White Nose Syndrome in bats

In 2007 a new disease was seen in cave hibernating bats in the US state of New York, and was retrospectively suspected to have been present the previous year. The disease was called "White Nose Syndrome" (WNS) because of the fluffy white growth of fungus that appeared on the muzzle, ears and wings of affected bats. Since then, the disease has spread to 22 US states and five Canadian provinces and had devastating effects on bat populations in affected caves with up 90% of the population dying. The disease affects microbats (small insectivorous bats) as they hibernate in caves. Bats with WNS may die due to depletion of fat stores associated with more frequent rousing from hibernation; cold exposure if they leave the cave to search for food in freezing conditions; or metabolic disruption due to the damage to the wing membrane.

The causative agent is a fungus called *Pseudogymnoascus* (formerly *Geomyces*) *destructans*. The fungus prefers to grow in cold conditions; caves with affected bats typically have an ambient temperature of 2-14°C. The fungus will not grow above 20°C. Bats experience decreased body temperature and immune function during hibernation, which facilitates infection by the fungus. They also congregate in very close proximity while hibernating, which increases transmission between bats and contamination of the cave environment. At other times of the year, body temperature is consistently above the temperature tolerated by the fungus and the disease is not seen.

In Europe, hibernating bats with visible fungal growth of *P. destructans* have been detected, but the fungus has not been associated with mass mortalities of bats. There is evidence to suggest that the fungus has been present since the 1980's or earlier. It is possible that bats in Europe have developed resistance due to a long evolutionary relationship with the fungus. In the USA, bats do not have this resistance and this suggests it may have been recently introduced there. The disease was first seen in the USA in a popular show cave, increasing suspicion that the fungus may have been introduced from Europe.

The spread of WNS in North America is believed to occur mainly by movements of bats between caves during their active season. However, the distances between known infected caves and newly infected caves are sometimes larger than could occur by this route, suggesting it may have been carried by people, for example those visiting caves. The fungus can be carried on contaminated equipment, clothing and footwear, and this is the most likely potential route of entry of the fungus into Australia. The fungus has been found to survive in the environment in caves for long periods even when bats are not present.

Speleologists have an important role to play in preventing WNS entering Australia and detecting the disease if it did occur here. Below is some information about decontamination of equipment, and how to report suspected disease outbreaks.

Decontamination of equipment

The best way to prevent entry of WNS on caving equipment is to avoid bringing equipment that has been used overseas into Australia. This applies equally to Australians visiting caves in other countries (particularly in Europe and North America) and to overseas tourists visiting caves in Australia. Decontamination of clothing, foot wear and equipment can be attempted but this may not

completely remove the risk that WNS could be brought into Australia. Items that have been used in caves where WNS is known or suspected to occur are at high risk of bringing the disease into Australia and should not be used in Australian caves, even if they have been decontaminated.

Decontamination procedures for equipment have been published in the USA and can be downloaded from http://www.whitenosesyndrome.org/topics/decontamination ('*Revised Decontamination Protocol*' and '*Supporting Decontamination Documentation for Cavers*'). A brief summary of these procedures is provided below, however please refer directly to the online protocol documents for more detailed information.

Please Note: There is no information confirming that safety equipment will remain as effective after decontamination, so careful thought is required when deciding whether to attempt decontamination of this equipment.

1) Select equipment that is easy to clean, and preferably will not be damaged by cleaning.
2) Remove outer garments and footwear as you leave the cave.
3) Thoroughly scrub and remove sediment/dirt from clothing, footwear and equipment immediately upon emerging from the cave, as these reduce the effectiveness of the decontamination procedure.
4) Once fully scrubbed and rinsed, seal clothing, footwear, and equipment in a plastic bag or container for transport. A clean change of clothing is recommended. Store exposed gear separately from clean gear, and avoid contamination of vehicles.
5) Later, clothing should be machine or hand-washed using a conventional cleanser and rinsed thoroughly.
6) All clothing, footwear and equipment that can be immersed in water should be submersed in water at a temperature of at least 50°C for a minimum of 20 minutes followed by air drying to kill any remaining fungus. Some effective disinfectants are available, but these are harsh chemicals and may damage some items. Refer to the decontamination procedures (links above) for more information.
7) It is recommended that equipment that cannot be immersed in water (e.g. cameras and electronics) only be taken into potentially contaminated overseas caves when absolutely necessary. In these instances refer to the decontamination procedures for more information about how to use a sealed disposable plastic container (such as a plastic bag) to minimise contamination.

Cleaning and decontamination of clothing and equipment between caves visited within Australia may also assist to reduce the spread of existing infectious diseases, and to prevent the spread of WNS were it to be introduced into this country.

How to report signs suspicious of WNS in Australia

We do not know exactly how WNS would behave if introduced into Australia. However, groups of live bats with fluffy, white growths on the muzzle, wings or ears, or sudden death of large numbers of bats in or around a cave are both highly suspicious. If you observe either of these situations, record the date and location, and take photographs if possible.

NOTE: While WNS has no known human health implications, bats should only be handled by people who are appropriately vaccinated and experienced in handling bats, due to the risk of exposure to Australian bat lyssavirus (see below).

To report bats with suspected WNS or other unusual signs, contact the state or territory department of agriculture or primary industries. The Australian Wildlife Health Network (soon to become Wildlife Health Australia) maintains a list of wildlife coordinators in each state or territory department or can accept reports directly and pass them to the appropriate person for further investigation (details below). Alternatively, call the Emergency Animal Disease Watch Hotline on 1800 675 888. Single dead bats with fungal growth are probably in the process of normal decomposition and do not need to be reported, however if in doubt please call for advice.

Emergency Animal Disease Watch Hotline: 1800 675 888

Link to the Australian Wildlife Health Network wildlife coordinator contacts:

http://www.wildlifehealthaustralia.com.au/AboutUs/ContactDetails.aspx

Further information and links

The Australian Wildlife Health Network maintains a fact sheet on WNS, available on their website:

http://www.wildlifehealthaustralia.com.au/Portals/0/Documents/FactSheets/EXOTIC%20-%20White-nose%20Syndrome%206%20Jun%202013%20(2.7).pdf

The United States Geological Survey website has the most up to date information on the situation in the US and links to research on this disease:

http://www.nwhc.usgs.gov/disease_information/white-nose_syndrome/

The White-Nose Syndrome.org website also has information and links to research into this disease. The recommended decontamination protocols are also published on this website and are updated from time to time.

http://www.whitenosesyndrome.org/

http://www.whitenosesyndrome.org/topics/decontamination

Public health notes

There is no evidence that White Nose Syndrome can affect humans, however there are some other diseases associated with bats that can affect people. Speleologists and others in close proximity to bats face a higher risk of infection.

Histoplasmosis is caused by a fungus, *Histoplasma capsulatum*, which is often associated with bird and bat droppings. People may become infected when they inhale the spores in dusty, contaminated environments, particularly in enclosed spaces such as caves. Most people do not develop obvious disease, but severe disease can be seen in those with weakened immune systems. Initial signs are often similar to flu. The best prevention is to avoid inhaling dust in potentially contaminated areas.

Australian bat lyssavirus is related to rabies virus and has caused the deaths of three people in Australia since it was identified in 1996. It has been found in both microbats and flying foxes in most states and territories. People become infected from bites or scratches from affected bats. You should avoid handling bats, particularly those that appear sick, unless you have current immunisations against rabies and are experienced at handling bats. There are rare reports of the related rabies virus being spread from bats to humans in caves in the US, probably by inhalation of aerosolised bat urine or faeces, however this has never been reported to occur in Australia due to Australian bat lyssavirus.

Note: Hendra virus may also be carried by flying foxes, however there is no evidence of direct transmission from flying foxes to humans. A small number of people have become infected with Hendra virus following close contact with infected horses.

For more information about any of these diseases, visit your GP or contact your state public health authority. If you believe you have been bitten or scratched by a bat, seek medical attention URGENTLY. Immediately wash the bite or scratch site thoroughly with soap and copious water for approximately 5 minutes and apply a virucidal antiseptic solution such as povidone-iodine or alcohol. Bat saliva in the eyes or mouth should be rinsed out immediately and thoroughly with water.