



Occupational Acquired Allergies and Sensitivities Awareness Guideline

2013

Safety Resources



UNIVERSITY OF
SASKATCHEWAN

Contents

1	Purpose	1
2	Scope	1
3	Allergies and Sensitivities	1
3.1	What is an Allergy?	1
3.2	What is a Sensitivity?	2
3.3	Exposure Routes	2
3.4	Signs and Symptoms	2
3.5	Risk Factors.....	4
4	Exposure Hazards	4
5	Protective Measures	5
5.1	Elimination and Substitution.....	5
5.2	Engineering Controls	6
5.3	Administrative Controls	8
5.4	Personal Protective Equipment.....	9
6	References and Resources.....	10
	Appendix A: Definitions	12
	Appendix B: Roles and Responsibilities	14
	Appendix C: Occupational Asthma Causing Agents.....	16

1 Purpose

The document herein is intended to provide information on, and recommended health and safety guidance to eliminate or mitigate the potential development of occupational acquired allergies or sensitivities for individuals working and studying at the University of Saskatchewan.

2 Scope

The University of Saskatchewan is committed to providing a place of employment and learning that is free from recognized hazards. A safe and healthy environment is created and maintained through the development and maintenance of supporting programs, the provision of proper facilities, equipment, training, and services, and by promoting safety consciousness.

Faculty, staff, students and visitors on our campus are engaged in a wide and every growing array of activities in research and academics. Literally, thousands of our people routinely handle and work with materials, biological and chemical substances, and animals which are potentially hazardous to human health, some of which can cause the development of allergies or sensitivities under repeated exposure conditions.

The *Occupational Acquired Allergies and Sensitivities Awareness Guideline* is intended to provide valuable health and safety information to help minimize the risk of developing acquired allergies and sensitivities in the workplace. The guide is not intended to provide an exhaustive list of possible allergens or sensitizers that might exist in the workplace.

The guide is a supporting document and does not replace or supersede current legislation, or other university health and safety policies, programs and associated requirements such as for chemical safety, and biosafety.

3 Allergies and Sensitivities

3.1 What is an Allergy?

Allergies are an abnormal response of the human immune system to a substance, also known as an allergen, that otherwise is not harmful and can trigger a cascade of signs and symptoms. The body produces antibodies to destroy foreign substances that the immune system perceives to be harmful. Allergies can develop at any time even to substances one has been previously exposed to with no adverse health reactions.



General Ventilation Systems – Heating, ventilation and air conditioning (HVAC) systems provide fresh air to buildings and to workspaces. These systems can be used to:

- Remove or dilute airborne concentrations of hazardous substances including allergens and sensitizers;
- Control the movement of airborne contaminants by maintaining pressure differentials between spaces to ensure the flow of air from clean (uncontaminated) areas to dirty (potentially contaminated) areas;
- Isolate workspace(s) through dedicated ventilation independent of other adjacent workspace(s); and
- Filter air (e.g. HEPA filters) to remove airborne contaminants.



Fume Hood
Health Sciences D-Wing

Local Ventilation Systems – These systems are intended to protect workers from airborne contaminants at the source when working/handling hazardous materials which pose a risk of inhalation. Common examples include fume hoods, biosafety cabinets, down draft tables and laboratory bench top ventilation snorkels. When using local ventilation systems, special attention must be given to ensure the systems are functioning properly, and that individuals understand their limitations, and how to use the systems.

Hand Washing Facilities – Hand washing facilities (e.g. sinks) should be readily accessible to individuals working with hazardous materials to facilitate good hygiene. Hand washing facilities should be located near the point of exit from the laboratory, and equipped with unscented, sensitive hand soap.

Relative Humidity – Relative humidity (greater than 50%) can play a role in decreasing the level of airborne allergens/sensitizers present in a room. For worker comfort and to prevent fungal growth, a relative humidity in the range of 40-50% is more optimal while still impacting the levels of allergens/sensitizers present. Consideration must be given for the animals and the particular species needs and requirements.

Animal Caging Systems – Small animals (e.g. mice, rats) used for research can be housed in specially designed filtered-top cages or individually ventilated cage racks to minimize worker exposure to airborne pathogens, allergens/sensitizers, and to protect the animals from environmental contaminants. Automated cage washing and waste handling systems will minimize worker contact with biohazards, allergens and sensitizers when cleaning and maintaining animal facilities.



Filtered animal cage

5.3 Administrative Controls

Administrative controls include a range of activities intended to minimize exposure to an allergen or sensitizer.

Education and Training – All individuals who work with materials or in areas where there is potential exposures to materials, substances or animals where known allergens or sensitizers exist, should receive training on the hazards and on methods to protect themselves. Training should cover the distinct needs of the workers in those particular jobs or locations including the rules, procedures and controls, and the use of personal protective equipment if required. Individuals should also be made aware of signs and symptoms of allergies, sensitivities and other potential health problems arising from exposure to agents in the workplace.

Standard Operating Procedures – The development of standard operating procedures can ensure the consistency of work procedures, and compliance with applicable legislation and best practices in health and safety.

Signs and Labels – Signs and labels notifying workers of the presence of areas and products that have the potential to contain allergens or sensitizers should be displayed. These signs and labels may need to be posted in addition to the requirements of other permits administered by WSEP (e.g. biosafety and nuclear substance permits).

Scheduling – Changes to schedules and routes with regards to moving animals can also be coordinated to minimize contamination by animal allergens/sensitizers in common areas. These changes could include moving animals during non-peak hours (e.g. after hours) and through designated animal corridors only. Other scheduling changes include using a rotating schedule for workers involved in procedures and areas with increased exposure to allergens/sensitizers thereby minimizing the time particular workers are exposed to the allergens/sensitizers.

Access Control – Limiting or monitoring access to particular areas or procedures may control the number of workers or the amount of time workers are exposed to allergens/sensitizers. Minimizing the number of people exposed can be accomplished by segregating the area and only allowing authorized personnel into the designated area(s).

Cleaning and Disposal – The implementation of appropriate cleaning and disposal procedures can also be used to minimize the aerosolization of allergens/sensitizers and decrease the amount of allergens/sensitizers present. When performing cleaning the following should be considered:

- Wet methods of cleaning (e.g. mopping or water washing) should be employed. Allergenic proteins are water soluble. Avoid dry cleaning methods (e.g. sweeping, brushing) as these may increase aerosolization of hazardous substances;
- Clean surfaces and equipment at regular frequencies;
- Cleaning solutions should be made fresh daily;

- Mop heads and other tools used for wet cleaning should be rinsed immediately and allowed to dry before being used again;
- When wet methods are not possible, use a HEPA filtered vacuum to trap allergens/sensitizers;
- If cleaning procedures allow, incorporate the use of local ventilation systems to collect airborne contaminants;
- Avoid transportation of contaminated clothing, equipment or waste to other locations; and
- Animal cage cleaning activities should be carried out in isolated areas away from animal holding and procedure rooms.

Inventory Management – Implementing changes to the experimental design can also reduce the likelihood of exposure to allergens/sensitizers. One way would be to consider looking at the stocking densities of animals both experimentally (within cages) as well as general housing numbers so as to decrease the animals concentrated in an area thereby producing less allergens/sensitizers. The method of controlling inventories can be implemented with other known allergens/sensitizer, such as keeping surplus gloves and chemicals stored appropriately and only keeping the required amount/volume of chemicals available during procedures will minimize the exposure intensity.

Health monitoring and medical surveillance may need to be established. Specifically, personnel that already have a sensitization to allergens, including asthma may need to have medical clearance to be fit tested for respirators, identification of their specific exposure limits and protective exposure plan.

5.4 Personal Protective Equipment

The use of personal protective equipment (PPE) can be employed to decrease exposure to allergens/sensitizers. The most common PPE are listed below:

Gloves – Wearing protective gloves during procedures that require handling of the animals, contaminated products (waste, bedding etc.), or chemicals for particular procedures can minimize the intensity of the exposure to the hands and skin. Gloves should be appropriate for the work (reuse, fit, lining, powdering, thickness and material). Consideration of allergen potential of the gloves can be addressed if the intended work allows for substitution of material (e.g. non-latex or powder-less, low protein latex gloves).

Clothing – Wearing long pants, lab coat, proper footwear and/or scrubs will reduce contact with hazardous agents. Protective clothing should be dedicated to the area where the work is occurring, or to the procedures. Protective clothing should not be worn in common areas, washrooms, lunchrooms or offices, or taken home.

Eye Protection – Glasses, goggles, face shield can be used to protect the eyes from splashes and exposure to hazardous agents.

Respiratory Protection – Respiratory protective devices are intended to protect the individuals from inhalation hazards in the course of work activities. Inhalation hazards could include chemical, biohazardous, nuclear and potentially allergens/sensitizers. There are a number of different types of respirators ranging from simple N95 filter masks, to half-face and full-face elastomeric respirators, powered air purifying respirators to self contained breathing apparatus.

Supervisors or individuals that believe there may be a need for respiratory protection must contact WSEP to ensure that use of respirators is indicated, the proper respiratory type is selected, and that individuals are properly fit tested and trained on the use and maintenance of the equipment.

6 References and Resources

- *Workplace Safety and Environmental Protection Policy*, University of Saskatchewan, www.usask.ca/wsep.
- Agrup, G., L. Belin, L. Sjostedt, and S. Skerfving. 1986. Allergy to laboratory animals in laboratory technicians and animal keepers. *British Journal of Industrial Medicine* 43:192-198.
- The American Academy of Allergy, Asthma and Immunology: <http://www.aaaai.org/home.aspx>.
- The American Conference of Governmental Industrial Hygienists (ACGIH), 2011 TLVs and BEIs (Threshold Limit Values and Biological Exposure Indices).
- American Latex Allergy Association, <http://www.latexallergyresources.org/>.
- Asthma and Allergy Foundation of America, <http://www.aafa.org/>.
- Brown, T. 2004. Strategies for prevention: occupational contact dermatitis. *Occupational Medicine* 54:450-457.
- Canadian Centre for Occupational Health and Safety, <http://www.ccohs.ca/>.
- Canadian Council on Animal Care, <http://ccac.ca/en/education/niaut/stream/cs-ohs>.
- D'Souza, E., R. Barraclough, D. Fishwick, and A. Curran. 2009. Management of occupational health risks in small-animal veterinary practices. *Occupational Medicine* 59: 316-322.
- Environmental and Occupational Health and Safety Services. University of Medicine and Dentistry of New Jersey. July 2007. Accessed November 2011. http://www.umdnj.edu/eohssweb/publications/animal_allergies_guide.pdf
- EpiPen. <http://www.epipen.com/>
- Government of Saskatchewan, Labour Relations and Workplace Safety, <http://www.lrws.gov.sk.ca/guidelines-latex-other-gloves>
- Guidelines for Allergy Prevention and Response. Missouri Department of Health and Senior Services, September 2011. Accessed November 2011. http://health.mo.gov/living/families/schoolhealth/pdf/mo_allergy_manual.pdf
- Institute of Laboratory Animal Research (ILAR) Journal.

- Lozewicz, S., A. Davison, A. Hopkirk, P. Burge, D. Boldy, J. Riordan, D. McGivern, B. Platts, D. Davies, and A. Newman Taylor. 1985. Occupational asthma due to methyl methacrylate and cyanoacrylates. *Thorax* 40: 836-839.
- National Institute of Health. Laboratory Animal Allergy Prevention Program (LAAPP) <http://www.nih.gov/>
- National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention. <http://www.cdc.gov/niosh/>.
- O’Gilvie, W. and J. Tinkler. 1996. Latex sensitization in the health care setting (Use of latex gloves). The Medical Devices Agency, Department of Health.
- Quint, J., W. Beckett, S. Campleman, P. Sutton, J. Prudhomme, J. Flattery, R. Harrison, B. Cowan, and R. Kreutzer. 2008. Primary prevention of occupational asthma: Identifying and controlling exposures to asthma-causing agents. *American Journal of Industrial Medicine* 51:477-491.
- Samadi, S., J. Spithoven, A. Jamshidifard, B. Berends, L. Lipman, D. Heederik, and I. Wouters. 2011. Allergy among veterinary medicine students in the Netherlands. *Occupational and Environmental Medicine* 69:48-55.
- Shaffer, M. and D. Belsito. 2000. Allergic contact dermatitis from glutaraldehyde in health-care workers. *Contact Dermatitis* 43: 150-156.
- Worksafe BC. 2005. Dealing with “latex allergies” at work. Worker’s Compensation Board of British Columbia.

Appendix A Definitions

Allergen: Any substance that can trigger an allergic reaction.

Allergic Reaction: An immune system response to a substance that itself is not harmful but that the body interprets as being harmful. It can trigger a cascade of allergy symptoms, which can include red eyes, itchiness, runny nose, eczema, hives, hay fever and/ or an asthma attack.

Anaphylaxis: Anaphylaxis is a life-threatening allergic reaction that may involve systems of the entire body. Anaphylaxis is a medical emergency that requires immediate medical treatment and follow-up care by a medical professional.

Animal Allergen: An animal allergen is a small molecular weight protein such as albumen found in serum, tissue, saliva, urine and/or skin dander.

Antigen: Any substance capable of inducing a specific immune response and of reacting with the products of that response.

Asthma: A respiratory disease characterized by a narrowing of the air passages that result in difficult breathing, tightness of the chest, coughing and breath-sounds such as wheezing.

Atopy: A genetic predisposition toward the development of immediate hypersensitivity reactions against common environmental antigens; although the susceptibility to the allergen appears to be inherited, contact with the antigen must occur before hypersensitivity can develop. Disorders include asthma or hay fever resulting from pollens and gastrointestinal tract and skin reactions resulting from food.

Authorized Worker: A University of Saskatchewan employee, student, visitor or contractor who has acquired the appropriate biosafety training and is approved to work with biological materials and/or biohazardous materials specified under an active biosafety permit.

Biosafety Cabinet (BSC): An engineering safety control device that is used to provide primary containment and an aseptic work area to protect the health of the worker, the product, and the environment.

Contact Dermatitis: A local inflammation of the skin. Symptoms of inflammation are itching, pain, redness, swelling, and the formation of small blisters or wheals on the skin. The inflammation is caused by an allergy or irritation as a result of substances that comes into direct contact with the skin.

Epinephrine (Epi) Pen: A device that contains a single dose of a medicine called epinephrine, which one injects into his/her outer thigh used for the emergency treatment of severe allergic reactions (anaphylaxis) caused by allergens. The Epi pen gives the individual time to get to a

hospital or medical center. An Epi pen is not a substitute for emergency medical treatment. Medical attention must be sought after injection (accidental or intentional).

Food Allergy: Food allergy is a group of disorders distinguished by the way the body's immune system responds to specific food proteins. In a true food allergy, the immune system will develop an allergic antibody called Immunoglobulin E (IgE).

Food Intolerance: Food intolerance refers to an abnormal response to a food or food additive that is not an Immunoglobulin E (IgE) allergic reaction.

Hypersensitivity: A state of altered reactivity in which the body reacts with an exaggerated immune response to what is perceived as a foreign substance.

Immunoglobulin E (IgE): It is a class of antibody, which plays an important role in allergies, especially with hypersensitivity, which is an undesirable response, produced by the normal immune system and requires a pre-sensitized state of the host.

Incident: Any undesirable or unplanned event or sequence of events that has had an unintended effect on the health and safety of University of Saskatchewan employees, students or contractors, or the safety and security of facilities, operations, and property, or on legal or regulatory compliance.

Irritation: A condition of over-sensitiveness of an organ or part of the body; a state in which the application of ordinary stimuli produces pain or excessive action.

Sensitivity: A nonspecific response, which does not involve the immune system, triggered by a substance (e.g. an animal, product, chemical or food).

Supervisor: A person who is authorized by the university to oversee or direct the work of employees and students. The authority to supervise employees and students is inherent in their job function. Although the university recognizes the ultimate responsibility of performing work in a safe manner lies with the individual employee, supervisors have additional responsibilities, which arise from their role as persons responsible for providing competent supervision and managing the workplace under their authority.

Worker: A person who is engaged in an occupation in the service of an employer.

Appendix B Roles and Responsibilities

The University of Saskatchewan provides a place of employment and learning that is as free as possible from recognized hazards. A safe and healthy environment is created and maintained through the provision of proper facilities, equipment, training, services, and by promoting safety consciousness. The Board of Governors shall meet these objectives through the assignment of duties and responsibilities to the President, Vice-Presidents, Associate Vice-Presidents, Deans, Associate and Assistant Deans, Department Heads, Heads of Administrative units, Principal Investigators, Managers, Supervisors, and all other employees in positions of authority.

Supervisors

Supervisors are responsible to:

- Identify health and safety hazards in the workplace including those that may cause allergies or sensitivities;
- Ensure that workers receive appropriate health and safety training;
- Ensure appropriate hazard control measures, including the provision of personal protective equipment (PPE), are implemented to protect workers;
- Ensure workers adhere to work policies, rules, procedures and applicable legislation; and
- Ensure workers report incidents in the workplace including those related to possible occupational acquired allergies and/or sensitivities.

Faculty, Staff, Students and Visitors

Faculty, staff, students and visitors are responsible to:

- Follow any policies, rules and procedures related to their work activities;
- Properly use and maintain PPE provided to them;
- Inform supervisors of any potential hazards they may be exposed to; and
- Report workplace incidents to their supervisor including those related to possible acquired occupational allergies and/or sensitivities.

Workplace Safety and Environmental Protection

Workplace Safety and Environmental Protection (WSEP) is responsible to:

- Provide advice and assistance in health and safety including acquired occupational allergies and sensitivities;
- Develop, implement, and administer the health, safety and environmental protection programs and services to the university;

- Provide training and awareness on allergy and sensitivities in the workplace;
- Identify work areas and activities that involve hazardous allergens;
- Post warning signs in areas of high allergen exposure;
- Provide advice and assistance to the university community in the development and implementation of controls to minimize allergy related illness; and
- Ensure compliance with applicable legislation.

Appendix C Occupational Asthma Causing Agents

List of Known Sensitizers *Adapted from: Chan-Yeung M. Malo JL. Aetiological Agents in Occupational Asthma. *European Respiratory Journal*. 1994. Vol. 7. pp. 346-371.

Chemicals		
<p style="text-align: center;">Acrylates</p> <ul style="list-style-type: none"> → Methyl methacrylate, cyanoacrylates → Ethylcyanoacrylate ester → Plexiglas 	<p style="text-align: center;">Azo Compounds</p> <ul style="list-style-type: none"> → Azodicarbonamide → Diazonium salt → Azobisformamide 	<p style="text-align: center;">Inorganic Chemical Metal</p> <ul style="list-style-type: none"> → Aluminum → Chromium and nickel (combination) → Cobalt and nickel (combination) → Zinc fumes → Nickel → Platinum → Tungsten carbide Chromium
<p style="text-align: center;">Alcohols</p> <ul style="list-style-type: none"> → Furfuryl alcohol (furan based resin) → Alkylaral polyether alcohol, polypropylene 	<p style="text-align: center;">Chlorinate Compounds</p> <ul style="list-style-type: none"> → Chlorhexidine 	<p style="text-align: center;">Inorganic Chemical Metal</p> <ul style="list-style-type: none"> → Zinc fumes → Nickel → Platinum → Tungsten carbide Chromium
<p style="text-align: center;">Aldehydes</p> <ul style="list-style-type: none"> → Formaldehyde → Glutaraldehyde → Urea formaldehyde 	<p style="text-align: center;">Sulphonates</p> <ul style="list-style-type: none"> → Iso-nonanyl oxybenzene sulphonate 	<p style="text-align: center;">Aliphatic Amines: Ethyleneamines</p> <ul style="list-style-type: none"> → Ethylene diamine → Hexamethylene tetramine → Triethylene tetramine
<p style="text-align: center;">Amines, Other</p> <ul style="list-style-type: none"> → Chloramine T 	<p style="text-align: center;">Inorganic Chemical Nonmetallic</p> <ul style="list-style-type: none"> → Flourine 	<p style="text-align: center;">Aliphatic Amines: Ethyleneamines</p> <ul style="list-style-type: none"> → Ethylene diamine → Hexamethylene tetramine → Triethylene tetramine
<p style="text-align: center;">Anhydrides</p> <ul style="list-style-type: none"> → Phthalic anhydride → Trimellitic anhydride → Tetrachlorophthalic anhydride → Pyromellitic dianhydride → Methyl tetrahydrophthalic anhydride → Himic anhydride 	<p style="text-align: center;">Isocyanates</p> <ul style="list-style-type: none"> → Toluene Diisocyanate → Diphenylmethane diisocyanate → 1,5 Naphthylene diisocyanate → Isophorone diisocyanate → TDI, MDI, HDI, PPI (combination) → TDI, MDI, HDI (combination) → TDI, MDI (combination) 	<p style="text-align: center;">Aliphatic Amines: Ethanolamines</p> <ul style="list-style-type: none"> → Monoethanolamine → Aminoethylethanolamine → Dimethylethanolamine

Chemicals	
<p style="text-align: center;">Aromatic Hydrocarbons, NOS</p> <p>→ Styrene</p>	<p style="text-align: center;">Pharmaceuticals</p> <p>→ Penicillin and Ampicillin → Penicillamine → Cephalosporins → Phenylglycine acid chloride → Psyllium → Amprollium → Spiramycin → Salbutamol intermediate → Methyl dopa → Tetracycline → Isoicotinic acid hydrazide → Hydralazine → Tylosin tartrate → Ipecacuanha → Cimetidine → Rose hips</p>
<p style="text-align: center;">Amines, Aliphatic: Other</p> <p>→ 3-(Dimethylamino)-propylamine</p>	
<p style="text-align: center;">Fluorinated Compounds</p> <p>→ Freon</p>	
<p style="text-align: center;">Amines, Heterocyclic</p> <p>→ Piperazine hydrochloride → N-methylmorpholine</p>	<p style="text-align: center;">Fluxes</p> <p>→ Colophony → Zinc chloride, ammonium chloride (mixture) → Alkylaral polyether alcohol, polypropylene glycol (combination) → Pylene glycol</p>
<p style="text-align: center;">Phenols</p> <p>→ Hexachlorophene</p>	
<p style="text-align: center;">Polymers</p> <p>→ Latex, synthetic → Polyvinyl chloride (fumes or powder)</p>	<p style="text-align: center;">Miscellaneous Chemicals</p> <p>→ Tetrazene → Oil mist</p>
<p style="text-align: center;">Dyes</p> <p>→ Levafix brilliant yellow E36 → Drimaren brilliant yellow K-3GL → Cibachrome brilliant scarlet 32 → Drimaren brilliant blue K-BL → Persulphate salts and henna → Reactive dye</p>	

Biological Agents		
Animal/Animal Materials	Plant/Plant Material	Biological Enzymes
<ul style="list-style-type: none"> → Laboratory animals (rats, mice, rabbits, guinea pigs) → Egg protein → Chicken → Sheep → Horse → Pit → Frog → Lactoserum → Casein (cow's milk) → Bat guano 	<ul style="list-style-type: none"> → Grain dust → Wheat, Rye → Soya flour → Lathyrus sativus → Vicia sativa → Buckwheat → Gluten → Coffee bean → Caster bean → Tea → Herbal tea → Tobacco leaf → Hops → Baby's Breath → Freesia → Paprika → Cacao seed → Mushroom → Garlic dust → Chicory → Sunflower → Lycopodium → Sericin → Nacre dust → Henna 	<ul style="list-style-type: none"> → B.subtilis → Trypsin → Papain → Pepsin → Panceatin → Flaviastase → Bromelin → Fungal: amylase, amyloglucosidade → Fungal hemicellulase → Esperase
<p style="text-align: center;">Fish/Fish Materials</p> <ul style="list-style-type: none"> → Crab → Prawn → Hoya → Cuttle-fish → Trout → Shrimp meal → Fish feed, Echinodorus lava → Red soft coral 		
<p style="text-align: center;">Vegetable Gums</p> <ul style="list-style-type: none"> → Gum, Guar → Gum, Tragacanth → Gum, Acacia → Latex, natural rubber 		

Biological Agents

Insect/Insect Materials	Wood Dust or Bark
→ Grain mite	→ Western red cedar (<i>Thuja plicata</i>)
→ Locust	→ California redwood
→ Screw Worm Fly	→ Cedar of Lebanon
→ Cricket	→ Cocabolia
→ Bee moth	→ Iroko
→ Moth	→ Oak
→ Butterfly	→ Mahogany
→ Mexican Been Weevil	→ Abiruana
→ Fruit Fly	→ African Maple
→ Honeybee	→ Tanganyika aningre
→ L. Cazsar larvae	→ Central American Walnut
→ Lesser Mealworm (grain and poultry workers)	→ Kejaat
→ Fowl mite (poultry workers)	→ African Zebra wood
→ Barn mite (farmers)	→ Ramin
→ Parasites (flour handlers)	→ Quillaja bark
→ Mites (flour handlers)	→ Fernambouc
→ Acarian (apple growers)	→ Ashwood
→ Weeping Fig (plant keepers)	→ Eastern Red Cedar
→ Sheep Blowfly	→ Ebony wood
→ Daphnia	→ Kotibe wood
→ Larva of Silkworm	→ Cinnamon