

Fire ants in Australia: a new medical and ecological hazard

This ant has the potential to be one of Australia's biggest ecological disasters

"of insects ... only the ants were troublesome ... one green as a leaf and living upon trees where he built his nest ... by bending the leaves together and glueing them ... their stings were by some esteemd not much less painfull than those of a bee..."

Joseph Banks, August 1770¹

INDIGENOUS AUSTRALIANS co-existed with native ants for thousands of years, using them as food (honey ants) and in medicinal decoctions (green tree ants).² It was the green tree ant (*Oecophylla* spp.) that first attacked the white invaders from the *Endeavour*, and a number of native ant species, in particular the jumper or hopper ant (*Myrmecia pilosula*), still cause significant morbidity.

But a foreign ant has now assumed the role of invader. In this issue of the Journal, Solley et al³ (page 521) describe the first Australian patient with anaphylaxis caused by the venom of the Red Imported Fire Ant (RIFA), *Solenopsis invicta*, and outline the appropriate diagnostic and management strategies, including successful desensitisation. Where did the RIFAs come from? Why are they a threat to our economy as well as our health? Can they be eradicated?

February 22, 2001, was a dark day for Australia with the identification of *S. invicta* at two sites across Brisbane. This ant has the potential to be one of Australia's biggest ecological disasters, with the ability to have an impact on the economy, the environment and society.

The ant itself appears innocuous. It is a small (2–6 mm), reddish-brown ant that is hard to distinguish from many other common ants. Its behaviour sets it apart as one of the world's great invaders. The ants will literally boil out of the nest ready to attack in huge numbers. The sting is painful, which accounts for the name "fire ant". Multiple stings are the rule rather than the exception and can be excruciating. The nest is dome-shaped and the colonies consist of up to half a million ants. *S. invicta* originated in South America, spread to Alabama in the 1930s and now infests 12 US States.

Fire ants are thought to have entered Australia via shipping containers. There are two RIFA epicentres, one on the east of Brisbane around the port area, the other in Brisbane's western suburbs and part of Ipswich. The eastern infestation has been identified by DNA testing and chemical analysis of its venom as being from the United States or northern South America. The western infestation may have originated from Argentina (Dr Robert K Vander Meer, Research Chemist, United States Department of Agriculture/University of Florida, Center for Medical, Agricultural, and Veterinary Entomology, unpublished data, personal communication). Despite this multiple encroachment, the pest seems confined to Brisbane. Ecological modelling shows that the ants are capable of surviving in most parts of Australia, while spread modelling suggests that, if uncontrolled, the ants could spread up to 2 million square kilometres (ie, about a quarter of the area of Australia) over the next 30 years.⁴

A study of the environmental impact of fire ants⁵ shows that areas infested with the ant have fewer native ant species, lower total biodiversity and an absence of scincoid lizards. The ants can decimate ground-nesting birds, turtles and frogs, and can damage farm, irrigation and electrical equipment.⁶ The Australian Bureau of Agriculture and Resource Economics⁷ estimates that the cost of fire ants over 30 years, if uncontrolled, would be \$8.9 billion. Australia's response to this invader is a \$123 million, five-year National Fire Ant Eradication Program funded by the Commonwealth and the State governments.

What about the medical aspects? It is appropriate to compare the RIFA with our most dangerous native ant, the jumper ant:

- Jumper ants are distributed throughout Australia; RIFAs have only been identified in the Brisbane area.

- Both jumper ants and RIFAs grasp the skin with the mandibles and sting repeatedly using a retractile stinger on the end of the abdomen.

- Stings from jumper ants usually cause a local weal-and-flare, while RIFA stings, because of the high alkaloid content of their venom, invariably result in sterile pustules. These pustules should not be broken.

- Venom proteins from both ants can result in immediate sensitivity. Two proteins have been cloned and sequenced from jumper ants (Myr p 1–2) and four from RIFAs (Sol i 1–4). There is no cross-reactivity between the main proteins of the two ants.

- Both jumper ants and RIFAs can cause large local allergic reactions that may need to be treated with oral corticosteroids.

- Up to 3% of Australians describe systemic allergic reactions to jumper ant stings,⁸ with most allergic sting reactions reported from Tasmania, Victoria and South Australia. In comparison, 30%–60% of people living in areas infested by RIFAs in the United States are stung, with 0.6%–16% of those stung developing anaphylaxis.⁶ Patients with anaphylaxis should be referred to an allergist/immunologist, and must carry self-injectable adrenalin. The best device, although expensive and still not subsidised by the Pharmaceutical Benefits Scheme, is the EpiPen Autoinjector (CSL, Melbourne).

- There is no commercial extract for desensitising patients with anaphylaxis to jumper ant venom. A clinical trial of a jumper ant extract has just been completed in Tasmania (Dr Simon G A Brown, Director, Department of Emergency Medicine, Royal Hobart Hospital, personal communication), but commercial production will not occur without financial help from government or private sector sources. At least three commercial desensitising extracts for RIFA venom are available from the United States.

- Deaths from anaphylaxis to jumper ant stings⁹ and RIFA stings⁶ have been documented.

Perhaps, with luck and hard work and lots of money, we might eradicate RIFAs from Australia, but no State in the United States has been successful in such a program once the ant has invaded. In some parts of the southeastern United States, stings by fire ants are the commonest cause of anaphylaxis. Let's hope that that is not the case in Australia in 2030. The cost to our health and ecology would be enormous.

Interested readers may wish to refer to two excellent web sites: <<http://www.dpi.qld.gov.au/fireants/>> (Queensland) and <<http://fireant.tamu.edu/>> (Texas).

Keith I McCubbin

Director, Fire Ant Control Centre
Queensland Department of Primary Industries, Brisbane, QLD

John M Weiner

Visiting Allergist
Department of Respiratory Medicine
St Vincent's Hospital, Fitzroy, VIC
jmweiner@allergynet.com.au

1. Banks, Joseph. The Endeavour Journal of Joseph Banks. August, 1770 <http://www.slnsw.gov.au/Banks/series_03/03_view.htm> (accessed February 2002).
2. Aboriginal Communities of the Northern Territory of Australia. Traditional bush medicines: an Aboriginal pharmacopoeia. Darwin: Northern Territory Government, 1990.
3. Solley GO, Vanderwoude C, Knight GK. Anaphylaxis due to Red Imported Fire Ant sting. *Med J Aust* 2002; 176: 518-519.
4. Vanderwoude C, Scanlan JC, Sutherst RW. The likely range and uncontrolled rate of spread of Red Imported Fire Ants in Australia. Proceedings of the National Fire Ant Conference, University of Georgia, Athens; 24-26 March 2002. In press.
5. Nattrass R, Vanderwoude C. A preliminary investigation of the ecological effects of Red Imported Fire Ants (*Solenopsis invicta*) in Brisbane. *Ecological Management and Restoration* 2001; 2: 521-523.
6. Kemp SF, deShazo RD, Moffitt JE, et al. Expanding habitat of the imported fire ant (*Solenopsis invicta*): a public health concern. *J Allergy Clin Immunol* 2000; 105: 683-691.
7. Kompas T, Che N. An economic assessment of the potential costs of Red Imported Fire Ants in Australia. Report for Department of Primary Industries, Queensland, Canberra, August 2001. Canberra: Australian Bureau of Agriculture and Resource Economics, 2001.
8. Douglass R, Weiner J, Abramson M, O'Hehir R. Prevalence of severe ant venom allergy in southeastern Australia. *J Allergy Clin Immunol* 1998; 101: 129-131.
9. Brown SGA, Wu Q-X, Kelsall GRH, et al. Fatal anaphylaxis following jack jumper ant sting in southern Tasmania. *Med J Aust* 2001; 175: 644-647. □



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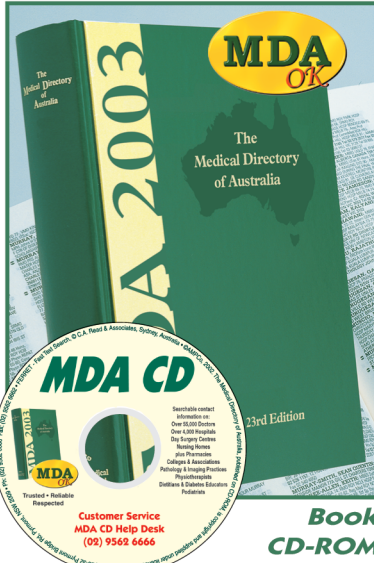
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