

regulators used on cars, and in operating theatres during the war, but it was Cousteau who figured that they could be adapted for underwater use. So the sport of SCUBA-diving was born in war-time, but not for war purposes. Cousteau thought only of exploring the mysteries of the sea.

The basic single-stage, double-hose regulator used commonly today is little different from the 1943 model that enabled Cousteau to produce the underwater film "Sunken Ships" in 1944.

Even the cold, which was a problem for the crews of the "X-craft", poses no discomfort to the modern SCUBA-diver, who can break a hole in the ice and go under, thanks to the wet-suit. Made of unicellular, neoprene rubber with a synthetic cloth packing to prevent tearing, it traps a thin layer of water against the skin, which is quickly brought to body temperature to act as an insulator.

Safe diving is now a sport within the reach of everyone physically able to dive, and observe the basic rules of safety.

What of the future? Experiments begun in 1961 lead some to suppose that man can flood his lungs with oxygenated water and "breathe" it, if such an expression is permitted. This would lead to dives to depths previously unknown, and a return to the surface without any need for decompression. Reading through this brief history, when pioneers risked, and sometimes lost their lives trying out a new technique, who knows but that this might not succeed? There will be someone willing to try it.

AQUATIC STATISTICS

BY TERRY MURPHY

A summary. The full text is available from the School of Underwater Medicine Library. This article is a collection of statistical data related to aquatic deaths.

Drowning is responsible for 6 fatalities per 100,000 people on a world wide basis and 4 per 100,000 in Australia.

The World Health Organisation classified drowning under five groupings for statistical purposes:

1. All accidental deaths by drowning where the cause is known except suicide and those associated with water transport (E.910)
2. Accidents to watercraft causing drowning (E.830)
3. Other drownings associated with watercraft (E.832)
4. Suicide by drowning (E.954)
5. Drowning where there is doubt as to whether this was due to suicide or purposely inflicted (E.984)

The 1-4 age group is responsible for far more drownings than any other. Yet this should be the group of drownings most amenable to prevention, as it is largely due to inadequate supervision of a child unable to swim - as seen in backyard swimming pool deaths.

Watercraft accidents tend to affect the middle age groups predominantly. Studies in Geelong⁴ and overseas have incriminated alcohol as being associated with almost half of the drownings in this middle age group. Giertson in 1970 obtained figures of 50% of drowning accidents in Norwegian seamen and one third of those in Finland occurred with the deceased being under the influence of alcohol. The use of small boats inadequate for the conditions, inexperience of the users and the non-wearing of flotation vests were also major factors.

A comparison with the 1967 deaths by drowning and motor vehicle deaths in Australia according to age groups gives the following results.

1967 TABLE I

DROWNING DEATHS			MOTOR VEHICLE DEATHS		
Age	Male	Female	Age	Male	Female
0	4	4	0	9	9
1-4	46	23	1-4	56	49
5-9	35	3	5-9	63	52
10-14	18	2	10-14	58	30
15-19	30	6	15-19	378	115
20-24	26	3	20-24	418	84
25-29	24	0	25-29	213	42
30-34	13	1	30-34	124	27
35 & Over	132	29	35 & Over	1112	433
TOTAL	328	71	TOTAL	2431	841

DIVING FATALITIES

In the United States there were 94 diving fatalities in 1964 and 130 in 1970. Of these, 109 were associated with the use of SCUBA or Hookah apparatus and 21 were skin diving. The Australian fatalities also show an increase.

Of the 1972 Australian fatalities, five occurred while the diver was on the surface, four occurred while diving in caves, two were due to decompression sickness and two were learners.

Of the people snorkelling, two drowned as a result of waves when trying to come ashore, one apparently suffered from cramp and one died of a coronary while in the water.

Either ignorance or carelessness was a major factor in all of them except for the coronary death.

A study on civilian diving deaths in Australia by Bayliss³ showed these causes of diving fatalities between 1957 and 1967.

Diving accidents resulting in Spinal Cord Injuries have become more frequent. A study by Burke⁹ at the Geelong Hospital between 1964 and 1972 gave 52 people admitted to the hospital with spinal cord injuries and of these, all but 4 occurred from diving into shallow water.

YEAR	NO. ADMITTED	YEAR	NO. ADMITTED
64-65	2	68-69	7
65-66	4	69-70	5
66-67	4	70-71	13
67-68	7	71-72	10

DANGEROUS MARINE ANIMALSShark Attacks

Sharks are responsible for about 75 recorded attacks on humans per year and most of these tend to occur where there is a concentration of bathers less than 1,000 feet from shore.

Studies by Dr VM Coppleson indicate that most attacks occur between latitudes

42° North and 42° South - this area being known as the shark belt, and that most attacks are along the East coasts of the major continents. This latter observation appears to be related to the warmer water temperatures along this part of the coast.

Between 1901 and 1968 there have been 210 shark attacks recorded in Australian waters - 93 of these were fatal.

Beaches	90	173 of these attacks occurred on the North-Eastern coast between Sydney and the Torres strait Thus giving a very uneven distribution.
Harbours	17	
Rivers and Creeks	24	
Bays and Estuaries	11	
Lakes	4	
Open Sea	4	

An analysis on the months in which shark attacks have occurred in Australia up to 1963 is given by GP WHITLEY in "Sharks and Survival" Chapter 10.

TABLE 2

	NSW	QLD	OTHER STATES		NSW	QLD	OTHER STATES
Jan	45	15	12	July	2	3	1
Feb	22	8	12	Aug	2	7	1
March	17	10	11	Sept	0	4	0
April	10	11	5	Oct	8	12	2
May	2	8	2	Nov	8	12	5
June	4	4	1	Dec	22	17	10

TABLE 3

STATE	PERSONS ATTACKED	PER CENT	
Queensland	123	39	These figures from GP Whitley show the heavy preponderance of attacks in NSW and Queensland.
New South Wales	129	41	
Victoria	15	5	
Tasmania	6	2	
South Australia	12	3	
Western Australia	19	6	
Northern Territory	7	3	

The effect of meshing sharks in the Sydney area has been demonstrated by Dr V Coppelson. This method of catching sharks was commenced in 1937 in the Sydney area.

TABLE 4

	ATTACKS BETWEEN 1919 AND 1937	ATTACKS SINCE MESHING
NEWCASTLE HARBOUR AND OCEAN BEACHES	12	2 since 1950
SYDNEY NORTHERN OCEAN BEACHES	5	None since 1937
SYDNEY HARBOUR	15	6 since 1942 (Entrance not meshed)
SYDNEY SOUTHERN OCEAN BEACHES	9	1 since 1937 till 1960

Since 1960 there have been at least five attacks in the Sydney Harbour area plus two attacks in the Manly Marineland. Two of the attacks occurred in Middle Harbour in 1960 and 1963 with these causing the death of the victim, but no attacks have occurred on netted beaches in the fourteen years since Coppelson's figures were published.

The Sea Wasp

The Chironex Fleckeri was first identified as a separate type of jellyfish 1955 by Dr. Flecker. It has been responsible for 30 recorded fatalities between Yeppoon and Cairns compared to about 20 shark fatalities in the same area.

The most often quoted figure is that about 90 fatalities in Australia have occurred this century due to this species of jellyfish.

The danger period is between November and March; the jellyfish being thought to possibly breed in the Timor Sea at the beginning of the summer season and then increase in size and virulence in the warm waters of the Northern Territory and upper Queensland coast.

They are incapable of effectively stinging through material as thin as pantyhose and this is becoming a popular method of protection by the Queensland surfing cult in summer months.

WATER SKIING

The increasing popularity of water sports is also causing a significant group of injuries.

The types of injuries suffered by people who water ski¹⁰ can be classified as follows:

1. Death by trauma - for example, skiers who hit obstacles such as ski jumps.
2. Orthopaedic - cervical spine damage; ankle and knee injuries; lumbo-sacral ligament damage
3. ENT injuries - ear drum perforation. These are often large and slow healing.
4. Genito-Urinary - water enema; water entering the vagina and causing peritonitis or spontaneous abortion; prostatitis, torsion of the testis and haematocoeles.
5. Rope Burns.

WATER POLO

Water Polo player injuries have been studied by J ROUS and J NOVAK¹⁰ with the following results.

YEAR	NO. INJURED	YEAR	NO. INJURED	SITE OF INJURY	NO.
1958	5	1963	4	Head	35
1959	3	1964	13	Chest	1
1960	4	1965	17	Abdomen	1
1961	0	1966	12	Upper Extremity	26
1962	3	1967	12	Combined Injuries	2
				Eye	9
				Ear	12
				Nose	5
				Mouth	4
				Others	1

These figures show a dramatic increase in the number of people being injured; the most common injuries being those to the ear or eye.

SURFING ACCIDENTS¹⁵

One Sunday in September, 1902, Mr William Gocher at Manly Beach in Sydney, defied the law of the time (which permitted surf bathing before sunrise or after sunset) by bathing in the prohibited hours. His action forced the issue of daylight bathing and virtually founded the zestful pastime and sport of surf bathing as enjoyed today.

Surf bathing grew rapidly in popularity, but just as rapidly its dangers became apparent. Of necessity, small groups of experienced and regular surfers formed themselves into life-saving bodies to assist those who could not swim, and those who were not familiar with the dangers associated with surf bathing. These life-saving bodies gradually grew in size, numbers and importance and on 18th October, 1907, the New South Wales Surf Bathing Association (later changed to the Surf Life Saving Association of Australia) was formed.

Since then, the Association has developed into an organisation known throughout the world for its voluntary and humanitarian work which has resulted by the end of 1973, in the saving of 200,000 lives. In 1973 alone, 4,000 rescues on Australian beaches were made.

Surfing accidents range from the orthopaedic injuries of body surfers to the physical trauma of surf boards (especially with some of the sharpened fins now being employed). Tides, undertows and rips aggravate the likelihood of drownings, and marine animal injuries are common to both types of surfers.

Australia is fortunate in possessing the longest coastline of any country. The increased aquatic recreational activities and the commercial exploitation of the continental shelf, we are in the position of having available the largest and most varied group of aquatic accidents. There is every reason to be modest regarding the Commercial and Governmental backing given to the voluntary sports organisations, and individual enthusiasts who have made the above data available. It is hoped and anticipated that some future Australian Government shall see fit to assist and subsidise compilation of this data, and its promulgation to other countries.

MEDICAL STANDARDS FOR DIVING by Carl Edmonds

The imposition of medical standards for any occupational activity is, to a large extent, both presumptive and arbitrary. Although divers and hyperbaric personnel share some hazards, others are peculiar to one or the other. Even within the diving occupation there may be considerably different medical requirements for the occasional shallow water, sport diver and the professional deep and experimental diver. Some of these variations in standards will be discussed using the model of a medical history and examination format similar to those being used by most navies employing divers.

Reports of diver selection criteria are mainly anecdotal.^{2, 6, 9} These infer that the diver should be a psychologically stable or even phlegmatic personality, able to endure much physical and emotional stress, free of all serious physical disease and also free of minor illnesses affecting the upper and lower respiratory tracts. A group of more objective reports^{3,4,7,8} more clearly define the psychological assessments, physical fitness levels and medical disease limitations which are relevant to diving candidates. In appreciating the importance of these criteria, it is necessary to consider three aspects of diver training. One is the high failure rate of diving courses^{3,4} and the characteristics necessary for success in these courses. The second is the hazardous nature of the marine environment and the sudden unexpected demands it is likely to make on the diver. The third is the occupational diseases to which the diver is subjected.

Medical Standards Format^{1,9}

A copy of a typical diver medical examination form is shown in Tables 1-3. This was developed for the Australian Standards Association for use with compressed air divers. The reasons for the requirements are outlined below with an explanation of any permitted relaxations and cautions.

- TABLE I - Medical history questionnaires (MH items 1-60) is completed by the candidate.
- TABLE II - Diving history questionnaire (DH items 1-24) is completed by the examining physician in consultation with the candidate.
- TABLE III - Medical examination (ME items 1-42) is completed by the examining physician.