

## LETTERS

Fish larval behavior, as glimpsed through the handful of studies completed to date, appears diverse and fascinating (reference 3 of Bellwood *et al.*). What Bellwood *et al.* do not mention is that their own research has revealed such swimming and orientation abilities only in late-stage larvae. For a large proportion of the dispersal phase, fish larvae may have much less control over transport. Undoubtedly, there will be some species whose behavior will lead to high levels of local retention. How else can we account for species with very restricted ranges in regions where reefs are highly interconnected by currents (1)? But this is only one end of a spectrum of behavior, and there will be many other species whose dispersal will be more passive. Such behaviors will result in a spectrum of transport distances ranging from short to long.

Furthermore, while both letters emphasize fish behavior, the interests of managers extend to all of the other taxa that compose reef ecosystems. As Bellwood *et al.* point out, many invertebrate larvae seem to have little capacity to modify their transport by currents. The transport envelopes I describe cannot capture the detail of individual species' behaviors but, then, managers require broad guidance rather than reductionist complexity.

**Callum M. Roberts**  
Environment Department,  
University of York,  
York, YO1 5DD, United Kingdom  
Email: cr10@york.ac.uk

### References

1. D. M. McAllister, F. W. Schueler, C. M. Roberts, J. P. Hawkins, in *Advances in Mapping the Diversity of Nature*, R. Miller, Ed. (Chapman & Hall, London, 1994), pp. 155-175.

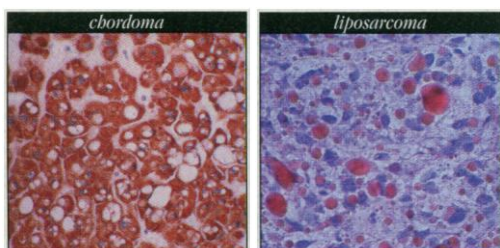
### Rapid-Wasting Disease: Pathogen or Predator?

Researchers have raised concern about the sudden emergence of coral diseases and the contagious nature of many of these diseases (1). A new "disease" was recently identified on star coral (*Montastraea annularis* species complex) and brain coral (*Colpophyllia natans*) from reefs of Bonaire, Netherlands Antilles. This affliction has been named "rapid-wasting disease" (RWD) because of the rate of tissue destruction (advancing 7.5 centimeters in 24 hours), associated with the removal of the top layers of calcium carbonate (Random Samples, 27 June 1997, p. 1979). While the extent of tissue loss ob-

## Framework for Federal Science Policy

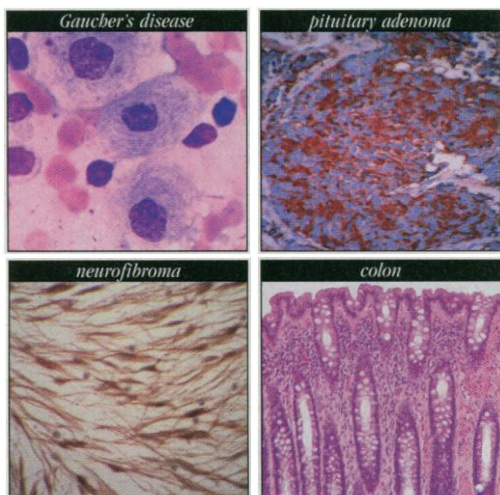
### REQUEST FOR COMMENTS

The AAAS Board of Directors invites you to help develop a framework for our nation's science policy. The Board is preparing a paper on goals and directions for American science as input to the National Science Policy Study being conducted by the Science Committee of the U.S. House of Representatives. Members can read and comment on a draft of the Board's paper on the AAAS website at <http://www.aaas.org/spp/fedsci>. Feedback will be most helpful if received by April 8, 1998.



**LifeSpan BioSciences, Inc.**  
The molecular pathology company.™

# Where Is Your Gene Expressed?



- Have you identified an interesting gene?
- Do you know in which tissues and diseases it is expressed?

*LifeSpan's Target Validation localizes your gene or protein, using its proprietary disease and normal tissue bank of more than 1,000,000 samples.*

LifeSpan BioSciences, Inc.  
700 Blanchard Street • Seattle, WA 98121  
Phone: 206/464-1554 • Fax: 206/464-1723  
Web Site: [www.lsbio.com](http://www.lsbio.com)

Circle No. 64 on Readers' Service Card

# CONCEPTS IN GENE THERAPY

Edited by Michael Strauss  
and John A. Barranger

1997. xx + 552 pages. With 67 figures.  
Hardcover \$99.95. ISBN 3-11-014984-2

Written by leading experts in their respective fields, this book not only provides a perfect overview of the various topics of gene therapy, but also discusses current problems and potential solutions. The various gene delivery vehicles and model systems for diseases are described in detail and specific problems encountered in the individual target diseases (genetic and nongenetic, as well as AIDS and cancer) are discussed in depth. This book is essential reading for students, scientists and physicians interested in molecular medicine.

Price subject to change.



**Walter de Gruyter, Inc.**

200 Saw Mill River Road  
Hawthorne, NY 10532  
Tel: (914) 747-0110 • Fax: (914) 747-1326

Circle No. 41 on Readers' Service Card

served may be reason for concern, we do not believe that this affliction is the result of a disease, but rather is caused by parrotfish bites.

In June 1997, we surveyed reefs of Bonaire and Curaçao to determine the incidence of disease among massive reef-building corals. In Curaçao, star corals (*Montastraea* spp.) exhibiting the described signs of "RWD" were present (less than 0.5%) in shallow water (less than 10 meters). In Bonaire (at depths of from 3 to 20 meters), these signs were present on a higher proportion of corals (0.5 to 5%); damage was concentrated on (but not confined to) reefs along the northwestern half of the island.

Several factors lead us to conclude that these signs are caused by something other than a disease. "Rapid-wasting disease" has been characterized by removal of tissue and the top layers of the skeleton; coral diseases typically damage coral tissue alone. Elevated portions of the colonies are affected; live, apparently healthy tissue remains within the depressions between lobes. Coral tissue at the margin of the tissue-denuded, abraded skeleton appears fully pigmented and does not exhibit signs of disease or necrosis. Calcium carbonate skeletal material may be found on or near the coral with "RWD."

The greatest number of damaged colonies occurs in areas with a high abundance of large, territorial stoplight parrotfish (*Sparisoma viride*).

We monitored colonies of *M. annularis* in Bonaire with recent tissue and skeletal destruction for up to 70 minutes each (at depths of from 3.5 to 15 meters). Approximately 70% of the colonies with fresh lesions identified during our dives ( $n = 14$ ) were attacked by *S. viride* at least once, and usually repeatedly. During these periods, one to three terminal-phase male and one or more initial-phase adult *S. viride* were observed removing live coral tissue and skeleton from a single coral head, returning at 2- to 15-minute intervals. In two cases, fish removed the majority of the tissue from one lobe, then began grazing on an adjacent, previously undamaged lobe. *S. viride* were also observed biting *C. natans*; fish removed tissue and skeletal material in a band, moving methodically across the coral.

Stoplight parrotfish use an excavating feeding mode that leaves deep grazing scars (2). In a previous study from Bonaire (3), terminal-phase males took 9.3% of their bites from live coral (primarily *M. annularis*), creating conspicuous white spots on the coral. Damage by *S. viride* is the most serious cause of chronic coral tis-

The AAAS Caribbean Division, the Latin American Federation of Chemistry Associations and the Puerto Rico Chemists Association invite you to:

## The 23<sup>rd</sup> Latin American Chemical Congress and Exhibition

26-30 July 1998

Westin-Rio Mar Resort  
Rio Grande, Puerto Rico

### Plenary Speakers

Dr. Mario Molina, Nobel Laureate - Boston, MA  
Dr. Roald Hoffman, Nobel Laureate - Cornell, NY  
Dr. Mario Suwalsky - Concepcion, Chile  
Dr. Hector Abruna - Cornell, NY  
Dr. Nelson Duran - Campinas, Brazil

Dr. Roger Bybee - Washington, DC  
Dr. Ernest Eliel - Chapel Hill, NC  
Dr. Antonio Monge - Navarra, Spain  
Dr. Pedro Joseph Nathan - CNIQM, Mexico

Symposia are currently planned in Environmental Chemistry, Chemical Education and Theoretical Chemistry.

Papers and posters will be accepted on Pure, Applied and Environmental Chemistry.

Abstracts should be received by April 17, 1998.

For further information, contact:

Puerto Rico Chemists Association  
658 Calle Penueles Esq. Hatillo  
Hato Rey, PR 00918

Tel: 787-763-6070  
Fax: 787-758-2615  
E-mail: cqpr@icepr.com



sue loss to *M. annularis* in the U.S. Virgin Islands (4). In our study, a maximum of 17 bites were taken from the same coral in a 70-minute period. If territorial fish repeat this behavior throughout the day, it would result in substantial damage (5), which might be correlated with high rates of tissue destruction characteristic of "RWD."

*Sparisoma viride* have been known to create large lesions on *M. annularis* for nearly 20 years (6). The abundance of macroalgae has increased on many Caribbean reefs since the loss of *Diadema antillarum* in the mid 1980s. A greater biomass of algae may support a larger population of herbivorous fish such as *S. viride*, resulting in a higher density of territories, more conspecific interactions, and consequently more territorial markings on live coral. Parrotfish white spot biting may be more noticeable on coral reefs in Bonaire, which have had protected fish populations for almost two decades. We have made similar observations on coral reefs of La Parguera, Puerto Rico.

Andrew Bruckner  
Robin Bruckner

Isla Maguëyes Laboratories,  
Department of Marine Sciences,  
University of Puerto Rico,  
Puerto Rico 00607  
E-mail: andy.bruckner@noaa.gov

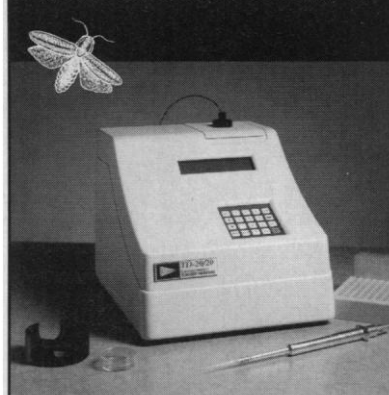
#### References and Notes

1. D. L. Santavy and E. C. Peters, *Proc. 8th Int. Coral Reef Symp. Panama* **1**, 607 (1997); E. C. Peters and H. B. McCarty, *Geotimes* **41**, 20 (1996); C. Williams, *ibid.* **42**, 6 (1997).
2. P. Frydl and C. W. Stearn, *J. Sediment. Petrol.* **48**, 1149 (1978).
3. J. H. Bruggemann, M. J. H. van Oppen, A. M. Breeman, *Mar. Ecol. Prog. Ser.* **106**, 41 (1994).
4. J. C. Bythell, E. H. Gladfelter, M. Bythell, *Coral Reefs* **12**, 143 (1993).
5. Average surface area removed in one bite from algal turf on *M. annularis* skeleton is 67 to 100 square millimeters (2).
6. P. Frydl, *Int. Rev. Gesamten Hydrobiol.* **64**, 737 (1979).

#### Letters to the Editor

Letters may be submitted by e-mail (at science\_letters@aaaas.org), fax (202-789-4669), or regular mail (*Science*, 1200 New York Avenue, NW, Washington, DC 20005, USA). Letters are not routinely acknowledged. Full addresses, signatures, and daytime phone numbers should be included. Letters should be brief (300 words or less) and may be edited for reasons of clarity or space. They may appear in print and/or on the World Wide Web. Letter writers are not consulted before publication.

#### Luminometer.committed™



#### The TD-20/20 Luminometer from Turner Designs

- Extremely Sensitive
- Wide Dynamic Range
- Internal Auto-Injectors
- \$ Low Cost \$

DLR<sub>ready</sub>™



**TURNER DESIGNS**

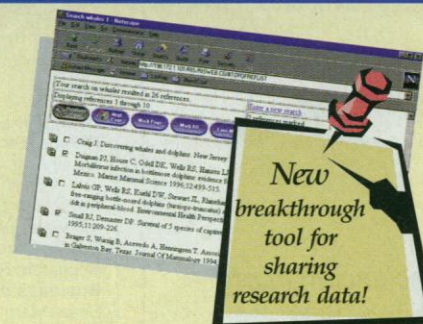
845 W. Maude Avenue • Sunnyvale, CA 94086  
(408) 749-0994 • FAX (408) 749-0998 • <http://www.turnerdesigns.com>

Call 408/749-0994 or visit our web site  
Circle No. 62 on Readers' Service Card

## One-Step Bibliographies *Plus* the Power of the Web



Try them today!  
The perfect  
combination —  
[www.risinc.com](http://www.risinc.com)



### Reference Manager®

- **NEW - version 8.5 includes Spell Checker!**
- Easy one-step bibliographies
- Link directly to the Web — or OLE objects such as a chemical structure or graphic file
- Perform key operations across multiple databases
- Designed for Win95/NT4



Research Information Systems, 2355 Camino Vida Roble, Carlsbad, CA 92009 USA  
800.722.1227 • 760.438.5526 • Fax: 760.438.5266

E-mail: [sales@risinc.com](mailto:sales@risinc.com) • WWW: <http://www.risinc.com>

Division of the Institute for Scientific Information, a Thomson Company

ProCite and Reference Manager are registered trademarks and Reference Web Poster is a trademark of the Institute for Scientific Information.

EndNote is a registered trademark of Niles Software, Inc. All other products are trademarks of their respective companies.

**NEW!**

### Reference Web Poster™

- **Post your Reference Manager, ProCite® and EndNote® databases on the Web**
- **Anyone with a Web browser can:**
  - access your Reference Web Poster site
  - search any combination of Reference Manager, ProCite and EndNote databases — simultaneously
  - mark and export references into bibliographic software
- **Designed for Win95/NT4**