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Correspondence

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Jellyfish responsible for Irukandji syndrome

Sir,

I enjoyed the recent letter from Little, Pereira, Carette and Seymour.[1] In a field where so little is known, all contributions help expand our knowledge base. However, of the five species presented, four have been previously linked to Irukandji syndrome,[2–5] and the fifth may be an erroneous attribution.

Alatina mordens was previously linked with Irukandji syndrome in its original description,[2] which included variation in the number of eyes. Multiple species may someday be distinguished on the basis of their eye number as the authors have suggested, but this has not been demonstrated taxonomically.

Malo maxima was also previously linked with Irukandji syndrome in its original description,[3] based on numerous eye-witness accounts of sting events identifying this as the culprit species. The genus name was derived from a person who survived a severe sting, believed to be from this species.

'*Carybdea alata*' from Hawaii was previously linked with Irukandji syndrome by Yoshimoto and Yanagihara,[4] although they lacked empirical evidence for positive confirmation. The Hawaiian species is now formally known as *Alatina moseri*, being originally named *Carybdea moseri*[5] and then transferred to the genus *Alatina*.[2]

'Fire jellies', also commonly called 'Morbakka', were previously linked with mild Irukandji syndrome by Fenner *et al*.[6] and Williamson *et al*.[7] The more severe case presented by Little *et al*.[1] is certainly valuable documentation, but is not the first report of Irukandji syndrome from Morbakka.

The attribution of the stinging in Palm Cove to *Carybdea xaymacana*, on the basis that it was collected in nets there, appears uncertain. It is so normal for *Carukia barnesi* to swarm at Palm Cove in December[8–10] that to attribute an Irukandji sting to another species would require strong evidence. As *C. barnesi* is about a third to a quarter the body size of *C. xaymacana*, it seems unlikely that it would have been trapped in the large-mesh nets used to collect *C. xaymacana*, if it was the culprit in this case.

On the other hand, there is growing circumstantial evidence that *C. xaymacana* and its relative *C. rastonii* may cause Irukandji syndrome. Several unexplainable cases of the syndrome have occurred: one near Rottnest Island (M. Corkeron, personal communication) and another nearby at a Perth beach (P. Fenner, personal communication), where *C. xaymacana* is common but other cubozoans have not been found; one near Queenscliff in Victoria,[11] where *C. rastonii* is common but other cubozoans have not been found; and one at Magnetic Island off Townsville, Queensland, followed by capture of only *C. rastonii* despite intensive sampling for Irukandjis or Irukandji indicators (Gershwin, unpublished data).

Little *et al*. state that 'published studies have often assumed that if a cubozoan jellyfish is found in a region, it is responsible for the envenoming syndrome, but with little data to support such assumptions', but it is unclear that this description is accurate and fair, or that their identifications are more reliable than those previously published. The published identifications of *Alatina mordens* and *Malo maxima* as causing Irukandji syndrome,[2,3] and similar identifications by Fenner *et al*.[6] and Williamson *et al*.[7] for Morbakka, were all based on eye-witness identification of species, or on specimen captures at the time of stings, similar to the evidence provided by Little *et al*. It remains possible that one sting is noticed, but another unnoticed sting is the one causing the syndrome, as when snake-bite victims bring in a harmless snake that they believe is the one that envenomed them. Only controlled sting experiments will

ultimately prove which species give which types of stings.

L. Gershwin
School of Marine Biology and Aquaculture
James Cook University
Townsville
Australia
email: lgershwin@lifesaving.com.au

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Jellyfish responsible for Irukandji syndrome

Sir,

A recent letter from Little *et al.*[1] makes several doubtful claims to be the first to describe the Irukandji syndrome in several species of cubozoans that have been described previously.

The 'fire jelly' they mention is more commonly known as the 'Morbakka' in Australia.[2] I first described Irukandji-syndrome-type symptoms from this jellyfish in 1985,[3] although these were far less intense than the classic Irukandji syndrome typically associated with *Carukia barnesi*. These symptoms occurred in approximately 10% of stings, as well as the sting itself causing quite intense skin burning and a fiery rash (hence 'fire jelly').

The usual or classical symptoms of Irukandji (*Carukia barnesi*) envenomation cause severe low back pain, progressing to cramping in the arms and legs, nausea, vomiting, headache, anxiety, restlessness and 'a feeling of impending doom'. They are brutal, but not life-threatening.[4] In contrast, 'Irukandji-like syndrome' has since been used to refer to those stings that are less severe than those typically associated with the classic Irukandji syndrome.

I first used the term 'Irukandji-like syndrome' to describe these milder systemic symptoms in Williamson *et al.*,[5] describing it as occurring in Morbakka, as well as several various species of jellyfish world-wide. Other Irukandji-like syndrome cases were then described by Cheng *et al*. in 1999,[6] and Yoshimoto and Yanagihara in 2002[7] after envenomation by the Hawaiian box jellyfish, known as at that time as *Carybdea alata*, although recently renamed *Alatina moseri*.[8] At the time Gershwin reported that the Irukandji, or Irukandji-like syndrome had been caused by *Alatina moseri*,[8] and later that it had been caused by *Alatina mordens* and *Malo maxima*,[9] now claimed again by the present authors.

However, it is interesting that the authors link Morbakka with a more severe case of Irukandji syndrome. I would be interested to know the evidence that this species was responsible (e.g. what did the recovered nematocysts look like?). As Irukandji stings can go unnoticed until the onset of symptoms some 30 min or so later, the specimen captured may not necessarily be the one that caused this more severe syndrome. This single event is discordant with numerous previous cases from the Queensland and New South Wales coastline,[5] and other records collected and held by the author (1984–2002).

If life-threatening Irukandji syndrome is indeed caused by Morbakka, this would have serious implications for beaches throughout Queensland and New South Wales, where Morbakka may be relatively common, and is traditionally described and accepted as mild. Severe Irukandji syndrome may include severe local skin pain with rapid development of even more the usual severe systemic symptoms, and often cause life-threatening hypertension[10] and occasionally, acute and critical heart failure.[11] Severe hypertension caused the

demise of two patients in 2002 after intra-cranial haemorrhage.[12]

P.J. Fenner
James Cook University
School of Public Health
Tropical Medicine and Rehabilitation Sciences
Queensland
Australia
email: pjf@occupationalhealthmackay.com.au

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Response

Sir,
On behalf of the authors I am delighted in Drs Gershwin and Fenner's interest in our letter.

Dr Gershwin's work has importantly taxonomically defined a number of cubozoan jellyfish. In our table we inadvertedly misreferenced one of her papers; we should have referred to her Memoirs of Queensland Museum 2005 paper,[1] not her Zootaxa 2005 paper,[2] and we apologize for this oversight.

Our letter is the first report where the jellyfish stinging the patient that subsequently developed Irukandji syndrome were captured at the time of the sting and identified. Other than Barnes's original report, this has not been documented elsewhere.[3] The evidence that Gershwin cites for *Alatina mordens*, *Malo maxima*, *Carybdea alata* and 'fire jellies' is based on jellyfish being seen or caught in the vicinity of the patient being stung (not invariably at the same time). These jellyfish often have a bell size of approximately 30–40 mm, and after reading Gershwin's detailed taxonomical reports,[1,2] it seems doubtful that an eye-witness could accurately identify what sort of cubozoan he was seeing in the water.

In the case of *Malo maxima*, named after a patient that our toxicology service managed through his ICU and hospital stay, this cubozoan was captured on a pearling boat 3 months after and some kilometres from the beach the patient was stung,[2] and the symptoms reported in our letter are significantly different to those of the patient this jellyfish is named after.

I sense that Gershwin may agree with our claim that *Carybdea xaymacana* causes Irukandji syndrome, although there are many jellyfish in the Perth waters, and the evidence she cites is circumstantial. The cubozoans we report were captured within metres and around the patients being stung, at the time they were being stung. It was our opinion that the patients were swimming in a swarm of *C. xaymacana*. The nets used have successfully captured many *Carukia barnesi*.

Well before the publication of Dr Fenner's excellent textbook,[4] Barnes originally described a milder version of Irukandji syndrome, that he named 'pseudo-Irukandji syndrome'.[5] In Dr Fenner's report of Morbakka causing Irukandji syndrome, a 12-year-old girl was stung on her shoulder by a long tentacle that slid into the water.[6] Her father saw a jellyfish in the water and identified it as Morbakka from photographs of this jellyfish. The child developed mild back pain that settled with paracetamol and antihistamine. Fenner and his colleagues subsequently described how they placed a tentacle from Morbakka on the arm of one of them, and the subject did not develop Irukandji syndrome, only symptoms around the

welt. Again, this is not conclusive evidence of causation.

In our 'fire jelly' case, the nematocysts recovered from our patient's skin were identical to those from the cubozoan captured by the patient at the time of her sting. These nematocysts (and the cubozoan captured) are different from the Morbakka described by Fenner *et al*.[6]

Anyone involved in the regular management of envenomed patients in Australia will be aware of the distress that the Australian public and medical profession experienced with the white-tailed spider and its presumed association with necrotic ulcers. For this reason, accurate identification of envenoming creatures is essential.

Some of these cubozoans have previously been suspected of causing Irukandji syndrome, but much of the evidence has been circumstantial. We believe we have presented good evidence identifying five cubozoans that cause Irukandji syndrome. We know there is much that is unknown about Irukandji syndrome, however with collaborative work and sharing of expertise between scientists and clinicians we will slowly come to understand more of this condition.

M. Little
Department of Emergency Medicine
Sir Charles Gairdner Hospital
Nedlands
Australia
email: angimark@iinet.net.au

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