LETTERS

Understanding the problem

The health of coral reefs around the world—and the degree to which "sport divers" can be of help detecting problems in these complex communities—is discussed by reef scientists, some of whom will attend an upcoming meeting in Costa Rica where reef diseases will be evaluated.


BILL KEOGH

Assessing Coral Reef Health

I would like to elaborate on the article "Scientists launch survey of reef health" by Barbie Bischof (News & Comment, 6 June, p. 1494) about the Reef Check survey. The first goal of the survey is to provide a scientific assessment of damage or degradation caused by human activity on coral reefs around the world, and the second is to raise public awareness of the socioeconomic and biodiversity value of coral reefs and of threats to reef "health." This second goal is necessary if public and political support for solutions is to be gained.

To achieve the first goal, the Reef Check scientific committee and advisers designed a simple protocol to assess the effects of human activity on the basis of a dozen easy-to-identify indicator species, such as long-spined black sea urchin (an overabundance of *Diadema* indicates overfishing) and butterflyfish (reduced populations indicate aquarium industry overharvesting). Two criteria were used to choose each indicator species: (i) Does it provide critical information about damage or degradation to reefs? and (ii) Can it be identified by a scuba-diving high-school student after about 1 day of training? Great care has been taken to design rigorous quality assurance and quality control procedures (per the International Standards Organization), including chain-of-custody documentation, trilayer error-checking, and use of automated data analysis spreadsheets. The draft Reef Check protocol was posted on the coral listserver of the U.S. National Oceanographic and Atmospheric Administration last year and was critiqued by many reef scientists. The protocol is now on the Reef Check web page at www.ust.hk./~webrc/reef.html.

Over 100 experienced coral reef scientists from more than 30 countries have agreed to volunteer travel costs and time to train recreational divers, lead the field work, and sign a quality assurance pro forma. This commitment attests to their belief that Reef Check will produce valid and useful scientific data. The overwhelming support we have received from the scientific community indicates that reef scientists are no longer willing to settle for the same old "science as usual" attitude while their favorite reefs are systematically pillaged at an unprecedented rate.

Gregor Hodgson
Institute for the Environment and Sustainable Development, Hong Kong University of Science and Technology, Clearwater Bay, Kowloon, Hong Kong, China
E-mail: rcgregor@usthk.ust.hk.

We are part of a group of researchers, experienced in field recognition of Caribbean coral reef diseases, who are compiling data on emerging coral diseases around that region. The number of individuals currently able to correctly identify all forms of coral disease, bleaching, and other types of mortality in the field is limited, yet among them there still exists no firm consensus on the terminology or diagnostic features of many, perhaps most, diseases. This confusion is illustrated by the caption to the photograph accompanying Bischof's article (p. 1494), which identifies markings on coral as "white plague disease." Two comprehensive (in preparation) compilations of coral diseases each describe "white plague disease" as completely different diseases, and neither of these diseases is the one called by that name in the photograph.

The need for accurate assessment is urgent. Diagnostic criteria to identify different coral reef species and diseases are too subtle and require too high a proficiency in taxonomic identification to be adequately taught to sport divers during a single 1-hour training course in all of coral reef ecology. We therefore expect that the Reef Check survey could obscure or confuse the differences between diseases, bleaching, and oth-

er causes of mortality, and thus would not provide the kind of accurate data that researchers on coral diseases could use. Support is urgently needed for field monitoring efforts to document the spread of new and old diseases, and for laboratory work to identify them and their causes, before the significance of this rapidly intensifying threat to coral reefs can be understood. A workshop is scheduled to evaluate all current Caribbean coral reef diseases and produce a common classification scheme and nomenclature at the Association of Marine Laboratories of the Caribbean Annual Meeting, hosted by the University of Costa Rica in San Jose, Costa Rica, from 21 to 25 July 1997.

Thomas J. Goreau*
Global Coral Reef Alliance,
324 Bedford Road,
Chappaqua, NY 10514, USA
E-mail: goreau@earthlink.net

*Cosigners: ***A. W. Bruckner,*** *Department of Marine Sciences, University of Puerto Rico, Lajas, PR 00667–0908;* ***J. Cervino,*** *Global Coral Reef Alliance;* ***R. L. Hayes,*** *Howard University College of Medicine, Washington, DC 20059, USA;* ***I. Nagelkerken,*** *Caribbean Marine Biological Laboratory, Piscadera Baai, Curacao, Netherlands Antilles;* ***J. W. Porter, K. G. Porter,*** *Institute of Ecology, University of Georgia, Athens, GA 30602–2202, USA;* ***L. L. Richardson,*** *Department of Biological Sciences, Florida International University, Miami, FL 33199, USA;* ***D. L. Santavy,*** *U.S. Environmental Protection Agency, Gulf Ecology Division, 1 Sabine Drive, Gulf Breeze, FL 32561–5299, USA;* ***G. W. Smith,*** *Biology Department, University of South Carolina, Aiken, SC 29801, USA;* ***E. H. Williams,*** *Department of Marine Sciences, University of Puerto Rico.*

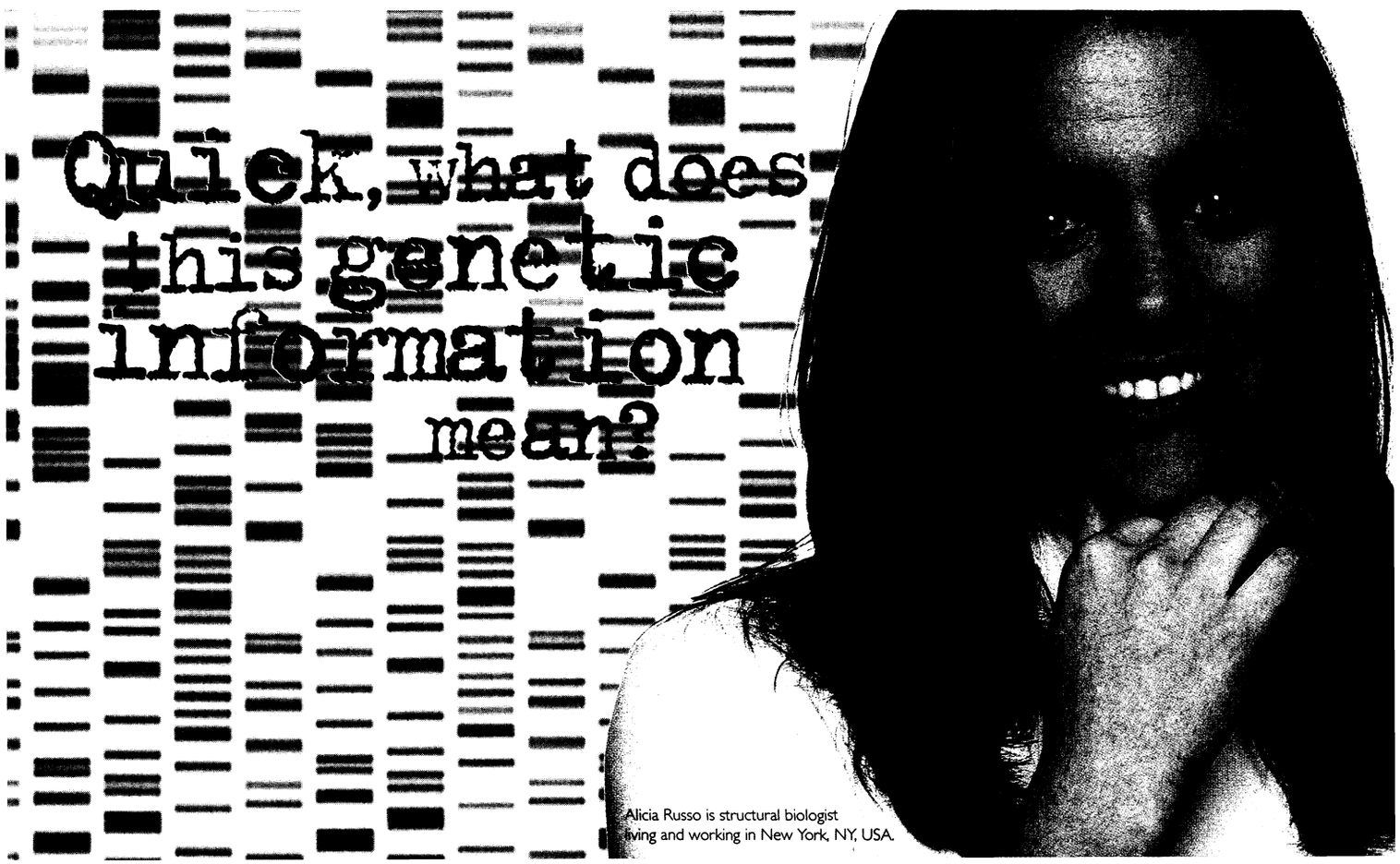
The photograph on page 1494 depicting a coral "beset by white plague disease" shows no evidence of white plague (or of any other known disease of scleractinian corals) on the *Montastraea* species, as shown. Numerous fish grazing scars, however, including some recovering lesions, appear to be present. It is also possible that these are bleached spots. White plague is characterized by the loss of tissue from the base of the colony progressing upward. While *Montastraea* is a known host, white plague is more common on other scleractinian species.

Erich Mueller
Director
Pigeon Key Marine Research Center,
Mote Marine Laboratory,
Post Office Box 500895,
Marathon, FL 33050, USA
E-mail: emueller@mote.org
Esther C. Peters,
Tetra Tech, Inc.,
10306 Eaton Place,
Suite 340,
Fairfax, VA 22030, USA

Photosystem I Measurements in Mutants B4 and F8 of *Chlamydomonas*

In the report "Oxygenic photoautotrophic growth without photosystem I" by J. W. Lee *et al.* (19 July 1996, p. 364) (*1*) and elsewhere (*2*), it is said that mutants of the green alga *Chlamydomonas* that lacked detectable levels of functional Photosystem I (PSI) were capable of photoreduction of atmospheric carbon dioxide, autotrophic growth, and sustained simultaneous photoevolution of H_2 and O_2. The absence of PSI in the mutant strains B4 and F8 used in our work (*1*, *2*) was confirmed by physical, biochemical, and genetic techniques.

Subsequent analyses in our own laboratories, however, as well as those of colleagues to whom we have sent the mutants, indicate that there is variability in the PSI content of the cultures that depends on growth conditions. While some strains retain undetectable amounts of P700, others contain variable (0 to 20%) amounts of wild-type P700. We stand by our original measurements, which showed a lack of detectable P700 in strains F8 and B4 at the time of these studies (*1*, *2*).



Alicia Russo is structural biologist living and working in New York, NY, USA.