

SCIENCE NEWS OF THE WEEK

AAAS: Politics . . . and Science

When in Washington, do as the politicians do. And that's just what a good many scientists did last week when more than 5,000 of them gathered for the annual meeting of the American Association for the Advancement of Science. Even though the theme of the meeting was "Science and Technology: New Tools, New Dimensions," many of those present seemed more interested in arguing social-political issues and policy questions than in presenting and listening to hard science.

As in previous years, the AAAS showed its willingness to take a stand. This year the association stood up for the Equal Rights Amendment. The Board of Directors of the AAAS voted its support of the aims of the ERA and announced its intention to hold future AAAS annual meetings in states that have ratified the amendment. The AAAS will not meet in Chicago in January 1979 as had been originally planned.

Among the other argued issues were Laetrile, genetic engineering, the hazards of nuclear radiation, weather prediction and sociobiology. Although protests and demonstrations on these and other issues were more dignified than in previous years (partially because symposia organizers attempted to have more than one point of view represented on controversial issues), there was at least one incident that showed a considerable lack of dignity. Amidst shouts of fascism, racism and social Darwinism, sociobiologist Edward O. Wilson of Harvard University was doused with a pitcher of water.

Aside from issues and incidents, the prime reason for the AAAS meeting was evident in 140 symposia on topics such as Progress in X-ray Astronomy, Picosecond Lasers in Chemistry, Mathematical Questions in Biology, The Question of Meat, and Corrosion: The Silent Scourge. □

trend in the north.

- No significant changes in the length or variability of the growing season are seen.
- Favorable conditions will return to India and other parts of Asia, with monsoon failures becoming less frequent.
- Average weather conditions will return to the Sahel region. □

Fertility drop: Turning a corner

It may be the longest, widest corner in humankind's history, but population experts say it's finally been turned, and the world's population growth rate has begun to decline. And, significantly, it is the so-called developing countries that are responsible for the fertility drop.

"This is very exciting news, because it's coming from less developed countries," says Nick Eberstadt of Harvard University's Center for Population Studies. "Everyone always said these countries were backward and it would never happen, but now we've got good, solid evidence," Eberstadt said in an interview at last week's AAAS meeting.

The figures — compiled and interpreted from United Nations and national census statistics and by W. Parker Mauldin of the Population Council — show that the world's population growth rate peaked in 1970, at 1.9 percent per year, and has fallen in 1977 to 1.7 percent. From 1965 to 1975, declines of 20 percent or more have occurred in a number of developing countries, including Thailand, South Korea, China, Colombia, North Vietnam, Chile, Cuba, the Dominican Republic, Panama and Jamaica.

Overall, since 1970, developing countries have dropped from 2.4 percent to 2.1 percent in population growth rates (birth/deaths) from 42 births per 1,000 persons per year in 1970 (excluding China) to 36 per 1,000 in 1977 (the U.S. rate is 14 per 1,000). "But the world is still rapidly growing," cautions Eberstadt, who chaired a session on fertility at the meeting. It will now take 41 years for the world's population, about 4.1 billion, to double, instead of the 36 years it would have taken in 1970.

Researchers attribute two-thirds of the fertility decline to the gains made by developing nations in socioeconomic status. "As the standard of living rises, children become a more expensive burden," says Eberstadt. "They don't work in the fields most of their lives to support their families, as they did when people were poorer. Now they must be educated, and are seen by parents as an economic loss." In addi-

The 25-year forecast: Group prediction

Are we headed for an ice age, will the build-up of CO₂ reduce the world to a hot-house or are we in for a bumpy ride of increasing climatic variability? Few climatologists agree on the weather picture for the next six months, let alone for the next 25 years. But according to a study by the National Defense University in Washington, D.C., released at the AAAS meeting, the likelihood of a catastrophic climate change is small. Most likely, the climate until the year 2000 will be very similar to that of the last 30 years, with more possibility of global warming than cooling. William R. Gasser of the U.S. Department of Agriculture presented the first part of the study that will attempt to quantify and estimate the likelihood of various climatic changes, estimate their effect on crop yields and evaluate policy implications. "We're not forecasting, but putting quantitative bounds on climate," Gasser said. "It is a survey of opinion to allow decisions to be made on the best judgments available at the time."

The findings of the study, called "Climate Change to the Year 2000," are based on a survey of 24 climatologists in seven countries. From their answers to questions about perceived global temperature changes, five climate scenarios, ranging from large cooling (0.3° to 1.2°C cooler than the early 1970s) to large warming (0.6° to 1.8°C warmer), were defined and assigned a probability of occurrence. Depending on their perceptions of global temperature trends, each respondent was associated with a particular climate scenario. The details of each scenario, such as latitudinal distribution of temperature

changes, length and variability of the growing season, amount of precipitation and frequency of droughts and monsoon failures, were drawn and assigned probabilities.

Though Gasser said there was no consensus on any issue, the warming effect of CO₂ seems to be well established. The most probable event is a climate like that of the last 30 years caused by a balance of CO₂-warming and the cooling of the natural climate cycle. The responses suggest there is only one chance in 10 of a global warming of more than 0.6°C above the temperatures of the early 1970s or of a cooling of more than 0.3°C. Greater variability of temperature and rainfall is associated with extreme global cooling and less variability with extreme warming. Regardless of the temperature change they favored, most respondents predicted that any global temperature change will be magnified in the higher latitudes. However, they believe the "thermal inertia" of the southern hemisphere's oceans will reduce the magnification in that hemisphere. Although the panelists did not necessarily relate drought cycles to solar activity, their responses did support a 20- to 22-year drought cycle in the western United States. The climatologists did not, however, predict cyclic drought or monsoon failures in the rest of the world.

Briefly, the "forecast" for the next 25 years is:

- The warming effects of atmospheric CO₂ will tend to balance the natural cooling cycle.
- Temperatures will increase uniformly in both hemispheres, with a slight warming

tion, as health care improves, it becomes less necessary to have "extra kids" to make up for those who will die from malnutrition and other causes, Eberstadt notes.

Mauldin estimates that better lifestyles, combined with "programmed, family planning efforts," account for 84 percent of the growth drop in developing countries. While some observers note the turnaround has just barely begun to dent the world's total population picture, Eberstadt maintains the drop is significant. "Population has been rising for three million years," he says. "It seems we've now reached a peak. I can't see any way the birth rates will start to rise again." □

Gamma ray spectral line

It is hard to imagine the science of astrophysics without spectroscopy. The overwhelming majority of the information astronomers have about what is going on in celestial objects comes from study of the spectra of their radiations. Among the most useful sources of such information are the spectral lines. These lines are particularly bright emissions or absorptions at sharply defined wavelengths. The wavelength of a spectral line corresponds to a resonance frequency associated with some physical process that generates or uses energy.

Spectral lines in visible light usually are associated with energy changes in atoms. Their pattern can identify particular elements and tell something about what is happening to them. In the last decade the discovery of numerous lines in the microwave radio range has opened to observation a previously unknown complex of chemical processes in the interstellar gas clouds. As astronomy has moved from visible light to more and more parts of the invisible electromagnetic spectrum, one of the first great joys of observers in a new range has been the finding of spectral lines.

At last week's AAAS meeting, Lawrence E. Peterson of the University of California at San Diego reported the first confirmation of the existence of a line in the gamma-ray range by the instrument designated A-4 on the High Energy Astronomical Observatory satellite. In recent years Robert C. Haymes of Rice University has presented evidence for the existence of three gamma-ray lines at energies corresponding to 0.5 million electron-volts (0.5 MeV), 4.2 MeV and 6.3 MeV. Observations of the galactic center by A-4, which is a collaborative experiment by UCSD and the Massachusetts Institute of Technology, show evidence for a line at 4.2 MeV, and Peterson says, "We believe we have indeed confirmed existence of a line complex near 4.5 MeV." □

More cancer links to low-level radiation

Results of two related epidemiological studies show a small but statistically significant correlation between exposure to low levels of ionizing radiation and at least two types of cancer. Results of both studies were presented at the AAAS meeting.

The AAAS's Committee on Scientific Freedom and Responsibility called a special, last-minute session on health effects of low-level radiation as a forum for updated findings by Alice Stewart and George Kneale of the University of Birmingham, England, and Thomas F. Mancuso of the University of Pittsburgh. They studied employees of the Energy Department and its contractors at the Hanford facility in Richland, Wash. The "update" shows a higher than expected incidence of pancreatic cancer and multiple myeloma (cancer of blood-plasma cells), and also indicates that lung cancer "is probably contributing the biggest number of radiation-induced cancers," says Stewart.

More important, resulting estimates of the levels of accumulated exposure (over and above exposure to background radiation, an average 0.1 rad per year) necessary to double the occurrence of cancers in a population are very low—3.6 rads for bone-marrow cancers (such as multiple myeloma); 13 rads for lung cancer; and 19 rads for pancreatic, stomach and large-intestine cancers. Their computed "doubling dose" for all cancers in general is only 33 rads for men, 9 rads for women. Stewart told SCIENCE NEWS that there weren't many women on which to base the latter figure, but several previous studies have indicated that women may be much more sensitive to radiation than men are. Stewart says younger, live workers are actually those accruing the largest exposures, so the cancer trend should become more pronounced with time.

"You could easily get two rads with a barium enema," Stewart says, or accumulate several rads from diagnostic X-rays. (Rad is an acronym for *radiation absorbed dose*. One rad equals the absorbed dose of any ionizing radiation that is accompanied by the liberation of 100 ergs of energy per gram of an absorbing material.)

Ethel S. Gilbert, an epidemiologist for Battelle Pacific Northwest Laboratories, presented another study of the Hanford group in an earlier AAAS session. She concluded that deaths of white males from all causes were 75 percent of what would be expected by U.S. vital statistics. Cancer mortality was only 85 percent of what would be expected—"results typical of a working population." She said death rates for all causes were slightly lower among workers exposed to higher levels of radiation than among those exposed to lower levels and that "neither death from all causes nor death from all cancer types shows a positive correlation with external

radiation exposures." The Stewart group accounted also for internal exposures.

Gilbert found a slight radiation-related increase over the expected incidence of multiple myelomas and pancreatic cancers, but cautioned that while they "warrant attention, one must consider the possibility that they may be due to other occupational exposures [such as chemicals] or pre-Hanford radiation exposures."

Gilbert's study, funded by the Energy Department, was conducted using much of the same data as that of Stewart, Kneale and Mancuso, and is actually an extension of a study begun by Mancuso 13 years ago. Shortly prior to Mancuso's controversial termination as the study's principal investigator last August (SN: 2/18/78, p. 103), he enlisted the Birmingham pair to analyze his data—Stewart as epidemiologist, Kneale as statistician. During recent congressional hearings it was alleged that the government was using Gilbert's work to refute and take attention away from Stewart, Kneale and Mancuso.

Statistical methodology is the primary difference between the Gilbert and Stewart-Kneale analyses. Although interpretations of their respective findings differ considerably, each say they used the best approach. Stewart, often regarded as the mother of radiation epidemiology, is known worldwide for pioneering work in demonstrating a high incidence of leukemia among children of women exposed to pelvic X-rays during pregnancy. □

Another attempt at a DNA bill

A two-year interim bill to extend National Institutes of Health guidelines to all publicly and privately funded recombinant DNA research was described by Burke Zimmerman of the House of Representatives Subcommittee on Health and the Environment at the AAAS meeting. Zimmerman said the bill will be introduced in a week or two by Rep. Paul G. Rogers (D-Fla.) and Rep. Harley O. Staggers (D-W.Va.). The proposal incorporates those sections of the NIH rules that describe prohibited experiments, classification of research and safety procedures (Sections II and III, Containment and Experimental Guidelines). Recombinant DNA would be defined as in the current guidelines.

The bill would empower the Secretary of the Department of Health, Education and Welfare to draw up administrative regulations within 90 days of passage. Thus the bill's sponsors are attempting to bypass congressional arguments on procedural topics, such as maintaining trade secrets. Exemptions for activities deter-