

CDHC: CORAL DISEASE & HEALTH CONSORTIUM

Coral Disease & Health: The Issue

Diseases and declining health condition among corals have dramatically increased in frequency and distribution over the last two decades, leading to unprecedented decreases in live coral and altering the function and productivity of coral reef ecosystems. Responding to this threat requires improved scientific understanding and tools to: 1) detect and assess trends in coral diseases at the necessary scales for scientific investigation and policy development; 2) determine the causes and consequences of disease and increases in their frequency and distribution; 3) provide possible management options designed to mitigate the spread and effects of disease on coral reef ecosystems; and 4) reduce the risk of disease onset.

CDHC: Who Are We?

The Coral Disease and Health Consortium (CDHC) was created in 2002, in response to the U.S. Coral Reef Task Force's (USCRTF) National Action Plan to Conserve Coral Reefs. Our goal is to provide coastal and ocean managers with scientific understanding and tools to help protect healthy coral reef ecosystems and restore degraded ones. The CDHC is a network of field and laboratory scientists, coral reef managers, and agency representatives devoted to understanding coral health and disease. It is extensive, highly collaborative, and completely voluntary. Currently over **150 national and international partners**, including federal agencies, EPA, DOI, NOAA along with academia, non-profit and industry, contribute their time and expertise to the CDHC. While organizational infrastructure is supported by the congressionally funded Coral Reef Conservation Program, the commitment to share information, ideas, and common goals that has inspired many to seek funding and devote new resources to the study and amelioration of coral disease.

CDHC: The Vision

Our vision is *'to understand and address the effects of natural and anthropogenic stressors on corals in order to contribute to the preservation and protection of coral reef ecosystems'*.

To realize this vision the CDHC serves to:

- unify the coral health and disease research community
- implement research priorities identified in the National Research Plan
- update and maintain the National Research Plan
- develop tools and methodologies for diagnosis and assessment
- provide an expert knowledge system for use in diagnosis and epizootiology
- provide education and outreach tools to equip a new generation of coral researchers

CDHC: What are we doing?

CDHC WEBSITE Launched – www.cdhc.noaa.gov

This comprehensive website includes two tools for public users to guide them in describing gross lesions they observe on coral in the field and a Coral Disease ID Key. It also features a Media Gallery with live coral photographs, photomicrographs, detailed glossaries to aid in the standardization of terms, an online protocol resource for various diagnostic assays, literature resources, and educational tools such as links to the virtual slide for coral histology and many others. This website delivers much requested and valuable resources for issues related to coral health and disease, educational materials and other resources to serve a broad audience from the public to the veterinary professional.

RESEARCH- Information is limited on the physiological parameters that define healthy coral and less on coral disease dynamics. Our challenge is to apply advanced technologies in cellular physiology, functional genomics, proteomics, systems biology and epidemiology to expand our knowledge in coral health and disease dynamics. The knowledge gained from these endeavors will help uncover the processes controlling ecological connectivity among reefs and discover critical control points for better risk management strategies.

- **Coral Microbial Communities** – Over 45,000 ribosomal gene sequences cloned from coral-associated bacteria are available at <http://www.marinegenomics.org/>.
- **Porites astreoides cDNAs** – Normalized cDNA library has been constructed and >30,000 sequences related to adult, and early life stage gene products are available at <http://sequoia.ucmerced.edu/SymBioSys/index.php>
- **Invitro Coral Cell Toxicity Screening – Ecotoxicology** (2010) 19:171–184.

This information is vital to developing an understanding for how an organism responds to its environment; they are key to developing diagnostic tools to assess coral health; and form the foundation for identifying causes and developing viable risk management options.

DIAGNOSTIC RESOURCES – There is limited application of medical/veterinary knowledge or protocols to the study of coral health and disease, resulting in ambiguous and often misleading communication of findings. Compounded by inadequate diagnostic tools and insufficient application of diagnostic procedures, the challenge is to develop standardized procedures based on medical principles that clearly define the terminology, pathology and diagnostic criteria. For more information please visit our website at: <http://www.cdhc.noaa.gov/diagnostics/default.aspx>

Advanced Histology Workshop Report includes 9 background papers, reviews case studies, set nomenclature and developed extensive glossary. Request a copy at CDHC.coral@noaa.gov.

Diagnostic Tools Available- Consortium members are developing diagnostic assays to assist researchers in identifying putative coral pathogens, characterizing a coral's health status and related pathologies associated with biotic or anthropogenic disease agents. Examples of new techniques include:

- PCR-screening test for recognized pathogens – Dr. Shawn Polson, Univ. Delaware & NOAA Charleston, SC
 - DNA AP site quantification to evaluate DNA damage– NOAA Charleston, SC & Haereticus Environmental Lab (HEL), Clifford VA
 - Porphyrin quantification as an indicator of general metabolic condition - NOAA Charleston, SC & HEL, Clifford VA
- Visit our new website: www.cdhc.noaa.gov to learn more.

SPECIALIZED RESOURCES

- **International Registry of Coral Pathology (IRCP)** supported by NOAA, Oxford, MD, is a research tool and resource of voucher materials for the coral research community. For more information contact Dr. Shawn McLaughlin, shawn.mclaughlin@noaa.gov
- Annotated cnidarian bibliography containing >6000 references and abstracts available as an ENDNOTE™ library is supported by a complete set of reprints and is accessible on an individual basis on site in Charleston, SC. Contact Dr. Sylvia Galloway, Sylvia.galloway@noaa.gov for more information.
- CDHC Listserve – Supported by NOAA's Coral Health and Monitoring Program at the Atlantic Oceanographic and Meteorological Laboratory in Miami, Florida. <http://coral.aoml.noaa.gov/mailman/listinfo/>

CDHC: Educational Opportunities

- **Coral Histology** – Coral tissue slide reading, using virtual slides. Mote Marine Lab, Summerland Key, FL 7/31 - 8/5/2011. Instructor: Dr. Esther Peters. For information visit http://www.mote.org/Keys/slide_workshop_2011.phtml
- **Diseases of Corals and Other Reef Organisms** – In water instruction on coral disease identification. Course is scheduled 8/6 -8/14/2011 at Mote Marine Lab, Summerland Key, FL. For information visit: http://www.mote.org/Keys/disease_workshop_2011.phtml
- **2012 Advanced courses in Histology Slide Reading and Disease Identification** are being planned for 2012 at James Cook University, in conjunction with the 12th ICRS meeting in Cairns, Queensland, Australia. Contact Dr. Esther Peters (epeters2@gmu.edu) if you are interested in participating.

Diseases of Coral Book– *Diseases of Coral* has been accepted by Blackwell for their veterinary series. This book will include a 1) Primer on Pathology; 2) establish diagnostic criteria for etiologic diseases and 3) uniform criteria for descriptive diseases of unknown etiology, 4) Toxicology and 5) Methods of Disease Investigation, including permitting and biological control. Expected release 2011.

CDHC Workshop: *Establishing an Acropora Surveillance Network in the Caribbean.* Epidemiology is the next step to improve our ability to identify health problems in coral populations, identify risk factors for developing disease or reducing performance, and effectively managing for healthy coral resources. The goal of this workshop is to provide a method that can assist coral reef managers, particularly those with limited resources, to assess and manage the health of their respective coral populations. Based on WHO and CDC models, the method will have a hierarchical structure in which surveillance is conducted to detect anomalies; resource managers are given inexpensive techniques they can use to diagnose the change; and then access to expertise when situations demand more specialized investigations. Workshop is being held April 16-18, 2011, co-sponsored with St. Matthew's University, School of Veterinary Medicine.

Rapid Response Teams – A long-range project geared to providing local response capabilities to coral disease outbreaks. Well trained teams capable of mobilizing on short notice will be available to carry out formal disease investigations of unusual coral disease outbreak or mortality events, including potential biotic and abiotic etiologies. <http://www.cdhc.noaa.gov/about/products.aspx>

Coral Histology using Virtual Slides – Understanding normal histology is needed to accurately interpret histopathology. Through virtual slide technology and the World Wide Web, we are providing a platform for distance learning, consultation with coral pathologists and continuing education through 'grand round' web-conferences. Access to the site requires registering for a password and is found at: <https://virtualmicroscope.noaa.gov/coral/>

U.S. Coral Reef Task Force Resolution 16.6 requested the Coral Disease and Health Consortium to serve as a Task Force Working Group to organize and coordinate scientific resources to address coral health and disease issues and link them to coral reef management (such as Local Action Strategies), with emphasis on diagnostics, etiology, outbreak investigations, training, and responses (www.coralreef.gov)

CDHC National Office

The CDHC is a virtual entity, centralized within the US NOAA, Charleston, SC via the office of Dr. Cheryl Woodley. **For information about the CDHC contact Cheryl.woodley@noaa.gov or Andy.Bruckner@livingoceansfoundation.org**

