E-SLATE

American Academy of Underwater Sciences (AAUS)

EDITORIAL BOARD NOTE – February 2012

Welcome to the February E-Slate. This month's issue features a call for AAUS BOD nominations and an update on the medical standard changes as well as information about several upcoming conferences and educational programs. We encourage you to submit new publications to share with the membership. It is a great opportunity to highlight research from your home institution. In addition, we welcome news, announcements, job postings, and images of underwater work at aaus@disl.org. Current and past issues of the E-Slate are available at www.aaus.org.

NEWS/ANNOUNCEMENTS

AAUS Website

AAUS is experiencing difficulties with the current website, aaus.org. If you experience login problems or cannot obtain the information you need from the site, please contact the AAUS office at aaus@disl.org or 251-591-3775. We are in the process of building a new custom website with an anticipated launch in late spring.

AAUS BOD Call for Nominations

AAUS is seeking individuals to run for the position of Director-at-Large. The Director-at-Large position involves a three year term commencing on January 01, 2013. Duties and committee responsibilities will be assigned by the President. Candidates must be voting members in good standing with the Academy. Please submit nominations to one of three nominating committee members:

Christian McDonald (cmcdonald@ucsd.edu)
Steve Sellers (Steven_Sellers@nps.gov)
Dave Pence (dpence@hawaii.edu)

The nominating committee will present a list of nominees and candidate bios to the Board of Directors on March 31, 2012. 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 on May 01 and close June 30, 2012.

2012 Organizational Member Dues

Invoices were sent to OMs the first week of January. If you did not receive your invoice, please contact the AAUS office. Please check your profile at www.aaus.org to be sure all of the information is correct as we begin to migrate our database to our new website.

AAUS Medical Standards Changes

The AAUS medical standards were first established in 1980, then revised in 1990 and again in 2000. The major feature of the 1990 revision was a change from mandatory annual medical examinations to age-based interval medicals. The major feature of the 2000 revision was a change in intervals to every 5 years under age 40, every 3 years from 40 to 60 an every 2 years thereafter. The AAUS diving medical review panel was convened on November 14, 2011 to consider the need for standards revision. The panel consisted of the following diving physicians with subspecialty accreditations in diving and hyperbaric medicine, nephrology, cardiology, pulmonology, neurology and ENT, with all service provided on a pro bono basis. The sole charge of the group was to ascertain whether current diving medical standards met the needs of the scientific diving community Panel members were: Dr. Stephen Thom (U. Pennsylvania), Dr. Nicholas Vandemoer (Hyannis, MA), Dr. Christopher Jankosky (US Navy Medical U.), Dr. James Loewenherz (Miami, FL - formerly Mercy Hospital), Dr. Tom Neuman (U. California San Diego Medical Center), Dr. David Southerland (US Navy, Panama City, FL), Dr. Peter Germonpré (Queen Astrid Hospital Hyperbaric Center, Brussels), and Dr. James Denham (Panama Canal Commission).

The panel's charge was specific to the evaluation of medical fitness to dive, not long-term health assessment. The panel recommended elimination of several laboratory requirements for the evaluation of younger divers, consistent with recent changes in commercial and military diving medical standards. Increased emphasis was placed on medical history and assessment of cardiovascular risk factors, a logical consequence of the aging diving community in which cardiovascular events play a substantial role in diving fatalities (Vann RD, Lang MA. Recreational diving fatalities. Undersea Hyperb Med. 2011; 38[4]:257-60.)

The panel unanimously agreed on revision recommendations. The recommendations were reviewed and adopted for the Academy by the Board of Directors on December 08, 2011. The changes were announced in the January 2012 E-Slate. Concerns received by the Board since the announcement have focused primarily on insufficient communication of the process of review, the implementation schedule, and potential issues affecting reciprocity agreements. Discussions have followed between the Board and major stakeholder partners, notably NOAA,

to address questions of potential impact on the AAUS-NOAA diving reciprocity agreement, which is renewable on an annual basis. NOAA has implemented a stopgap measure for diving projects to continue until their medical review board has rendered a final decision.

The AAUS Board is cognizant of the fact that implementation of significant AAUS standards changes requires timely communication and sufficient open discussion to ensure complete understanding and to allow reasonable implementation schedules to minimize disruption of organizational member operations and collaborations. The Board will address a formal roll-out policy for all future standards changes at the March 03-05 board meeting.

Rebreather Forum 3.0

AAUS has partnered with DAN and PADI to co-sponsor and convene RF3, May 18-20, 2012 in Orlando, FL (www.rf30.org<http://www.rf30.org). Similar to the goals of the 2010 DAN Recreational Diving Fatality Workshop, the enhanced safety of all applications of rebreather technology is of concern to the broader recreational, commercial, scientific and military diving communities. For the scientific diving community in particular, the shift in thinking by the diving industry towards the creation of a simpler, more robust recreational rebreather diving infrastructure comes at an opportune time. Since TEKTITE here has been ample scientific justification for the need and value of rebreathers for the conduct of scientific data and specimen collection and recording behavioral observations. RF3.0 will provide AAUS Diving Officers and scientific divers with an opportunity to thoroughly consider the possibilities of incorporating rebreather technology into the underwater research tool box. AAUS, DAN and PADI are bringing together experts to present and discuss issues relevant to rebreathers, rebreather safety and to help plot a forward path. We encourage you to participate in the program. Early bird registration rates are available through February 01.

2011 AAUS Statistics

2011 statistics are due by June 30, 2012. Please begin compiling and submitting these numbers now! Though most AAUS web functions now reside on the MemberClicks website, the statistics database now resides on an Ego Factory server. This site is linked from the current AAUS homepage (www.aaus.org) and can be accessed at http://stats.diveaaus.com. Please review 'AAUS Statistics Collection Criteria and Definitions' (Statistics Collection page) or contact Cheryl Thacker (cthacker@ehs.ufl.edu) or Mike Dardeau (mdardeau@disl.org) with questions.

STUDENT OPPORTUNITIES

Channel Islands National Park Internship

Channel Islands National Park's (CINP) Kelp Forest Monitoring Program has two Student Conservation Association (SCA) internships available from May-November, 2012. The intern will assist with all aspects of CINP long-term kelp forest monitoring program (KFMP). The KFMP has conducted annual monitoring around the five Park Islands since 1982 and has recently added sites to evaluate new marine reserves. The intern will collect data on population dynamics of 70 species of fish, invertebrates and algae. Most data are collected underwater using scuba and surface-supplied air. Desirable candidates would have a minimum of 50 logged cold water dives, an AAUS-recognized scientific diving certification, some vessel experience, excellent references, and the ability and willingness to make up to five dives per day in water temperatures ranging from 50-73°F. Applicants should be willing and able to hike 10 miles in remote, rugged off-trail terrain. To apply, send a resume with cover letter that explains your interest in this internship, summarizes your dive history, and includes at least three references to David Kushner (david_kushner@nps.gov; 805-658-5773).
Application packages should be submitted immediately. Candidate selection will be mid-March.

2012 Underwater Field School in Albania

Transylvania University and the Albanian Center for Marine Research are offering a field school in underwater archaeology and coastal ecology for the 2012 field season. Since 2007, the Albanian Coastal Survey has located numerous sites from the ancient through modern. Students will gain hands on experience participating in the ongoing underwater research while learning theory and methods in classroom sessions taught by experts in the field from institutions including East Carolina University, Tirana University, Albanian Institute of Archaeology, and RPM Nautical Foundation. Day trips and daily dives will expose students to a variety of site types found underwater, as well as the best practices for conducting question based research, survey, documentation, and site development over the three week field school. The field school also acts as a capacity building project for long-term professional development of maritime archaeology and coastal ecology in Albania, but also for university students from around the Balkan region. Deadline to apply is March 15, 2012. For more information, check out www.albaniamarinecenter.org.

Scientific Diving Course in Albania

The Albanian Center for Marine Research (ACMR) is offering a scientific diving course for the 2012 field season. This course complies with the 100+hour AAUS Standards

for Scientific Diving. Upon completion of all requirements, students will be authorized divers in the ACMR Diving Safety Program and can receive verification of training at their home institution. Students will gain diverse diving experience, participate in ongoing underwater research, and learn diving theory and methods in classroom sessions taught by experts in the field from institutions including East Carolina University, the Albanian Institute of Archaeology, and RPM Nautical Foundation. Almost daily dives over the two-week course will expose students to a variety of habitat types found along the southern Albanian coastline as well as the best practices for conducting hypothesis-based research, environmental survey, and archaeological methods. The diving course also offers a necessary component to participate in other ACMR field school offerings. Deadline to apply is March 15, 2012. For more information, check out www.albaniamarinecenter.org.

JOB OPPORTUNITIES

Channel Islands National Park's Kelp Forest Monitoring Program plans on hiring two GS-5 Biological Technicians for the 2012 field season. These positions are similar to the summer internships listed above and we expect these position announcements will be posted the first week of February. The positions will likely only be open for applications for two weeks. If you are interested, please search for them at USAJOBS.gov. If you have any questions please contact David Kushner (805-643-0260; David_Kushner@NPS.gov).

FUNDING OPPORTUNITIES

Dr. Nancy Foster Scholarship

The National Oceanic and Atmospheric Administration's (NOAA) Dr. Nancy Foster Scholarship Program recognizes outstanding scholarship and encourages independent graduate level research - particularly by female and minority students - in oceanography, marine biology and maritime archaeology. Congress authorized the Program, described in the National Marine Sanctuaries Amendments Act of 2000 (Pub. L. 106-513), soon after Dr. Foster's death in June 2000, as a means of honoring her life's work and contribution to the nation. Applications for 2012 are due mid-February. Visit: http://fosterscholars.noaa.gov.

UPCOMING EVENTS

Rebreather and Advanced Diving Tech Workshop

The second NE Rebreather and Advanced Diving Technology Workshop will be hosted at the University of Rhode Island February 12, 2012. The program will consider a variety of rebreathers and related technologies in discussion and special presentations. Divers are invited and encouraged to bring their rebreathers for a 'show and tell' session to share configuration tips and techniques. Registration is $25 and limited to 80 participants.
http://www.oceanopportunity.com/attachments/Attach2012RBWorkshop.pdf

41st Annual Benthic Ecology Meeting

The 41st Annual Benthic Ecology Meeting (BEM) will be held March 21-24, 2012 in Norfolk, VA at the Norfolk Marriott Waterside Hotel. The meeting will be hosted by Old Dominion University, an AAUS OM. Visit: http://dl.dropbox.com/u/13470552/BEM%202012%20First%20Flyer.pdf.

DAN DMT Course

The April 13-20 DAN Diver Medical Technician (DMT) program is now full; however, spaces remain for the September course as well as both DMT continuing education course dates. To be added to the April course waiting list or register for the September or continuing education courses, contact DAN Education (919-684-2948; oxygen@diversalertnetwork.org).

Second Annual Dive Medicine Conference

The second Annual Dive Medicine Conference at Danbury Hospital, CT is scheduled for Saturday, April 14, 2012. Morning sessions include: 'Diving Emergencies' by Dr. Nicholas Bird (DAN), 'Situational Awareness' by Dr. Richard Sadler, 'Bounce Diving' by Dr. Matthew Partrick, 'When to Retire the Diver and When to Hang up your Fins' by Dr. David Charash. Afternoon sessions feature DAN certification courses in Advanced O2 and Neurological Assessment. For more information contact Martin Folan (mfolan9371@att.net)

International Marine Forensics Symposium

The Marine Forensics Committee (MFC) of the Society of Naval Architects and Marine Engineers (SNAME) is holding the International Marine Forensics Symposium at the Gaylord National Hotel, Washington, DC, April 02-05, 2012. The event is co-sponsored by: Marine Technology Society (MTS), Royal Institute of Naval Architecture (RINA), American Society of Naval Engineers (ASNE), and Institute of Marine Engineers, Science and Technology (IMARest). Visit: http://www.rina.org.uk/marineforensics.

DAN Diving and Hyperbaric Medicine Course

The 71st DAN Diving and Hyperbaric Medicine Course will be held April 28 to May 05 at the Fort Young Hotel in Dominica. This six-day course is designed primarily for physicians. Emergency medical personnel, paramedics, nurses and professionals with interest in diving medicine will also find the course valuable. The program is jointly sponsored by DAN and Wilderness Medical Society for continuing medical education credit. A special dive package

supplements the course. Contact DAN Education at 919-684-2948, ext. 556 or 800-496-446-2671, ext. 556 or cme@dan.org. Visit: http://www.diversalertnetwork.org/?a=events&eventNo=989.

Rebreather Forum 3.0

Rebreather Forum 3.0 (www.RF30.org) will be convened May 18-20, 2012 at the Caribe Royale Hotel in Orlando, FL. The meeting is co-sponsored by AAUS, DAN and PADI. This program will be of particular interest to the scientific diving community as there are now evolving rebreather concepts and technologies that are simplified from the technical diving approach with more potential of becoming mainstream scientific diving methodology. Registration prices begin at $290 ($275 during the early-bird registration period ending February 01). Multiple pricing packages are available.

NEW PUBLICATIONS

Chenelot H, Jewett SC, Hoberg, MK. Macrobenthos of the nearshore Aleutian Archipelago, with emphasis on invertebrates associated with *Clathromorphum nereostratum* (Rhodophyta, Corallinaceae). Mar Biodiversity. 2011; 41:413-24.

In the Aleutian Islands, Alaska, crustose coralline algae can be widespread in the low intertidal and shallow subtidal regions, and cover most available hard substrates. The longevity and slow growth-rate of coralline algae make them vulnerable to major disturbances, including anthropogenic disturbances and ocean acidification. Subtidal habitats dominated by crustose coralline algae are often associated with sea urchin-barren grounds and regarded as supporting limited invertebrate communities, especially compared with the adjacent kelp forests. *Clathromorphum nereostratum* is one of the most abundant crustose coralline algae found in the Aleutian Islands. Although the surface of this crustose alga exhibits little structural complexity, it can develop into crusts half-a-meter thick (2-10 cm in this study) that provide microhabitats for a variety of cryptic invertebrates. Despite the omnipresence of this alga throughout the nearshore Aleutians, very little is known about its associated faunal community. In the summers of 2006 and 2007, a benthic survey was conducted at 50 sites throughout the shallow (<20 m), nearshore Aleutian Islands as part of the Alaska Monitoring and Assessment Program.

Clark RN, Jewett SC. A new sea star of the genus *Hippasteria* (Asteroidea: Goniasteridae) from the Aleutian Islands. Zootaxa. 2011; 2963:48-54.

A new species of goniasterid sea star, *Hippasteria aleutica* **sp. nov.** is described from the Aleutian Islands, and compared to *H. phrygiana* (Parelius, 1768) from the North Atlantic-Arctic, as well as its congeners from the North Pacific. Distribution is discussed and a key to the described species of *Hippasteria* in Alaskan waters is presented.

Clark RN, Jewett SC. Three new sea stars (Asteroidea: Solasteridae & Pterasteridae) from the Aleutian Islands. Zootaxa. 2011; 3051:1-13.

Two new species of *Solaster*, and a new species of *Pteraster* are described from the nearshore waters of the Aleutian Islands and compared to congeners from the region. *Solaster hexactis* **sp. nov.**, *S. spectabilis* **sp. nov.,** and *Pteraster willsi* **sp. nov.**, are distinguished by the characteristics of the paxillar, marginal and adambulacral spines, and (in *Solaster*), the number of rays. The distributions of the new species and keys are provided.

Hooker SK, Fahlman A, Moore MJ, Aguilar de Soto N, Bernaldo de Quirós Y, Brubakk AO, Costa DP, Costidis AM, Dennison S, Falke KJ, Fernandez A, Ferrigno M, Fitz-Clarke JR, Garner MM, Houser DS, Jepson PD, Ketten DR, Kvadsheim PH, Madsen PT, Pollock NW, Rotstein DS, Rowles TK, Simmons SE, Van Bonn W, Weathersby PK, Weise MJ, Williams TM, Tyack PL. Deadly diving? Physiological and behavioural management of decompression stress in diving mammals. Proc R Soc B. 2011 doi:10.1098/rspb.2011.2088.

Decompression sickness (DCS; 'the bends') is a disease associated with gas uptake at pressure. The basic pathology and cause are relatively well known to human divers. Breath-hold diving marine mammals were thought to be relatively immune to DCS owing to multiple anatomical, physiological and behavioural adaptations that reduce nitrogen gas (N_2) loading during dives. However, recent observations have shown that gas bubbles may form and tissue injury may occur in marine mammals under certain circumstances. Gas kinetic models based on measured time-depth profiles further suggest the potential occurrence of high blood and tissue N_2 tensions. We review evidence for gas-bubble incidence in marine mammal tissues and discuss the theory behind gas loading and bubble formation. We suggest that diving mammals vary their physiological responses according to multiple stressors, and that the perspective on marine mammal diving physiology should change from simply minimizing N_2 loading to management of the N_2 load. This suggests several avenues for further study, ranging from the effects of gas bubbles at molecular, cellular and organ function levels, to comparative studies relating the presence/absence of gas bubbles to diving behaviour. Technological advance in imaging and remote instrumentation are likely to advance this field in coming years.

Laurent PE, Coulange M, Bartoli C, Boussuges A, Rostain JC, Luciano M, Cohen F, Rolland PH, Mancini J, Piercecchi MD, Vidal V, Gorincour G. Appearance of gas collections after scuba diving death: a computed tomography study in a porcine model. Int J Legal Med. 2011 Dec 30. [Epub ahead of print].

INTRODUCTION: Postmortem computed tomography can easily demonstrate gas collections after diving accidents. Thus, it is often used to support the diagnosis of air embolism secondary to barotrauma. However, many other phenomena (putrefaction, resuscitation maneuvers, and postmortem tissue offgassing) can also cause postmortem gas effusions and lead to a wrong diagnosis of barotrauma. OBJECTIVES: The aim of this study is to determine topography and time of onset of postmortem gas collections respectively due to putrefaction, resuscitation maneuvers, and tissue offgassing. METHODS: A controlled experimental study was conducted on nine pigs. Three groups of three pigs were studied postmortem by CT from H0 to H24: one control group of nonresuscitated nondivers, one group of divers exposed premortem to an absolute maximal pressure of 5 b for 16 min followed by decompression procedures, and one group of nondivers resuscitated by manual ventilation and thoracic compression for 20 min. The study of intravascular gas was conducted using CT scan and correlated with the results of the autopsy. RESULTS: The CT scan reveals that, starting 3 h after death, a substantial amount of gas is observed in the venous and arterial systems in the group of divers. Arterial gas appears 24 h after death for the resuscitated group and is absent for the first 24 h for the control group. Concerning the putrefaction gas, this provokes intravenous and portal gas collections starting 6 h after death. Subcutaneous emphysema was observed in two of the three animals from the resuscitated group, corresponding to the thoracic compression areas. CONCLUSION: In fatal scuba diving accidents, offgassing appears early (starting from the first hour after death) in the venous system then spreads to the arterial system after about 3 h. The presence of intra-arterial gas is therefore not specific to barotrauma. To affirm a death by barotrauma followed by a gas embolism, a postmortem scanner should be conducted very early. Subcutaneous emphysema should not be mistaken as diagnostic criteria of barotrauma because it can be caused by the resuscitation maneuvers.

Madenjian C, Rutherford E, Blouin M, Sederberg B, Elliott J. Spawning Habitat unsuitability: an impediment to cisco rehabilitation in Lake Michigan? N Am J Fish Manage. 2011; 31:905–13.

The cisco *Coregonus artedi* was one of the most important native prey fishes in Lake Michigan and in the other four Laurentian Great Lakes. Most of the cisco spawning in Lake Michigan was believed to have occurred in Green Bay. The cisco population in Lake Michigan collapsed during the 1950s, and the collapse was attributed in part to habitat degradation within Green Bay.Winter water quality surveys of lower Green Bay during the 1950s and 1960s indicated that the bottom dissolved oxygen (DO) concentration was less than 2 mg/L throughout much of the lower bay, and most cisco eggs would not successfully hatch at such low DO concentrations. To determine present-day spawning habitat suitability in lower Green Bay, we compared cisco egg survival in lower Green Bay with survival at a reference site (St. Marys River, Michigan–Ontario) during 2009. We also conducted winter water quality surveys in lower Green Bay and the St. Marys River during 2009 and 2010. Cisco egg survival in lower Green Bay averaged 65.3%, which was remarkably similar to and not significantly different from the mean at the St. Marys River site (64.0%). Moreover, the lowest bottom DO concentrations recorded during the winter surveys were 11.2 mg/L in lower Green Bay and 12.7 mg/L in the St. Marys River. These relatively high DO concentrations would not be expected to have any negative effect on cisco egg survival. We conclude that winter water quality conditions in lower Green Bay were suitable for successful hatching of cisco eggs and that water quality during the egg incubation period did not represent an impediment to cisco rehabilitation in Lake Michigan. Our approach to determining spawning habitat suitability for coregonids would be applicable to other aquatic systems.

Schagatay E.Predicting performance in competitive apnea diving. Part III: deep diving. Diving Hyperb Med. 2011 Dec;41(4):216-28.

The first of these reviews described the physiological factors defining the limits of static apnea, while the second examined performance in apneic distance swimming. This paper reviews the factors determining performance in depth disciplines, where hydrostatic pressure is added to the stressors associated with apnea duration and physical work. Apneic duration is essential for performance in all disciplines, and is prolonged by any means that increases gas storage or tolerance to asphyxia or reduces metabolic rate. For underwater distance swimming, the main challenge is to restrict metabolism despite the work of swimming, and to redirect blood flow to allow the most vital functions. Here, work economy, local tissue energy and oxygen stores, anaerobic capacity of the muscles, and possibly technical improvements will be essential for further development. In the depth disciplines, direct pressure effects causing barotrauma, the narcotic effects of gases, decompression sickness (DCS) and possibly air embolism during ascent need to be taken into account, as does the risk of hypoxia when the dive cannot be rapidly interrupted before the surface is reached again. While in most deep divers apneic duration is not the main limitation thus far, greater depths may call for exceptionally long apneas and slower ascents to avoid DCS. Narcotic effects may also affect the ultimate depth limit, which the divers currently performing 'constant weight with fins' dives

predict to be around 156 metres' sea water. To reach these depths, serious physiological challenges have to be met, technical developments needed and safety procedures developed concomitantly.

Vacchim M, Montefalcone M, Bianchi C, Morri C, Ferrari M. Hydrodynamic constraints to the seaward development of *Posidonia oceanica* meadows. Estuar Coast Shelf Sci. 2012; 97: 58e65

Posidonia oceanica, the most important and abundant seagrass in the Mediterranean Sea, forms large meadows from the sea surface down to 40 m. The depth of the lower limit of the meadows marks the boundary between the infralittoral and the circalittoral zone, and is said to be normally set by light attenuation underwater, while the role of water movement has been little explored. In this paper, the position (i.e. distance from the shoreline and depth) of *P. oceanica* meadow lower limits along the whole Ligurian coastline (about 350 km) was related to the annual storm wave base. This depth represents the limit of interaction between waves and seafloor and corresponds to L0/2, where L0 is the annual offshore wave length. In all meadows, the lower limit has never been found deeper than the annual stormwave base, and its depth (Zc) showed related to L0 according to the equation Zc¼0.32·L0þ5.62. In the coastal tracts affected by the least intense waves, the reduction of water movement with depth represents the most important constraint to the seaward development of the meadow, whereas light availability plays a major role in meadows affected by the most intense waves. The present study represents the first attempt at understanding the role of hydrodynamic factors in setting the depth limit of seagrass meadows. If corroborated by future research at other sites, this will have important implications for both basic and applied science, as it would imply rethinking about the relative importance of water movement and light in seagrass depth distribution, and could allow for a better estimate of the extent of meadow regression in anthropized areas.

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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