



E-SLATE

American Academy of Underwater Sciences (AAUS)

EDITORIAL BOARD NOTE – January 2010

Best of the New Year! Our ongoing goal is for the E-Slate to serve as a useful tool for the readership. One comment recently received concerned the 'New Publications' concentration on diving physiology and medicine articles. The writer believed that editorial policy should be established to rank content along the lines of biology, geology, archaeology and others pertinent to scientific diving with diving medical literature taking a secondary role.

These comments are worth sharing for several reasons. First, because the writer was correct that the 'New Publications' section is not 'balanced.' The reason for the imbalance, however, is not intentional but practical. The E-Slate is prepared as a volunteer effort on behalf of the Academy. We rely on readers to submit items from their own field of expertise to be shared. The balance will be improved if more people contribute.

The editorial policies of the E-Slate are purposely liberal because we appreciate the diversity of personal and professional interests in our readership. Rather than arbitrarily establishing a ranking order, we accept that any number of items may be of primary, secondary or even welcome passing interest value. By keeping pieces short and including links to additional material, we give readers the choice of what to read, what to follow up and what to skip.

Regarding rankings, the perception of diving medicine as relatively unimportant to the membership is misguided. The physiological impact of the elevated pressure environment is perhaps the most common factor in all forms of scientific diving. Diving medicine and research development are relevant and useful to many involved in or working with others pursuing a range of scientific diving activities.

We need your contributions to ensure that the E-Slate is a useful resource. Remembering a few key editorial policies and guidelines will help. 'New Publications' must be immediately available in print or electronically. Thus, "in press" articles do not qualify. Publications must include complete citations and abstracts when available. Electronic links to additional material should be provided when available. All items should be in Word format. The E-Slate arrives in inboxes early on the last regular business day of the month so the release schedule is inflexible. Items should be submitted by the 23rd of the month to allow time for editing, layout and editorial board review.

The E-Slate is a newsletter from and for the scientific dive community. Make it personal by submitting content that you value. We welcome news, announcements, job positions, new citations, and images with captions of underwater work. Please submit items to aaus@disl.org. Current and past issues of the E-Slate are available at www.aaus.org.

NEWS/ANNOUNCEMENTS

Dive Helmet History

These photos are from the early 1940s from Walton Smith's marine biology class at University of Miami using Miller-Dunn shallow water helmets. Walton Smith was a famous coral biologist. These were the helmets first used to study reefs and reef fish behavior at the Dry Tortugas marine lab in the 1910-40s. The most famous of these early studies was Longley WH, Hildebrand SF. Systematic catalogue of the fishes of Tortugas, FL. Papers from the Tortugas Laboratory. Vol. 34. Carnegie Instit. Wash. Publ. 535, 1941: 331 pp. Longley did the first underwater color photos using this type helmet, published in National Geographic.



VR Technologies Computer Winner

The 2009 winner of the VR NHeO is Michael Raftery. Congratulations to Michael and thanks to all for your support of the AAUS Scholarship fund.

Assistant Diving Safety Officer Position Available

The Georgia Aquarium in Atlanta is searching for an assistant diving safety officer to support their ongoing program. Visit: <http://www.georgiaaquarium.org/> or contact Jeff Reid, Diving Safety Officer/Manager (jreid@georgiaaquarium.org; 404-581-4310).

Web-Based Dive Record Logging

Our first year of web-based logging is nearly complete and only a couple things are left to do to submit OM statistics to AAUS in January. After confirming that dives have been entered correctly, run the AAUS report (which will not count dives not checked as having met AAUS standards). Go to <http://aauscf.egofactory.com/omservices1.cfm> and enter the data printed on your report. OMs not using the AAUS web-based logging software to track their program's dives must still log in to submit and review annual summary statistics as they have in years past. Contact aaus@disl.org if your organization is not listed or you do not know your password.

Remember that neither statistics nor incidents reach AAUS until the DSO goes to the URL above and actively uploads them. Your OM summary statistics may be edited later, if necessary. There are some error-checking routines built into the entry form so be prepared to defend your numbers. If you are using the web-based logging and encounter problems, please notify mdardeau@disl.org with as much information as possible. Suggestions for improvements are also welcome.

Hawaii Symposium Flights and Hotel

Continental Airlines offers discounts off published fares of 2-10%. Call a travel agent or Continental MeetingWorks at 800-468-7022 for reservations. Refer to ZGJS and ALFFHT. Alternatively, save an additional 3% off by booking your own reservations at www.continental.com.

Choose your flight times and access your meeting discounts by inserting ZGJSALFFHT in the Offer Code box. Location: HONOLULU, Valid Travel Dates: March 19-30, 2010. Most of the symposium workshops and meetings will be held at the Ala Moana Hotel. It is located across the street from a beautiful beach and in the middle of Honolulu shopping. Visit: www.alamoanahotelhonolulu.com for details.

Channel Islands National Park Internship

Channel Islands National Park's Kelp Forest Monitoring Program has a Student Conservation Association (SCA) internship available from February -November, 2010.

The intern will assist with all aspects of the Park's 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 up to 70 species of fish, invertebrates and algae.

Most data are collected underwater using scuba and surface-supplied air. The intern will also assist with a three-month terrestrial vegetation monitoring program.

Desirable candidates would have a minimum of 50 logged cold water dives, an AAUS-recognized scientific diving certification, some vessel experience, excellent references, the ability and willingness to make up to five dives per day in water temperatures ranging from 50-73°F. Dive depth is typically less than 65 ft, frequently in dense kelp forests and exposed offshore locations. Applicants should be willing and able to hike 10 miles in remote, rugged off-trail terrain.

Remuneration includes a stipend of up to \$640/month in addition to \$650/month for housing, accident and medical insurance, and \$2,000 to purchase scuba equipment. A \$1,250-\$4,725 Americorps Education award may also be available. Background on SCA is available at www.thesca.org. To apply, send a resume with cover letter to David Kushner (david_kushner@nps.gov; 805-658-5773). Diving history and biological experience should be described and references listed. Packages should be submitted immediately since candidate selection is to be made by the end of January.

DSO Meeting - Call for Topics and Speakers

The DSO meeting scheduled for the 2010 symposium in Honolulu will include time for formal debate of topics. The first debate topic is, 'Should it be mandatory for a DSO to attend one symposium at least every five years for that OM to remain in good standing?' Please submit ideas for other questions or requests to participate as a speaker to Kevin Flanagan (kflanaga@hawaii.edu) for consideration by the BOD. The debate format will be structured: five minute pro view, five minute con view; two minute pro rebuttal; two minute con rebuttal; and five minute open questions by membership.

Divers, How Clean is Your Air?

Sean Sheldrake, Unit DO, EPA Region 10 Dive Unit

All divers require compressed air to meet operational needs. For ease of use, some dive organizations may provide compressed air where it is needed (e.g., aquarium dive support or ocean survey vessel work). Those without such equipment often buy air, enriched air, or some such breathing media from local dive shops. Regardless of the source, all divers should

agree that clean air is important to their safety.



Scuba cylinders at an air fill station filled and "ready to dive." Or are they? Photo credit: S. Sheldrake

What is clean air?

NOAA defines acceptable air to be that which meets the compressed gas association (CGA) grade E standard or better. The following table is taken from the NOAA Scientific Diving Standards and Safety Manual, section 3.6, August, 2008.

CGA Grade E Standards	
Component	Maximum
Oxygen	20-22%/v
Carbon monoxide	10 ppm/v
Carbon dioxide	1000 ppm/v
Condensed hydrocarbons	5 mg/m ³
Total hydrocarbons as methane	25 ppm/v
Water vapor (ppm)	2
Objectionable odors	None

OSHA defines clean air for commercial diving as containing less than 20 ppm (parts per million) by volume of carbon monoxide (vs. the CGA standard of 10 ppm), less than 1,000 ppm by volume of carbon dioxide, no more than 5 milligrams per cubic meter of oil mist (except that non-oil-lubricated compressors need not be tested for oil mist), and a pronounced or noxious odor may not be present (29 CFR 1910.430(b)).

EPA requires compressed air to meet CGA grade E standards. It probably goes without saying that a grave risk of breathing impure air is loss of consciousness under water.

How often must compressor air be tested?

OSHA defines minimum compressor testing frequency for commercial operations as once every six months (29 CFR 1910.430(b)). NOAA and EPA also require testing at least every six months for their compressors. A major dive training center used to require tests for their air on a quarterly basis, but now leaves this up to local governing authorities—ironically in most cases there are no such regulations outside of OSHA requirements for commercial dive operations.

Are all the dive shops you may use testing their air?

The short answer is an emphatic "NO." The EPA Region 10 unit sometimes dives the same locations multiple times, but just as often we travel to a new site; typically this means using a dive shop new to us. Dive shops throughout Region 10—Oregon, Idaho, Washington, and Alaska -- like the rest of the U.S., have fallen on hard times due to the economic downturn. Shops are closing right and left, and those that are surviving are making hard choices for their bottom line which may impact your safety.

Here are some quotes gathered in cold-calling separate dive shops that might have been used just during the EPA Region 10 2009 operational window for scuba tank air/nitrox fills:

"Yes, we meet CGA grade E air except for the CO₂ reading, which I admit is a little high."

"I don't remember when we did our last air test. It was at least a year ago."

"Our last air test was seven years ago. We would be happy to do another one if you are willing to pay for the cost of testing."

"We did our air test regularly up to last year when we stopped. We decided that since the results were always the same, there was no reason to continue with the regular testing."

In the case of the shop with the high carbon dioxide reading and all the shops above without a current test, they were still filling scuba bottles. Could high CO₂ levels cause DCI-like symptoms - e.g., headache and confused diagnosis - following a deep scientific dive? Maybe. In the case of the final quote above, EPA divers noted that the compressor station area had been recently remodeled, the intake moved, and a charcoal grill located near the compressor building, if not the intake itself. This was a dive shop that had emphatically told me that the air used to fill their cylinders was tested regularly. In the end, they were grateful I had asked so that they could ensure that testing occurred in the future. What all of these responses highlight is that you cannot count on consistent acceptable practice for shop air testing. Shop policies may also change without informing their customers.

Where do we go from here?

Until more divers and dive organizations start asking for air tests and demanding clean air, I would expect that the next several years will again present a mixed bag of shops "doing the right thing" and those that try more bottom-dollar approaches. There are a lot of shops doing air tests regularly and posting them — and they deserve credit for their hard work and monetary expenditure on behalf of dive safety by virtue of your business. Protect your divers, take nothing for granted, ask for that air test.

Disclaimer: This article is an illustration of potential hazards from compressed air impurities used during diving and does not represent the official view of the USEPA. Mention of any specific brand or model, instrument, material, or protocol does not constitute endorsement by the USEPA.

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>.

EQUIPMENT RECALLS

Ocean Management Systems, Inc. – BCS Seal Ring

Ocean Management Systems, Inc. (OMS) has notified the U.S. Consumer Product Safety Commission (CPSC), that OMS is voluntarily recalling Sealing Rings BCA-500. Molding variations in this part as used in the OMS Buoyancy Control System (BCS) could cause cracking or breakage of part, resulting in rapid loss of buoyancy, creating a potential drowning hazard. While this variation is not present in every seal ring, it would be difficult to determine in the field which Seal Rings are suspect. Therefore we are requiring that all Seal Rings be updated with new assemblies. All new seal rings are equipped with reinforcement at critical areas. There are a total of 19,790 BCS seal rings (Item # BCA 500) installed in 5730 BCS in use and from May 11, 2006 19 failures have been reported. These failures were discovered during inspection, with no reports of injuries or death. Consumers should examine the Warning label on their BCS. If the serial number on the BCS is listed in the recall list (visit <http://www.omsdive.com/bca500-recall.html> for list of affected serial numbers). stop using your BCS and contact your local OMS dealer or distributor for a no charge repair.

UPCOMING EVENTS

Rebreather & Advanced Diving Tech. Workshop

The University of Rhode Island's (URI) Center of Excellence in Undersea Technology will host a rebreather and advanced diving technology workshop on January 23, 2010 at the Coastal Institute Auditorium at URI. The event is being organized by Ocean Opportunity Inc., and includes a line-up of presenters covering new trends in safety/training, equipment configuration, scientific diving, and the future of manned undersea exploration. Registration is \$20. Visit: <http://oceanopportunity.blogspot.com/2009/11/2010-northeast-rebreather-advanced.html>.

Ocean Sciences Meeting 2010

The 2010 Ocean Sciences Meeting will be held February 22-26 at the Oregon Convention Center in Portland Oregon. Visit: <http://www.agu.org/meetings/os10/index.php>.

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>). Call 808-955-4811 or visit <http://www.alamoanahotelhonolulu.com/> for reservations.

2010 Diving for Science Symposium Workshops

Monday, March 22

University of Hawaii Diver Training Methods - \$50
Oceanic Regulator Repair Workshop - \$150

Tuesday, March 23

PSI Visual Cylinder Inspector Training - \$250
(Refresher - \$175.00)

Digital Photography for Scientific Divers - \$100 (includes 2-tank dive)

Wednesday, March 24

PSI Oxygen Cleaning and Cylinder Valve Repair Technician - \$175

Identification and Study of Coral Disease - \$100 (includes two-tank dives*)

Towboarding techniques for Science - \$100 (includes tows over shallow reef*)

* diving activity requires current AAUS Scientific Diver LOR and UH Visiting Diver Forms

For more information visit:

<http://www.aaus.org/mc/page.do?sitePageId=94127&orgId=aaus>.

Future AAUS Meetings - Site Solicitation

OMs interested in hosting future scientific diving symposia are invited to submit proposals. For more information contact Christian McDonald (cmcdonald@ucsd.edu).

NEW PUBLICATIONS

Carins SD, Jaap WC, Lang JC. Scleractinia (Cnidaria) of the Gulf of Mexico. In: Felder DL, Camp DK, eds. Gulf of Mexico: origin, waters, and biota, 1. Biodiversity. Texas A&M Univ Press College Station TX, 2009: 333-41.

Recap - A 50 year update of the US Fisheries Bulletin 89.

The structured format covers the taxonomy and nomenclature of the "stony corals," Order Scleractinia. We include a checklist list of all known species by geographic divisions (NE, NW, SE, and SW); defining the depth range, habitat preferences, and notes regarding references and interesting aspects of the fauna.

Djurhuus R, Nossum V, Lundsett N, Hovin W, Svoldal AM, Havnes MB, Fismen L, Hjelde A, Brubakk AO. Simulated diving after heat stress potentiates the induction of heat shock protein 70 and elevates glutathione in human endothelial cells. Cell Stress Chaperones. 2009 Nov 19. [Epub ahead of print].

Heat stress prior to diving has been shown to confer protection against endothelial damage due to decompression sickness. Several lines of evidence indicate a relation between such protection and the heat shock protein (HSP)70 and HSP90 and the major cellular red-ox determinant, glutathione (GSH). The present study has used human endothelial cells as a model system to investigate how heat

stress and simulated diving affect these central cellular defense molecules. The results demonstrated for the first time that a simulated dive at 2.6 MPa (26 bar) had a potentiating effect on the heat-induced expression of HSP70, increasing the HSP70 concentration on average 54 times above control level. In contrast, a simulated dive had no significant potentiating effect on the HSP90 level, which might be due to the higher baseline level of HSP90. Both 2- and 24-h dive had similar effects on the HSP70 and HSP90, suggesting that the observed effects were independent of duration of the dive. The rapid HSP response following a 2-h dive with a decompression time of 5 min might suggest that the effects were due to compression or pressure per se rather than decompression and may involve posttranslational processing of HSP. The exposure order seemed to be critical for the HSP70 response supporting the suggestion that the potentiating effect of dive was not due to de novo synthesis of HSP70. Neither heat shock nor a simulated dive had any significant effect on the intracellular GSH level while a heat shock and a subsequent dive increased the total GSH level approximately 62%. Neither of these conditions seemed to have any effect on the GSH red-ox status.

Hine AC, Halley RB, Locker SD, Jarrett BD, Jaap WC, Mallinson DJ, Ciembronowicz KT, Ogden NB, Donahue BT, Naar DF. Coral reefs, present and past on the west Florida shelf and platform margin. In: Riegl BM, Dodge RE, eds. Coral reefs of the USA. Springer, 2008: 127-73.

Recap - A comprehensive review of the eastern Gulf of Mexico emphasizing the history of reef development and the influence of glacial and interglacial epochs. Focus includes mid shelf reefs, Florida Middle Ground, multi-beam seismic interpretations, climate, principal fauna, small bank reefs, reefs and paleo shorelines, Pulley Ridge, shelf edge reefs, and upper slope reefs.

Jaap WC, Szmant A, Jaap K, Dupont J, Clarke R, Somerfield P, Ault J, Bohnsack JA, Kellison SG, Kellison GT. A perspective on the biology of Florida Keys coral reefs. In: Riegl BM, Dodge RE, eds. Coral reefs of the USA. Springer, 2008: 75-126.

Recap - A summary of knowledge about biology and ecology of Florida Keys coral reef communities. The compilation includes historical research, context of Caribbean affinities, climate, oceanography, taxonomic distinctness of the fauna, community structure, status and trends of coral reef conditions, natural and anthropogenic disturbances, a case study of Dry Tortugas, fisheries and their management, human influences on water quality, and comments on the future.

Miller RJ, Stephen C. Nolan. Management methods for a sea urchin dive fishery with individual fishing zones. J Shellfish Res. 2008; 27(4): 929-38.

ABSTRACT: Management of the Nova Scotia sea urchin fishery includes several unusual features: one license per

fishing zone, fishers increase resource yields over natural levels by controlling the sea urchin-macrophyte cycle, fishers scale fishing effort to market demand, fishers map the resource in their zones, a reference point for good resource management based on a conspicuous habitat feature, an audit of zone management success, and low ongoing input from the management agency. The low mobility of sea urchins and the opportunity for the diver-harvesters to observe the resource directly make this fishery a good candidate for management by fishers. Variable sea urchin growth and reproduction on a small spatial scale and the high cost of stock surveys by diving make the fishery less suitable for government regulation. Fishing zones were allocated based on the length of feeding fronts (i.e., the deep edge of the macrophyte beds where sea urchins aggregate and where most harvesting occurs). Fishers and government jointly developed enhancement techniques to increase the length of feeding fronts. The reference point used to measure a fisher's success at managing the stock was based on the depth of these feeding fronts.

Somerfield PJ, Jaap WC, Clarke KR, Callahan M, Hackett K, Porter J, Lybolt M, Tsokos C, Yanev G. Changes in coral reef communities among the Florida Keys, 1996–2003 Coral Reefs. 2008; 27: 951-65.

ABSTRACT: A comprehensive monitoring programme to detect and evaluate changes in coral communities throughout the Florida reef tract, USA, has gathered a wealth of information. Here hard coral (*Scleractinia* and *Milleporina*) cover data, gathered by divers using video methods at 37 sites annually from 1996 to 2003, are examined. Site to site differences are generally very much greater than differences between times within sites, and differences between different geographical areas (Upper, Middle and Lower Keys) within the reef tract are not significant. Large-scale changes documented include a reduction in species numbers and total cover between 1997 and 1999, especially among offshore reefs where recovery in species numbers was incomplete, and recovery of total cover had yet to begin, by 2003. These changes reflect bleaching events in 1997 and 1998, and the passage of Hurricane Georges through the Lower Keys in 1998. Changes in community structure at some sites may be interpreted in the light of knowledge of events at those sites and the relative sensitivities of species to various stressors, such as changes in cover of *Acropora palmata* and *Millepora complanata* at Sand Key following the bleaching events and hurricane in 1998, and declines in *Montastrea annularis* at Smith Shoal following a harmful algal bloom in 2002. For most sites it is impossible to determine the causes of observed variation. Some sites show relatively little temporal variation, essentially random in direction, while others show relatively large year-on-year changes. There is little evidence of any major region-wide changes affecting assemblage composition, or of any events that have impacted all of the sampling sites in any single year. Instead, different sites

exhibit differing patterns of temporal variation, with certain sites displaying greater variation than others.

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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