U.R.G. NEWS

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O C T O B E R 1962

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CLUB NEWS - La Perouse was the scene of the launching of the club sea sledge with Wally Reynolds as the guinea pig in the driver's seat and David Landor at the helm of his "cat". Although needing a little more adjustment, the sledge performed fairly well for a test run and will prove to be a valuable club asset.

The annual sports day will be held at Clifton Gardens in November. As usual prizes will be awarded to the winners of the various events and a surprise and Christmas gifts will be organised for the children. The day will end with a barbecue and we hope for full club attendance.

As a service to members this sheet will publish personal adds etc. A nominal charge of 2/- will be made to assist club funds. A limit of two or three lines per add will be made and they should reach the news sheet at least one week before the monthly meeting, where payment can be made directly to the treasurer.

The Instructors course for the Elementary Diving School will be starting soon, so if you intend participating, contact Wally Reynolds, David Landor or Barry Jentsch as soon as possible.

Sorts confusion seems to exist at the groups monthly outings, as to the exact location for assembly. To overcome this, a diving flag, with the "U R G" printed on it will be displayed at future club dives.

An offer has been made by the Malabar Surf Club to make its club house available for URG meetings. If the sub-committee for this matter feels it has any advantage, the group will be asked for their ideas on the subject.

The newly formed "Shark Research Society of Aust" has Howard Couch as the U.R.G. representative and David Landor as its treasurer.

For the benefit of any curious member, who has seen a large collection of used flash bulbs at the bottom of Clovelly Pool, we advise that Don Wilson and Co. have been testing a new camera housing. So be warned and don't go walking about on the bottom of the pool with your bare feet.

News of the club activities is always required for inclusion in this sheet. If you have, or know of, anything of general interest to the group, drop a line to the U.R.G. News.

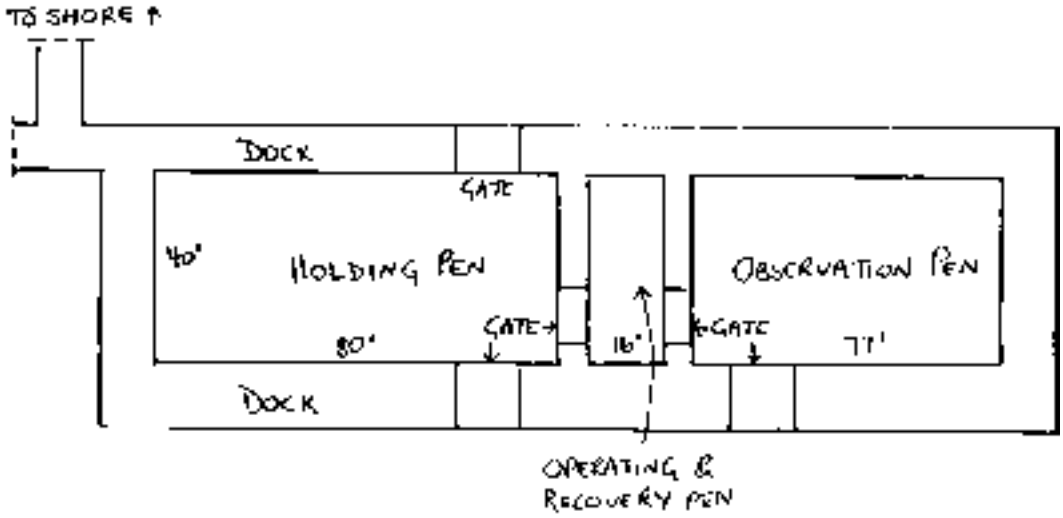
In the last issue of the U.R.G. News a report on the work of the Shark Research Panel, which was formed in America, was given. Dr. Perry Gilbert, who is chairman of the panel also conducts research into shark behaviour, etc, at the Lerner Marine Laboratory on the island of Bimini in the Bahamas. This laboratory has been operating for almost fourteen years and is the largest and most comprehensive shark experimental station in the world.

The experimental shark pens measure approximately 40 by 80 feet and are 7 feet deep at mean high tide. Connecting the two main pens is a smaller operating and recovery pen over which is an electrically driven 2 ton hoist and viewing platform. Due to the great clarity of the waters around Bimini, details of the experimental sharks can be observed from this platform as they swim over the

white coral sand bottom of the two pens. The walls of all pens are constructed of chain-link 11 gauge stainless steel wire stapled to pressure treated wood pilings, a dock 10 feet wide surrounds the three pens and a 2 foot catwalk extends along the sides of the operating pen.

To remove a shark for experimental work, the animal is separated from the others by a net and guided into the operating pen, where it is confined. By using the hoist, the netting on the floor and sides of this pen is elevated until the shark is raised to the surface. In this position it is anaesthetised by spraying a preparation known as MS 222 into its mouth and gills. One litre of this drug can be delivered into the shark in 6 to 10 seconds and it takes only 0 to 90 seconds to anaesthetise a 400 to 500 lb animal. It is then raised onto the dock in a canvas strap stretcher where it can be operated on for up to 20 minutes. After the operation it is not necessary to "walk" the shark to bring about its recovery as the normal flow of water through the pens, due to the proximity of the Gulf Stream, is sufficient to activate its breathing and wash the drug from its gills. Results of experiments conducted at this and other research sites will be given in future issues of this news sheet.

DIAGRAM OF SHARK PENS SHOWING RELATIVE SIZES & POSITIONS.



NITROGEN NARCOSIS ?

Recently the Underwater Explorers Club of Western Australia suggested that they believed there was no such thing as nitrogen narcosis and that this was in fact, a state of "mental intoxia introduced through excitement, or achievement".

This is simply another suggestion in a search for the real cause of the narcosis which began when the British Admiralty deep sea diving trials to 320 feet were commenced in 1930. New symptoms became apparent which had not previously appeared.

The main symptoms were the loss of man's most highly developed senses, namely his memory and power of concentration. This became evident when divers were on different occasions, overcheerful, hysterical, stupid, depressed and rendered completely unconscious. However, these symptoms rapidly disappeared as the diver was brought to the surface.

A theory was put forward by Damont (1930) that the narcosis was due to the increased partial pressure of oxygen. Since roughly one fifth or 20% of the air you breathe at atmospheric pressure is oxygen, when you descend to 300 feet or 10 atmospheres absolute, the partial pressure of oxygen now becomes equivalent to breathing pure oxygen at 33 feet. However, no symptoms of narcosis appear under these conditions.

Another theory put forward by Hill and Phillips (1932) that the narcosis was brought about by the individuals psychological reaction. They showed that many of their more sensitive subjects were suffering from suppressed claustrophobia, but when a change in the gas mixture was introduced, the level of the narcosis also changed.

In 1935, Behenke, in America, advance the theory that the partial pressure of nitrogen was responsible for the narcotic effect when deep diving on air. Nitrogen, he believed, was more soluble in fatty organs e.g. brain and spinal cord, than in water e.g. blood and tissue fluid. This was based on the Meyer-Overton law which related the oil, water solubility ratio of a gas and its anaesthetic value e.g. ether and chloroform.

Although a general trend was present relating the solubility ratio of a gas and its narcotic potency, there were almost as many exceptions as there were facts to support the theory.

But, because of the Meyer-Overton law and because as soon as the nitrogen was replaced by helium, all symptoms of the narcosis disappeared, it was generally accepted that the partial pressure of nitrogen was responsible for the narcotic effect. From about 1950, however, a body of opinion began to support carbon dioxide as being the cause of the narcosis.

The first of these was Bean, who revived an idea put forward earlier by Damant (1930) and Hill and Phillips (1932). As a result of 24 experiments, Bean suggested that the narcosis was due to retention of carbon dioxide in the body. This could be brought about in a number of ways.

1. By the difficulty of diffusion and mixing the carbon dioxide would meet, due to the increased density of the air.
2. By compression of the gases in the lungs causing an increase in the partial pressure of carbon dioxide.
3. By the inflow of air into the chest during rapid compression, preventing carbon dioxide being breather out, or any form of combination of the above.

These changes would tend to drive the carbon dioxide back into the blood, causing changes in its acidity.

Bean's experiments showed that the carbon dioxide in the lungs rose from the normal 4% to values as high as 10% during compression. This led Bean to conclude that carbon dioxide should be considered as an alternative cause of the narcosis until a definite solution to the problem was found. Experiments were carried out at the Royal Naval Physiological Research Laboratory by C.R. Rashbass in an attempt to clarify the matter. He subjected 26 men to pressure equivalent to 250 feet and compared the carbon dioxide content in their lungs to the level the narcosis affected the men.

For the latter he used arithmetic problems. Although there was an increase in the percentage of carbon dioxide upon reaching full pressure, it was found the percentage returned to normal after five to six minutes, whilst the level of narcosis remained constant after this period.

Results led Rashbass to believe that the suggestion that carbon dioxide was responsible, was reasonably disproved.

Regardless of this work, however, Seusing and Drube (1960) and Buhlman and Keller (1961) continue to expound CO_2 as the cause of the narcosis and denied the action of nitrogen. They based their belief on much the same argument as Bean. That due to the increased gas density caused by the compression, there is a rise in the resistance in the respiratory tree. They believe the problem is aggravated by the high partial pressure of oxygen which produces a tendency for under ventilation in the lungs. Previous work, however, carried out by Cabarrou in Toulon on similar lines to Bean and Rashbass measuring the CO_2 level in the lungs confirmed the work of Rashbass that CO_2 levels return to normal after a period of four to eight minutes at full pressure.

He also conducted an experiment where he exposed 20 subjects to mixtures containing 2% oxygen at a pressure equivalent to 270 feet. The partial pressure of oxygen would have been slightly less than the oxygen of atmospheric air.

An excess of CO_2 under these conditions should have given immediate rise to the rate and depth of respiration. However Cabarrou found no variation in the course of sixty experiments.

Further work by Cabarrou is also against the density - CO_2 hypothesis. From studies of brain wave activity, he showed that with a constant partial pressure of nitrogen variations in the absolute pressure had no effect on the brain waves. But with a constant absolute pressure variations in the nitrogen partial pressure did cause changes in the brain wave pattern.

This led to the conclusion that the density of the mixture was not the cause of the narcosis, neither was carbon dioxide except as a possible aggravating factor. But, the main cause was the partial pressure of nitrogen.

As you can see only further research will settle this problem, one way or the other.

W.H. REYNOLDS

APPROACH TO RESEARCH

The U.R.G. is primarily a group of diving enthusiasts who wish to participate in the field of marine research, compensating any lack of technical knowledge with practical diving experience. The main factor which makes the Group valuable to established marine research institutions is its ability, as a group, to dive, thus allowing "on the spot" observations to be made and recorded. The recorded observations being of no value unless the diver observes and records accurately what he has seen.

The initial approach to a research project is most important as this is the means of achieving a successful end. Listed below are some suggestions which may be of assistance to members who intend taking an active part in research projects.

1. SELECT A SUBJECT : Little is known about the marine life that abounds our coastline, therefore this should present no problem. Just select a book on marine life, any book, open it at any page and there you will probably find something worth investigating.

2. FAMILIARISE YOURSELF WITH THE SUBJECT MATTER : Read any written material you may find which is relevant to the subject. The N.S.W. Library has an excellent research department which you will find most helpful. Talk to people who may have done some preliminary work in your particular field, remembering always to endeavour to verify the information already received as well as bringing forward new facts.

3. PRE-DIVE PREPARATION : Before attempting a dive make sure you have the equipment necessary for your work in good operating condition, many a good specimen has been lost due to lack of preparation. As this is a relatively new field, manufactured equipment is hard to come by, so use a bit of ingenuity. Your fish trap may look like a mobile fowl house, but as long as it traps fish – who cares?

4. DIVE LOCATION : Select an area in which you are likely to meet up with the particular beast you are searching for. Your fellow divers may be able to help you here, just ask around, it's amazing the answers you will receive – Yes, you will receive many of that type of answer, but disregard them for practical information.

5. ACCURACY OF OBSERVATION : Record the things you see during a dive, not what you thought you may have seen. (I thought I spotted a mermaid off Broughton Island last Easter, but who wouldn't with a tummy full of Harry Tracey's O.P. + Rum.)

6. RECORDS : Record observations as soon as possible after leaving the water – a time lapse can mean a lapse of memory. In your record be sure to enter all relevant information such as date – time- weather – location – type of bottom – depth – etc., as these factors may be important during the final analysis.

7. ASSISTANCE : If you feel you require assistance do not be afraid to contact established research institutions requesting information or help, as these people will be only too glad to lend assistance in genuine cases.

In conclusion, I would like to point out that it is nice being able to dive and just look, but so much nicer when you have something to look for.

D. MURDOCH