



# Imported rickettsial infections

Australia has a full range of endemic rickettsial infections, with the possible exception of Ehrlichiosis (Table 1). Hence a patient with a rickettsial disease is most likely to have been infected in Australia, not elsewhere.

Nevertheless, overseas travellers may return to Australia with an 'exotic' rickettsial disease (see case history). The greatest difficulty for the practising doctor is to think of rickettsial diseases in the differential diagnosis of illness in a returned traveller (malaria and typhoid fever are more likely) and attempting a satisfactory laboratory confirmation of a rickettsial disease (Table 2).

A 'recent' rickettsial import into Australia (probably within the last 10,000 years) is *Rickettsia honei*, the causative bacterium of Flinders Island Spotted Fever. This rickettsia came from south-east Asia originally. Human cases now occur in Tasmania (Flinders Island and Schuten Island). It is very unlike the endemic Spotted Fever Group rickettsia of the Australian mainland, *R. australis* (causing Queensland Tick Typhus). How *R. honei* got to Tasmania is not known, but hitching a ride in an ectoparasite of a migrating bird is the most likely possibility (Figures 1-4).

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### A case history A returned traveller with a rickettsial infection ('Indian tick typhus')

An Australian citizen (who originally migrated from India in 1992) had returned from a holiday to the Punjab region of India. On the return flight he developed fever and, 2 days later, a maculopapular rash. Examination by his doctor revealed an eschar between his second and third right toes (the site where the patient had earlier removed a tick). Over the next few days he got progressively worse with fever, rigours, myalgia, headache and fatigue. He was admitted to hospital where several

Table 2.

### Diagnosis of rickettsial diseases

#### Serology

- Microimmunofluorescence (gold standard)
- Enzyme immuno assay  
 Serum required by laboratory, preferably two specimens, 7-14 days apart, to detecting changing antibody titres or seroconversion.

#### DNA detection by PCR

- Citrate synthase gene detection for spotted fever group and typhus group rickettsial infections
- 56 kDa surface antigen gene detection for scrub typhus group rickettsial infection
- Blood in EDTA required by laboratory

#### Culture

- Growth in tissue culture (VERO or L929 cells)
- Blood in EDTA (taken aseptically) during the acute illness (rickettsaemic phase) and before antibiotic treatment started, is required by the laboratory.

Table 1.

### Classification of Australian rickettsial diseases

#### *Rickettsiae (Typhus Group)*

*Rickettsia prowazekii* (epidemic typhus)

- Transmitted by human body louse
- Not seen in Australia since the gold rush and convict times. Relapsing epidemic typhus (Brill's disease) is a rarely seen imported disease in migrants from endemic countries.

*R. typhi* (murine typhus)

- Transmitted by fleas of rats and mice
- Cases in WA, QLD and SA, but may occur throughout Australia.

#### *Rickettsiae (Spotted Fever Group)*

*R. australis* (Queensland tick typhus)

- Transmitted by *Ixodes sp* ticks
- Cases in Qld, NSW, Vic (east of the Great Dividing Range).

*R. honei* (Flinders Island Spotted Fever)

- Transmitted by *Aponomma hydrosauri* (reptile ticks)
- Cases on Flinders Island (Bass Strait) and Schuten Island (east coast of Tasmania).

*R. felis*

- Transmitted by cat fleas.
- Status in Australia – unknown.

#### *Rickettsiae (Scrub Typhus Group)*

*Orientia tsutsugamusbi*

- Transmitted by mite *Leptotrombidium deliense* in tropical northern Australia including Cape York (Qld), Kimberley region of WA and Top End of NT.

#### *Ehrlichiosis (human monocytic ehrlichiosis)*

*Ehrlichia chaffeensis*

- Transmitted by tick.
- Status in Australia – unknown.

#### *Anaplasmosis (human granulocytic ehrlichiosis)*

*Anaplasma phagocytophila*

- Transmitted by tick.
- Status in Australia – unknown.

#### *Coxiella burnetti (Q-Fever)*

- Widespread infection in Australia.
- Transmitted by aerosol (common) and tick bite (rare).



Figures 1-4. Endemic rickettsial diseases in Australia.

Figure 1. Scrub typhus (*Orientia tsutsugamushi*).

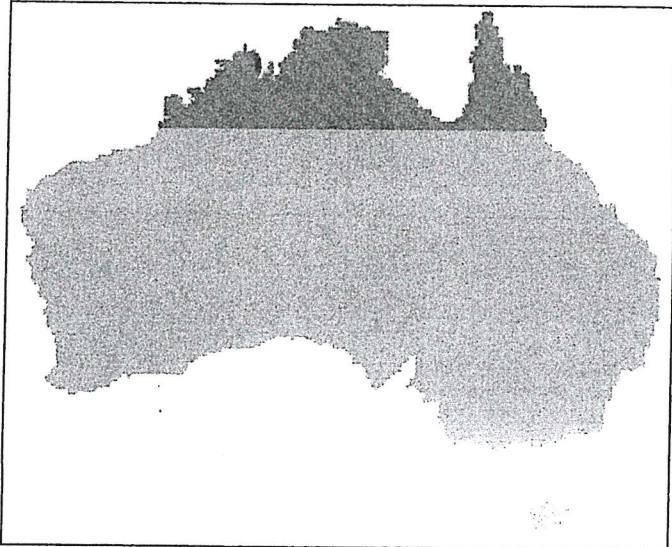


Figure 2. Spotted Fever Group. Queensland Tick Typhus (*Rickettsia australis*).

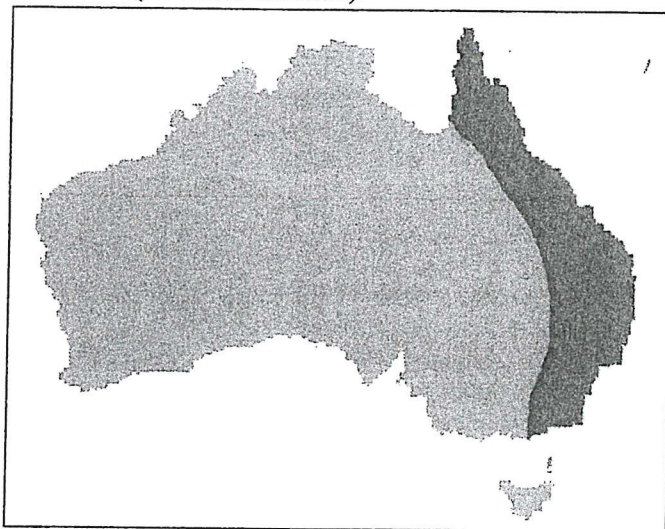


Figure 3. Spotted Fever Group. Flinders' Island Spotted Fever (*Rickettsia honei*).

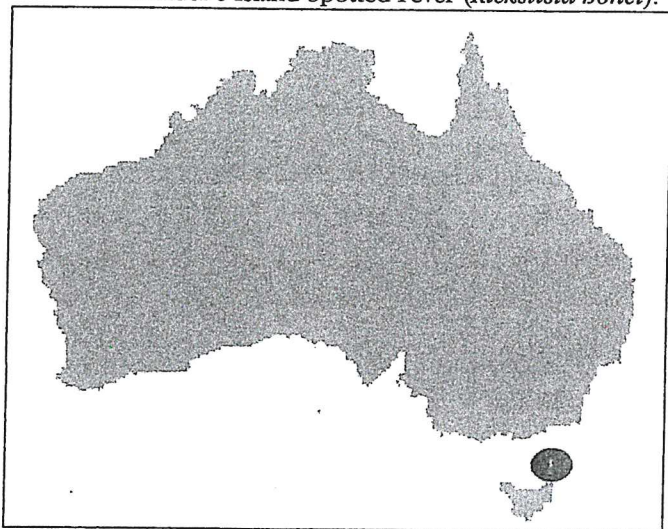
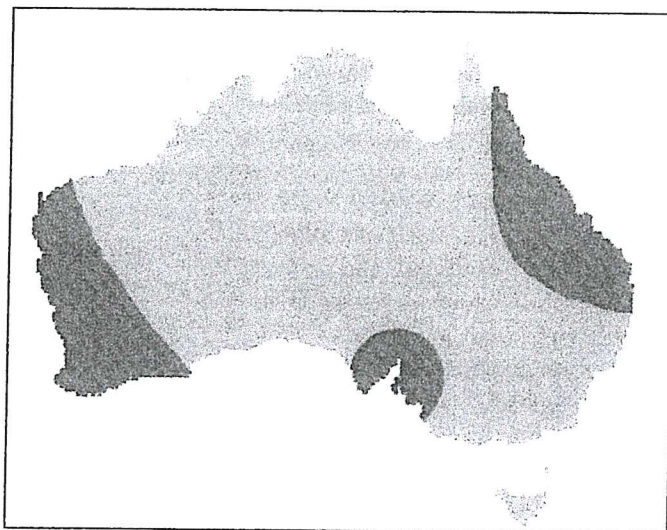


Figure 4. Murine Typhus (*Rickettsia typhi*).



investigations were undertaken, including serology, polymerase chain reaction (PCR) and blood culture for rickettsia. He was then treated with doxycycline and responded.

**Laboratory results**

**Rickettsial serology**

'Acute' serum: negative  
'Convalescent' serum (8 days later): positive

- R. conorii* } all  $\geq 1/1024$  titre
- R. rickettsii* }
- R. akari* }
- R. honei* }

This sero conversion result confirms the diagnosis of Spotted Fever Group rickettsial infection.

**PCR**

Positive for citrate synthase gene DNA of Spotted Fever Group/Typhus Group rickettsiae.

**Culture**

A rickettsia was grown in tissue culture from the patient's blood. A molecular analysis of the isolate was undertaken which confirmed it was a Spotted Fever Group rickettsia.

Based on 16SrRNA gene sequence comparisons, it was 99% similar to the 'Astrakhan fever' rickettsia. A further analysis of the rickettsial outer membrane protein A (rOMPA) gene showed homology with the 'Astrakhan fever' rickettsia and the 'Israeli tick typhus'

rickettsia. These are all local variants of *R. conorii* (the causative agent of Mediterranean Spotted Fever).

**Histochemistry of eschar biopsy**

Positive for Spotted Fever Group rickettsial vasculitis.

This returned traveller had a rickettsial infection of the Spotted Fever Group, an Indian variant of *R. conorii*, causing Indian Tick Typhus.

**Acknowledgements**

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