ductivity and distribution of nutrients in the oceans will change. The West Antarctic ice sheet, according to many scientists, is particularly vulnerable to warmer oceans (SN: 10/7/78, p. 246). Should it melt — and estimates give it 50 to 300 years — it could raise sea levels worldwide by five meters, they say. Studying ocean physics is the key to understanding such effects, according to the panel.

Increased CO_2 and warmer temperatures will begin to nudge the limits of plant and animal tolerance, altering competition among species and possibly changing forest succession among plants. Such changes are particularly researchable, said the panel on the "unmanaged biosphere," chaired by Frederick Smith of Harvard University. Salt marshes might be studied, for example, as areas that must adapt rapidly to changing environmental conditions.

The strongest pro-CO_2 signal came from the panel on agriculture and domestic animals. Agriculture, limited primarily by water, stands only to gain from CO_2-increased precipitation. "The bottom line is that we don't see catastrophe in the dislocation of agricultural productivity as a result of an increase in CO_2," Michigan State University's Sylvan Wittwer, chairman of the panel, told SCIENCE NEWS. "There are opportunities here that we need to look at." New strains of crops attuned to such changes could reap maximum benefits from increased CO_2, he said.

The attitude expressed by Wittwer and others has come, Bretherton told SCIENCE NEWS, as other scientists — particularly economists and agriculturalists — have taken a look at the CO_2 issue. "There are specific things — details such as the West Antarctic ice sheet — that need to be looked at," he said. "But the clear disadvantages [of increasing CO_2] are in the 'noise' level. We would have to have a much greater response to stop burning fossil fuels."

So how does this translate into public policy? Very simply, it comes out: Be adaptable. The panel on social and political institutions said the social sciences must find ways to encourage and develop those parts of society and institutions that are attuned to the physical world — "build in the appropriate infrastructures" in social science parlance. Learning to manage CO_2 as a "trend crisis" rather than as an immediate problem, the panel said, can serve as a model for managing other long-term issues.

According to the economics impact panel, adaptability means making "decentralized decisions" based on understanding of details. Investing in real estate, for instance, will require attention to the possibility of rising sea levels. No drastic policy changes are required, said economist Lester Lave of Carnegie-Mellon University; such awareness should already be a part of decision-making. "If your house is in order," he said, "you're all right." □

Chemists catch the sun (on electrodes)

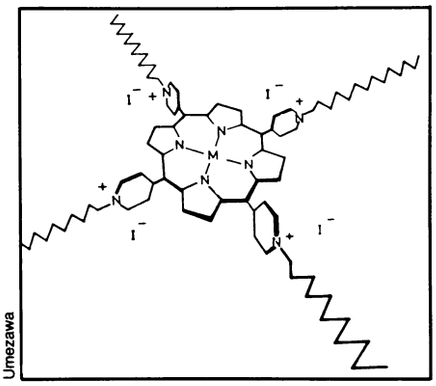
Sunbathing was not the predominant activity of the 8,000 chemists who gathered in Honolulu last week to hear probably the largest number of talks on chemistry ever given at a meeting. Outside the technical sessions, one major activity was socializing with chemists from other countries; the meeting was co-sponsored by American and Japanese chemical societies and attended by scientists from 42 countries including the People's Republic of China. The other dominant pastime was standing in line at the airline agencies. The strike of United Airlines mechanics prevented some U.S. chemists from reaching Hawaii and kept those who did arrive busy trying to make alternative return reservations.

Still, the sun permeated a number of the scientific sessions, exciting the researchers with possibilities for using chemistry, as plants do, to convert solar energy into other forms. Diverse and ingenious schemes are already being applied to harnessing sunlight (SN: 4/22/78, p. 248), but the chemists at this meeting described new angles on materials for generating electricity and for splitting water into oxygen and hydrogen, which can be stored or used as fuel.

An oxide of a rare earth, rhodate, is the key to a system powered solely by light that both produces hydrogen from water and generates electricity. H. S. Jarrett and Arthur W. Sleight of E. I. Dupont de Nemours and Co. report that the red oxide absorbs sunlight better than do white semiconductor oxides, and the new cathode does not decompose as the system is used. "If we take the system out into sunlight, we see hydrogen and oxygen bubbling off the electrodes," Jarrett told the press. "There is enough energy left over that some electrical power can be generated." The researchers now hope to find a less expensive, but suitable, cathode and to develop a more efficient system.

Another approach to making solar cells is to coat an electrode surface with light-absorbing molecules. Kenichi Honda of the University of Tokyo is using chlorophyll as a coating, but others synthesize new compounds to make an especially stable cover. Yoshio Umezawa and colleagues, also at the University of Tokyo, have worked with porphyrin molecules. They report synthesis of a compound, that Umezawa says gives nearly permanently stable coated platinum electrodes. The synthetic porphyrin has long side chains that attach to the electrode, "like an octopus," Umezawa says.

Finally, Shigeo Tazuke of the Tokyo Institute of Technology describes a chemical system in solution, rather than with electrodes, that more directly mimics a green plant. It uses sunlight to transfer electrons



New porphyrin stably coats electrodes.

from water to carbon dioxide, generating a more complex organic compound. Tazuke simplifies the plant's intermediate electron transport steps into three components. Light is absorbed by an aromatic hydrocarbon, which transfers electrons from amines to aromatic cyano compounds. In the presence of water and carbon dioxide, formic acid and hydrogen peroxide are produced. Tazuke says the efficiency of the system now must be increased by separating the products to prevent their decomposition. He plans to develop an electron transport membrane, thus further imitating photosynthesis in green plants. □

Cooking with gas: More NO_x concern

A cozy kitchen with a teapot whistling on a gas stove joins automobiles and factories as a source of nitrogen oxide pollutants. High concentrations of nitrogen dioxide, which have resulted from occupational accidents, can cause lung disease and even death. Recent concern over less obvious effects of long-term, low-level nitrogen oxide exposures has led to comparisons of large groups of people living in different communities and to studies tracing the fate of the nitrogen oxides within experimental animals.

Gas cooking versus electric cooking was one of the questions asked as part of a long-range study of children and adults in six U.S. communities. Frank E. Speizer of Harvard Medical School reported a preliminary result at the Honolulu meeting of the American Chemical Society. The nitrogen dioxide measured inside the houses was higher when cooking was done with gas, rather than electric, stoves. Speizer and colleagues tested approximately 8,000 children, ages 6 to 9, half of whom were from homes with gas stoves.

Across the communities, the children whose parents cooked with gas had lung functions slightly, but consistently, below those of the children from homes with electric stoves. Analysis of medical information provided by the parents revealed that children from gas-stove homes had 15

percent more respiratory disease than did the other group. The comparisons took into account the parents' smoking behavior — smoking was associated with two to three times more respiratory illness in the children than was use of gas stoves.

Nitrogen dioxide appears to be generated in the kitchen when natural gas is burned, oxidizing nitrogen monoxide. Speizer told SCIENCE NEWS that gas heating does not seem to have the same effect on children's lungs. He attributes the difference to the effective venting of furnaces, and he says gas cooking effects might be avoided by venting stoves to the outside.

The researchers say their findings must be replicated to eliminate any subtle bias or alternative explanation. Although the effect on the lung function they observe is small, they believe it might contribute significantly to eventual development of respiratory disease.

A variety of studies on animals are mapping just how the nitrogen oxides affect the body. Elliot Goldstein of the University of California at Davis exposed rhesus monkeys to nitrogen dioxide labaled with ^{13}N, a positron-emitting nitrogen isotope that can be tracked from outside the monkey's body. Goldstein says approximately 60 percent of the NO_2 inhaled is retained in the primate. The pollutant is absorbed continuously throughout the lungs, and some NO_2 (or its derivatives) is carried in the blood to other sites. Experiments simulating lung conditions indicate that NO_2 reacts with water vapor to form nitrous and nitric acid. Irritation by those acids, Goldstein explains, accounts for the NO_2 toxic effects.

Nitric oxide (NO) is the other important component of nitrogen oxide pollution. An important discrepancy between its action in biochemical experiments and in health observations has been examined by Katsumi Yoshida of Mie University Medical School in Tsu, Japan, and Taichi Nakajima and Hajime Oda of the Osaka Prefectural Institute of Public Health. In laboratory experiments NO binds to hemoglobin with an affinity 300,000 times that of oxygen, indicating that NO exposure should seriously threaten human life. Yet the expected harm is not observed.

Looking at the fate of ^{15}NO, Yoshida finds it is rapidly changed into different compounds, such as nitrate, which are transferred into blood and eventually urine. Nakajima and Oda, using electron spin resonance methods, for the first time were able to detect hemoglobin in the blood bound to nitric oxide. They found only 0.01 percent of the hemoglobin thus bound in mice exposed to nitric oxide for their entire lives. Nakajima and Oda agree with Yoshida that inhaled NO is probably changed to nitrate in the lungs. Although the scientists expect only a very minor effect, they say inhaled nitrogen oxides may contribute to formation of nitrosamines. □

Endangered species: Abroad and at home

Grevy's zebra cannot be traded, they decided. Nor can the Guadalupe fur seal or the Chilean mussel. The pigmy marmoset now requires only an export license, they said, and Mearn's quail can be traded without restrictions.

Sounds like a zoological swap mart. And with delegates from 34 countries and 55 lobbying groups wrangling for two weeks over international trade regulations on 250 kinds of plants and animals, that's probably not an inaccurate description of the recent conference in Costa Rica on the endangered species treaty.

The 51 members of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, negotiated in 1973, have agreed to eliminate commercial trade as a cause of the decline of any species (SN: 3/10/73, p. 151). By agreements made at this and a 1976 conference, the members have listed nearly 1,000 plants and animals they hope to save from human exploitation — the rhinoceros whose horn may adorn a shiek's dagger or even the orchid grown and exported solely to grace a private atrium. These regulations affect a multi-million-dollar commerce. One official said more than 90 million wildlife products made from endangered species, including snakeskin belts, lizard skins and shells, were imported into the United States in 1977 alone. For some species — those threatened with extinction — trade is prohibited; for others that are not in as much danger, import and/or export permits are required for international trade.

The conference scored a major coup, according to delegate Richard Parsons of the Federal Wildlife Permit Office (which issues U.S. trade permits for protected species), by placing trade restrictions on all whales. The move reinforces the protection offered whales by the quotas set through the International Whaling Convention. Owls and falcons came under similar protection by vote of the nations, who agreed to require licenses for their trade.

Many of the resolutions adopted by the convention, Parsons told a public meeting, would help remove major stumbling blocks to carrying out the treaty, such as the methods for listing species and enforcement and management of the regulations. For instance, the nations adopted a proposal for listing species that would require references to scientific literature in support of the claim for protection. A species identification manual for import authorities, presented in prototype, would help regulators spot restricted species and their parts and products. The convention members also adopted a detailed set of guidelines for the humane transfer of plants and animals — the first such guide ever developed, Parsons said.

Nearly 250 proposals were made for changes in the list of regulated species, Parsons said. Between pressure from nonmember lobbying groups and bargaining among member nations, the final count was much lower. All told, 31 animal taxa and 17 plant taxa were added to the convention's protection. Fourteen taxa of animals were released from all trade restrictions, eight were given less protection and 17 plant and animal taxa became more controlled. The new regulations become effective this June. Of particular interest to U.S. conservationists is the new status of the alligator, which, pending changes in the Endangered Species Act, will be allowed to enter international commercial trade.

Before considering the alligator, however, the Endangered Species Act has to look out for its own hide. Picking up where they left off last fall (SN: 10/21/78, p. 279), the Senate subcommittee on resource protection, chaired by Sen. John Culver (D-Iowa) last week held the first hearings on the full reauthorization of the Endangered Species Act. The act nearly became extinct in the last Congress due to controversial amendments attached to its reauthorization. In the end, Congress passed an 18-month reauthorization and established a Cabinet-level committee to resolve disputes between the act and projects that may threaten species. A bill to extend the act's funding will not be presented to Congress until May; the recent hearings were held to determine whether the act should be funded and at what level.

But already the waters are beginning to muddy. Three bills have entered the Senate — one to eliminate the arbitrating committee, one to exempt the Tellico Dam project (which was abolished by the committee) and one to do both. A draft report from the General Accounting Office presented at the hearing found deficiencies in the act's method of listing species and in the required consultations between federal agencies and the endangered species office, and recommended amendments to clear up such problems. Robert Herbst, assistant secretary for fish and wildlife and parks, called some of the GAO conclusions "simply inaccurate." The subcommittee staffer, who told SCIENCE NEWS they hope to present a "clean bill" in May, might be disappointed. □