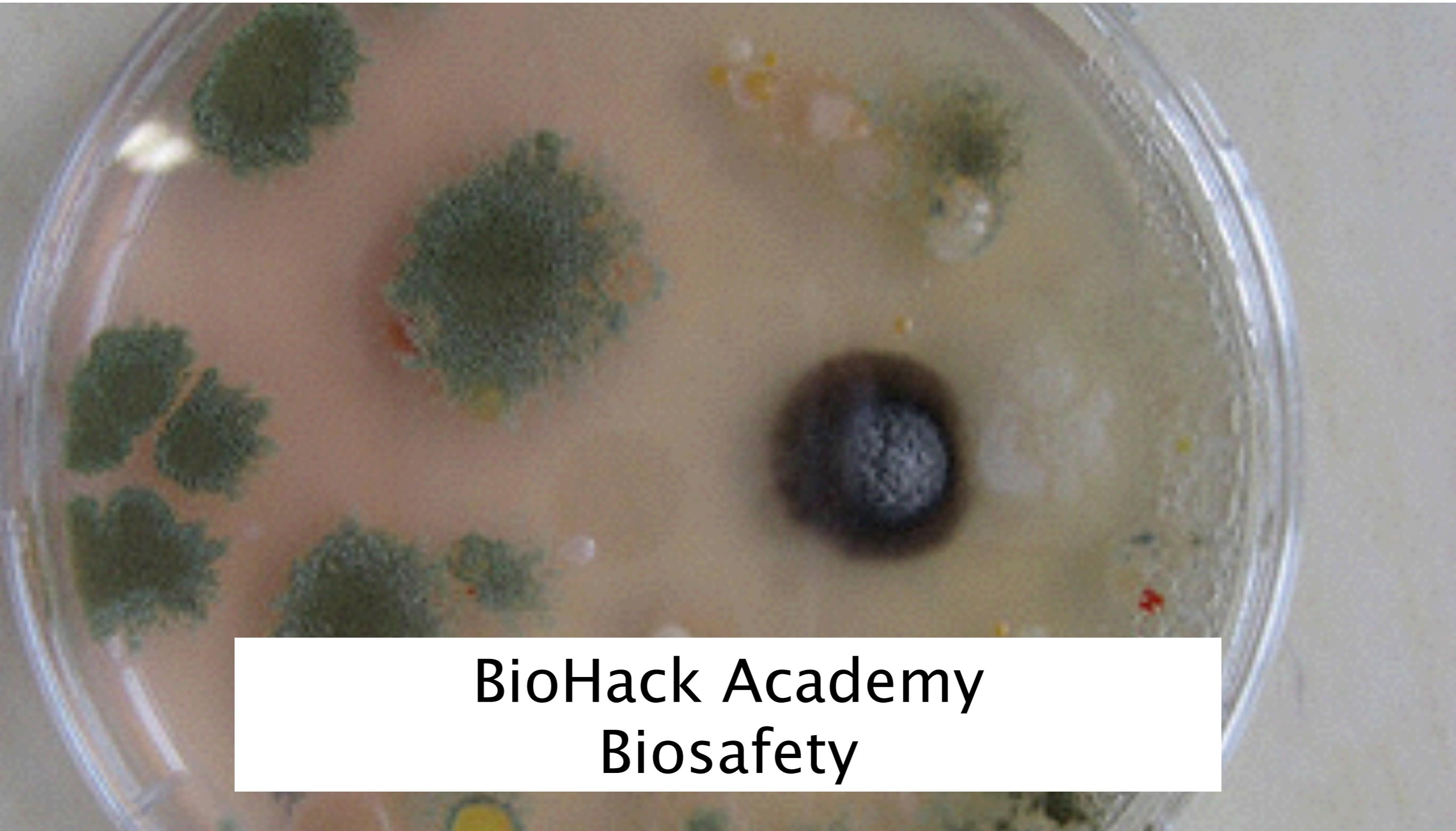




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**BioHack Academy
Biosafety**



Importance of safety

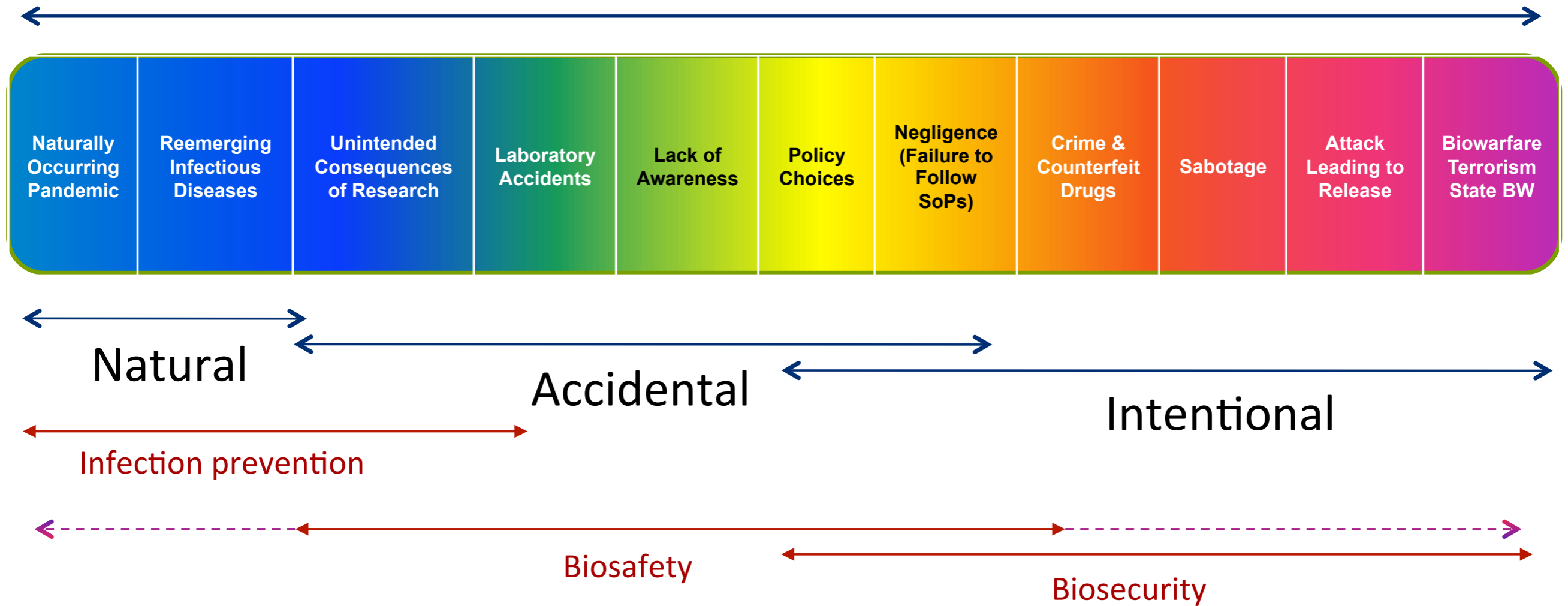
Safe procedures protect:

1. The environment
2. Your colleagues
3. Yourself



Spectrum of Risk

Biological risks can be seen as a spectrum:



By courtesy of Tim Trevan, ICLS



Ways of infection

Exposure, sources and routes of infection 41

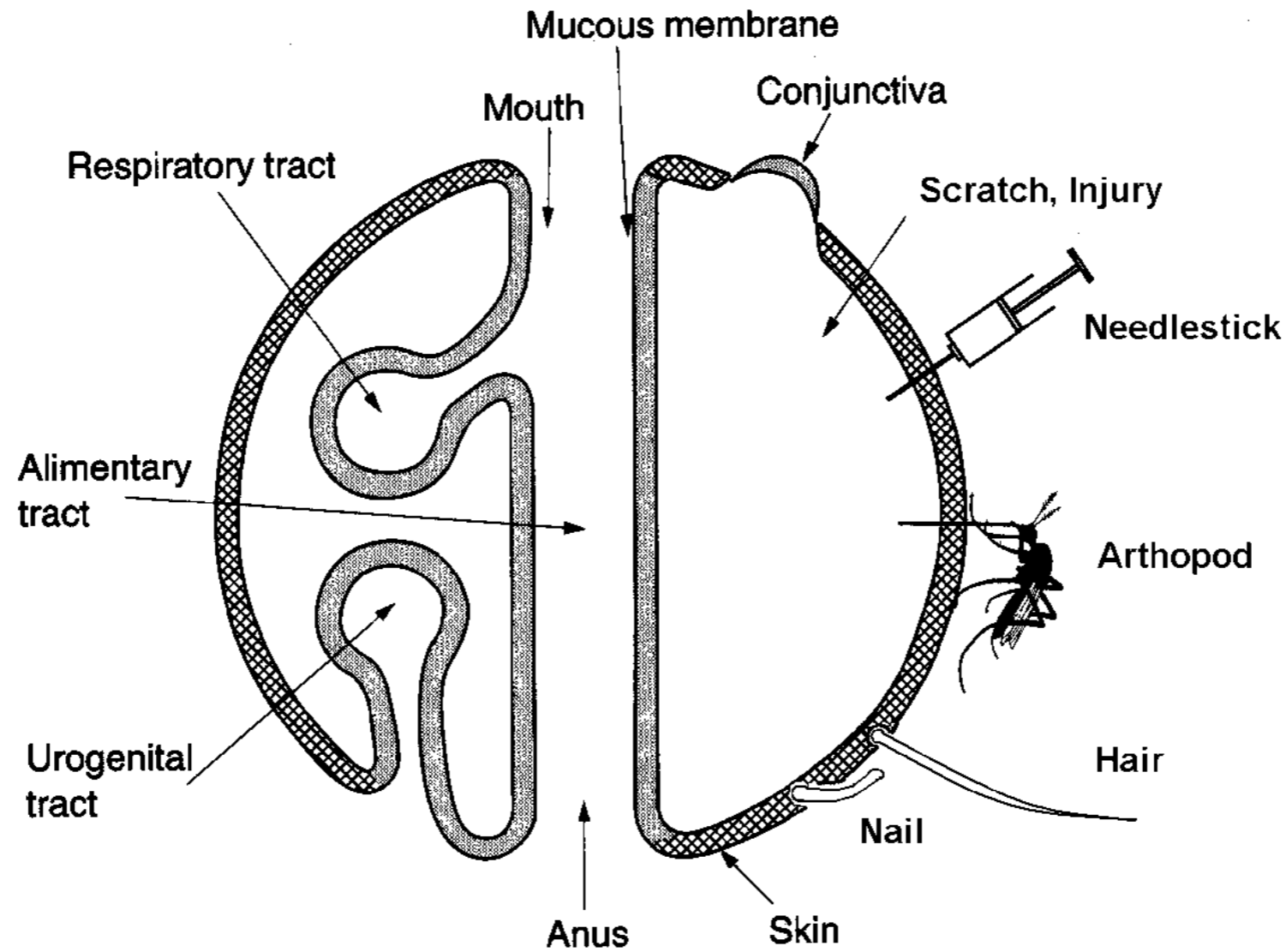


Figure 2.1 Routes of infection: the body's portals of entry of microbes. (From Mims, 1982, by permission of Academic Press)



Please note

- Only non-pathogenic microbes are used in the Academy
- Wash your hands before and after experimenting
- Do not eat or drink next to the microbes





Danger of biological agents

- The danger of a biological agent is influenced by numerous factors such as:
 - Pathogenicity
 - Spread to the community
 - Infective dose
 - Availability of effective therapeutic treatment or vaccin



Contamination in the lab

- Bio safety level number indicates the level of regulations that are in place to prevent contamination.
- Types of organisms allowed per level:
 - 1) Well characterized non pathogenic organisms to humans
 - 2) Micro organisms with high infection doses, and known cures
 - 3) Micro organisms with low infection doses, and known cures
 - 4) Micro organisms with extremely low infection doses, severe disease and no cure





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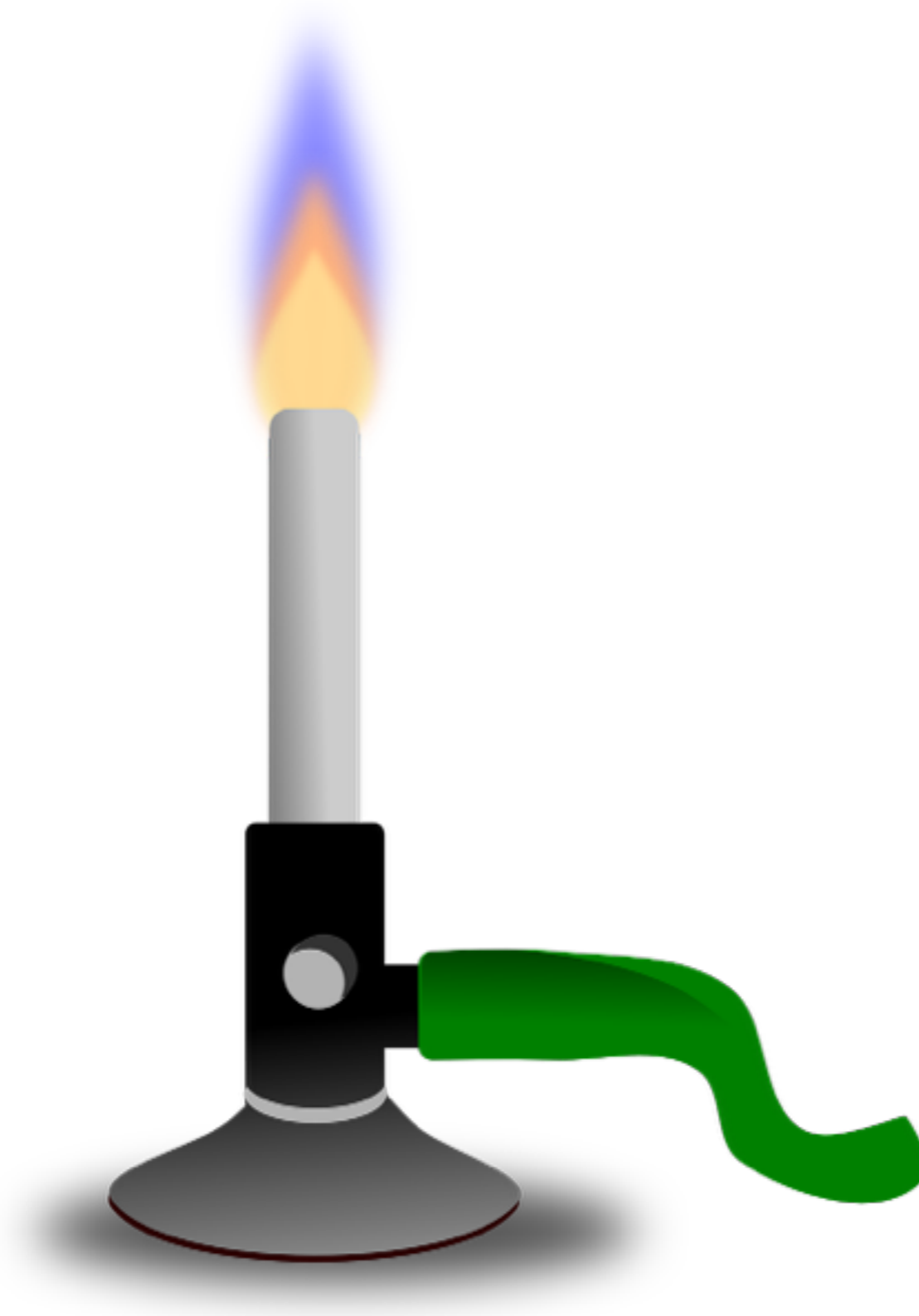
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Personal Protection

Equipment for protection yourself



Working sterile





Personal Protection

These items are recommended in the lab





Wash your hands!

Remember, before and after experiments:

- Wash your hands
- Wash your hands
- Wash your hands
- Wash your hands
- Wash your hands
- Wash your hands
- Wash your hands
- Wash your hands
- Wash your hands
- Wash your hands
- Wash your hands
- Wash your hands
- Wash your hands
- Wash your hands
- Wash your hands
- Wash your hands
- Even after wearing gloves



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Chemicals



Label everything

- Use labels on everything!!
- You are the only one who knows what is in the container
- Labels must consist of:
 - Content
 - Date
 - Name



Global Harmonized System Labels

Familiarize yourself with the meaning of these symbols:



Explosive



Flammable



Oxidizing



Skin
Irritation



Pollution



Corrosive



Compressed



NFPA safety diamond

NFPA diamonds are often used as well




NFPA Rating Explanation Guide

HEALTH HAZARD

- 4 = Can be lethal
- 3 = Can cause serious or permanent injury
- 2 = Can cause temporary incapacitation or residual injury
- 1 = Can cause significant irritation
- 0 = No hazard

FLAMMABILITY HAZARD

- 4 = Will vaporize and readily burn at normal temperatures
- 3 = Can be ignited under almost all ambient temperatures
- 2 = Must be heated or high ambient temperature to burn
- 1 = Must be preheated before ignition can occur
- 0 = Will not burn

- ALK = Alkaline
- ACID = Acidic
- COR = Corrosive
- OX = Oxidizing
-  = Radioactive
-  = Reacts violently or explosively with water
-  = Reacts violently or explosively with water and oxidizing

- 4 = May explode at normal temperatures and pressures
- 3 = May explode at high temperature or shock
- 2 = Violent chemical change at high temperatures or pressures
- 1 = Normally stable. High temperatures make unstable
- 0 = Stable

SPECIAL HAZARD

INSTABILITY HAZARD

This chart for reference only - For complete specifications consult the NFPA 704 Standard



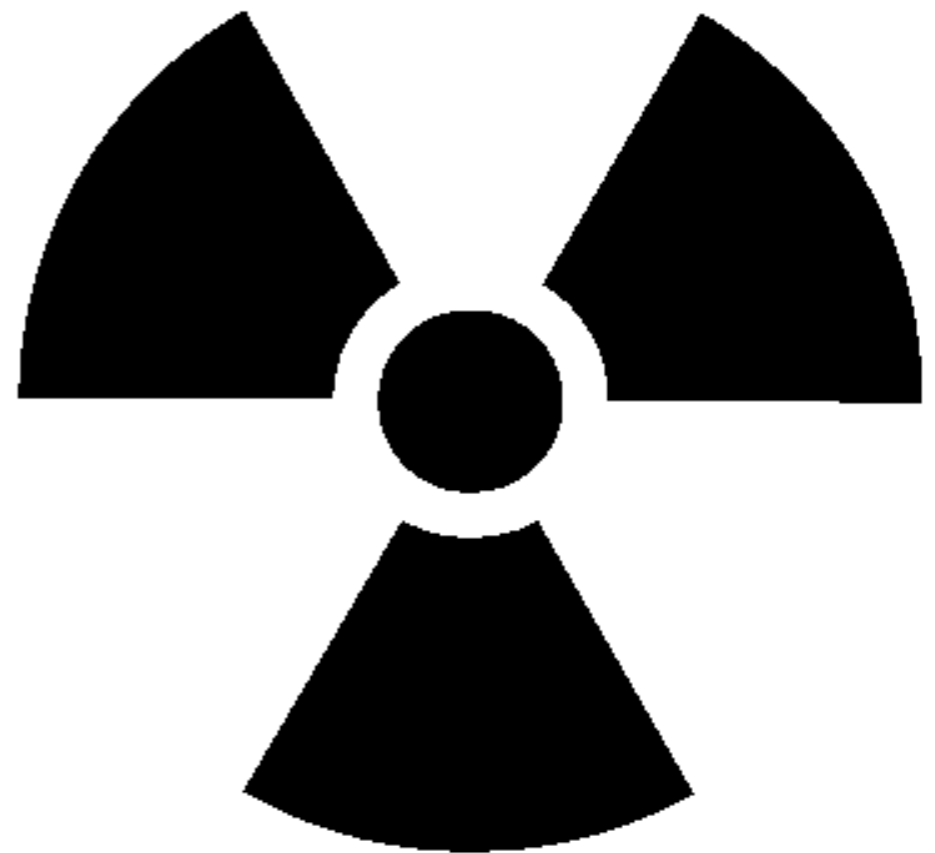
Special labels

Do not bring anything with such label to the Open Wetlab

BIOHAZARD



DANGER



**RADIOACTIVE
MATERIAL**



MSDS

- Material Safety Data Sheets come with every chemical and contain information about all safety aspects such as:
 - Procedures for safe handling
 - Physical Data
 - Melting point
 - Boiling point
 - Toxicity
 - Reactivity
 - Storage
 - First aid procedure
- Read the MSDS before you use any chemical!





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Waste Disposal



Waste disposal

- Think of how to dispose of things before you bring it into the lab



Biological Waste

You are responsible for killing anything you grow:

- Kill of any culture with 10% hypochlorite bleach
 - Incubate for 24h before disposal
- Clean any used surface and object with 70% ethanol (red capped bottles)
- Autoclave for 20 minutes





Broken glassware

- Do NOT dispose in the normal trash bin
- Special “broken glass” container
- Use broom to clean up, because you can easily cut yourself





Chemical waste

- Check what is allowed to store in the lab with the labmanager
- Check what is allowed to go down the sink with the labmanager

- Do NOT mix / bomb guide:
 - Concentrated Acids and Bases
 - Oxidizers and Flammables
 - Water reactive substances and aqueous solutions
 - Cyanides and acids => cyanide gas
 - Bleach and acids => chloride gas

- Search for reactivity on the internet!
- Read the MSDS before using a chemical!



some

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