

blood stream are:

- 1 Directly intravascularly or
 - 2 Indirectly from the tissues into the lymph vessels.
- Toxic material entering the blood stream directly would reach the heart more rapidly than that entering the blood stream by an indirect route.

Sections through mouse skin reveal that adhering tentacles contained many undischarged nematocysts. In human envenomation, it is necessary to inactivate any remaining nematocysts which had the potential to discharge. Dilute acetic acid (vinegar) has been shown to inactivate *C fleckeri* nematocysts. After the application of vinegar, to inactivate nematocysts with the potential to discharge, immediate application of a pressure immobilization bandage to retard passage of injected venom from the tissues into lymph vessels is recommended. This bandage should be left in place until the sufferer is under medical care, in a hospital equipped with *C fleckeri* antivenom, and all preparations have been made to cope with collapse of the patient.

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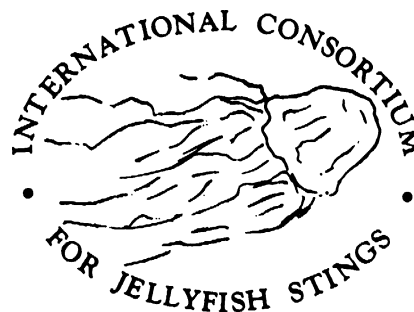
Dr Jacquie Rifkin is a consultant Marine Biologist. Her address is Lot 105 Riverside Avenue, Karalee, Queensland 4306, Australia.

THE WORK OF THE INTERNATIONAL CONSORTIUM FOR JELLYFISH STINGS

John Williamson

Introduction

The "International consortium for Jellyfish Stings"¹ arose from the earlier collaborative work of a small group of clinicians, marine biologists, "in-the-field" workers and toxinology researchers scattered around North Queensland, Australia and in the U.S.A. It was conceived in particular by Professor Joseph Burnett, whose laboratory in Baltimore, Maryland, is at the forefront of jellyfish venom toxinology.^{2,3,4} Its prime function is to create a focus for international communication between interested workers in the subject of human jellyfish envenomation. The Consortium was formed, with its letterhead symbol, in 1987.



Current participants

Medical, biological and marine scientists, scuba diving instructors and distinguished underwater photographers all feature in the current international mailing list. Some of these people are making original and pioneering observa-

tions in this field of study.^{5,6,7,8,9,10} The countries at present involved are the United Kingdom, Portugal, Yugoslavia, Greece, Italy, South Africa, Sultanate of Oman, Sri Lanka, India, Pakistan, Thailand, Malaysia, China, Japan, Eastern Russia (Vladivostok), Canada, U.S.A., Argentina, New Zealand, Fiji, Australia, Papua New Guinea, Sarawak and the Philippines.

Activities

1 COMMUNICATION

This a prime function of the Consortium in an attempt to harness, and to a small extent, co-ordinate research and publication efforts internationally.

To this end the Consortium publishes a bi-annual "Newsletter", compiled mainly by Joe Burnett in Baltimore. This is distributed to the American and European regions from Baltimore, and to the Middle East, Indian, Asian, Australasian and Pacific areas from Adelaide. The mailing list currently numbers 115 on the latter, and 30 on the Baltimore list.

An annual "Sting Report Summary", which is prepared by myself in Adelaide and Dr Peter Fenner in Mackay, Australia, is sent to the same mailing list. This is a compilation and analysis of confirmed envenomations world wide, and although obviously incomplete, provides on-going epidemiological and medical insight.

The Consortium mailing list also allows notification of relevant scientific meetings internationally, and research, publications and significant advances in understanding by and to Consortium participants.

2 RESEARCH

This is increasingly active, but still in the early stages of development. For some years past, captured specimens and freeze-dried tentacle material has been exchanged between Baltimore, Brisbane, North Queensland, the Mediterranean area, and more recently Karachi and the Australian Northern Territory. This exchange of scientific material will expand in the future. Current efforts are directed towards both classification and identification of specimens and life cycles,¹¹ laboratory toxinological and immunological studies,^{12,13} clinical research^{14,15,16,17} and epidemiological efforts.¹⁸

3 PUBLICATIONS

These are increasing in both quality and quantity, and some are listed in this report.

4 EPIDEMIOLOGY OF STINGS

Apart from the Consortium's regular review based upon documented or confirmed first-hand reports,¹⁸ commu-

nications of unpublished observations, direct investigative enquiries (e.g. museum specimens) and some publications have now confirmed that human mortality, or life-threatening envenomation from jellyfish stings have occurred, or are occurring over a very wide area. Envenomation has been reported in the mid- and south Atlantic Ocean, the Pacific Ocean, the Sea of Japan (North China Sea), throughout the Indo-Pacific region (the major number of known deaths), the Indian Ocean, the Gulf of Oman and parts of the African coastline.

The future

In addition to increasing the international "membership" of the Consortium (there is at present no joining fee), it is hoped that its existence will encourage international visits, and the cross-fertilization of experience and ideas that is so necessary for progress with understanding.¹⁹ Jellyfish envenomation is an event which is far more common than was previously realised and has been a neglected area of study.

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Dr John Williamson is the Director of the Hyperbaric Medicine Unit, Department of Anaesthesia and Intensive Care, Royal Adelaide Hospital, North Terrace, Adelaide, S.A., 5000.

SYMBIOSIS BETWEEN EDUCATION, RESEARCH AND TOURISM

Andrew Dunstan

Reef Biosearch is a group of nine marine biologists employed within the Quicksilver Connections company.

Quicksilver runs two high speed wave-piercing catamarans to the outer reef and a large sailing catamaran to Low Isles daily, employing biologists on board for educational and interpretive activities.

A common question asked of us is "Do they actually pay you to do this every day"? Increasingly in tourism it makes economic sense not only to ensure the long term survival of the reef but to provide the educational and interpretive options demanded by a more environmentally aware tourist/client population.

For the marine biologist this means being able to spend valuable time in the reef environment, daily accruing knowledge in the field. It also gives the chance to educate many thousands of people not only to the wonder and beauty but the importance and fragility of the reef system. It also means that biologists, generally a group with highly protective moral standards towards their reef subjects are on hand to ensure the integrity of an operation.

This is a healthy outcome from a trend towards ecotourism. Ecotourism has been defined by the Ecotourism Association of Australia as "Ecologically sustainable tourism that fosters environmental and cultural understanding, appreciation and conservation". This does not mean just having a reef guide on board to take rudimentary tours but a policy spanning all company activities.

This type of attitude equates well with the Great Barrier Reef Marine Park Authority (GBRMPA) guidelines which dictate that tourism activities must "provide for the protection, wise use, understanding and enjoyment of the Great Barrier Reef (GBR) in perpetuity." The enjoyment aspect is well catered for by tourist operations, while reef understanding is an increasingly integrated part of the whole package.

At Reef Biosearch, since its inception in 1986, we have taken approximately 70,000 people out on extended snorkelling tours, captivating their interest and knowledge of the reef. About half a million people have been subjected to our indoctrination procedures during slide presentations and talks, and over 100,000 during naturalist walks at Low Isles.

Education is accepted as possibly the best conservation tool and we have extended this beyond the boat/reef operations to within the regional school and community. Programs have been developed in conjunction with the environmental educational division and local teachers which are compatible with existing curriculum requirements. These involve students in four to eight week long school programs devoted to the reef. A great thing about these programs is the enthusiasm generated for subjects otherwise seen as boring. Community talks and activities such as beachcombing, rainforest and mangrove walks are also conducted frequently. Quicksilver's commitment to