



E-SLATE

American Academy of Underwater Sciences (AAUS)

EDITORIAL NOTE – April 2009

Welcome to the April issue of the E-Slate. The scientific dive community has much to share this month. The AAUS symposium was a great success; thanks to all who contributed to the event. We look forward to 2010 in Hawaii.

The E-Slate is a newsletter from and for the scientific dive community. We welcome submission of news, announcements, job positions, new citations, and images with captions of underwater work. Please email submissions to aaus@disl.org. Current and past issues of the E-Slate are available at www.aaus.org.

NEWS/ANNOUNCEMENTS

AAUS Welcomes New OM

AAUS welcomes the University of Delaware-College of Marine and Earth Studies and EDAW, Inc. as our newest Organizational Members (OM).

Call for DSO Meeting Topics

The diving safety officers' (DSO) meeting format is being revised to ensure that we have maximum gain from the process. The 2010 meeting will include a portion dedicated to formally debating topics of member interest. This is your Academy and your opportunity to have a voice in the discussion. Pro and con views will be presented by representatives of task groups assigned to each side of a topic. The critical first step is to identify topics for discussion. Please submit your suggestions to BOD member Kevin Flanagan (kflanaga@hawaii.edu). Questions and details on the process will be posted in future issues of the E-Slate.

Winner of Kathy Johnston Painting

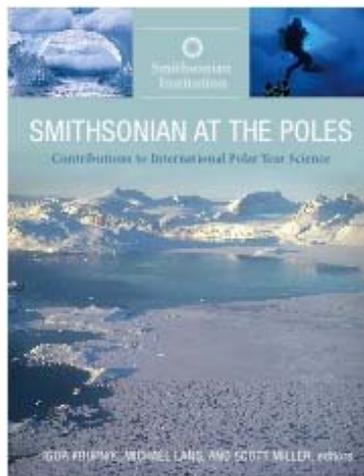
Congratulations, Richard Ducey. Richard Ducey won the beautiful Kathy Johnston painting that was raffled off at this year's symposium. Thank you, Richard, and everyone else who supported the AAUS scholarship fund by purchasing raffle tickets.



Liz Ducey, Richard's daughter, with Kathy and this year's raffle painting.

Smithsonian at the Poles

The Smithsonian Institution announces a new publication: "Smithsonian at the Poles: Contributions to International Polar Year Science: Proceedings of the International Polar Year Symposium" (Smithsonian Institution Scholarly Press). It is available in print or electronic form at <http://www.si.edu/ipy>.



For three periods spread over more than 125 years, scientists from around the world have focused their attention on polar research and exploratory programs to gain a better understanding of geophysical phenomena and the important influence of polar systems. Each International Polar Year (IPY) increases our overall knowledge of

Arctic and Antarctic flora, fauna, and ecosystems; methods and techniques of polar research; cultural history; and the poles as platforms for astrophysical observations.

The symposium - sponsored by the Smithsonian Institution's Office of the Under Secretary for Science with major support from the National Science Foundation - was convened to celebrate the fourth IPY. The proceedings highlight contributions to polar research in IPY history, astrophysics, biology, and cultural studies that have resulted from Smithsonian research as well as collaboration with various other organizations. Methods and techniques of under-ice diving research were addressed by Michael Lang, Ken Dunton, Adam Marsh, Gerald Kooyman and Langdon Quetin. For further information, contact Michael Lang (langm@si.edu; 202-633-6887).

Review - 2009 AAUS Symposium

The 2009 AAUS meeting in Atlanta, GA was a great success. The Georgia Aquarium staff and volunteers did a superb job in organizing venues for DSO workshops, diving experiences and social events. The Crown Plaza Airport delivered excellent support for our symposium program and accommodations.

AAUS symposia are noteworthy in bringing together a diverse range of disciplines supported by scientific diving or addressing the science of diving. The meetings provide a great venue for cross-training and networking for professionals with a range of specialties. The 31 presentations delivered in this meeting covered ecology, archaeology, risk management, diving medicine, marine protection, conservation, medicine, technology, diver protection and program development. The benefits of collaborative efforts were highlighted in the invited plenary session provided by Dennis Nixon (University-National Oceanic Laboratory System - UNOLS) and the seven presentations given by the NOAA National Marine Sanctuaries (NMS) team. Papers from each session will be included in the proceedings available later this year.

A number of presentations were provided by students, both graduate and undergraduate. We recognize each for their efforts:

Bridget Benson (University of California San Diego)
Valentina Di Santo (University of West Florida)
Elizabeth Ducey (St. Mary's College of Maryland)
Dawn Kernagis (Duke University)
Kathryn Kovitvongsa (Boston University)
Ryan Patryluk (University of Connecticut, Groton)
Noelle Van Ee (University of Miami)

The impressive quality of several student presentations prompted the BOD to create a new student presentation competition that will be initiated at the 2010 symposium. Recognition will include both certificates and cash awards.

The 2010 symposium will be held March 22-29 in Honolulu, HI. There will be a few structural changes. One to be aware of now is the implementation of an earlier abstract submission deadline. This will accommodate those who need to confirm presentation acceptance before booking travel. A side-benefit of this change is that it may allow us to shift back to the proceedings model previously employed by the Academy. That is to have full papers submitted in advance so that the proceedings of the meeting are available at or immediately following the meeting. This would help our efforts to reach the wider community in a timely manner.

Neal Pollock
Meetings and Publications Chair

AAUS Conrad Limbaugh Memorial Award

The AAUS Conrad Limbaugh Memorial Award is presented annually to an individual who has made a significant contribution in diving safety and diving leadership on behalf of the scientific diving community.

Conrad Limbaugh was an underwater naturalist and Chief Diving Officer for of Scripps Institution of Oceanography, where he directed the diving program. He was killed in a scuba diving accident in the Mediterranean on March 20,

1960. Limbaugh graduated from Whittier College in 1948 and did graduate work at the University of California at Los Angeles before going to Scripps Institution in 1950. He was largely responsible for developing the diver-training program at Scripps, as well as many research techniques used by marine scientists.

The 2008 AAUS Recipient of the Conrad Limbaugh Memorial Award for Scientific Diving Leadership is Michael A. Lang.

Michael began diving for science in 1978 and was employed as a staff marine biologist at San Diego State University from 1982-1989. Lang was recruited in 1990 as the Smithsonian Scientific Diving Officer and since 1998 has concurrently directed the pan-institutional Smithsonian Marine Science Network in the Office of the Under Secretary for Science. His leadership efforts in diving safety research have produced proceedings, volumes and consensus standards on dive computers, ascent rates and safety stops, repetitive diving, polar diving, enriched air nitrox, reverse dive profiles, advanced scientific diving methods, and contributions to the United Nations Educational, Scientific and Cultural Organization Code of Scientific Diving Practice, NOAA Diving Manual, and Bennett and Elliott's Physiology and Medicine of Diving. Michael participated in the 1980 Occupational Safety and Health Administration exemption hearings in Los Angeles, is a past-President of AAUS (1987-1988, and 1991-1993), chaired multiple AAUS scientific symposia, and is a former Director of the Coral Reef Alliance, Our World Underwater Scholarship Society, Divers Alert Network, and Undersea and Hyperbaric Medical Society Diving Committee. Michael is quintilingual and an internationally-requested speaker, recipient of the 1991 DAN/Rolux Diver of the Year and the 2000 UHMS Craig Hoffmann Diving Awards and has served as the National Science Foundation Polar Programs Diving Officer since 2001. Lang has been an active National Association of Underwater Instructors (1980) and International Association of Nitrox and Technical Divers (1991) scuba instructor. Michael acknowledges the long-term leadership support he has received since the formative AAUS days from Chuck Mitchell, Jimmy Stewart, Glen Egstrom, John Duffy, Lee Somers, Lloyd Austin, John Heine, and Dennis Divins.

AAUS Training Verification Cards

The AAUS Scientific Diver Verification of Training Card Program that was started in 2001 has been updated and the academy will begin to issue new cards starting in June. The card front will have the AAUS logo, the OM logo, a picture of the diver, the date of issue, and the name and logo of the certifying OM. The back of the card will list all volume two specialties training verifications for which the diver qualifies. An example of the card can be found at www.aaus.org. As recommended by the 2008 DSO Training Summit, once the DSO has verified that an applicant is qualified the applicant's name will be added to a national registry of scientific divers

that have met the training requirements of AAUS. This card is not intended for use in lieu of a Letter of Reciprocity and Training Verification when requesting reciprocity from or transferring authorization to another AAUS organizational member. Participation in the card program is optional but all applicants will have to meet the following requirements:

- Applicant is an individual member of AAUS, has paid the card fee, (Individual Members \$25, Student Members \$10).
- Candidate's DSO has verified that the applicant received the required training, as listed in Sections 4 and 5 of the current AAUS Standards for Scientific Diving Volume 1 and any applicable sections of Volume 2.
- Or, replacing OM DSO verification, applicant is a full member of AAUS with an AAUS DSO reference who has applied to the AAUS Membership Chair and been approved by the Board of Directors.

The National Association for Cave Diving (NACD)

The NACD includes several committees that are concerned with the science of cave diving. The NACD provides funding for exploration and survey projects both internationally and throughout the United States. In addition, the NACD is dedicated to involving the public in issues related to water quality and has developed a water quality test kit that is available to members and the general public. The kit contains all the supplies needed and simple instructions on how to conduct the chemical analysis tests, conduct flora and fauna counts, and species identification manuals. The kit is provided free to interested parties. Results of water quality tests are maintained on the website and updated as new tests are conducted. The NACD is also collecting biological data on aquatic cave life to form a large-scale multi-state database to assess long-term changes in cave life. Additionally, psychological data is of concern to the NACD, including accident analyses, personality and attitudes, and team dynamics. The NACD encourages cooperative projects and can provide modest funding for some projects. Workshops on how to survey, conduct water quality testing, collect biodata, and other topics are conducted periodically. All information concerning these and other activities of the NACD can be found at www.safecavediving.com.

2009 Board of Directors Election

The AAUS is seeking individuals interested in running for the Board of Directors (BOD) in 2009. This election cycle consists of three positions: Director, Secretary, and President-Elect. To qualify to run for the position of Director or Secretary, individuals must qualify as voting members in good standing with the Academy for at least two consecutive years prior to nomination. To qualify to run for President-Elect, the individual must have previously served as a member of the AAUS BOD. The Director position is for a three-year term starting January 1, 2010. Specific committee duties will be

assigned by the 2010 incoming President, Christian McDonald. The Secretary position is for a two-year term beginning January 1, 2010. Additional committee duties are assigned by the incoming President. The President-Elect position serves two years as President-Elect beginning January 1, 2010, and will assume the Presidency January 1, 2012 for a two-year term. The list of nominees along with candidate bios will be presented to the BOD on March 31, 2009. Candidates will be asked to submit responses to several questions to be provided to the AAUS membership as part of the election process. Balloting will open May 1st and close June 30th. Questions can be directed to Nominating Committee Chair, Steve Sellers, at sellerss@ecu.edu or 252-328-4041.

UPCOMING EVENTS

DAN Diving Medical Technician Course

A Diving Medical Technician (DMT) course will be held in Durham, NC April 19-24. The program includes a lecture series and hands on experience at local recompression facilities. Participants who complete the certification course receive DMT certification through the National Board of Diving and Hyperbaric Medical Technology (NBDHMT). For registration or more information visit:

<http://www.diversalernetnetwork.org/training/courses/dmt>.

Bimini Bay Lionfish Smash

South Florida Freedivers has organized a spearfish tournament to help protect the Florida reefs from invasion of Lionfish. The event will take place May 2, 2009, with a 0800 start and 1630 weigh in, followed by a ceremony at Bimini, Bahamas. For information contact Mike Schmidt (President - 305-491-7244), Joe Fernandez (Treasurer - 305-562-1944), Edwin Gonzalez (VP and Marketing - 305-215-5702) or Ivon Rodriguez (Public Relations and Sponsorships - 305-781-6941).

UAF Cold Water Diving Course

The University of Alaska Fairbanks is offering a cold water diving course May 11-15, 2009 at the Kasitsna Bay Laboratory in Alaska. Introduction to Cold Water Diving will train certified scuba divers in drysuit use and maintenance. The course will stress drysuit safety and buoyancy skills and will include practical experience in a cold-water rescue. Students will be beach and small boat scuba diving. Students will graduate with a PADI Drysuit certification.

Professor: Dr. Brenda Konar

Prerequisites: AAUS scuba certification

www.sfos.uaf.edu/dive/index.html

Costs: \$598 + tuition (in-state tuition for all students)

To register visit: <http://www.uaf.edu/summer/>.

Prospective students are encouraged to contact

bkonar@guru.uaf.edu

Shoals Marine Lab Underwater Archaeology Course

Shoals Marine Laboratory (SML) is offering an Underwater Archaeology course (ARKEO 3002) August 10-17, 2009. This course will be held on Appledore Island, located six miles off the coast of Portsmouth, NH. The course will cover the development of maritime archaeology and the discipline of underwater archaeology. Students will participate in active fieldwork, including underwater exploration. Tuition includes room and board, activity fees, and round trip boat transportation between Portsmouth, NH and Appledore Island. This two-credit course is open to all college undergraduates. If space is available, non-matriculating students may audit with permission of the instructor. Those who wish to scuba dive must be active AAUS scientific divers. Training to become an AAUS scientific diver is also available at SML by participating in our four credit Underwater Research course (BIOSM 3650/ZOOL 730). For those without AAUS diving qualifications, snorkeling is a suitable way to participate. Financial aid is available and students are encouraged to apply. For more information visit: <http://www.sml.cornell.edu>.

NEW PUBLICATIONS

Bonomo M, Cairoli R, Verde G, Morelli L, Moreo A, Grottaglie MD, Brambilla MC, Meneghini E, Aghemo P, Corigliano G, Marroni A. Safety of recreational scuba diving in type 1 diabetic patients: the Deep Monitoring programme. *Diabetes Metab.* 2009 Feb 27. [Epub ahead of print].

AIM: To verify whether, with thorough practical and theoretical training, well-controlled, non-complicated diabetic patients can safely go diving underwater with no additional medical or metabolic risks. **METHODS:** Twelve diabetic patients participated in the study after undergoing training focused on their diabetic status. Two dives per day were scheduled during two five-day stays on the island of Ventotene (Italy). Capillary blood glucose (BG) was checked at 60, 30 and 10 minutes before diving, and corrective measures adopted if necessary, based on BG absolute levels and dynamics. A device for continuous subcutaneous glucose monitoring (CGM), expressly modified for the purpose, was worn during dives. **RESULTS:** Data were gathered from 90 dives; mean BG at 60, 30 and 10 minutes before diving was 205.8±69.6 mg·dL⁻¹, 200.0±66.4 mg·dL⁻¹ and 200.5±61.0 mg·dL⁻¹, respectively. In 56 of the 90 dives, supplementary carbohydrates or insulin were necessary, but only one dive was interrupted on account of hypoglycaemic symptoms. Mean post-dive BG was 158.9±80.8 mg·dL⁻¹. CGM recordings showed that glucose levels gradually decreased during the dives (nadir: -19.9%). **CONCLUSION:** Experienced, well-controlled, complication-free young diabetic patients can safely go scuba diving, provided that they apply a rigorous protocol based on serial pre-dive BG measurements. The specific variables of underwater diving

do not appear to involve significant additional risks of hypoglycaemia.

Chouchou F, Pichot V, Garet M, Barthélémy JC, Roche F. Dominance in cardiac parasympathetic activity during real recreational scuba diving. *Eur J Appl Physiol.* 2009 Mar 11. [Epub ahead of print].

It was already established that exposure to hyperbaric conditions induces vagal-dependent bradycardia but field study on autonomic nervous system (ANS) activity during self-contained underwater breathing apparatus (scuba) diving is lacking. The aim of the present study was to evaluate ANS modifications during real recreational scuba diving using heart rate variability analysis (time domain, frequency-domain and Poincaré plot) in 10 experienced and volunteers recreational divers. Mean RR, root mean square of successive differences of interval (rMSSD), high frequency of spectral analysis and standard deviation 1 of Poincaré Plot increased ($p<0.05$) during dive. Low frequency/high frequency ratio decreased during dive ($p<0.05$) but increased after ($p<0.05$). Recreational scuba diving induced a rise in vagal activity and a decrease in cardiac sympathetic activity. Conversely, sympathetic activity increases ($p<0.05$) during the recovery.

Connell, SD and AD Irving. Integrating ecology with biogeography using landscape characteristics: a case study of subtidal habitat across continental Australia. *J Biogeogr.* 2008; 35(9): 1608-21.

Aim: We aimed to redress a current limitation of local ecological studies (i.e., piecemeal information on specific taxa) by integrating existing ecological knowledge with quantifiable patterns in primary habitat (i.e., composition, distribution and cover) from local to continental scales. By achieving this aim, we sought to provide a biogeographical framework for the interpretation of variation in the ecology of, and threats to, subtidal rocky landscapes.

Krupnik I, Lang MA, Miller SE, eds. *Smithsonian at the Poles: Contributions to International Polar Year Science.* Washington, DC: Smithsonian Institution Scholarly Press, 2009; 405 pp.

Moreh E, Meiner Z, Neeb M, Hiller N, Schwartz I. Spinal decompression sickness presenting as partial Brown-Sequard syndrome and treated with robotic-assisted body-weight support treadmill training. *J Rehabil Med.* 2009; 41(1): 88-9.

OBJECTIVE: To describe the rehabilitation outcome of a case of spinal decompression sickness presenting as partial Brown-Sequard syndrome treated with robotic-assisted body-weight support treadmill training. **STUDY DESIGN:** Case report. **BACKGROUND:** Type II decompression sickness patients commonly suffer from myelopathy with gait disturbances necessitating rehabilitation. Robotic-assisted body-weight support treadmill training has been

shown to improve the rehabilitation outcome of incomplete spinal cord injury. Its usefulness has not been described in decompression sickness myelopathy. **METHODS:** Robotic-assisted body-weight support treadmill training was administered using the Lokomat. Primary outcomes were American Spinal Cord Association scale, Spinal Cord Independence Measurement, Berg Balance Test, and Walking Index for Spinal Cord Injury. **RESULTS:** The patient was admitted 3 weeks after the diving injury, with severe paraparesis and a T11 sensory neurological level, resembling partial Brown-Sequard syndrome. After 3 months of rehabilitation including 18 Lokomat sessions, American Spinal Cord Association score improved from C to D, Spinal Cord Independence Measurement improved from 50 to 90 out of 100. Berg Balance Test improved from 35 to 43 out of 56 and Walking Index for Spinal Cord Injury improved from 1 to 15 out of 20. Upon discharge he could walk with one crutch for more than 1 km. **CONCLUSION:** Robotic-assisted body-weight support treadmill training for spinal decompression sickness rehabilitation might be beneficial.

Nisse AG, Heine JN, Brown JA. The application of adaptive cluster sampling for rare subtidal macroalgae. Mar Biol. 2007; 151(4): 1343-8.

Abstract: Adaptive cluster sampling (ACS) is a targeting sampling method that provides unbiased abundance estimators for populations of rare species that may be inadequately sampled with simple random sampling (SRS). ACS has been used successfully to estimate abundances of rockfish and sardine larvae from shipboard surveys. In this study, we describe the application of ACS for subtidal macroalgae. Using scuba, we measured abundances of *Codium mamillosum*, *C. pomoides*, and *Halimeda cuneata* at three islands and two levels of wave exposure. The three species were relatively patchy and could be sampled with ACS at one site per dive. Their distributions differed among islands and with exposure to wave energy, with *H. cuneata* found at only one island. ACS is a useful tool for understanding the spatial distribution and abundance of populations of rare benthic species, but, as was the case in this study, may not be as efficient as sampling with SRS with comparable replication.

Wienke BR. Diving decompression models and bubble metrics: modern computer syntheses. Comput Biol Med. 2009 Feb 27. [Epub ahead of print].

A quantitative summary of computer models in diving applications is presented, underscoring dual phase dynamics and quantifying metrics in tissue and blood. Algorithms covered include the multitissue, diffusion, split phase gradient, linear-exponential, asymmetric tissue, thermodynamic, varying permeability, reduced gradient bubble, tissue bubble diffusion, and linear-exponential phase models. Defining relationships are listed, and diver staging regimens are underscored. Implementations, diving

sectors, and correlations are indicated for models with a history of widespread acceptance, utilization, and safe application across recreational, scientific, military, research, and technical communities. Presently, all models are incomplete, but many (included above) are useful, having resulted in diving tables, underwater meters, and dive planning software. Those herein employ varying degrees of calibration and data tuning. We discuss bubble metrics in tissue and blood as a backdrop against computer models. The past 15 years, or so, have witnessed changes and additions to diving protocols and table procedures, such as shorter nonstop time limits, slower ascent rates, shallow safety stops, ascending repetitive profiles, deep decompression stops, helium based breathing mixtures, permissible reverse profiles, multilevel techniques, both faster and slower controlling repetitive tissue half-times, smaller critical tensions, longer flying-after-diving surface intervals, and others. Stimulated by Doppler and imaging technology, table and decompression meter development, theory, statistics, chamber and animal testing, or safer diving consensus, these modifications affect a gamut of activity, spanning bounce to decompression, single to multiday, and air to mixed gas diving. As it turns out, there is growing support for many protocols on operational, experimental, and theoretical grounds, with bubble models addressing many concerns on plausible bases, but with further testing or profile data analyses requisite.

The mission of the American Academy of Underwater Sciences is to facilitate the development of safe and productive scientific divers through education, research, advocacy, and the advancement of standards for scientific diving practices, certifications, & operations.

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