SCIENCE

5 August 1977

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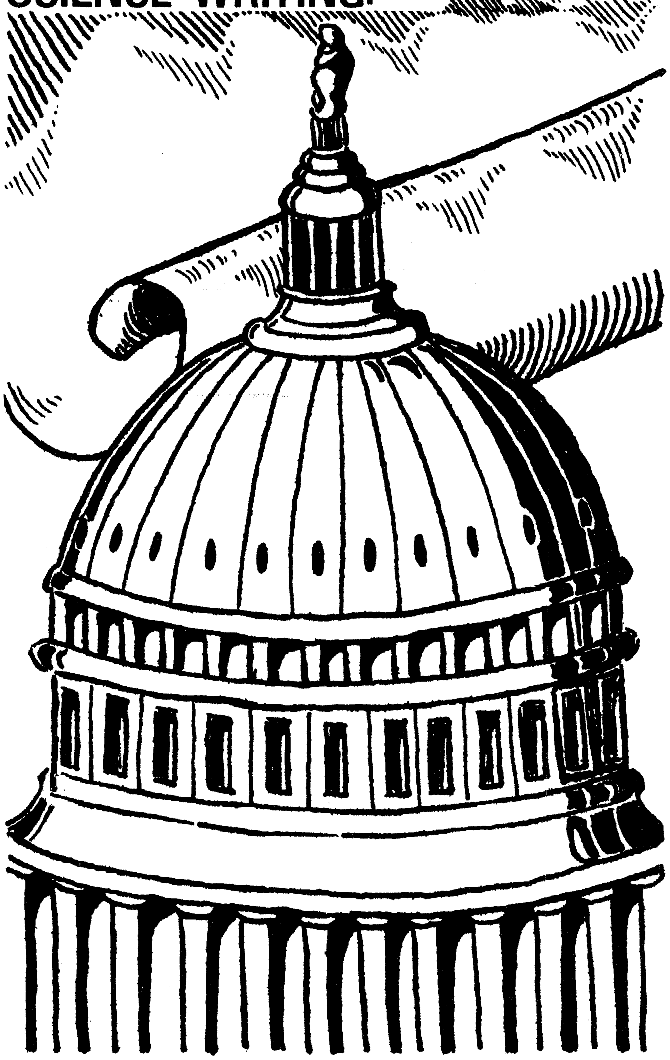
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

1977

AAAS-Westinghouse

SCIENCE WRITING AWARDS FOR NEWSPAPERS AND MAGAZINE SCIENCE WRITING.



RULES

1) The aim of this competition is to encourage and recognize outstanding writing on the sciences and their engineering and technological application in newspapers and general circulation magazines. The following categories are not eligible: articles on the field of medicine, articles published originally in AAAS publications, articles by employees of the AAAS or Westinghouse Electric Corporation.

2) Each entrant in a newspaper award competition and each entrant in the magazine award competition may submit three entries.

3) An entry for a newspaper competition may be any of the following: a single story; a series of articles; or a group of three unrelated stories, articles, editorials, or columns published during the contest year. A magazine entry may be a single story or series published during the contest year.

4) A completed entry blank must be submitted together with five copies of each entry in the form of tear sheets, clippings, reprints, or syndicate copy (not over 8½" x 11"), showing name and date of the publication. ENTRIES MUST NOT BE ELABORATE.

5) Each entry must have been published in a newspaper or general circulation magazine within the United States during the contest year — 1 November 1976 through 31 October 1977. (In the case of a series, more than half of the articles comprising it must have been published during the contest year.) Date on the issue in which an article appeared will be considered as the date of publication. All entries must be postmarked on or before midnight, 15 November 1977.

6) Persons other than the author may submit entries in accordance with these rules. Entries will not be returned.

7) Winners of the 1976 awards are not eligible for the 1977 awards. Persons winning three times are no longer eligible.

8) The Judging Committee, whose decisions are final, will choose the winners. There are three awards of $1000: for the winning entry in the over-100,000 daily circulation newspapers competition, for the winning entry in the under-100,000 circulation newspapers competition; and for the winning entry in the general circulation magazine competition. For award purposes, newspaper circulation will be sworn ABC daily circulation as of 30 September 1977. The Judging Committee may cite other entries for honorable mention.

9) The awards will be presented at the dinner meeting of the National Association of Science Writers, during the 1978 meeting of the American Association for the Advancement of Science in Washington, D.C. Travel and hotel expenses of the award winners will be paid. Entrants agree that, if they win, they will be present to receive their awards, unless prevented by circumstances beyond their control.

Grayce A. Finger

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

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REPORTS

COVER

Wild Mongolian dog (top) and Alaskan Malemute (bottom). Pariah or wild dogs approaching the size, form, and ferocity of the Mongolian dog occur over much of Asia. The Mongolian/Husky/Malemute Eskimo dog group exhibit the strong wolf characteristics of their ancestry. See page 533. [Mongolian dog by Roy Chapman Andrews, courtesy of the American Museum of Natural History; Malemute (Elsa Alyeska) by James Haller].

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of selected symposium volumes

Since January 1934, AAAS has published symposium volumes based on materials presented by renowned scientists at its annual meetings. The AAAS Publications Committee has selected for publication symposia that are comprehensive, timely, and well-documented. In addition, the Association has published books based on material presented at special conferences and meetings. Now, the Association is offering ten of these volumes at a special, reduced, price.

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☐ **Arid Lands in Transition.** Edited by Harold E. Dregne. Contains papers presented at the 1969 international conference on "Arid Lands in a Changing World." The papers explore the use of arid lands in different parts of the world. 538 pages, 1965; third printing 1970.
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Control of Automobile Emissions

After a decade of efforts and the expenditure of more than a hundred billion dollars to protect and clean its environment, this country has achieved only little. Air pollution continues, most of the rivers are still dirty.

Legislation was enacted at a time when the nature or toxicity of the crucial pollutants was unknown, and no great effort was mandated to discover them. The laws placed the major burden of abatement on industry. But everyone pollutes; industry could perform perfectly and pollution would still abound. Mainly as a result of partial abatement by industry, some rivers are cleaner. However, many municipalities have been slow to meet their responsibilities. Pollution from distributed sources (agriculture) continues.

An example of weaknesses in our pollution abatement efforts is in the handling of automobile emissions. Laws have been enacted and regulations have been issued in the absence of a solid scientific basis. The burden of attaining and maintaining low emissions has been placed on the automobile industry. In most states, the owner of a high-polluting jalopy is untouchable.

Automobiles are an important contributor to urban air pollution. Photochemical reactions occur among the hydrocarbons (HC's) and the nitrogen oxides (NO_x) and other constituents of the air. Reaction products that are damaging include nitrogen dioxide, oxidants whose major component is ozone, nitric acid, and nitrates, However, the mechanisms and crucial factors are not well established. A recent National Research Council report* states, "To formulate cost-effective oxidant and NO_x abatement strategies, some understanding is required of the processes and factors that influence the conversion and transport processes and the interaction of NO_x with atmospheric oxidant/HC. The present state of knowledge is very incomplete and urgently needs improvement. . . ."

One hypothesis is that in urban situations the rate-limiting factor in production of oxidants is hydrocarbons. Were this to be proved true, it would simplify the abatement problem. However, in 1977, 7 years after the Clean Air Act, we still do not know with certainty the circumstances in which HC's or NO_x are rate-limiting. Even so, in 1970 a law was enacted calling for an arbitrary 90 percent reduction from the 1970 levels of emissions of hydrocarbons and carbon monoxide and the 1971 levels of nitrogen oxides. To meet the 90 percent reduction will require a complex and costly system. The current California experience indicates that fuel economy will suffer.

The present reluctance of Detroit to meet the exacting requirements is based not so much on cost as on an inability to guarantee that their output will meet the standards. After all, costs of installing pollution-abating equipment are passed on to the customers. Guaranteeing reliability is another matter. Once the customer obtains the car, the situation is out of control. New Jersey, one of the few states that has an emissions inspection program, has found that in 10 percent of the automobiles seen, the emissions control system had been tampered with.

It is important that Detroit produce low-polluting cars, but that is only a small fraction of the problem. What matters is the performance of automobiles on the road. This will vary with age, wear, and maintenance. A relatively small percentage of high-polluting vehicles can negate the low pollution of a fleet of cars whose characteristics were obtained through the expenditure of tens of billions of dollars. Until a nationwide inspection system is in being and fines are levied on large polluters, there will be limited progress toward clean urban air.

During the next decade we will spend hundreds of billions of dollars on pollution abatement, but most of it will be wasted unless there is better scientific understanding of the problems, a better analysis of costs and benefits, and an enforcement system applicable to all polluters.

—PHILIP H. ABELSON

**Implications of Environmental Regulations for Energy Production and Consumption* (National Academy of Sciences, Washington, D.C., 1977), vol. 6, p. 100.

Reports

Calcium Carbonate Production of the *Mare Incognitum*, the Upper Windward Reef Slope, at Enewetak Atoll

Abstract. *Corals and algal pavement produce calcium carbonate more slowly on the windward reef slope of Enewetak Atoll than on the reef flat despite the high standing crop of reef-building organisms on the slope. The capacity of reefs to remain at or near sea level is therefore not determined primarily by growth on the seaward slope.*

The windward reef slope of coral atolls abounds with reef-building organisms (Fig. 1, a and b). Ladd considered the windward margin as "the most vital part of a reef" (*1*, p. 705). He suggested that the slope to depths of 15 m may be biologically the richest region of a coral reef, and he pointed out that on coral atolls of the Marshall Islands this region "is so inaccessible that it has been dubbed the '*mare incognitum*' " (*1*, p. 706). Recent studies of the growth potential of coral reefs in terms of $CaCO_3$ production [summarized in (*2*)] have only hinted at the activity of reef slopes. It is our purpose in this report to consider the role played by the *mare incognitum* in reef growth.

The reduction in the alkalinity of seawater can be used to determine $CaCO_3$ production rates (*2*). Seaward reef flats and slightly submerged coral pinnacles produce about 4 kg of $CaCO_3$ per square meter per year, whereas more protected lagoonal environments produce about 0.8 kg m^{-2} $year^{-1}$. In order to measure $CaCO_3$ production by alkalinity reduction on the seaward slope, we have used transparent Plexiglas domes similar to those described by Wells (*3*) as in situ respirometry chambers (Fig. 1b). We have developed techniques for dome emplacement in packed sediment or irregular limestone terrain (*4*). During October 1976 we used these techniques to isolate water and measure alkalinity reduction rates by selected components on the windward reef slope of Enewetak (also called Eniwetok) Atoll, Marshall Islands. The primary study site was immediately offshore of Jinimi (Chinimi) Island, near the seaward extension of reef flat transects which have been the subject of earlier studies of community metabolism (*5*, *6*). Incubations were also conducted at selected control sites in shallow water.

Two prominent ecological components of the slope were examined: coral heads and algal pavement. Vasiform colonies of *Acropora* (probably *A. hyacinthus*) are the most conspicuous coral on the windward slope (Fig. 1). Wells (*7*) did not consider this species to be common in the Marshall Islands, but his inability to sample the environment so obviously favored by this coral led to the term *mare incognitum* rather than a zonal name denoting the dominant coral there. Coral cover increases from near 0 percent on the reef crest to about 30 percent at depths of 25 m (the local base near Jinimi of the so-called "ten-fathom" terrace marking the base of this zone) and then decreases to near 0 percent at 50 m. The reef crest is dominated by a pavement of crustose coralline algae (particularly *Porolithon*), and some algal pavement persists to the base of the 25-m terrace. Poorly sorted sand and rubble comprise a third major (but unsampled) component of the slope. Table 1 includes estimates of the vertical distribution of the coral and pavement components near Jinimi. The same general distribution pattern characterizes other areas we have examined on the windward slope of the atoll, although the local distributions differ in detail.

Coral incubations were carried out at depths of 7, 11, 15, and 21 m on the slope. Control incubations were conducted in an abandoned limestone quarry on the reef flat near Enewetak; this quarry supports a rich biota in a protected setting. Corals used for the incubations were vasiform *Acropora* colonies which covered 30 to 80 percent of the bottom area under the domes and displaced 10 to 30 percent of the water volume therein (Fig. 1b). Pavement incubations were carried out on relatively flat areas of 100 percent hard bottom at all but the deepest of the above sites and