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COVER: Child with severe case of smallpox. The World Health Organization hopes to finally eradicate this ancient scourge this year by treating outbreaks one by one, thus stopping spread of the disease. See page 74. (Photo: WHO)

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Books	Margit Friedrich
Advertising	Scherago Associates, Inc. 11 W. 42nd St. New York, N.Y. 10036 Fred W. Dieffenbach Sales Director

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Science News of the Week

AAAS Meeting: The Quality of Life

"If our generation survives . . . people will look back at our time and say we were insane," said outgoing President Roger Revelle of the American Association for the Advancement of Science at the opening of the association's 141st annual meeting in New York this week. Instead of wasting time arguing over such things as military deterrents, "We have got to talk much more loudly," he says, "about questions of survival." This concern was echoed throughout the AAAS meeting, in various sessions devoted to food shortages, climatic change, population growth, health care and the changing urban environment—all organized around the conference theme: "The Quality of Life." The problem presented to a society that now faces a multitude of crises is nothing less than transformation of the post-World War II life-style based on cheap energy, says current AAAS President Margaret Mead, and science can help define the options available and find out what the public really wants. Mead scorned the use of polls that only measure public reaction to some specific policy, suggesting instead that sophisticated new techniques of in-depth interviewing be used to determine how people would react to a wide variety of options. For scientists to be able to help meet the challenges that would then present themselves, better communication between the scientific community and politicians must be established. Mead concludes: "The knowledge the President is going on is 20 years out of date."

To help formulate a position on what sort of science advice the President needs, the AAAS meeting featured a panel discussion including several scientists who have served in various science advisory capacities in the last three administrations. The urgency of the issue was expressed by William D. Carey, who spent many years in the bureau of the budget: "If the Government goes on believing that science is partly a charity activity or a cure for this morning's headache, we can expect the worst—and that's what we've been getting."

Clay T. Whitehead, who worked on science policy in the Nixon White House, emphasized the need for more technically trained people in various agencies, such as the Office of Management and Budget. Science advice, he



Mead and Revelle: Much more loudly.

says, "doesn't mean a damn" unless White House decision makers understand what it means in terms of national policy.

The last Presidential Science Adviser with full-time White House duties, Edward E. David, adds gloomily that the country seems to act on a "crisis-by-crisis" basis, and that though past advisers warned about the energy and food crises long before they appeared, little constructive action was taken. To this, panel moderator Jurgen Schmandt of the University of Texas in Austin replies that unless society can learn to respond to the scientists' "early warning system," about all that the scientific community can do is prepare for the time when "action readiness" comes about. At times the response to this challenge by scientists at the meeting was almost evangelical: One conference speaker modestly titled his talk "What must we do to be saved? The modern dilemma." Other speakers took more explicitly political stands than have been common at past AAAS meetings, condemning the "insidious" use of health care as a means of social control, or asserting the rights of the elderly and poor, as in a talk entitled "How to hurt aged tenants without even trying."

But other speakers represented a new sense of cautiousness. One session focused on the problems of the misuse of scientific data by the uninformed and by outright charlatans. Richard W. Roberts of the National Bureau of Standards finds a classic example in the old phlogiston theory: When chemists found that metals gained weight upon oxidation, rather than losing it as they had expected, they merely twisted their theory still further to say that the phlogiston lost during oxida-

tion had "negative weight." This twisting process still goes on, several speakers warned, especially in areas not open to rigorous experimentation which develop a popular following based on erroneous belief.

Clearly, the association and individual scientists present were seeking new roles and new relevance in a time increasingly beset by problems more complex than any faced in the past.

Development may not cut population

Recent research has cut out a fundamental assumption underlying population control efforts, according to a panel of social scientists at the AAAS meeting. Known as the Theory of Demographic Transition, the assumption that a rising standard of living automatically results in decreasing birth rates, has been seen as the last hope for curbing the population explosion. Now, according to panel moderator Peter F. M. McLoughlin, some researchers believe that in some cultures the transition period between peasant and industrial economies is marked by *rising*, not falling, birth rates. Since this period may last a couple of generations, resulting population increases could be considerable.

McLoughlin bases his conclusions mainly on the subjective judgment of researchers in the field and admits that sufficient data is lacking to define the exact nature of the transition period; but the anomalous growth, he says, apparently results from the social disruptions that accompany industrialization. Families have more children to minimize the economic insecurity that comes with the breakdown of traditional cultures.

University of California sociologist Rae L. Blumberg agrees. She points not only to the "risk increase" that faces families no longer sheltered by village society, but also to the occasional economic betterment that a family can achieve in a developing economy by having more children to bring in income. What results is a "cruel paradox," she says, in which each child may represent a liability to the developing country, but is an economic asset as well as personal asset to the individual family.

Blumberg sees this pattern fitting into an alternative theory of fertility—that birth rate depends on parents' expectations of costs versus benefits of having additional children. This, in turn, depends on the society's state of development, especially the economic status of women. Where women share economic power, Blumberg concludes, they are more able to participate in "life options" such as spacing and num-

As Edward David said of the Government's science advice apparatus, it was set up "in a different era," one with narrower problems, more directly approachable. The question remains whether either the Government or the scientific community can restructure its decision-making apparatus fast enough to keep up with some of the problems worriedly discussed at this year's AAAS meeting. □

ber of children, and generally have fewer children. To back up her theory, she points to research by anthropologist Richard Sipes, showing that in a 17-nation sample, the higher the position of women the lower the society's birthrate.

George Washington University anthropologist Ruth B. McKay says her study of well-to-do black families in Baltimore supports this conclusion. Most of her families made the transition from the lower to the upper classes in just one generation—mainly through education and hard work, including that of the mother. Fertility, she found, dropped from an average of 5.2 children per family to only 1.5 in that one generation.

She also found an unexpected corollary: In the smaller families girls outnumbered boys 5 to 4 and in fact, she says, that stems from the age of the father at the time of conception. Apparently, older fathers tend to sire a larger proportion of girls and the fathers in her sample ranged from 24 to 50—much older than among poorer families at the time of first conception. Cautiously she says, this raises "a shakey question I have for the future: What happens when these girls grow up looking for husbands?"

The speakers conclude these recent findings have serious implications for population policy. If the assumption that economic development leads quickly to a drop in birth rate proves untrue, McLoughlin told SCIENCE NEWS, then the world may soon reach the point where its population cannot be supported and "somebody is going to have to die." Not enough thought has yet been given to what sorts of development tend to have the best effect on population growth, he says.

Blumberg offers one specific suggestion: Synthesize education and job opportunities for the young women in developing countries, particularly those between the ages of 13 and 20. By delaying childbirth and increasing women's economic participation in society, such a program, she says, could have a great effect in slowing population growth. □

Social stress and the immune system

More and more medical attention is being paid to the role of immunological systems in chronic diseases such as cancer and heart disease. At the same time attention is being focused on the psychological and social bases for disease. Research linking the failure of the immune system to psychological stress was discussed at a session on brain function and health at the AAAS meeting. Inherent in this finding is the possibility of controlling diseases by learning to control psychological stress.

Psychiatrist Marvin Stein of Mount Sinai School of Medicine in New York reviewed the findings. The immune system, he said, has been implicated in a wide range of diseases. In some cases, it fails to protect the organism from invading bacteria and viruses. In other cases, the immune system overreacts, causing the release of factors that damage the animal's own tissues and causes the so-called autoimmune diseases such as rheumatoid arthritis, hemolytic anemia and ulcerative colitis.

Both the underreaction and overreaction can now be linked to stresses on the nervous systems of experimental animals. In several studies, rats and monkeys have been taught to perform tasks at the presentation of a signal to avoid receiving an electric shock. This stress, over long periods, leads to increased susceptibility to several types of virus infections, including tumor and poliomyelitis viruses. Electric shocks and daily handling of rats early in life decreased their chances of surviving the injection of sarcoma viruses.

In other studies, it has been shown that lesions on the anterior hypothalamus can decrease the numbers of antibodies circulating in an animal's blood and can thus decrease the overreaction response of the immune system. There also appears to be some nerve transmission across the vagus complex during certain immune responses. These findings suggest that the nervous system might be affecting the type and magnitude of immune responses, Stein says.

Once the connections between the cerebral cortex, the nervous system and the hypothalamus have been elucidated, it may be possible to teach animals—including humans—to control nerves that effect the immune system and thus prevent certain types of disease.

At the same session on brain function and health, the founder of the field of autonomic nervous system control, psychologist Neal E. Miller of Rockefeller University in New York, discussed some of the psychological factors that may predispose individuals

to disease and how they might be overcome. Citing studies on stress-related diseases, such as lesions of the stomach, he said it appears that changing general worry to specific fears helps reduce stress-related illness, particularly if the animal learns to deal with the specific danger. Thus, although the animal is still exposed to the stress, knowledge of how to cope with it reduces the incidence of certain diseases.

Stressful sociological conditions are also implicated in a constellation of illnesses. Elmer L. Struening, director of psychiatric research at the New York State Department of Mental Hy-

giene at Columbia University, reviewed a large number of epidemiological studies which show that under certain social conditions, the incidence of infectious and chronic diseases increases. These include unemployment, recent widowhood, lack of support from personal relationships, the isolation of ethnic group members and rapid urbanization of a previously rural area. This research, some of it based on decades of medical records, shows that there is a definite link between psychosocial problems and disease, Struening says, and he points up the need for more research in this area. □

valuating the currency—runaway inflation was threatening the Roman Empire with collapse.

Excavation of two housing complexes sheds light on the daily life on ancient Aphrodisias, at least among the rich. The houses contain elaborate mosaic floors, with geometric and figurative designs, such personal items as a portable sundial and some perfume containers, a few glass objects and ubiquitous terra-cotta lamps. Most of the buildings in the city were destroyed by the frequent earthquakes that plagued the region, so that in the ruins of the temple to Aphrodite were found remains of two previous temples, one dating back to the 6th century B.C.

Despite the occasional intrusions of such modern technologies as carbon dating, classical archaeology remains basically a shovel and trowel operation, performed by people with a strong romantic streak in addition to their scientific curiosity. Erim is no exception, as one immediately senses when he describes his "little gem"—the odeum, or small theater used for concerts and ballet. The floor is patterned with rich local marbles of pink, blue and white, and the film provided an appropriately romantic moonlight tour among the aging columns and interspersed trees. Erim described to *SCIENCE NEWS* how he and some fellow workers would take a transistor record player into the odeum at night and have their own private moonlight concerts.

To preserve the archaeological treasures and to make them available to a wider audience, the Turkish government is building a museum at Aphrodisias, aided by funds from the National Geographic Society, which has sponsored Erim's decade of work. At present, artifacts are stacked on shelves of the excavation headquarters or scattered about the yard, and their organized display will represent a major addition to the world's collections of antiquities. If he can get enough funds, Erim hopes to have the museum open sometime next year, and begin convincing others of his belief that "Aphrodite still looks over her favorite city." □

Aphrodisias: Provincial Roman life

Besides giving scientists a chance to talk with their fellows in other disciplines, the annual AAAS meeting provides an opportunity for the layman to glimpse how the business of science is actually conducted, through a series of public lectures. This year's National Geographic Society-sponsored lecture offered a particularly appealing example as New York University professor Kenan T. Erim narrated a silent film showing in intimate detail some varied scenes from his life's work—excavation of the ancient city of Aphrodisias in southwestern Turkey.

Considered by some scholars to be the most important excavation now in progress at a classical site, the digs at Aphrodisias have revealed a wealth of new material depicting life in a provincial capital of the Roman Empire. In introducing the speaker, University of Pennsylvania anthropologist Ward H. Goodenough called this life in the provinces "the part of the Greco-Roman world that didn't get into the textbooks." He compared the resulting vision of antiquity to one that future archaeologists would have if they tried to describe current American civilization only in terms of what happened in New York, Washington and Chicago.

In those terms, Aphrodisias was a Roman San Francisco, far removed from the seat of power, but endowed with a culture famous throughout the Roman Empire. It had the good fortune to be located near vast marble deposits, and sculpture and marble slabs became principal exports. Named for Aphrodite, goddess of love, natural forces and the goodness of life, the city's remains, slowly uncovered during the past 10 years, reveal a wide variety of the buildings and works of art that represent provincial culture at its best.

One of the most rewarding and difficult tasks of the excavation has been the tedious unearthing of a large amphitheater that had been buried under 30



Aphrodisias's love goddess Aphrodite.

feet of debris. The film shows Turkish workmen staging races with their wheelbarrows as they remove the dirt, while nearby, children drive their herds to pasture through the excavation site. Sculptures found so far in the theater include figures of athletes, gods, philosophers and emperors—which are dutifully put back together with epoxy.

Erim comes from Turkish descent and he has apparently been very successful in winning the confidence of local villagers, who have proved invaluable in helping locate and retrieve works of art. One boy brought him the fragment of sculpture which led to the discovery of an ancient necropolis, and a local farmer used his tractor to help Erim and his workmen recover a large sarcophagus from the site. Another sarcophagus was found being used by villagers as a vat for crushing grapes. One discovery bore a particularly pertinent inscription. On stone panels from the ancient city's marketplace were edicts from 301 A.D. by Emperor Diocletian, freezing all prices and de-

Diabetes drugs and fatal heart disease

One of the most common drugs given by mouth to control diabetes is Orinase, marketed by the Upjohn Co. In the *Physicians' Desk Reference*, one of the doctors' main guides to prescription drug use, the following is stated about Orinase: "Orinase appears to be remarkably free from gross clinical toxicity on the basis of experience ac-