and the rapid and very beneficial outcome demonstrates how war stimulates excellence in research. Studies have eventuated in specifications for metals most suitable for butadiene and styrene plant construction. Worthy fundamental work has been done on the physical chemistry of the purification of synthetic rubber raw materials. The polymerization phenomena of butadiene, styrene and acrylonitrile are under close scrutiny. In an adjacent field new tests

[1] F. H. H. Roberts, *Scientific Monthly*, 58: 156–157, 1944.

for adhesive properties and aging characteristics of tapes and for the rheological properties of elastomeric adhesives have been adopted as guides in the development of novel adhesive compositions. Extremely finely divided silicate minerals have been found satisfactory as reinforcing fillers for natural and synthetic rubbers.

Discoveries in Protective Coatings

The fellows in the domain of protective coatings have similarly shown ready and productive responsiveness to heavy demands. Investigations were continued on underwater coatings and several papers were published on the basic aspects of antifouling paint performance. Exhaustive studies of possible accelerated corrosion effects arising from the accidental or deliberate contacting of steel hulls by the antifouling paint have disclosed that appreciable acceleration can arise under the usual type of heavy metal-containing antifouling compositions. The interposition of even a single barrier paint coat substantially eliminates any accelerated attack, though all tests indicate the desirability of employing at least two such intermediate coats. Accidental contact with large areas of the hull not only causes accelerated pitting but also may inactivate the antifouling paint.

Some New Compounds and Their Uses

Descriptions were released of simple and differential cryometers for measuring the degree of purity and the freezing temperatures of liquid or melted substances. An article set forth information on foam formation in organic liquids. The production of alkylene polyamines is being delineated precisely for industrial application. New organo-silicon compounds have been prepared and made commercially. The likely industrial utility of new aluminum derivatives has been surveyed from all points of view. From investigations on nickel compounds and catalysts, products have been developed that are of promise in the synthesis of motor fuel, in the preparation of chemicals for synthetic rubber and as ingredients for lubricants, paints and combination insecticides-fungicides. In other insecticide research several difficult assignments have been dealt with. For instance, an insecticide has been originated which is being tested for use in an important war application. Then, too, the betterment of insect repellents is being carried forward.

Success in the Pharmaceutical and Chemical Hygiene Fields

Several new organic iodine compounds have been prepared in research relating to improved iodine antiseptics. A novel commercial synthesis of theophylline has been achieved. Work on intermediates for sulfa drugs has kept pace with current advances in the field. A new petrolatum gauze has been developed. Dehydration of gypsum to produce plaster for surgical casts has been accomplished by an improved process. The original paths of research of the Industrial Hygiene Foundation at the institute have become avenues of progress. In chemical hygiene by means of animal and human experiments there have been completed studies on the toxicity of several new products and of materials whose health hazards were unknown, all of them used by the military forces or by prime government contractors: dioctyl phthalate, new cable-impregnating compounds, low-temperature lubricants, extreme-pressure lubricants, newer insect repellents, a new textile lubricant and cobalt oxide dust. "Range-finding" toxicity tests have been performed on twenty-two new organic chemicals which are under industrial development owing to war demands. Altogether twenty-six of the hundred fellowships in operation relate to specific divisions of chemical technology.

The Institute's Department of Research in Pure Chemistry

The interests of this department have been directed chiefly toward studies on synthetic antimalarial drugs. The presence of U. S. Armed Forces in tropical areas (in which the hazards of climate and of endemic infections are foreign to conditions normal in most of our country) has given immediate pressure to the need for new chemotherapeutic agents for combating diseases which, in the past, were but occasionally found in our coastal cities and metropolitan centers, except in the southern states. Along with many other American laboratories, special emphasis has been placed on the synthesis of compounds which might prove of value in the treatment of malaria and of certain other infections previously rare within our own borders.

The Urgency of Research on Antimalarials

Even prior to our entry into the war, the need for new and more efficient therapeutic agents for coping with malaria was beginning to attract some share of the recognition to which this most important medical problem is entitled. The ability of this disease to influence the course of military campaigns, demonstrated again on many battlefronts of World War II, has brought into sharp focus our deficiencies regarding drugs capable of controlling the infection. It has been reported that 85 per cent. of the U. S. and Filipino troops on Bataan suffered from malaria, and that the

infection rate in the South Pacific has averaged nearly 50 per cent. It seems established that, until new compounds are discovered which can act as casual prophylactics or can effect a true sterilization of the disease, the war in the Pacific will continue to be fought against two enemies, the Japanese and malaria-carrying mosquitoes. The fact that research on antimalarials is more than merely a war problem is indicated by the number of publications which have appeared on the possibility of the importation of malaria into the United States at the termination of hostilities. Species of mosquitoes capable of transmitting malaria are to be found throughout the nation and the return to civilian life of men bearing chronic malaria infections may possibly be followed by the establishment of new endemic foci in sections now free from the disease. Furthermore, as the strains of the parasite introduced will in general be foreign to this country, little or no existing immunity will be found thereto. Obviously, in the face of such possibilities, the search for new and improved antimalarials will require continuation in the postwar period.

ADVANCES IN THE INSTITUTE'S ANTIMALARIAL PROGRAM

Owing to the extreme urgency of the problem of finding improved antimalarials to replace quinine, a drug which is now practically unobtainable since the acquisition by the Japanese of the Dutch East Indies, the activities of this department have been largely concentrated on the synthesis of new drugs of possible antimalarial value. Because of wartime limitations, it is not permissible to describe these investigations. It can be stated, however, that the results obtained with certain new drugs as antimalarial agents are sufficiently encouraging to warrant further researches. A survey article on the advances in antimalarials has been published. Under a scheme promoted by the National Research Council, arrangements have been made for evaluating the antimalarial effectivity of new drugs. Furthermore, the cooperation of those fellowships engaged in research in organic chemistry at the institute has been enlisted, so that likely compounds prepared by them may also be tested if desired. Over eighty new drugs have been submitted for antimalarial appraisal, embracing substances related to quinine, quinacrine and pamaquine; in addition, many quinoline, pyridine and aromatic derivatives have been prepared and studied. In part, efforts have been directed toward possible ways of diminishing the toxicity of chemical structures recognized as possessing antimalarial potentialities. Facilities have also been provided for testing new drugs for possible activity against trypanosome infections.

Every resource is being employed to expand the institute's area of opportunity and aid to our country at war. In this résumé it is shown that results of value have been effected by tapping the constructive power of the research staff, whose members are constantly being given channels for personal assistance through the cooperative procedures of the institution and the close contacts maintained with governmental agencies.

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SPECIAL ARTICLES

STUDIES ON THE GROWTH OF RATS RAISED ON CHOCOLATE MILK[1]

AT the present time rather large quantities of chocolate products are included in the average American dietary. A considerable amount of the chocolate is consumed in chocolate milk or in products containing appreciable amounts of milk solids. In spite of the increasing utilization of chocolate in the diet, questions are still raised concerning its possible harmful effects. Mueller and Ritchie[2] found that rats fed mineralized whole milk containing 1 per cent. of cocoa grew as well as those receiving the mineralized milk alone. When fluid chocolate milk containing more than 1 per cent. of cocoa was fed *ad libitum* the rate of consumption decreased as the percentage of cocoa added increased. When cocoa was added to whole milk powder definite retardation of growth did not result until 4 per cent. of cocoa was used. The results reported in this paper as well as those given in later papers by Mueller and coworkers[3] have attracted considerable attention because deleterious effects were obtained with the higher levels of cocoa. It is, however, difficult to evaluate the results until consideration is given to the actual amount of cocoa used in commercial chocolate milks.

Since a uniform chocolate milk was being prepared daily by our Department of Dairy Industry[1] we were asked to study its nutritional value on animals. The

[1] Published with the approval of the Director of the Wisconsin Agricultural Experiment Station. We are indebted to Mr. Gideon Hadary for the continuous supply of these milks.

[2] W. S. Mueller and W. S. Ritchie, *Jour. Dairy Sci.*, 20: 359, 1937.

[3] W. S. Mueller, *Jour. Dairy Sci.*, 25: 221, 1942; L. D. Lipman and W. S. Mueller, *ibid.*, 24: 399, 1941; Faye Kinder, W. S. Mueller and Helen S. Mitchell, *ibid.*, 25: 401, 1942; W. S. Mueller and Marilyn R. Cooney, *ibid.*, 26: 951, 1943.