

5.3 Personal research from travel

5.3.1 Hong Kong 1991 and 1993

Despite investigation and netting of the beaches around the Colony of Hong Kong in both 1991 and 1993, no venomous jellyfish were caught. The opportunity was taken to discuss the question with both the Royal Life Saving Club of Hong Kong, Professor Brian Morton, Head of Department at the Marine Biological Department of the University of Hong Kong, and representatives of the Life Saving Club who patrol the beaches of Hong Kong. No information was available on venomous jellyfish in the area, nor any human envenomation - apart from the usual minor stings. This was despite the fact that Hong Kong was reasonably close to the region of Qingdao, China, where severe envenomation, and even death, had occurred. At the weekends vast numbers of residents crowd the beaches and swim, so there is no lack of people in the water if problem jellyfish were around.

5.3.2 Okinawa, Japan

In 1995 the author was invited to Okinawa (latitude 27°), Japan as chirodroids were a known problem, having caused one death and at least two life-threatening stings (Fenner & Williamson 1996). The following severe envenomations were confirmed at this time:

Table 3 - Fatal and serious chirodroid stings in Japan

<i>Fatal stings</i>			
9	Shirahama,	August 1961 Boy, 14	Received no medical treatment and died about an hour later.
<i>Serious non-fatal stings</i>			
10	Okinawa Island	August 1988 Boy, 2	Lost consciousness and rapidly stopped breathing. Resuscitated but cyanosed on arrival at hospital. Developed haematuria and skin blistering.
11	Okinawa Island	August 1989 Girl, 7	Lost consciousness approximately 5min. after being stung. Spontaneous breathing returned after about 15 min of CPR.

Chirodropid specimens were seen that are currently identified - probably incorrectly (PJF 1995, personal observation; C Lewis 1996, personal communication) as *Chiropsalmus quadrigatus* (Shokita 1986; Kohama 1995). Their distribution extends to the Amami Islands in the north (latitude 28°).

A fatal human envenomation occurred in 1961 when a 14-year-old boy was stung on both upper thighs at Shirahama, Okinawa (2° north of the Tropic of Cancer). He received no medical treatment and died about an hour later (Fenner & Williamson 1996). Although the jellyfish was not identified at the time, the subsequent confirmation of the presence of the above chirodropid in the area, and the clinical course of the envenomation, suggests chirodropid envenomation as the cause of death.

Investigation suggested that up to 200 chirodropid stings may occur each year in Okinawa from June to September (the Northern Hemisphere summer). Children under the age of 9 years are the usual victims (a similar observation to within Australia) with some stings being life-threatening (see Table 3 above). It is usually safe to swim in the sea from July to August (northern Hemisphere summer); chirodropids have not been reported between the months April to October.

Dr Y Araki in Okinawa (1995, personal communication) discovered small *Chiropsalmus* in the local mangroves. However there are very few mangroves on the Island. The rivers are very short and steep, and the oxygen content in some, due to pollution, is very low. *Chiropsalmus* could possibly breed there, although Dr Araki felt their life cycle was not based around mangroves (1995, personal communication), although having been established for other chirodropids (Guest 1959; Hartwick 1987).

A number of beaches were visited, some of which had 'stinger-resistant' nets. After a delegation from Okinawa had visited the author in Mackay two years prior, the delegation were shown the Australian 'stinger-resistant' nets, and using the same principle similar ones had been erected on certain beaches in Okinawa. A typical one of these beaches was Sunset Beach, next to the US Navy Base. This is an artificial beach created within the fringing reef specifically for the local US Base, as there had been many stings from *Chiropsalmus quadrigatus* prior to the net being sited. There were no signs warning people to swim inside the net because of jellyfish, and it seemed that many people (over 20) were stung outside the net as they waded through the coral reef just outside the net. This scenario is totally opposite to Australia where chirodropids actively keep away from coral reefs

(Williamson *et al* 1996), although they have been reported over rocks (Fenner *et al* 1995).

There were two breakwaters with the net stretched between. It had a mesh of about 20mm and hung down from a solid pontoon filled with many (polystyrene) blocks. The net was anchored every 20 metres with ropes attached to two sandbags buried deep in the sand and steel ropes were threaded through the bottom of the net to hold it down. The net constructor stated that all the nets were constructed this way, and that they had had no one stung inside the nets. It seemed there was little wave damage to the nets as with the reef just offshore there was little or no wave action. The only time the wind caused problems was during a typhoon, when the net was removed - however, in 1994 they had 34 typhoons in the three-month summer season! - usually they get just two or three. Nets are rarely removed for cleaning as there seems to be little water moving past, and seaweed or other flotsam does not seem to get caught. They are removed for cleaning just once during the season of 6 months. Although the box jellyfish season seemingly only lasted a month further north, it was a little longer in this area, but the nets were left in to keep out, according to the net manufacturer, "seaweed and stonefish etc".

5.3.3 Singapore

In 1927, just 3 miles (5.5k) from Singapore, Searle had caught two chirodropids which he identified as *Chiropsalmus quadrigatus* (Searle 1957). As the whole region is equatorial there must have been many mangroves round at that time. As mangroves are the known habitat for at least one chirodropid, *Chironex fleckeri* (Hartwick 1987) it seems logical that they should be in that area. However, as far as members of the International Consortium of Jellyfish Stings are aware, there have been no severe stings reported from Singapore, and certainly no deaths.

In 1987 the author undertook a trip with Dr Robert Hartwick, from the James Cook University, Townsville, Queensland to Singapore and the Philippines to explore the current jellyfish problem. In this trip it was confirmed that much of the original coastline vegetation had been destroyed and the edge of the sea altered by reclamation work. There were a number of fairly large beaches and these are well used by the locals at the weekends and large numbers of people swim. In Singapore all unusual deaths go the Government pathologist, hospitals keep accurate records and certificates are issued for all deaths and it seems highly unlikely that a severe

sting from a jellyfish would go unnoticed, particularly if it caused death. It is therefore presumed to be unlikely that there is a jellyfish problem in Singapore.

5.3.4 Philippines

Cleland and Southcott (1965) had reported several deaths from the Philippines, particularly in the Lingayen Gulf. The author and Dr R Hartwick went to Bolineo, in the Bay of Sual, Lingayen Gulf, Philippines. A boat was hired early one morning to “spot” for jellyfish (see 5.1.1.1).

The technique worked well and some chirodropids were seen in waist deep water, 50m from shore. Specimens were caught from the boat using a fine net (to try to prevent damage to the tentacles). Wearing lycra protective clothing, using Barnes original technique, the author entered the water and herded specimens into a large bucket. This technique is sometimes difficult because, unlike most people believe, chirodropids will retract their tentacles and swim away from people trying to catch them! Because they have sensory organs containing rudimentary eyes able to distinguish light from dark, they will retreat from anything causing a shadow that may be a predator. Using the same sensory organ, they can distinguish vibration, such as a predator moving through the water towards them. However, it is the best method to catch specimens as the tentacles are less likely to be damaged; care has to be taken not to get stung by tentacles which sometimes stick to the sides of the bucket, breaking off. Only 30 metres from where were catching them four naked children splashed around happily in the shallow water in front of their homes!

Twelve specimens were caught. The bell diameters, measuring between the inter-radial diameters as accurately as possible with just a plastic ruler, were: -117mm, 53mm (with 8 tentacles per pedalum), 43mm (7 tentacles), 52mm (8 tentacles), 100mm(8 tentacles), 118mm (8 tentacles), 113mm (two pedalia with 8 tentacles, one with 10 and the other damaged), 95mm (8 & 9 tentacles per pedalum), 90mm (8 tentacles), 63mm(7 tentacles). They were provisionally identified as *Chiropsalmus quadrigatus*.

The next day the author interviewed a local Doctor, Dr. GP, a graduate of the U.P. School of Medicine who was treating has cases expertly despite never having never been taught, nor read on the treatment of jellyfish stings. His was the experience of many years treating many cases: -

"We have many stings and approximately 10% die, usually occur within hours of the sting. The victim usually is in severe pain, sweats profusely, has trouble breathing and is usually very weak. If tentacles are seen, vinegar is used as it dissolves them. This has been used for as long as I can remember in this area and people often take it to the beach. They are then given IM 'antistine' or 'benadryl', a sedative and an analgesic (? what - morphine and pethidine have been unavailable since 1972). For breathing tiredness, 250mg of IM caffeine is used. Many cases get infected and need treatment with oral penicillin, tetracycline or chloramphenicol, together with oral `decadron' and phenergan 25mg 4 hourly.

There have been three local deaths in the last 10 years. The first a 35-year-old fisherman, thin but fit, found floating face down next to his Banka, his back covered with jellyfish tentacles. The second, a 10-year-old girl stung in Bolineo harbour 5 years ago. She walked back to the shore screaming and then collapsed on the beach and went a dark colour and died (? respiratory failure). She only had a few tentacle marks on the front of her stomach. The third was two years prior, when a 7-year-old boy was stung on the stomach and died two hours later; none of these people saw a doctor.

This year there have been many stings, but no deaths. Two fishermen who were stung early this year caught the jellyfish, cut off the tentacle, soaked it in vinegar and then ate it! They say it tasted 'soapy' but good."

Table 4 - Fatal and serious chirodroid stings in the Philippines

<i>Fatal stings</i> (None of these people saw a doctor)				
12	Bolineo		Man, 35	Found floating face-down with tentacles from a jellyfish covering his back.
13	Bolineo harbour	1982	Girl, 10	Collapsed on the beach and died. Few tentacle marks on stomach.
14	Bolineo	1985	Boy, 7	Stung on the stomach and died 2 h later.

Information provided by a local doctor in Bolineo, who wished to remain unnamed.

The author interviewed many fishermen from villages around the Bay of Sual. Calculating and comparing the number of villages in the area, compared to those around the Philippines in susceptible chirodroid areas, a rough conclusion was reached that at least 20-50 human fatalities could occur in the Philippines each year. Dr Paul Cornelius D.Sc., of the British Museum of Natural History calculated this same figure after his visit to the Philippines in 1995 (1995, personal communication).

Dr Benjamin Canlas, the Chief Pathologist of the University of Manila Hospital was interviewed and explained that when someone dies in the Philippines they do not need a death certificate. They are simply buried by their family and no further details are required to the authorities. This probably accounts for why so little information seems to have been available in the past, despite it being a major medical problem.

5.3.5 Indonesia September 1993

In 1993 the author undertook extensive travels in Java, Bali and Lombok. No chirodropids were found. Using photographs of medusae and their stings many locals were questioned on if there was a jellyfish problem. Deaths and chirodropid occurrence are well known in other areas of Indonesia, including Kalimantan on the island previously known as Borneo (see 5.7.3 & Fenner and Williamson 1996).

Java

The only coastal roads are on the northern coastal regions of East Java. Java is the most heavily populated Island in Indonesia with a consequent great strain on its land that can be cultivated. In an area of the tropics where mangrove swamps should be found, very few were present. Most areas that had presumably been mangrove swamps had been cleared for cultivation (similar to Singapore) or made into fish and lobster farms. This mass destruction of the breeding grounds had presumably led to a vast reduction, if not total annihilation of the chirodropids from these areas.

In the rest of Java small, narrow, winding, pot-holed roads led to beaches that were a long way from the main routes. At the end of these tracks were villages, again which had cultivated land in both directions along the coast. Boats were chartered in these areas to explore further down the coast line but few mangroves, if any, were found in most places and this method of search was very time consuming, and not conducive to covering as much of the coastline as possible in the short time available. In retrospect probably the best approach would be to return to the areas of mangroves found (mainly around Cilacap, south Central Java) and conduct an intensive hunt at the end of the wet season when there may perhaps be more chance of netting large specimens.

Bali

North Bali and west Bali had sandy beaches and were well cultivated with little sign of mangrove swamps except in the north west corner. Netting and photos failed to

show signs of chirodropids in this area; the other areas had the usual crab and fish farms that had replaced the mangroves.

East Bali was volcanic and had no sign of cultivation by the beaches, and no sign of mangroves - possibly destroyed in the devastating 1963 eruption of the volcano, aptly named Gunung Abang.

South Bali looked more promising around Benoa Port, a large protected bay where there were many mangroves. Unfortunately, the tide went out a long way and all the area exposed at low tide was coral, and not mangrove mud. This would make the area more inhospitable to any chirodropids if they were there.

Questioning of the fishermen and lifesavers produced a no definitive result. Some local fishermen recognised the photos of chirodropids and said that they did occur - but in the winter months (July and August), and that they had only just gone. However, they also stated these jellyfish were blown up from Australia (an incorrect assumption) by easterly winds (wrong direction) and that they did not like warm seawater (opposite to normal for chirodropids). Although the information sounded promising at first, it seems unlikely that they were actually discussing chirodropids. However, they have scars from jellyfish stings, but they were not more than a month or two old. They also stated that after the stings people often had to visit the 'dokter' as they were 'sick' (? nauseated -? in pain). They did not get any chest pain or back pain on questioning. Finally, it appeared that the water was too cold (below 28°C) (Barnes stated the water temperature should be about 28 degrees Celsius [Kinsey 1988]), and so the information was not thought to be positive.

Lombok:

Driving around failed to show any sign whatsoever of mangroves, no fishermen showed any sign whatsoever of recognition of the photos and netting the waters proved negative.

Conclusions

As it was the end of the dry and the beginning of the wet, it is possible that the visit was at the wrong time and so failed to detect chirodropids that were actually present. However, because of the close proximity to the Equator to the north, and because it was further north than Darwin which has chirodropids almost every month of the year was, this is doubted. Also no Javanese questioned had any idea

about chirodropids, severe jellyfish stings or even deaths, also casting the idea into doubt.

Recent information from Cnidaria-net include other Islands in the Indonesian group including Kalimantan, where chirodropids have been confirmed, and deaths documented by the author (see above).

5.3.6 Malaysia 1989

In 1989 the author visited Penang and toured round the Island trying to gather information on jellyfish stings. Although one fatality has previously been reported (Cleland and Southcott 1965), and serious envenomations continue to occur (Filling Katz 1984; Williamson *et al* 1988; Peel & Kandler 1990; Burnett *et al* 1994), no evidence was found of chirodropids, nor other severe stings that people questioned on the subject could recall

Driving down the west coast of Malaysia, local residents were again questioned on the occurrence of jellyfish, particularly chirodropids, by showing them photographs to try to gain more information. This was unsuccessful until reaching Kukup, a small fishing village in south west Malaysia, where "jellyfishermen" (Fenner in Williamson *et al* 1996, p.296) regularly trawled the Straits of Malacca specifically to catch jellyfish. These were then dehydrated under compression by packing them in large jars with aluminium and magnesium sulphate between layers, before being sold to Japan as food for human consumption.

When questioned these fishermen readily recognised photographs of chirodropids and their stings as they occasionally caught them, reporting painful stings, although nothing more serious. Their "ancient Chinese remedy" to put on such stings proved to be vinegar, later found to be effective on Australian chirodropid (*Chironex fleckeri*) stings (Hartwick *et al* 1980]).

5.3.7 Sri Lanka September 1995

In September 1995 Dr Malik Fernando was visited in Sri Lanka. The previous year he had caught some chirodropids whilst Scuba diving and had preserved them in formalin saline. Examination of these specimens showed they were different to

anything before seen by the author, although they matched the description in Kramp (1961) for *Chiropsalmus buitendijki* (see taxonomy above). Fortunately, in the local Colombo Museum, the original description by Menon (1930) was found, and confirmation made on the identity of the specimens as being the same as Menon's *Chiropsalmus buitendijki*. Recent work by Southcott (1967) suggested that, because of the linear arrangement of the tentacles arising from the pedalia, it should be placed in new genus. Consequently he renamed this jellyfish *Chiropsoides buitendijki*, a nomenclature that will be followed here.

Although specimens of this chirodroid have now been caught and described in Sri Lanka, extensive questioning of the members of the Sri Lankan Surf Life Saving Association who patrol the beaches around Colombo, failed to uncover any major jellyfish stings that they have ever treated.

Large numbers of *Chiropsalmus (Chiropsoides) buitendijki* were described in south Indian waters where they cause great problems by blocking the huge water intakes for the power stations, despite the fact they have elaborate nets and grills in place (Rajagopal *et al* 1989). This is a problem that is faced worldwide and one that Japan is continually facing (Dr Y Araki, 1993, personal communication). Despite their relative abundance in South India, no records of any human stinging could be obtained. Severe unidentified stings have been described from that area, although serology obtained from the victim suggested it to be a *Physalia spp.* (Williamson *et al* 1988). The original type-species of *Chiropsoides buitendijke* had been described off Java (Horst 1907) but again, no stings had been described, nor proof of species being caught in Indonesia, nor of evidence of human stings, were discovered on the earlier trip to this part of western Indonesia (see 'Borneo' above).