Biosafety Measures for Working with *Pseudogymnoascus destructans* in the Laboratory and Use or Storage of Potentially Contaminated Materials

The emergent disease of bats, white-nose syndrome (WNS), has caused one of the most precipitous declines documented among North American wildlife. This disease is caused by the recently described fungal pathogen *Pseudogymnoascus* (formerly *Geomyces) destructans*. Because of the grave threat this fungus presents to populations of hibernating bats, precautions must be taken when working with *P. destructans* in the laboratory to prevent accidental release of the fungus into the environment.

The following guidelines apply to all members of the WNS Diagnostic Laboratory Network. Other laboratories that work with *P. destructans* or that maintain specimens that may harbor viable fungus may use these guidelines to develop appropriate institutional standards for preventing accidental release of a Biosafety Level-2 (BSL-2) fungal pathogen of animals.

Based upon biological risk assessment, work in the laboratory with viable *P. destructans* should be restricted to BSL-2 or higher. Adherence to this guidance will ensure that in accordance with the manual **Biosafety in Microbiological and Biomedical Laboratories (BMBL) 5th Edition**, appropriate procedures, mechanical controls, and containment equipment are in place to facilitate biosecure work with the fungus and to prevent accidental release.

Use of a biosafety cabinet. Fungi such as *P. destructans* readily produce aerosolizeable, environmentally resistant, and long-lived spores (reproductive structures). Therefore, all manipulations of potentially viable *P. destructans* (fungal cultures, carcasses, unfixed tissue samples, wing swabs, environmental samples, fungal tape lifts) in the laboratory should be restricted to a certified Class I or Class II biosafety cabinet. Questions have been raised about the efficacy of ethanol solutions to kill spores of *P. destructans*, therefore fungal samples preserved in alcohol should be handled inside a certified biosafety cabinet. Formalin-fixed tissues and prepared histopathology slides can be handled safely outside of a biosafety cabinet. Samples containing extracted or amplified DNA of *P. destructans*, although noninfectious, should be restricted to a biosafety cabinet to reduce the risk of laboratory contamination.

Inter-laboratory transfer. *P. destructans* or other specimens that may harbor viable fungus should only be transferred to laboratories that operate at BSL-2 or higher. Prior to transferring *P. destructans* or other potentially infectious material to a laboratory, ensure the recipient laboratory has approval from their institutional biosafety committee to possess and work with the fungus. All shipments should be classified as "dangerous goods" and shipped in accordance with DOT and IATA regulations. As a courtesy, laboratories transferring *P. destructans* or other potentially infectious materials to a laboratory outside of the WNS endemic region should notify the receiving state agency's WNS primary point of contact. For a current map of affected counties, see http://whitenosesyndrome.org/resources/map. *To identify agency contacts, email WNS National Assistant Coordinator (jonathan_reichard@fws.gov).*

Storage and handling of museum voucher specimens. There are no available data assessing risk that museum specimens may harbor viable *P. destructans* nor have effective decontamination techniques that maintain integrity of study skins been developed. Therefore, museum specimens collected from the WNS endemic area after 2006 should be considered to potentially harbor viable spores of *P. destructans*, and their use should be restricted to a work space with appropriate biocontainment in accordance with procedures approved by the institution's biosafety committee.

Disposal of materials. All unfixed tissues should be disposed by incineration or by autoclaving (121°C for 90 minutes) followed by disposal as biomedical waste. All lab materials that contain or come into contact with potentially viable spores of *P. destructans* should be autoclaved (121°C for 90 minutes) or otherwise inactivated using an appropriate disinfectant (refer to the current National WNS Decontamination Protocol) prior to disposal as biomedical waste.

Personal quarantine. To further reduce the risk for accidental release of *P. destructans*, laboratory personnel who have contact with the fungus should observe a personal quarantine and not enter bat congregation sites during periods of active culture work and for at least seven (7) days after last contact with the fungus. Laboratory processes should be managed to avoid inadvertent contact with culture materials. Clothing and other materials brought into the laboratory should be segregated from those transported to any potential bat congregation sites.

For further information. Contact the WNS Diagnostic Working Group Leader, Dr. Anne Ballmann (608-270-2445, aballmann@usgs.gov) or Dr. David Blehert (608-270-2466, dblehert@usgs.gov).

More information on biosafety and decontamination practices can be found at:

- http://www.cdc.gov/biosafety/publications/bmbl5/
- http://whitenosesyndrome.org/topics/decontamination

More information on WNS in bats can be found at:

- http://whitenosesyndrome.org (U.S. Fish and Wildlife Service)
- http://www.nwhc.usgs.gov/disease_information/white-nose_syndrome (USGS National Wildlife Health Center)
- http://www.fort.usgs.gov/WNS/ (USGS Fort Collins Science Center)

Definitions *(excerpted from* ***BMBL****)*

Biosafety Level-2 (BSL-2): Suitable for work involving agents that pose moderate hazards to personnel and the environment. It differs from BSL-1 in that: 1) laboratory personnel have specific training in handling pathogenic agents and are supervised by scientists competent in handling infectious agents and associated procedures; 2) access to the laboratory is restricted when work is being conducted; and 3) all procedures in which infectious aerosols or splashes may be created are conducted in biosafety cabinets or other physical containment equipment.

Class I biosafety cabinet: Provides personnel and environmental protection but not product protection. Unfiltered room air is drawn in through the work opening and across the work surface. Personnel protection is provided by this inward airflow as long as appropriate airflow velocity is maintained. Exhaust air flows through a HEPA filter system.

Class II biosafety cabinet: Provides personnel, environmental, and product protection. Supply air flows through a HEPA filter and provides particulate-free air to the work surface. Exhaust air flows through a separate HEPA filter system.