E-SLATE

American Academy of Underwater Sciences (AAUS)

EDITOR'S NOTE – October 2009

Welcome to the October issue of the E-Slate. AAUS congratulates the 2009 recipients of the AAUS Scholarship Awards. Also in this issue, a call for abstracts for the 2010 AAUS symposium, new funding opportunities, a review of the Haldane Symposium, and several new publications.

The E-Slate is a newsletter from and for the scientific dive community. We welcome 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 Scholarship Award Winners - 2009

AAUS offers two competitive scholarship programs. The Kathy Johnston (KJ) award for doctoral-level students and the Kevin Gurr (KG) award for master-level students. First place awards are $2500; second place awards are $1500. A group of external reviewers and the AAUS Scholarship Committee evaluated a total of 31 proposals for the 2009 competition (17 KJ [10 female, 7 male] and 14 KG [8 female, 6 male]). Many of the proposals were of high quality and worthy of funding, making the final decisions challenging. Best wishes to all who participated. Special thanks to the nine anonymous reviewers.

Kathy Johnston Recipients

1st place winner: **Lauren Garske** (Bodega Bay Marine Lab, University of California, Davis)
Title: Integrating oceanographic, chemical and ecological processes to identify 'zones of impact' for runoff in coastal waters.

2nd place winner: **Katherine Grablow** (Department of Biology, University of Central Florida)
Title: Recruitment and dispersal of the long-spined urchin *Diadema antillarum*.

Kevin Gurr Recipients

1st place winner: **Alecia Adamson** (Fisheries and Aquatic Sciences, University of Florida)
Title: Do sanctuary preservation areas provide hogfish (*Lachnolaimus maximus*) significant protection against exploitation?

2nd place winner: **Arley Muth** (Moss Landing Marine Laboratories)
Title: Substrate rugosity effects on kelp spore aggregation and fertilization success.

AAUS Fall BOD Meeting

The Fall AAUS Board of Directors meeting will be held in conjunction with the Diving Equipment and Marketing Association (DEMA) meeting in Orlando, FL. The BOD will meet on Thursday, November 5, 2009, from 1000-1800, at the Metropolitan Hotel in Orlando.

New Student Competition - AAUS Symposium 2010

A new competition - the best student presentation - will be initiated at the 2010 symposium. Recognition will include both certificates and cash awards ($250 for first place with an optional $100 for honorable mention, if appropriate).

Call for Abstracts – AAUS 2010

Abstracts for the upcoming AAUS symposium can be submitted until January 15, 2010. As is the custom for AAUS, full papers are required for all presentations. These will be published in the ISBN-indexed proceedings of the meeting. It is expected that some papers will be brief (minimum around 2000 words) and may focus on the diving methods of central interest to the Academy to avoid compromising the ability to publish research data in peer-reviewed journals. For more information or to submit abstracts (150-250 words) visit http://www.aaus.org.

AAUS Scientific Diving Internship

The Our World-Underwater Scholarship has collaborated with AAUS to create a new scientific diving internship. This internship will provide undergraduates with the experience and opportunities necessary for a future in science, diving for research, or scientific diving-related fields. Intern applicants can be students from colleges and universities with an interest in science and diving. The program runs primarily from mid-May through August and will include training at one of several AAUS organizational member sites. This training will give the intern the necessary dive qualifications to allow participation on research projects requiring scientific diving and introduce the intern to careers that utilize scientific diving as a tool. Once trained as an AAUS-recognized diver-in training, interns will participate in underwater field-work at one or more locations and research facilities associated with AAUS. The internship will be supported by funding for travel to/from site, room, board, and other internship-related expenses. For more information visit:
http://www.owuscholarship.org/internships/current.aspx

Standards Reminder – Diver Medical Authority

AAUS medical evaluation forms have a space for MD/DO (medical doctor/doctor of osteopathy) signatures. Please remember that current standards do not give signing authority to nurse practitioners, physician assistants or any other medical personnel.

Haldane Symposium – Review

The symposium results of *The Future of Diving: 100 Years of Haldane and Beyond*, convened by the Baromedical and Environmental Physiology Group of the Norwegian University of Science and Technology, 18-19 December 2008, in Trondheim, Norway, are reported in 28 papers and three discussion sessions in this volume. These Proceedings include a wide range of environmental research studies demonstrating the breadth and diversity of decompression physiology studies. The first section treats an overview of the Norwegian University of Science and Technology, John Scott Haldane's life and work, and environmental physiology of the future. Subsequent proceedings papers represent findings by international workers on overarching topics of decompression physiology, decompression methodology, strategic approaches to decompression research, and environmental physiology. The volume includes contributions on clinical aspects of decompression illness, biochemical approach to decompression, the cellular stress response, individual risk of decompression sickness, and the possible effects of epigenomic variation altering gene expression; on inducing heat-shock proteins for protection against decompression sickness, lack of brain injury after decompression in rats; on exercise, endothelium and diving physiology, and animal experiments for evaluating decompression; on ultrasound decompression methodologies and the future of dive computers; on decompression research strategies, collaborative networks, and recruiting new researchers to the field; on marine mammal adaptations to avoid decompression sickness, whether diving destroys the brain, and effects of diving on the lung; on the limits of breath-hold diving and parameters of extreme environment diving; and, on creativity in science. As we are preparing to face challenges of new ideas, methodologies, and interdisciplinary approaches to studies of decompression sickness, we are reminded of the limited increase in knowledge of decompression sickness as a systemic disease since Haldane's seminal work 100 years ago. The original 1908 paper by Boycott, Damant, and Haldane on Prevention of Compressed-Air Illness (Journal of Hygiene, Cambridge) was reprinted with permission as an appendix in this volume.

Lang MA, Brubakk AO, eds. The Future of Diving: 100 Years of Haldane and Beyond. Washington, DC: Smithsonian Institution Scholarly Press, 2009; 286 pp.

Request print copies by email: schol_press@si.edu. Proceedings are provided as a professional courtesy by the Smithsonian Scientific Diving Program.

Newly Discovered Cave Dwelling Crustacean

During a cave diving expedition off the coast of Africa a team of scientists and cave divers discovered a previously unknown species of crustacean, belonging to the remipede genus *Speleonectes*. The new crustacean is believed to be among the most primitive of all types of crustaceans. It has been named *Speleonectes* (cave swimmer) *atlantida* and is about one inch in length. The crustacean has no eyes, venom-injecting fangs, and an almost transparent body. Researchers from Penn State University, Texas A&M University at Galveston and universities in Spain and Germany found the new species in Tunnel de la Atlantida, the world's longest cave created by a tube of lava from a volcanic eruption around 20,000 years ago. Their findings are published in the current issue of Marine Biodversity. For more information visit: www.sciencedaily.com/releases/2009/08/090824115813.htm.

Captain Maino des Granges - Obituary

Captain Maino de Granges, former officer in charge of the US Navy Experimental Diving Unit in Panama City, FL died August 19, 2009 at age 91 (born August 02, 1918). He enlisted in the Navy in 1936, was selected for the Naval Academy in 1938 and graduated in December 1941. He was assigned to submarine patrol in January 1942. In the 1950s, Captain des Granges was officer in charge of the Navy Experimental Diving Unit in Washington, DC. He was intimately involved in the development of the US Navy's first set of diving tables.

For the full obituary visit: http://navxdivingu.blogspot.com/2009/09/capt-maino-des-granges-former-oic-of.html.

FUNDING OPPORTUNITIES

NOAA OER Program Funding

The Ocean Exploration and Research (OER) Program anticipates up to $3 million will be available for projects in FY10 in the Ocean Exploration. A two page pre-proposal in addition to the OE Cover Sheet is required and must be submitted either by e-mail (OAR.OE.FAQ@noaa.gov) or by hard-copy (send signed hard-copies to the address below) by 1700 (EST) October 8, 2009:

NOAA Office of Ocean Exploration & Research
1315 East-West Highway
SSMC 3, 10th Floor (R/OER)
Silver Spring, MD 20910

For full details, please go to Ocean Exploration website (http://www.explore.noaa.gov) and look under the 2010 Announcement of Opportunity.

Pre-proposals are required before full proposals can be submitted. Full proposals should be submitted to the Federal Government grants online site (www.grants.gov)

Questions and problems should be directed to Nic Alvarado in the NOAA Office of Ocean Exploration and Research (Nicolas.Alvarado@noaa.gov)

Women Divers Hall of Fame Scholarships

The Women Divers Hall of Fame (WDHOF) is offering four scholarships and nine training grants in 2010. WDHOF offers scholarships and training grants in diverse fields such as marine science, marine archeology, technical diving, hyperbaric medicine and handicapped diving. WDHOF scholarships are available to women and men of all ages to pursue higher education and training, further their career goals, and seek out opportunities in the aquatic and diving-related industries. Applications can be downloaded from the WDHOF website: www.wdhof.org. All applications for 2010 must be submitted electronically by November 15, 2009. Applicants may apply for only one scholarship or grant.

Our World Underwater Scholarship

The Our World Underwater Rolex Scholarships provide a hands-on introduction to underwater and other aquatic-related endeavors for young persons with an interest in underwater-related disciplines. The scholarships provide a year of experiences and rare opportunities to meet and work with many highly respected individuals and organizations. The deadline for applications is December 31, 2009. For more information visit: http://www.owuscholarship.org.

UPCOMING EVENTS

ISOSD 2009

The 2nd International Symposium on Occupational Scientific Diving (ISOSD) of ESPD, held at Tvärminne Zoological Station, University of Helsinki, Finland October 6-8, 2009, is organized by the Finnish Scientific Diving Steering Association. Special emphasis is on methods, techniques, and instrumentation in actual underwater fieldwork. In addition to scientific presentations, presentations of scientific diving methods, interesting projects etc, are encouraged. Presentations are not required to follow strict scientific guidelines, and may be in the form of image slideshows, video etc. Optional dives at sites of scientific and/or archaeological interest in northern Baltic Sea archipelago, and in a clear water limestone quarry will be offered. Information: http://luoto.tvarminne.helsinki.fi/ISOSD2009.html.

Diving for Science - 2010 AAUS Symposium

The 29th AAUS scientific symposium will be held at the Ala Moana Hotel, March 25-27, in Waikiki, HI. Mention AAUS when making reservations to get a reduced room rate of $119 (available March 22-29). If hotel rates decrease before the symposium, the AAUS rate will also decrease. If the hotel rate increases, the AAUS fee is locked in at $119. All symposium meetings including the DSO meeting and business meeting will be held at the hotel. The banquet will be at the Waikiki Aquarium (http://www.waquarium.org). Schedule of workshops will be posted ASAP. Call 808-955-4811 or visit http://www.alamoanahotelhonolulu.com/ for reservations.

EQUIPMENT WARNING

Closed-Circuit Rebreathers and Hydraulic Tools

Recent testing of Ambient Pressure Diving's Vision Electronics (used in the Inspiration, Evolution and Evolution + closed-circuit rebreathers), while operating underwater hydraulic tools (handheld hydraulic breakers) has demonstrated that water jets from tool use can activate switches on the handsets. This could lead to alterations in the closed-circuit rebreather user-defined programming. A report will be issued but DSOs using closed-circuit rebreathers and hydraulic tools in their program should take appropriate precautions in the interim.

NEW PUBLICATIONS

Adolfsson P, Ornhagen H, Jendle J. Accuracy and reliability of continuous glucose monitoring in individuals with type 1 diabetes during recreational diving. Diabetes Technol Ther. 2009; 11(8): 493-7.

BACKGROUND: This study evaluated the accuracy and function of the continuous glucose monitoring system (CGMS, Minneapolis, MN) during recreational scuba diving in individuals with type 1 diabetes. METHODS: Twenty-four adults, 12 with type 1 diabetes and 12 healthy controls, were studied during five recreational scuba dives performed on three consecutive days. All the participants used the CGMS on all the days and during all the dives. Comparisons were made between plasma glucose at specific time intervals and the CGMS. RESULTS: The recording by the CGMS was robust, with few sensor problems. The mean sensor survival time was >48 h. Eighty-five percent of the individuals used one sensor during the entire length of the trial. The overall mean absolute difference (MAD) within the group with diabetes was 14.4±6%, and the corresponding daily figures were 23.2±19.3% on day 1, 11.6±4.5% on day 2, and 11.2±5.7% on day 3. A significant improvement regarding MAD when day 1 was compared with day 2 and 3 ($p<0.05$). With a limit set at 70 $mg \cdot dL^{-1}$, hypoglycemia pre- and post-dive was detected with a positive predictive value of 0.39, negative predictive value of 0.98, sensitivity of 0.64, and specificity of 0.94. CONCLUSIONS: We demonstrate that the CGMS was used with accuracy in such difficult conditions as scuba diving and provided robust information on glucose variations.

Grassi P, Stenner E, Rinaldi A, Delbello G, Piccinini C, Bussani A, Biancardi B, Biasioli B, Berlot G. B-type natriuretic peptide after open-water and hyperbaric chamber exposure to 10 msw. Aviat Space Environ Med. 2009; 80(8): 716-9.

INTRODUCTION: Hyperbaric environment exposure in humans has cardiovascular effects mainly characterized by an increase in afterload and a decrease in cardiac output. In

a previous study we did not find B-type natriuretic peptide (BNP) changes in healthy volunteers exposed to hyperbaric oxygen while other authors documented a significant increase in N-terminal pro-BNP after scuba diving. On the basis of these data we hypothesized that dry hyperbaric exposure and scuba diving could have different effects on BNP secretion. METHODS: Nine healthy volunteers performed a one hour open-sea air dive at 10 m depth (T); a few days later they were compressed in air in a hyperbaric chamber (CT) using the same dive profile. Three venous blood samples were drawn for each session: before starting the dives (T0 and CT0), immediately after exiting the water and the chamber (T1 and CT1), and 5 h later (T2 and CT2). RESULTS: A significant increase in plasma BNP was found with respect to baseline conditions after scuba diving both at T1 (median increment +32.69% [interquartile range +25.62 to +65.35%]) and at T2 (+28.03% [+23.08 to +38.92%]) while no differences were documented after the same dive in dry conditions either at CT1 (+1.34% [-17.57 to +33.55%]) or at CT2 (0.00% [17,67 to +21.62%]). DISCUSSION: These preliminary findings show that scuba diving and dry hyperbaric exposure, although at the same environmental pressure, cause different effects on ventricular loads in healthy subjects.

Haag SM, Kennish MJ, Sakowicz GP. Seagrass habitat characterization in estuarine waters of the Jacques Cousteau National Estuarine Research Reserve using underwater videographic imaging techniques. J Coastal Res. 2008; 55: 171-9.

A benthic habitat assessment study conducted in the Barnegat Bay-Little Egg Harbor Estuary from June to November 2006 reveals that boat-based videographic imaging is comparable to in situ diver observations for determining the occurrence and percent cover of seagrasses in actively growing beds. A Seaviewer Sea Drop camera and recorder unit deployed along 12 transects in the estuary generated 331 images of seagrass habitat during the study period. A comparison of video still images with data derived from diver observations indicates consistent results in terms of the presence/absence and percent cover of seagrass on the estuarine floor throughout the seagrass growing season. Plots of the percent cover of seagrass recorded by the camera system vs. in situ diver observations reveal a high correlation for the June-July, August-September, and October-November sampling periods (R2 = 0.936, 0823, and 0.894, respectively) as well as for the entire June-November sampling period (R2 = 0.888). A kappa statistic calculated for the presence/absence of seagrass in the estuary (0.83) reflects a nearly perfect level of agreement between the two methods (camera and diver) of data collection. In addition to generating rapid databases, digital underwater video imaging requires less field time than the use of divers and other traditional field monitoring methods. Digital videographic files can also be post processed, geolocated using a global positioning system, analyzed by multiple investigators, and stored for later analysis, thereby offering several other advantages over traditional in situ monitoring techniques in shallow estuarine systems.

Langhamer O, Wilhelmsson D, Engstrom J. Artificial reef effect and fouling impacts on offshore wave power foundations and buoys - a pilot study. Estuar Coast Shelf S. 2009; 82(3): 426-32.

Little is known about the effects of offshore energy installations on the marine environment, and further research could assist in minimizing environmental risks as well as in enhancing potential positive effects on the marine environment. While biofouling on marine energy conversion devices on one hand has the potential to be an engineering concern, these structures can also affect biodiversity by functioning as artificial reefs. The Lysekil Project is a test park for wave power located at the Swedish west coast. Here, buoys acting as point absorbers on the surface are connected to generators anchored on concrete foundations on the seabed. In this study we investigated the colonization of foundations by invertebrates and fish, as well as fouling assemblages on buoys. We examined the influence of surface orientation of the wave power foundations on epibenthic colonization, and made observations of habitat use by fish and crustaceans during three years of submergence. We also examined fouling assemblages on buoys and calculated the effects of biofouling on the energy absorption of the wave power buoys. On foundations we demonstrated a succession in colonization over time with a higher degree of coverage on vertical surfaces. Buoys were dominated by the blue mussel *Mytilus edulis.* Calculations indicated that biofouling have no significant effect in the energy absorption on a buoy working as a point absorber. This study is the first structured investigation on marine organisms associated with wave power devices.

Peker I, Erten H, Kayaoglu G. Dental restoration dislodgment and fracture during scuba diving: a case of barotrauma. J Am Dent Assoc. 2009; 140(9): 1118-21.

BACKGROUND: The term "barotrauma" is used to describe a physical injury caused by a rapid or extreme change in air pressure. Enclosed areas within the body are particularly affected by barotrauma. CASE DESCRIPTION: A 40-year-old man had complaints of restorations in three teeth fracturing and dislodging while he was scuba diving at a depth of 35 meters. The affected teeth contained carious dentin. The caries was removed, and the affected teeth underwent endodontic, restorative and prosthetic rehabilitation. CLINICAL IMPLICATIONS: Inadequate restorations and selection of dental materials in some cases predispose patients to barotrauma. To prevent barotrauma-related damages on the teeth, it is important to maintain good-quality restorations and avoid trapping air beneath them. Dentists and patients who are exposed to barometric stress as part of their jobs or hobbies should know the causes of barotrauma and be aware of the importance of

routine dental checkups to avoid barotrauma-related dental problems.

Shearer D, Mahon R. Brain natriuretic peptide levels in six basic underwater demolitions/SEAL recruits presenting with swimming induced pulmonary edema (SIPE). J Spec Oper Med. 2009; 9(3): 44-50.

Swimming induced pulmonary edema (SIPE) is associated with both scuba diving and strenuous surface swimming; however, the majority of reported cases and clinically observed cases tend to occur during or after aggressive surface swimming. Capillary stress failure appears to be central to the pathophysiology of this disorder. Regional pulmonary capillaries are exposed to relatively high pressures secondary to increased vascular volume, elevation of pulmonary vascular resistance, and regional differences in perfusion secondary to forces of gravity and high cardiac output. Acute pulmonary edema can be classified as either cardiogenic or noncardiogenic or both. Cardiogenic pulmonary edema occurs when the pulmonary capillary hydrostatic pressure exceeds plasma oncotic pressure. Noncardiogenic pulmonary edema occurs when pulmonary capillary permeability is increased. Given the pathophysiology noted above, SIPE can be described as a cardiogenic pulmonary edema, at least in part, since an increased transalveolar pressure gradient has been implicated in the pathogenesis of SIPE. Brain natriuretic peptide (BNP) is used in the clinical setting to differentiate cardiac from pulmonary sources of dyspnea, specifically to diagnose cardiogenic pulmonary edema. During clinical management, BNP levels were drawn on six BUD/S recruits simultaneously presenting with pulmonary complaints consistent with SIPE, after an extended surface bay swim. This paper analyzes that data after de-identification and reviews the pathophysiology and clinical management of SIPE.

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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