THE WORLD AS IT IS

OZTEK99 DIVING TECHNOLOGIES AND REBREATHER FORUM A NON-MEDICAL REVIEW

Lynn Taylor

Key Words

Decompression illness, equipment, meeting, mixed gas, rebreathers.

Introduction

On April 24th and 25th 1999 the inaugural OzTeK Diving Technologies Conference and Rebreather Forum was held in Sydney, Australia. The 1999 Asia-Pacific TDI (Technical Diving International) Members Forum had been held over the two previous days, so some attendees had 4 enthralling days of presentations and workshops from some of the World's leading Technical Diving identities.

Opening address and history of rebreathers

The convener, Richard Taylor, (TDI Australia and New Zealand) welcomed us to the conference on Saturday morning. Bret Gilliam (President TDI) then set the scene with a keynote speech reviewing the past, present and future of technical diving. This included a look at some video footage taking advantage of the relative silence of a rebreather, enabling the cameraman to get close in amongst a school of hammerhead sharks. Adding reality and entertainment to the scene was the fact that the microphone had picked up the adrenaline-mediated increase in heart rate of the cameraman as the sharks swam so unbelievably close! Bob Ramsay of the Diving Historical Society Australia and South East Asia (DHS ASEA) followed, with a history of rebreathers. He informed us that the first documentation of "rebreather" use dated as far back as 1624, with a description of a submarine made out of a barrel, and containing a special pot of unknown liquid, being used in the River Thames. The first design of an oxygen rebreather was first documented in 1778.

Decompression theory and application

From a historical overview, the morning evolved into decompression theory and application starting with Chris Parrett (author of the Abyss Advanced Dive Planner) discussing the micro-bubble theory and its relevance to technical diving requiring decompression stops. This theory supposes that tiny bubble "nuclei" (microscopic pockets of gas) are naturally present within our bodies and that excess gas diffuses into these nuclei, expanding them and so creating bubbles. Once bubbles form they may join together and form larger bubbles and may distort other tissues. Bubbles can become trapped and put pressure on nerves, damage tissues or block the blood supply to vital organs. As the ambient pressure is reduced during ascent, the bubbles grow in accordance with Boyle's Law (*P*ressure x *V*olume = *k* constant). In addition, since the pressure inside the bubble will always be roughly equivalent to ambient pressure, any gas which remains dissolved in tissue at greater than ambient pressure (from a previous depth) will tend to move into the (lower pressure) bubble, causing it to expand further causing more damage.

It has been suggested that these micro-bubbles can be crushed by high pressure. This is the basis of the controversial theory behind making an initial deep dive for a few minutes, before the day's diving activities, to crush the micro-bubbles. It is thought that the micro-bubbles take somewhere between hours and days to regenerate so, theoretically, regular diving every few days may have beneficial effects by keeping micro-bubbles crushed.

Of interest to technical divers, Chris presented evidence to show that on decompression dives, deep, short (1-3 minute) stops have advantages. The long ascent to the first stop, in traditional decompression profiles, because of its steep gas to ambient pressure gradient, produces many bubbles. Shorter, deeper stops reduce this pressure gradient and so theoretically reduce the potential for bubble formation. Also eliminating bubbles formed early decompression reduces overall decompression time.

Chris translated the micro-bubble theory into general practical safe diving advice, which applies to both technical and recreational divers. He noted that Doppler monitoring of divers has revealed that the number of bubbles peaks approximately 30-60 minutes after surfacing. With this in mind, Chris suggested that repetitive dives within this window of maximal bubble formation (30-120 minutes after a dive) should be avoided. For the same reason, multiple surface ascents within a dive should also be avoided. Other practical applications of the theory include making a slow ascent of 10 m/minute and making a stop in the 3-6 m range on all dives. Diving at altitude requires careful consideration as bubble excitation and bubble growth rates are enhanced by a decrease in ambient pressure. In other words, bubbles grow more easily at altitude and can have greater impact on the diver.

Chris pointed out that the micro-bubble model has not been validated and is sometimes in conflict with the tissue-based model. However early results have been encouraging. Chris also gave participants a chance to win a copy of the Abyss98 Advanced Dive Planning software!

In-water recompression

After lunch there was a very informative forum on in-water recompression (IWR) with three eminent speakers, Dr Ann Kristovitch (Medical Officer), Richard Pyle (Deep Reef Explorer) and Dr Carl Edmonds (Director, Diving Medical Centre). It is accepted within the diving medical community that, in general, IWR should not be attempted as it carries inherent risks. However, in certain circumstances, such as in remote areas or after failed decompression stops in deep technical diving, in-water recompression may be the best, or the only, immediate option. Three important points were emphasised. The correct equipment, including a full-face mask for the delivery of 100% oxygen, must be available for safe IWR. In the case of deep technical divers with missed decompression stops, immediate treatment is essential. Following IWR, a diver should be transported to a medical recompression facility as soon as possible. Various methods of IWR were discussed.

Medical aspects of closed circuit rebreathers

Then Dr Robyn Walker (Royal Australian Navy) enlightened us about medical problems with rebreathers. The main take home message was the importance of checking and re-checking that the level of oxygen is as planned before starting the dive. When oxygen is breathed at partial pressures of greater than 1.4 bar (ATA) the degree of central nervous system toxicity rapidly increases. Unless one is wearing a full-face mask acute oxygen toxicity under water is nearly always fatal. Oxygen toxicity causes fitting without warning, resulting in the diver losing the regulator. The respiratory muscles go into spasm and the diver stops breathing. When respiration restarts the diver will inhale water and drown. Often the first signs of oxygen toxicity are recognised by others observing slightly unusual behaviour, as the diver often does not recognise the subtle indications such as nausea, light headedness, ringing in the ears, a sense of impending doom, sweating and pallor. She also touched on CO_2 toxicity, caustic cocktails and dilution hypoxia.

Cave diving in Australia

After all this fascinating information, I was pleased to sit back, relax and watch Neil Vincent show us wonderful pictures of his cave diving exploits in Australia. Fantastic water clarity and rock formations. Although I do not think you will catch me diving down through the "birth canal" (in McCavity Cave at Wellington, NSW) and waiting for someone to push my scuba gear after me!

The evening session proved to be both stimulating and entertaining with three presentations. Richard Pyle talked about deep reef explorations and researching new species of fish using the CIS-Lunar MkV rebreather around the Hawaiian Islands at depths of 75-150 m. Jim Bowden gave us an insight into the tremendous physical and psychological demands of the Deep Project in the jungles of Mexico where exploration has led to diving to nearly 300 m (1,000 ft). Finally Nuno Gomes took us through the meticulous planning and execution of his world record scuba dive to 282 m at altitude in South Africa! The audience was mesmerised by the sheer dedication of these men, though there was a teaser thrown out, that no woman has yet dived to beyond 180 m (600 feet).

Diving with closed circuit rebreathers

On Sunday Peter Readey (CABA/Steam Machines) enlightened us with the unexpected things that one can do on your first dive using a rebreather. For example if you want to swim above an obstacle, in traditional scuba you would inhale but if you do this with a rebreather you will crash head long into it! The volume in your lungs and the counter-lung exchange, but remain constant. Also, a gentle reminder was not to leave the mouthpiece in the open position at the surface. This lets the rebreather bag deflate and you will sink!

Treating decompression illness in mixed gas divers

Dr Simon Mitchell, a Specialist in Diving and Hyperbaric Medicine, has left the Royal New Zealand Navy and is now the Medical Director of the Wesley Centre for Hyperbaric Medicine in Brisbane. He briefly reminded us of the mechanisms and manifestations of decompression illness (DCI) and discussed the relative advantages and disadvantages of using helium and/or nitrogen as the inert portion of the diver's breathing gas. His attention then focussed on the treatment of DCI in technical (mixed-gas) divers. The emphasis here was on the divers being prepared and having a plan of action, which can be implemented immediately if the need arises.

DCI resulting from deep technical diving is often neurological DCI with early onset of symptoms and a very rapid deterioration. The window of opportunity to help the situation is small. Involving the nearest recompression facility so they can be on stand-by is an important part of the planning process, as is having correct emergency equipment on hand at the dive site. Dr Mitchell's recommended hierarchy of intervention options in rapidly progressive DCI are:

1 Immediate (in less than 30 minutes) recompression in an appropriate recompression chamber,
2 In-water recompression if done early and with the proper equipment,
3 First aid at the site with evacuation to a recompression chamber.

It is very important to give 100% oxygen immediately in all options.

Controversy surrounds the administration of aspirin in suspected DCI. Gas bubbles in the blood can damage the vessel lining and the body produces platelets, which aggregate to help mend the damage. A consequence of this natural response is that platelets can also stick to the bubbles, so making them more likely to cause a blockage and facilitate the immune response and contributing further to DCI. Aspirin reduces platelet aggregation and theoretically this may help reduce some of the effects of DCI. However, Dr Mitchell pointed out that there is no data, in either animals or humans, which suggests aspirin administration improves the outcome in DCI. Moreover, aspirin may exacerbate any haemorrhage into the spinal cord occurring in the pathology of spinal DCI. The weight of evidence at present, in his opinion, favours not giving aspirin to victims of DCI.

He then addressed some of the logistical concerns in treating technical divers in a recompression chamber. Treatment in a recompression chamber is likely to involve recompression to 18 msw and breathing 100% O_2. Deep technical divers may need to be taken deeper that 18 m to control the bubbles more quickly, but the risks associated with oxygen toxicity mean that 100% O_2 cannot be administered beyond this depth. So a diluent gas must be added with deeper treatments and the dilemma of whether to use helium or nitrogen was discussed.

The basic take home message was “the earlier the treatment the better the results” but sadly, not everyone will have a complete recovery. Dr Mitchell concluded his presentation with his usual panache and entertained the audience with a couple of stories from his navy days.

CO_2 absorber design

The later morning sessions included a look at the Royal Australian Navy (RAN) experiences of rebreather CO_2 scrubber design faults by Dr Carl Edmonds and a review of closed-circuit rebreather failures by John Pennefather (RAN Submarine and Underwater Medicine Unit).

Rebreather try dives

After lunch we could try out a rebreather in the pool! It was $20 well spent. One could chose from Dräger Dolphin and Dräger Ray Rebreathers, Prism, Inspiration, Cis-Lunar, Halcyon, Steam Machine 1600’s and more. I had my first dive with a semi-closed circuit Dräger Dolphin. After getting used to the slight resistance on exhalation, and all the extra weight I needed, I descended to the deep end of the pool and swam around in almost silence. After a while I stopped and observed the scene. It was like a dream, observing. I could not be diving, there were no blasts of bubbles. Amazing. I definitely want to try one in the sea.

There were also presentations on the Wakulla 2 Project (John Vanderleest, one of the Australian divers on the team), Diving the World War 1 Australian submarine AE2 in Turkey (Dr Mark Spencer, the AE2 Project Leader), Doppler Monitoring of bubbles in divers after decompression (Dr Akin Toklu of the AE2 Project Turkish Support Team), and Diving the Atlanta, Britannic and Saratoga (photographer and expedition leader Kevin Denlay).

Throughout the conference, equipment seminars and rebreather forums were taking place in an adjacent room. If only I could have gone to everything!

All in all, an excellent 2 days. Congratulations to Richard Taylor (TDI Australia and New Zealand) for putting together such an excellent and informative program and to the exhibitors who made it all possible.

Lynn Taylor is a PADI IDC Staff Instructor and a DAN O_2 instructor. She came to New Zealand, from England, in 1994 and soon found a passion for diving. Her interests in the technical and medical aspects of diving have stemmed from her science and research background, BSc and PhD, and hence her interest in OzTeK. Her address is 26 Barker Rise, Browns Bay, Auckland, New Zealand. Telephone + 64-9-367-2948. Fax +64-9-367-2500. E-mail ltt21040@GlaxoWellcome.co.uk .

SUB-SPECIALTY CERTIFICATION IN UNDERSEA AND HYPERBARIC MEDICINE

The first examination for certification in Undersea and Hyperbaric Medicine (UHM) was held on 8 November 1999 by the American Board of Preventive Medicine (ABPM), which plans to offer this exam on a regular basis. The requirements to sit the examination may be met either through completion of an approved fellowship in UHM after primary board certification. Or, starting in 2003, through a combination of basic training and practical experience. The applicant must have current certification from one of the 24 Member Boards of the American Board of Medical Specialties. Detailed requirements, application forms and examination content outline are available on the ABPM’s web site at www.abprevmed.org .

Key Words

Hyperbaric oxygen, qualifications, underwater medicine.

SPUMS NOTICES

SOUTH PACIFIC UNDERWATER MEDICINE SOCIETY DIPLOMA OF DIVING AND HYPERBARIC MEDICINE.

Requirements for candidates

In order for the Diploma of Diving and Hyperbaric Medicine to be awarded by the Society, the candidate must comply with the following conditions:

1 The candidate must be a financial member of the Society.

2 The candidate must supply documentary evidence of satisfactory completion of examined courses in both Basic and Advanced Hyperbaric and Diving Medicine at an institution approved by the Board of Censors of the Society.

3 The candidate must have completed at least six months full time, or equivalent part time, training in an approved Hyperbaric Medicine Unit.

4 All candidates will be required to advise the Board of Censors of their intended candidacy and to discuss the proposed subject matter of their thesis.

5 Having received prior approval of the subject matter by the Board of Censors, the candidate must submit a thesis, treatise or paper, in a form suitable for publication, for consideration by the Board of Censors.

Candidates are advised that preference will be given to papers reporting original basic or clinical research work. All clinical research material must be accompanied by documentary evidence of approval by an appropriate Ethics Committee.

Case reports may be acceptable provided they are thoroughly documented, the subject is extensively researched and is then discussed in depth. Reports of a single case will be deemed insufficient.

Review articles may be acceptable only if the review is of the world literature, it is thoroughly analysed and discussed and the subject matter has not received a similar review in recent times.

6 All successful thesis material becomes the property of the Society to be published as it deems fit.

7 The Board of Censors reserves the right to modify any of these requirements from time to time.

Key Words
Qualification.

AWARDS PRESENTED AT THE HTNA SCIENTIFIC MEETING 1999

The Hyperbaric Technicians and Nurses Association (HTNA) Annual Scientific Meeting was held at the Stamford Plaza Hotel, Adelaide, 25-28 August 1999. The meeting brought together representatives from all Australian and New Zealand Hyperbaric Medicine Units along with the invited speakers, Dr Caroline Fife, President of the Undersea and Hyperbaric Medical Society, Dr Paul Sheffield and Mr Tom Workman.

SPUMS award

SPUMS presented the first of what will become an annual award for the most outstanding original paper presented by a HTNA member at the meeting.

Papers by Kathryn Borer and Mike Dawe received a special mention with the prize (Eric Kindwall's Textbook of Hyperbaric Medicine) being awarded to Greg Melbourne of the Prince of Wales Diving and Hyperbaric Medicine Unit for his paper titled "Course accreditation for hyperbaric nurse attendants".

Awards to SPUMS members

During the conference dinner, John Lippmann, on behalf of DAN SEAP, presented two special awards to SPUMS members in recognition of their contributions to diving safety.

Dr John Knight received his award for his active pursuit of diving safety during his many years of association with SPUMS and in more recent times as the Editor of the SPUMS Journal.

Dr Douglas Walker, a Foundation Member of SPUMS, was also recognised by DAN SEAP for his contribution to diving safety through his dedicated collection and publication of diving accident data over many years.

Congratulations to both recipients for this highly deserved recognition.

Robyn Walker
President of SPUMS

Key Words
Meeting.

PRESIDENT'S REPORT FOR 1999

Thank you for attending the 27th Annual Scientific Meeting of our Society, particularly those attending for their first time. I would especially like to thank and acknowledge the guest speakers, Alf Brubakk and Richard Moon. I would also like to thank Greta Bolstad from EUBS for again supporting our meeting with her attendance.

I would like to congratulate Robyn Walker on her elevation to the Presidency of our Society, thus ending my three terms as President. I would like to thank the various committee members over that time for their support and the membership at large for accepting me (and putting up with me) over this time.

I now look forward to arguably the best position in our Society, the Past-President's position. My elevation to Past-President now retires Professor Des Gorman from that Committee position. I wish to acknowledge the many years of commitment to the society by Des Gorman. Unfortunately Des was unable to attend this meeting due to commitments with the University of Auckland.

During the last twelve months there have been a number of matters worthy of special comment.

1 The SPUMS Website (www.SPUMS.org.au) has been opened. It is a significant mechanism for spreading information about our Society and information on diving medicine. It a reference point for members wishing for information about our Scientific Meetings. It is also becoming a useful resource for new members and delegates at ASMs.

2 The SPUMS Grant. In future SPUMS will fund a grant, to be awarded where appropriate, to a diving medical researcher, to present an approved research paper at our Annual Scientific Meeting. Eligibility and amount will be determined by the SPUMS Education Officer in conjunction with the SPUMS Executive. Anyone wishing to apply should contact our education Officer, David Griffiths.

3 SPUMS Stickers. The new SPUMS stickers, promoting our society and the DES telephone number, have been available to members at this meeting. Stickers will be distributed with the June 1999 Journal. Please stick them somewhere prominent.

In 1999 we will be trialing the appointment of an Administrative Officer to perform many of the day to day duties of the Society. Steve Goble, from the Royal Adelaide Hospital, who is already working to maintain the Diving Doctor List, will be performing these duties. We hope this will improve our service to the membership and our response time to membership inquiries and other matters. The SPUMS membership database has been upgraded and updated, Steve Goble will maintain this and the other day to day duties, on a part-time basis. This should also ensure that future changes in the SPUMS executive will not interfere with the day to day operations of the Society.

Later in this meeting we will be considering changes to our constitution. These are entirely procedural changes, largely to correct errors, omissions and changes. I will summarise the important aspects.

Firstly, the Australian and New Zealand Hyperbaric Medicine Group is a sub-committee of SPUMS. That has been the case for some time, but it has never been documented in our constitution, and it is proposed now that it should be.

Secondly, the members of the Australian and New Zealand Hyperbaric Medicine Group must be members of SPUMS. This follows on from the first.

The Chairman of the ANZHMG will have a position on the SPUMS Executive. There are some other changes in the composition of the committee composition to incorporate that.

There is to be a change to the election of the Editor and the Public Officer. In the history of the Society there has never been an election for the Editor. It is proposed that rather than elect the Editor, the Committee will appoint the Editor, and in fact, as the Editor is an employed position of the Society, that is a better relationship to have with the Editor.

We also propose that rather than elect a Public Officer, the Public Officer be appointed. That is largely because we cannot have an open election for a Public Officer. As we are an association incorporated in Victoria, the Public Officer has to reside in Victoria. The reason that we are an incorporated Society is that it gives our Committee members protection from legal action from the public and members.

There are number of other minor changes in the constitution wording to accommodate those changes. We will formally, in the constitution, document the Board of Censors of the Society, and have clearly established who the Board of Censors are. They are in fact, the Education Officer, David Griffiths, the President of the Society and the Director of a Hyperbaric Unit in Australia or New Zealand.

1999 also sees SPUMS formalising its relationship with ANZHMG. In the future the Chairman of ANZHMG will be on the SPUMS Executive and be the official spokesperson on Hyperbaric Medicine matters. The SPUMS President and Secretary will remain the spokespersons on Diving Medical matters.

I look forward to seeing many of you in Fiji in 2000, where the theme will be "Diving Medicine in the New Millennium".

Finally, thank you all for the three years I have enjoyed as President of SPUMS. I hope that SPUMS is a little better at the end of my term and continues to improve under Robyn Walker, with increasing membership, particularly in Europe, USA and Asia. When you return home please encourage your colleagues to join our Society, and to attend our Scientific Meetings.

Guy Williams
President of SPUMS

SECRETARY'S REPORT FOR 1999

Now, in May 1999, the membership database has been reformatted. The number of members on the database is 1,272. Of these, 860 have renewed and are financial members. We have 300 members who are unfinancial since the beginning of this year, who we hope will renew. There are also 112 unfinancial members from the beginning of last year, who are probably not going to renew but are still on the database.

The currently financial membership breakdown is, 830 in Australia, 113 in New Zealand and 225 from overseas. Of the overseas members, approximately 100 are from North America, 100 in Europe and 25 from South East Asia and the Pacific.

The past

This is a quick overview of my time as Secretary, which is 1993 to the present. I was recruited in Port Douglas, at my very first SPUMS meeting, by John Williamson in 1992. I was nominated for and elected Secretary in Palau, at the AGM, in 1993.

Since then, SPUMS has really changed as to how we maintain membership records and our technology. I initially started doing the secretarial duties on my home computer, which was IBM. The Treasurer used a small Macintosh to maintain the database, and she did all the financial records on paper with a cash book. All the correspondence with the committee was by fax and telephone.

In the transition period between Treasurers, in 1996, we bought two Toshiba notebook computers, one for the Treasurer and one for the Secretary. We converted the database to IBM and it was put into Microsoft Access. However the financial records were still on paper. The Committee started to communicate tentatively by e-mail, although still using a lot of fax and phone. Now the financial data is in an electronic data package, the database has been reformatted with increased functionality . This year renewals were made easier for us to handle by printing our current data on the back of the renewal, so that members could ensure that we had the correct information to update our records efficiently. This will lead to increased efficiency and better accuracy of membership details. The majority of communication within the committee is now by e-mail, and we have a website, **www.SPUMS.org.au**, which will be the central point for information for members and others. This year for this meeting, as you have seen, we now have advanced projection technology to go with our public address system which allows recording of all words spoken into a microphone.

The future

SPUMS has grown to the size of needing a central administrator, as the President has already told you. This will facilitate efficiency and accuracy. It will streamline all the membership processing and dealing with enquiries. We hope that this will allow the other office holders to concentrate on their actual official roles.

The last six years as Secretary of SPUMS has been very challenging and rewarding. I look forward to the future, to the administrator starting work and to leaving the day to day chores to him. Also for the chance to concentrate on specific issues and enhancing the image of SPUMS in cyberspace.

Cathy Meehan
Secretary of SPUMS

SPUMS

ANNUAL SCIENTIFIC MEETING 2000

will be held at

Castaway Island, Fiji from May 6th to 13th 2000

Guest speaker Professor David Elliott

Convenors are Drs Vanessa Haller and Guy Williams. Members wishing to present papers should contact Dr Haller at 55 Two Bays Crescent, Mount Martha, Victoria 3934.

The travel agent is Allways Dive Expeditions.
168 High Street
Ashburton, Victoria 3147, Australia
Tel +61-(0)3-9885-8863
Toll Free 1800-338-239
Fax +61-(0)3-9885-1164
E-mail allways@netlink.com.au

INTRODUCTORY COURSE IN DIVING AND HYPERBARIC MEDICINE

Department of Diving and Hyperbaric Medicine
Prince of Wales Hospital
Barker Street, Randwick NSW 2031
Monday 21st of February to Friday 3rd of March 2000

Objectives of the course

To provide a broad introduction to the theory and practice of diving and hyperbaric medicine (DHM)
To provide the formal teaching component required for the SPUMS Diploma of DHM
To promote integrated teaching of DHM
To promote the evidence-based practice of DHM

Course content includes

History and chamber types
Physics and physiology of compression
Decompression illness
Assessment of fitness to dive
Other accepted indications for hyperbaric oxygen (HBO) therapy
Wound assessment including transcutaneous oximetry
Practical sessions including in chamber treatment

Cost **$A 1,500.00**

For further information contact
Miss Gabrielle Janik
Phone +61-2-9382 3880 Fax +61-2-9382-3882
E-mail janikg@sesahs.nsw.gov.au

DIVING MEDICAL CENTRE

SCUBA DIVING MEDICAL EXAMINER COURSE

A courses for doctors on diving medicine, sufficient to meet the Queensland Government requirements for recreational scuba diver assessment (AS4005.1), will be held by the Diving Medical Centre at:

Bond University
Gold Coast, Queensland.
Easter weekend 2000.

Previous courses have been endorsed by the RACGP (QA&CE) for 3 Cat A CME Points per hour (total 69)

Information and application forms for courses can be obtained from

Dr Bob Thomas
Diving Medical Centre
132 Yallambee Road
Jindalee, Queensland 4047
Telephone (07) 3376 1056
Fax (07) 3376 4171

"FIT TO DIVE"

A 2-day meeting on
MEDICAL ASSESSMENT OF FITNESS TO DIVE
is being arranged by Biomedical Seminars
in association with The Medical Subcommittee of the
European Diving Technology Committee
at
The Royal Society of Medicine, London
8th & 9th April, 2000

In 2000, the annual "Fit to Dive" meeting will be held at the Royal Society of Medicine. With the subsequent retirement of the organisers, Nick McIver and David Elliott, this may be the last in this series that has survived 20 years and so we are planning it to be the best yet.

Five years have passed since the Biomedical Seminars meeting "Medical Assessment of Fitness to Dive" which was sponsored by the HSE in Edinburgh. It was a significant step towards new medical guidance on fitness assessment which was then issued to all HSE Approved medical examiners of divers. The new Diving Regulations in the UK have ensured that these annual medical assessments are applied to the wide range of working divers, from those in the offshore oil and gas industry to diving scientists and the professional instructors of recreational divers.

The Edinburgh meeting recognised that there was no great place for pass/fail criteria but that each diver needed individual assessment related to their work and that, to achieve this, the judgement of the medical examiner is paramount. Since then, training objectives for diving doctors have been approved by the European Diving Technology Committee. This 2-day meeting is for all medical examiners of divers including those Approved in the UK by the HSE. It will focus on areas of continuing controversy, such as late onset diabetes in relation to the established but inevitably ageing diver. The resumption of diving after illness, injury, surgery or a diving-related incident will be highlighted as perhaps the examiner's most challenging assessment. The medical subcommittee of the European Diving Technology Committee hopes that the output of this meeting will lead to a greater international harmonisation of standards.

The academic program will start at 0900 on Saturday 8th and end at 1700 on Sunday 9th April, 2000. The Registration fee of £180 (if paid before 31 December) will include lunch on both days. From 1 January 2000 registration will be £210.

Further details from

BIOMEDICAL SEMINARS, 7 Lyncroft Gardens, Ewell, Surrey, KT17 1UR, England.
Telephone (+44) 181 393 3318 : Fax (+44) 181 786 7036
E-mail: Karen@biomedseminars.demon.co.uk

BOOK REVIEWS

VENOMOUS CREATURES OF AUSTRALIA. 5th Edition.
Straun Sutherland and John Sutherland.
ISBN 0 19 550846 7. 1999.
Oxford University Press, Melbourne.
131 pp. 64 colour plates. RRP $Aust 24.95.

Venomous Creatures of Australia is a small paperback, easily fitting in a car glove box or jacket pocket. This guide is definitely a reference to take whenever you are out in the bush or ocean, it is a useful and compact reference tool. However, if you choose to read it before departure you may choose not to venture out at all!

First published in 1981 it has been printed in revised editions in 1982, 1985 (reprinted in 1989) and 1994, all produced by Professor Struan Sutherland. In this edition he has been joined by his son John. Obviously a book in steady demand. The subtitle A Field Guide with Notes on First Aid exactly expresses the book's scope.

The book is divided into a number of sections, the first being on First Aid Management of Bites and Stings and provides some very useful basic management advice, including The Pressure-Immobilisation Methods, when to use and when not to use. The next section relates to notes for medical and paramedical staff, and provides more specific advice on management and some useful contact telephone numbers. The guide then covers the different types of venomous creatures, beginning with snakes, ants, bees, wasps, spiders, ticks, miscellaneous land creatures, then jelly fish, octopuses, stinging fish and other sea creatures.

The book is a useful source of basic information on the 64 venomous creatures reviewed. Each entry has a description of the creature, its photograph, its habitat, with a map of its distribution, and other useful information. For each animal there is, at the foot of the last page of the entry, advice on the first aid for the bites/stings. This advice refers the reader to the appropriate page in the First Aid Management section. A syringe logo marks those animals where an antivenom is available.

This book should be in the home, car or boat. The statement in the last paragraph of the preface "..the reader who is careful is almost guaranteed immunity from bites and stings" is certainly true for the venomous creatures in this book.

Guy Williams

Key Words
Book review envenomation, first aid, land animals, marine animals.

20,000 JOBS UNDER THE SEA: A HISTORY OF DIVING AND UNDERWATER ENGINEERING.
Torrance R Parker.
Sub-Sea Archives, PO Box 2471, Rancho Palos Verdes, California 92075-6298.
Price from the Publisher $US 87.00 plus postage and packing ($US 20.00 overseas).

This is a magnificent book, a little bit bigger than A4 and 30 mm deep. It is expensive, but it is excellent value for money and the order form on the flyer ends with "I understand that I may return my order for a full refund - for any reason, no questions asked". The author, whose company published the book, is most unlikely to be called upon to refund a purchaser.

Written by a diver who started diving for a living at the tender age of 16 with the Greek sponge divers of Florida, this book leads the reader rapidly through the ages to the introduction of compressed air and the diving helmet and suit, then a short history of diving to the present day. Part 1 of the book is The Hand Pump Era, when the diver's safety at depth depended on the strength and endurance of two or more men working the handles of a pump. The deeper the diver the harder they had to work to keep up a sufficient air supply to prevent carbon dioxide build up. Muscle power could not be relied upon to properly serve the hard working diver much deeper than around 100 ft (30 m). It was the petrol engine that allowed divers to work at greater depths and face greater dangers. Hand pumps were being replaced before the end of World War I although small outfits, and most US commercial divers in those days were self employed, continued to use hand pumps for jobs away from base until World War II.

Most of the book is about work underwater. Until the 1960s most work underwater was with bridge footings and harbour construction. A side effect of harbour construction was the need for sewage outfalls to serve the growing population and then ocean intakes and outfalls to provide cooling water for power stations. The problems and dangers of placing large pipes into position for up to a mile or more on the sea bed and the solutions found by divers take up a large part, a fascinating part for those with mechanical inclination, of the book. Of course there are accidents recorded. Also recorded is the progress made by pioneers in the treatment of decompression accidents and the slow process of improving safety at work. In the 1960s oil exploration moved out to sea in a big way. This created many new jobs for divers and thousands of new divers were needed.

The fact that the book is mostly about the diving construction industry in California gives no narrow focus. Because of the small size of the commercial diving

industry in the USA divers, travelled and turned their hands to everything underwater, salvage, building pipeline and docks, inspecting dam outlets etc. Of interest is the way that unionism spread through the diving industry during the depression and New Deal years of the 1930s. Apparently new laws gave unions new powers and, as the dock construction industry had been unionised since the early 1920s, the divers had to join a union, the Pile Drivers, who were later taken over by the United Brotherhood of Carpenters. There were benefits in the form of fixed wages and better conditions of work but difficulties in getting a union ticket.

Torrance Parker considers that the period after World War II to the present, where divers are being replaced in much oil field work by remotely operated vehicles, as "Diving's Golden Age". He, among many others mentioned in the book, have made large contributions to the advancement of safety in diving by introducing new equipment, techniques and procedures.

Surprisingly those who did construction work wearing hard hats (standard diving dress) with motorised air pumps found that, in spite of the weight out of the water of all the lead needed to achieve submersion, they were able, by skilful manipulation (if that is the right word for using one's head to push a button) of inlet and outlet valves it was possible to achieve perfect buoyancy.

The book discusses two groups of hard hat divers who have disappeared. The Greek sponge divers of Florida came in the early years of the century when sponge diving was having to go deeper in the Mediterranean and the Florida sponge beds had just been discovered. The Florida sponge beds were destroyed in the late 1940s by a blight and the industry vanished. The abalone divers in Southern California were mostly Japanese who worked from small boats in teams with two or three divers who all used the same suit one after the other. Now it is illegal to dive commercially for abalone in Southern California.

In the 1960s, with the advent of deep offshore diving, some ex-abalone divers using helium recirculating helmets with carbon dioxide absorbers, based on US Navy helmets, designed modified helmets which were quieter and worked more effectively than the originals.

This brief review has just touched on a few of the many, many fascinating facts to be found between the covers. Everyone who has an interest in how working divers and water have interacted to produce the world we enjoy living in, should buy this book. Not only is it interesting, it is well written, well illustrated (nearly 400 illustrations) and has a comprehensive index.

John Knight

Key Words

Book review, equipment, diving operations, history, occupational diving.

SEA SNAKES

Harold Heatwole
ISBN 0-86840-776-3. 1999.
UNSW Press, University of New South Wales, Sydney, New South Wales 2052, Australia.
167 pp, 12 colour plates. RRP $Aust 29.95

This is one of a series of 10 books published by the University of New South Wales Press on Australian Natural History. The Series Editor, Professor Terence Dawson, stated that the ".. function of this series of titles is to make accessible accurate scientific information, complemented by high quality illustrations, on a wide variety of Australian animals. ... they are intended for students and biologists at both secondary and tertiary levels and, in general, for readers with a serious interest in animals and the environment." This book adequately achieves that goal.

Well presented and illustrated, it is easily understood by the non-marine biologist (have you ever noticed how marine biologists like using names that no one recognises and just confuses the issues?). The medical management of bites is briefly covered but then this should be expected. However, the first aid section was poorly done and lacked suitable illustrations. I believe that it is important that any book on Australian venomous animals should have a detailed description of the first aid management of injuries from that particular animal.

For all divers, Chapter 8: "Diving Adaptations", is a 'must read'. It outlines how the sea snakes avoid getting decompression illness (or "The Bends" as Professor Heatwole calls it). This chapter also highlights the difference between aquatic diving reptiles and mammals. The description of how the snakes control their buoyancy by varying their breathing pattern and lung volumes should be an example for all divers. (Sea snakes do not rely on any buoyancy aid!)

I recommend this book to all divers and non-marine biologists. It will disperse any fear about being attacked by snakes while swimming near them and perhaps will make divers realise what magnificent creatures they are. For the readers who want to know more about the biology and physiology of sea snakes without being bothered by long unpronounceable names then this book is for you. My only other criticism of the book is that it is a soft back publication which may not withstand constant handling over the years.

Chris Acott

Key Words

Book review, marine animals.