Nidoviral respiratory disease in Australian lizards

Fact Sheet

February 2026

Key points

- "Blue-tongue nidoviruses", also called "blue-tongue serpentovirus", including *Shingleback nidovirus-1* have been associated with respiratory disease in wild and captive shingleback lizards in Western Australia, as well as in other blue-tongued and pink-tongued skinks in other parts of Australia.
- "Blue-tongue nidoviruses" have not been experimentally confirmed as the cause of the disease, but it is very likely that, when associated with other risk factors such as stress, pre-existing bacterial and fungal infections, poor nutritional state and reproductive activity, they can cause disease in some lizards.
- These viruses appear highly contagious in captivity. Excellent husbandry and appropriate biosecurity management should be employed with sick reptiles in care.
- Most individuals respond well to supportive treatment but mortality rates without treatment may be high.

Introductory statement

A respiratory disease syndrome has been anecdotally reported in wild and captive shingleback lizards (*Tiliqua rugosa*) in Western Australia (WA) since the late 1990s. The disease was colloquially termed "bobtail flu", as well as "Upper Respiratory Tract Infection". Since the isolation of a virus (*Shingleback nidovirus-1*) associated with this disease, other nidoviruses have been detected and associated with this disease in blue-tongued (*Tiliqua* spp.) and pink-tongued skinks (*Cyclodomorphus gerrardii*). These viruses will be referred to in this Fact Sheet as "blue-tongue nidoviruses"[*]. A number of blue-tongue nidoviruses cluster within the single species known as *Shingleback nidovirus-1*. However, not all blue-tongue nidoviruses fall within this viral species.

Aetiology

A viral aetiology for the disease syndrome seen in shingleback lizards had been suspected for many years, due to the apparent contagious nature of the disease in captive environments, and lack of consistent evidence for a bacterial or fungal cause on cytology, culture and histopathological investigation.

---

[*] not to be confused with blue tongue virus, a reovirus that infects a number of livestock species, see www.woah.org/en/disease/bluetongue

Since 2015, studies and diagnostic laboratory services have consistently correlated clinical respiratory disease with the presence of blue-tongue nidoviruses in a range of *Tiliqua* lizard species.

A novel nidovirus (family *Tobaniviridae*, subfamily *Serpentovirinae,* genus *Pregotovirus*[†]*),* species *Shingleback nidovirus-1*, was identified by next generation molecular sequencing of samples collected from wild shingleback lizards with respiratory disease in WA. Although there was a significant association between the presence of the virus and the presence of respiratory signs, causation has not been proven experimentally, and it is not known if this virus is an obligate pathogen, or if (as has been commonly demonstrated with respiratory disease in reptiles) it forms one component of a multifactorial disease [1, 2].

Since this study, diagnostic testing has identified other blue-tongue nidoviruses in association with similar upper respiratory tract disease [3].

In Australia, different reptile nidoviruses have been associated with severe disease and mass mortality in endangered, wild Bellinger River snapping turtles (*Myuchelys georgesi*) in NSW [4]. Globally, reptile nidoviruses (associated with respiratory disease) have been reported in veiled chameleon lizards (*Chamaeleo calyptratus*) [5], and in captive pythons in Europe and North America [6-11].

One Health implications

Wildlife and the environment: further work is needed to understand the conservation implications of blue-tongue nidoviruses, and their possible impact on free-ranging Australian lizards, including those already threatened.

Domestic animals: there is no evidence that blue-tongue nidoviruses of reptiles may cause disease in domestic animals.

Humans: there are no known human health implications, and it is unlikely that the virus would be zoonotic. Cross-species transmission of nidoviruses in general from reptiles to humans has not been documented or suspected.

Natural hosts

The respiratory disease was initially primarily reported in wild and captive shingleback lizards. Further research and diagnostic testing of captive and wild skinks of the *Tiliqua* genus, as well as the pink-tongued skink, has provided evidence of a widespread distribution of this virus.

Blue-tongue nidoviruses have not been detected in other Australian reptiles. Limited screening of other reptiles, either housed with affected individuals, demonstrating clinical signs of respiratory disease, or 'apparently healthy', has failed to find evidence of this virus outside of the *Tiliqua* and *Cyclodomorphus* genera. However, without appropriate surveillance and robust sample sizes, it is unknown if other species are affected or may act as reservoirs in the wild. Given the finding in pink-

[†] Previously family *Coronaviridae*; subfamily *Torovirinae*

tongued skinks, it is biologically plausible that other species in the subfamily *Egerniinae* are susceptible.

World distribution

The disease has only been reported in Australia.

Occurrence in Australia

Members of the *Tiliqua* and *Cyclodomorphus* genera are found in the wild across most of Australia, however the disease has primarily been reported in the wild in shingleback lizards in WA, with first reports in the 1990s. It is not certain when the disease first emerged, although records in wildlife centres document an increase in admissions with corresponding clinical signs during the 1990s.

Testing has confirmed the presence of blue-tongue nidoviruses in captive and wild *Tiliqua* spp. and pink-tongued skinks, from all states and territories in Australia (with the exception of Tas, noting the limited testing in this region) [13].

There are numerous anecdotal reports (such as in herpetologist blogs) of the disease occurring in captive shinglebacks across Australia [12]. There are reports of the disease in wild shinglebacks in SA [14] and a wild blue-tongued lizard in Vic [15]. There have been no published reports of the disease in wild shinglebacks outside of SA and WA.

Epidemiology

The disease has been described in adult and immature individuals of both sexes. Limited review of the age and sex associations of the virus in wildlife care facilities in WA, suggests that juveniles are more likely to test PCR-positive for the virus. However, the epidemiology of the disease and virus will be dependent on the situation (captive vs wild, barrier managed vs free contact), and associations are likely to be location, species and context specific. Further epidemiological information will require ongoing studies.

The presence of blue-tongue nidoviruses in clinically healthy animals suggests a carrier status is possible and that an absence of respiratory signs does not preclude infection.

The disease likely develops as a result of multiple factors, with stress, nutritional status, reproductive status and secondary bacterial and fungal infections interacting with nidovirus to result in clinical disease.

Clinical signs

Clinical signs include loss of body condition, lethargy, depression, inappetence, pale mucous membranes, increased amounts of clear to cloudy mucus in the oral cavity, nasal passages and choana, sneezing, watery and swollen eyes, and bubbling from the eyes and nostrils. In a few cases, a marked proliferative stomatitis has been observed grossly and on histopathology. Mortality rates are reportedly high in the absence of supportive treatment [1, 12].

Diagnosis

Diagnosis of blue-tongue nidoviral disease is based on the characteristic pattern of clinical signs, combined with confirmation of viral presence using PCR. Detection of virus to date has been from oral/tracheal and/or eye swabs [16]. Development of a LAMP assay to enable more rapid diagnostics is underway [15].

Laboratory diagnostic specimens and procedures

A diagnostic service for this virus is available for **veterinarians only** through Murdoch University. For viral testing, aseptic technique is used to collect swabs of secretions from the conjunctiva and oral cavity at the level of the glottis, which are placed into sterile physiological saline [1]. The preferred sample type is either separate or a combined conjunctival-oral swab, to maximise likelihood of detecting the virus. A combined oral-conjunctival swab is appropriate if screening of two swabs is cost-prohibitive.

A full post-mortem examination should be undertaken and a range of samples, particularly upper respiratory tract (tongue, glottis, trachea, nasal turbinates) and conjunctival tissues, collected aseptically for culture and histopathology. Examination should include bacterial culture of aseptically collected lung samples and qRT-PCR of oral and eye swabs.

The blue-tongue nidoviruses are yet to be isolated and grown in cell culture.

Pathology

Changes seen at post-mortem include poor body condition, thick mucus in upper respiratory tract, sometimes blocking the glottis, and hyper-inflated lungs occupying much of body cavity, which remain inflated during post-mortem examination. In advanced cases, the liver may be pale [12]. There is no published information on histopathological changes. There is no information available on clinical pathology changes seen with blue-tongue nidovirus infections.

Differential diagnoses

Other reported causes of respiratory disease in reptiles include viral, bacterial and fungal infections (such as adenovirus, herpesvirus and *Mycoplasma* spp.) and non-infectious causes [2]. A full diagnostic work-up to exclude other agents of disease should be included in any investigation that involves blue-tongue nidoviruses, to rule out co-infections and develop a greater understanding of potential mixed infections.

Treatment

Supportive treatment is recommended, including warmth, parenteral or oral fluid therapy, and nebulisation with distilled water. Affected lizards have been found to have relatively higher loads of gastrointestinal tract parasites (coccidia, *Trichomonas* and oxyurids) and individuals may require treatment for these conditions [17]. A broad-spectrum parenteral antibiotic treatment and administration of an antiprotozoal treatment may be considered, although this should be decided

by the veterinarian on a case-by-case basis[‡]. See the Guidelines for Antimicrobial Prescribing in Australian Wildlife (https://www.amrvetcollective.com/assets/guidelines/AMRVC-Guidelines-for-Antimicrobial-Prescribing-in-Wildlife-FINAL_191125.pdf) for more information. The majority of treated individuals respond well to therapy [1].

Euthanasia should be considered for individuals with severe or chronic disease, very poor body condition and a failure to respond to preliminary supportive therapy [12]. Mortality rates without treatment may be high [1, 12]. Due to the potential for carrier status and spread to natural environments or other individuals, asymptomatic or recovered individuals that are due to be housed with others or released should be serially tested negative, e.g. using a combined oral-conjunctival swab once every 2 weeks for a period of 6 weeks.

Prevention and control

The (anecdotal) epidemiology of the disease seen in correlation with blue-tongue nidoviruses indicates that the disease is highly contagious in a captive management situation. Excellent husbandry and appropriate biosecurity management should be employed including dedicated equipment for each enclosure, barrier management, attention to shared air spaces or ability for direct contact between enclosures, daily cleaning of the environment and equipment with detergents and then disinfecting with agents such as Virkon or F10, and use of gloves and hand hygiene when handling and treating affected lizards. See the National Wildlife Biosecurity Guidelines (https://wildlifehealthaustralia.com.au/Portals/0/ResourceCentre/BiosecurityMgmt/National_Wildlife_Biosecurity_Guidelines.pdf) for more information.

Research

Further work is recommended in the following areas:

- confirm the aetiology of the disease and its epidemiology including transmission pathways, presence of a carrier state and geographic and host range and risk factors
- determine the prevalence of shingleback nidovirus in wild individuals of the *Tiliqua* genus
- conduct surveillance of sympatric *Egernia* species to determine if shingleback nidovirus is more widespread in these individuals
- determine optimal treatment, including assessment of long-term response and fate in the wild following rehabilitation
- describe the disease at a histological level through detailed investigation of confirmed cases by histopathology and immunohistochemistry
- assessment of conservation implications, including for captive management, release to wild and population viability of threatened species.

[‡] enrofloxacin is NOT recommended as a first line treatment in these host species due to antimicrobial stewardship concerns and the apparently high carriage of *Salmonella* and *E.coli* in shingleback lizards (see www.ncas-australia.org/animal-antimicrobial-stewardship)

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/Our-Work/Surveillance and https://wildlifehealthaustralia.com.au/Our-Work/Surveillance/eWHIS-Wildlife-Health-Information-System.

Cases seen in WA are presented to wildlife rehabilitation centres including Kanyana Wildlife Rehabilitation Centre (www.kanyanawildlife.org.au), Perth Wildlife Hospital (www.pwh.org.au/) and WA Wildlife (https://wawildlife.org.au) for treatment.

Suspect cases should be reported to your state or territory WHA Coordinator (https://wildlifehealthaustralia.com.au/Incidents/WHA-Coordinator-Contacts).

Acknowledgements

We are grateful to the people who contributed to this Fact Sheet and would specifically like to thank Dr Bethany Jackson, Dr Tim Hyndman, Dr Mark O'Dea and the staff and volunteers at Kanyana Wildlife Rehabilitation Centre.

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.

Please cite this Fact Sheet as: Wildlife Health Australia (2026) "Nidoviral respiratory disease in Australian lizards – Fact Sheet", published by Wildlife Health Australia, Canberra, available at https://wildlifehealthaustralia.com.au/Resource-Centre/Fact-Sheets

Updated: February 2026

References and other information

1. O'Dea MA, Jackson B et al. (2016) Discovery and partial genomic characterisation of a novel nidovirus associated with respiratory disease in wild shingleback lizards (*Tiliqua rugosa*). *PloS ONE*, **11**(11): e0165209
2. Schumacher J (2011) Respiratory medicine of reptiles. *Veterinary Clinics of North America: Exotic Animal Practice*, **14**: 207-224
3. Hyndman T 2023 Identification of other blue-tongue nidoviruses in association with upper respiratory tract disease. Personal communication
4. Zhang J, Finlaison DS et al. (2018) Identification of a novel nidovirus as a potential cause of large scale mortalities in the endangered Bellinger River snapping turtle (*Myuchelys georgesi*). *PLoS ONE*, **13**(10): e0205209

5. Hoon-Hanks LL, Stöhr AC et al. (2020) Serpentovirus (nidovirus) and orthoreovirus coinfection in captive veiled chameleons (*Chamaeleo calyptratus*) with respiratory disease. *Viruses*, **12**(11): 1329

6. Bodewes R, Lempp C et al. (2014) Novel divergent nidovirus in a python with pneumonia. *Journal of General Virology*, **95**(11): 2480-2485

7. Lempp C, Bodewes R et al. (2015) Detection of a novel nidovirus in an Indian python (*Python molurus*). *Journal of Comparative Pathology*, **1**(152): 91

8. Stenglein MD, Jacobson ER et al. (2014) Ball python nidovirus: a candidate etiologic agent for severe respiratory disease in *Python regius. MBio*, **5**(5): e01484-14

9. Uccellini L, Ossiboff RJ et al. (2014) Identification of a novel nidovirus in an outbreak of fatal respiratory disease in ball pythons (*Python regius*). *Virology Journal*, **11**(1): 144

10. Marschang RE and Kolesnik E (2017) Detection of nidoviruses in live pythons and boas. *Tierärztliche Praxis Kleintiere*, **45**(1): 22-26

11. Leineweber C and Marschang RE (2023) Detection of nidoviruses in samples collected from captive snakes in Europe between 2016 and 2021. *Veterinary Record*: e2588

12. Haight R (2004) Flu In Bobtail Skinks (Shinglebacks). In 'Australian WIldlife Rehabilitation Conference '. National WIldlife Rehabilitation Conferences: Penrith NSW

13. O'Reilly RL, Jones TC et al. (2024) Serpentoviruses in free-ranging shingleback skinks (*Tiliqua rugosa*) in western Australia and south Australia, Australia. *The Journal of Wildlife Diseases*, **60**(4): 931-939

14. Smyth AK, Smee E et al. (2014) The use of body condition and haematology to detect widespread threatening processes in sleepy lizards (*Tiliqua rugosa*) in two agricultural environments. *Royal Society Open Science*, **1**(4): 140257

15. Panigas S (2024) Development of a rapid diagnostic test for a lizard respiratory nidovirus. Master Research thesis Faculty of Science, University of Melbourne; Available from: https://minerva-access.unimelb.edu.au/items/a369b5ab-e8ae-44e2-88c3-a927a06639fb

16. O'Dea MA 2021 Detection methods for shingleback nidovirus. Personal communication

17. Kanyana 2017 Treatment of nidovirus shingleback lizards for other conditions. Personal communication

To provide feedback on Fact Sheets

Wildlife Health Australia welcomes your feedback on Fact Sheets. Please email admin@wildlifehealthaustralia.com.au. We would also like to hear from you if you have a particular area of expertise and are interested in creating or updating a WHA Fact Sheet. A small amount of funding is available to facilitate this.

Disclaimer

information in this Fact Sheet. Persons should accordingly make and rely on their own assessments and enquiries to verify the accuracy of the information provided.

Find out more at www.wildlifehealthaustralia.com.au
Email admin@wildlifehealthaustralia.com.au
Or call +61 2 9960 6333