

Bartonella and Australian wildlife

Fact sheet

September 2023

Key points

- *Bartonella* are vector-borne bacteria that can cause disease in mammals and humans, with a growing number of *Bartonella* species recognised globally.
- *Bartonella henselae* is carried by cats and their fleas and can cause **cat scratch fever** and other serious diseases in humans, dogs, cats and other felids.
- Rodents and non-human primates are reservoirs for other *Bartonella* species found overseas, and these can cause disease in humans and other mammals.
- In Australia, several novel *Bartonella* species have been found in (or associated with), Australian wildlife species (rodents, antechinus, macropods, bandicoots and koalas), but little is known about these bacteria and there are no reports of associated disease.
- For information on **cat scratch fever** (caused by non-wildlife species of *Bartonella*), see www.cdc.gov/healthypets/diseases/cat-scratch.html and speak to a human health professional.

Aetiology

Bartonella is a genus of fastidious, Gram-negative, intracellular bacteria (Family *Bartonellaceae*).

One Health implications

Wildlife and the environment: little is known about the *Bartonella* found in Australian wildlife but they have not been shown to cause disease in their natural hosts and have not been found in accidental hosts to date.

Domestic animals: some species of *Bartonella* are carried by domestic species, notably the cat (*Felis catus*). Both the cat and dog can develop disease as a result of *Bartonella* infection. The species of *Bartonella* found in Australian wildlife are not known to cause disease in domestic animals.

Humans: the species of *Bartonella* found in Australian wildlife are not known to cause disease in humans. Other species of *Bartonella*, including those found in cats in Australia, can cause serious human disease ^[1].

World distribution, natural hosts and occurrences in Australia

Bartonella spp. occur throughout the world, with at least 36 species described, 17 of these associated with disease in either humans or animals. Globally, reservoir hosts for different species

of *Bartonella* include domestic cats, wild felids, dogs, macaques, humans, cattle, sheep, rabbits, deer, bats and a number of rodent species (see Breitschwerdt 2017 [1]).

Several novel *Bartonella* spp. have been identified in mammalian hosts in Australia and these bacterial species have only been found in Australia [2-4]. Table 1 lists the *Bartonella* spp. identified in Australian mammals. *Candidatus* species are proposed new species that have not met all the criteria for being accepted as a new species.

Table 1: *Bartonella* spp. identified in Australian native mammals¹

<i>Bartonella</i> species	Host	Vector	Geographic location	Reference
<i>B. australis</i>	Eastern grey kangaroo * (<i>Macropus giganteus</i>)	Not known	Coastal central Qld	Fournier et al. 2007 [3]
<i>B. coopersplainsensis</i>	<i>Uromys caudimaculatus</i> * <i>Rattus fuscipes</i> #	Not known	Qld	Gundi et al. 2009 [4]
		Flea (<i>Stephanocircus pectinipes</i>)	WA	Kaewmongkol et al. 2011 [5]
<i>B. queenslandensis</i>	<i>Melomys</i> spp.	Not known	Qld	Gundi et al. 2009 [4]
<i>B. rattaaustraliani</i>	<i>Rattus</i> spp. * <i>R. fuscipes</i> #	Not known	Qld	Gundi et al. 2009 [4]
		<i>Ixodes</i> ticks	WA	Kaewmongkol et al. 2011 [5]
<i>Candidatus</i> “ <i>B. antechini</i> ” sp. nov	Yellow-footed antechinus # (<i>Antechinus flavipes</i>)	Tick (<i>Ix. antechini</i>) and flea (<i>Acanthopsylla jordani</i>)	South-west WA	Kaewmongkol et al. 2011 [2]
<i>Candidatus</i> “ <i>B. bandicootii</i> ” sp. nov	Western barred (Shark Bay) bandicoot # (<i>Perameles bougainville</i>)	Flea (<i>Pygiopsylla tunneyi</i>)	Bernier and Dorre Islands, WA	Kaewmongkol et al. 2011 [5]
<i>Candidatus</i> “ <i>B. woyliei</i> ” sp. nov	Woylie # (<i>Bettongia penicillata</i>)	Flea (<i>P. hilli</i>) and tick (<i>Ix. australiensis</i>)	WA	Kaewmongkol et al. 2011 [5]
<i>Bartonella</i> sp. (potential new species)	Woylie #	Tick (<i>Ix. australiensis</i>)	WA	Kaewmongkol et al. 2011 [5]
<i>Bartonella</i> -like organisms	Koala # (<i>Phascolarctos cinereus</i>)	Tick (<i>Ix. tasmani</i>)	Vic	Vilcins et al. 2009 [6]

* detected in blood of host

detected in vector parasite collected from host

¹ Other species of *Bartonella* have been described in feral cats, red foxes and introduced rodent species. See Dybing et al. 2016 [7], Kaewmongkol et al. 2011 [8].

Epidemiology

Bartonella are highly adapted to a mammalian reservoir host species. In the reservoir host, infection usually causes a long-lasting bacteraemia (bacteria in the blood stream) and endotheliotropic infection (infection focused on the cells lining the blood and lymph vessels and other organs), but this infection is generally **not** associated with obvious disease ^[1].

If infection is transmitted to a non-reservoir (accidental) host species, disease can result, but this is not universal. Occasionally, disease develops as a result of infection in a natural reservoir host species.

The factors driving disease development in accidental (and reservoir) hosts are not well understood but are likely multifactorial and include differences in virulence among *Bartonella* species and strains, genetic differences in the host's immune function and the presence of other factors such as co-infection, immunosuppression, stress and other disease states in the host ^[1].

Transmission is generally by invertebrate blood-sucking vector such as fleas, lice, sandflies and probably ticks, although the method of transmission of many *Bartonella* spp. globally has not been confirmed ^[1]. At least some of the *Bartonella* spp. found in Australian wildlife may be carried by ticks and fleas (see Table 1). The ectoparasite species found to be infected with *Bartonella* spp. from marsupials are found only in Australia ^[5].

Little is known about the epidemiology of *Bartonella* found in Australian wildlife species ^[2, 5, 6]. It is likely that *Bartonella* species associated with Australian marsupials co-evolved with their hosts, as they appear to form a distinct phylogenetic cluster, whereas rodent-derived *Bartonella* in Australia appear to be more closely related to previously known *Bartonella* spp. ^[2]. The clustering of *Bartonella* species with their marsupial flea hosts also suggests co-evolution ^[9]. There is currently no evidence of disease associated with the presence of the *Bartonella* found in Australian mammals and no evidence of transmission to humans.

Clinical signs

There have been no signs of disease attributed to the presence of *Bartonella* spp. in Australian wildlife species.

In humans and animals experiencing disease as a result of *Bartonella* infection, a wide range of signs may be seen. Disease may fluctuate in severity, symptoms and signs. Fever, malaise, anaemia and skin lesions, as well as signs associated with lymph node, blood vessel, heart and kidney disease, can occur ^[10].

Diagnosis

Serology can be as an indicator of infection in humans and domestic pets, but results are often unreliable. PCR can be used to detect bacteria in the blood, but can be unreliable in diseased individuals. Blood smears or biopsy of lymph node, skin lesion or other tissue can be examined microscopically and via PCR.

Bartonella may be difficult to culture in the laboratory due to their fastidious nature ^[10].

Clinical pathology and pathology

There are often no consistent changes in clinical pathology, even when disease is present. Anaemia may occur in some, but not all, diseased individuals.

Disease caused by other species of *Bartonella* can result in a range of pathological changes in various tissues in the body, including granulomatous inflammation, vascular proliferation, lymphadenitis, vasculitis, glomerulonephritis and endocarditis ^[10].

No pathological changes have been reported in Australian native mammals infected with *Bartonella*, however very little investigation has occurred.

Treatment, prevention and control

In cases where disease is present, *Bartonella* is treated with antibiotics, however the potentially compromised immune status of the host should also be addressed ^[10]. Treatment for the species of *Bartonella* found in Australian wildlife is not warranted, as no disease has been associated with infection.

Prevention and control for disease-causing *Bartonella* species primarily relies on controlling the blood-sucking vector. For example, prevention of cat scratch fever relies on control of cat fleas, as well as reducing the risk of scratches from cats ^[10].

Research

More work is required to better understand the reservoir hosts, vectors, geographic distribution and prevalence of the *Bartonella* spp. found in Australian wildlife. While it is likely that these bacteria co-evolved with their mammalian hosts, a greater understanding of possibility of disease in both reservoir and accident hosts would help to inform disease risk management.

Surveillance and management

Wildlife Health Australia administers Australia's general wildlife health surveillance system, in partnership with government and non-government agencies. Wildlife health data is collected into a national database, the electronic Wildlife Health Information System (eWHIS). Information is reported by a variety of sources including government agencies, zoo based wildlife hospitals, sentinel veterinary clinics, universities, wildlife rehabilitators, and a range of other organisations and individuals. Targeted surveillance data is also collected by WHA. See the WHA website for more information <https://wildlifehealthaustralia.com.au/ProgramsProjects/eWHIS-WildlifeHealthInformationSystem.aspx>.

There is no targeted surveillance program for *B. australis*. *Bartonella* presence in native species would constitute an "interesting or unusual" case for inclusion in the national wildlife health surveillance database (www.wildlifehealthaustralia.com.au). We are interested in hearing from

anyone with information on this condition in Australia, including laboratory reports, historical datasets or survey results that could be added to the National Wildlife Health Information System. If you can help, please contact us at admin@wildlifehealthaustralia.com.au.

Acknowledgements

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Wildlife Health Australia recognises the Traditional Custodians of Country throughout Australia. We respectfully acknowledge Aboriginal and Torres Strait Islander peoples' continuing connection to land, sea, wildlife and community. We pay our respects to them and their cultures, and to their Elders past and present.

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References and other information

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