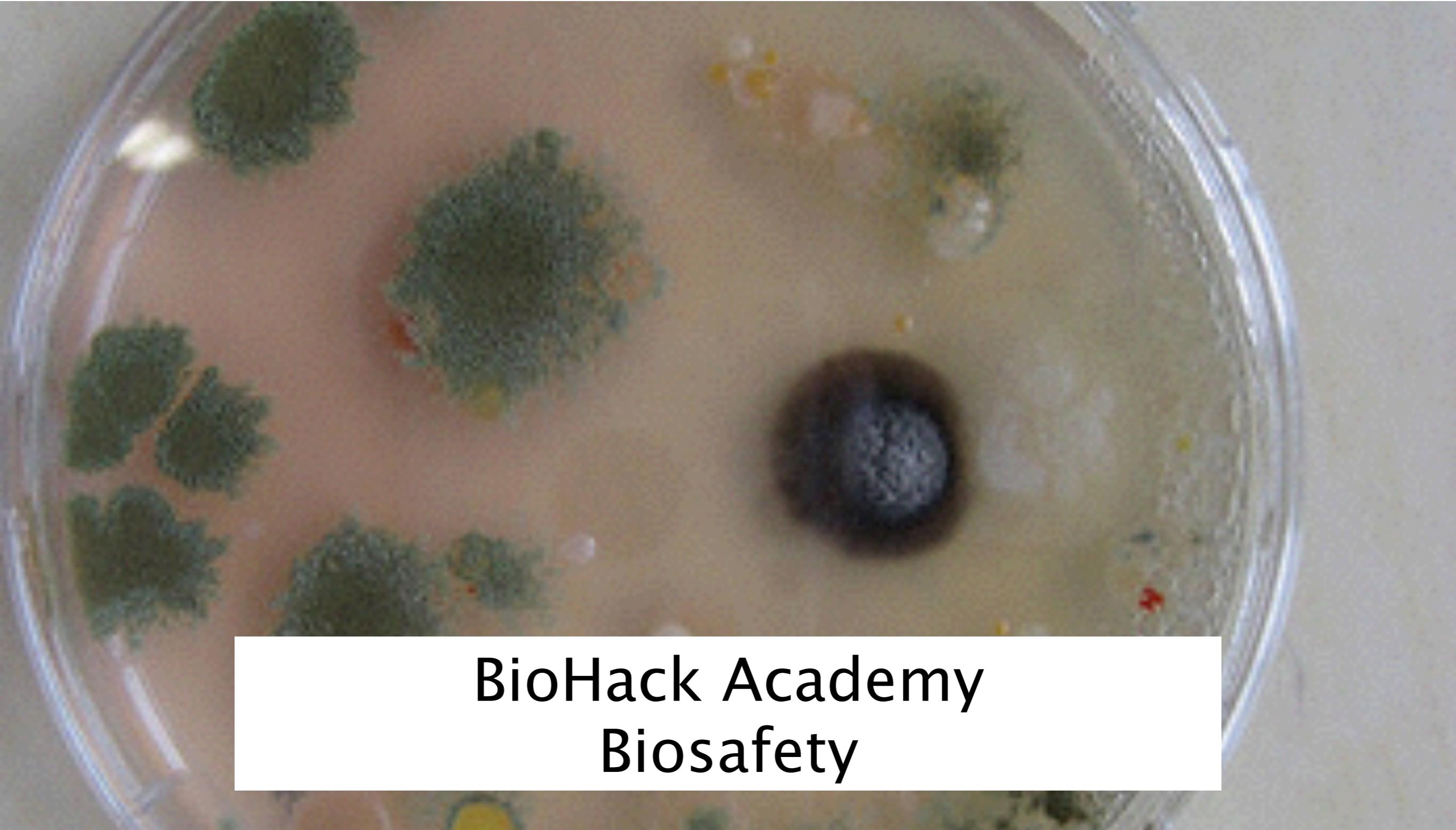


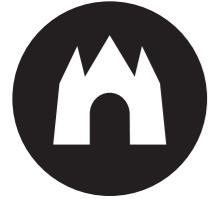


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**BioHack Academy
Biosafety**



Importance of safety

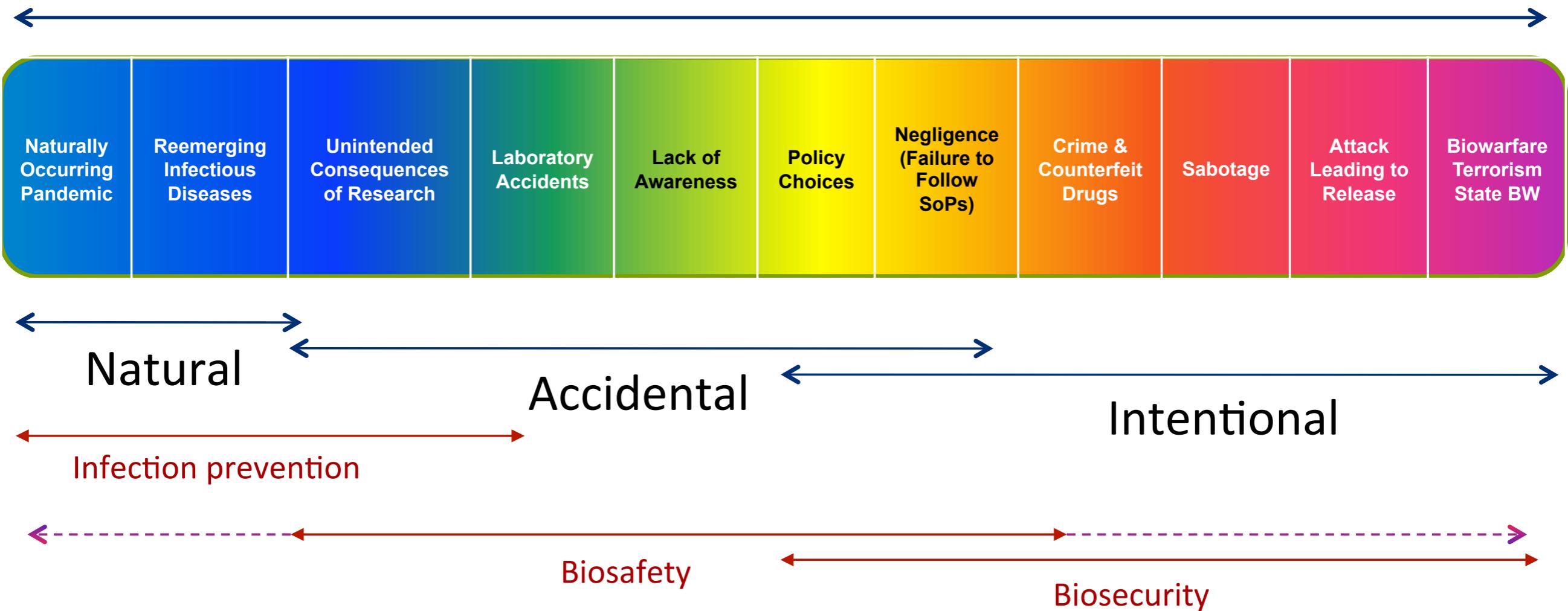
Safe procedures protect:

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

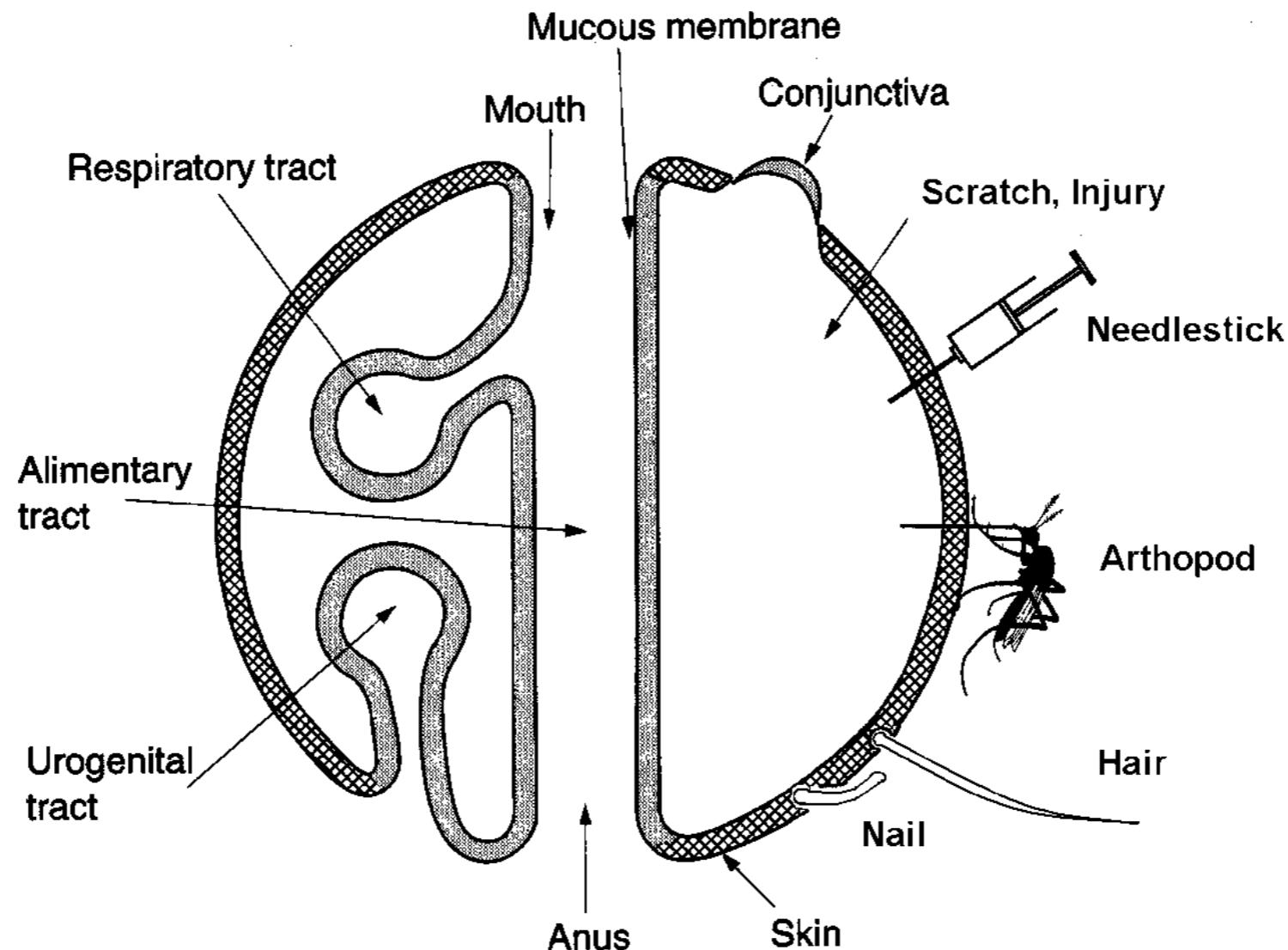


Figure 2.1 Routes of infection: the body's portals of entry of microbes. (From Mims, 1982, by permission of Academic Press)



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





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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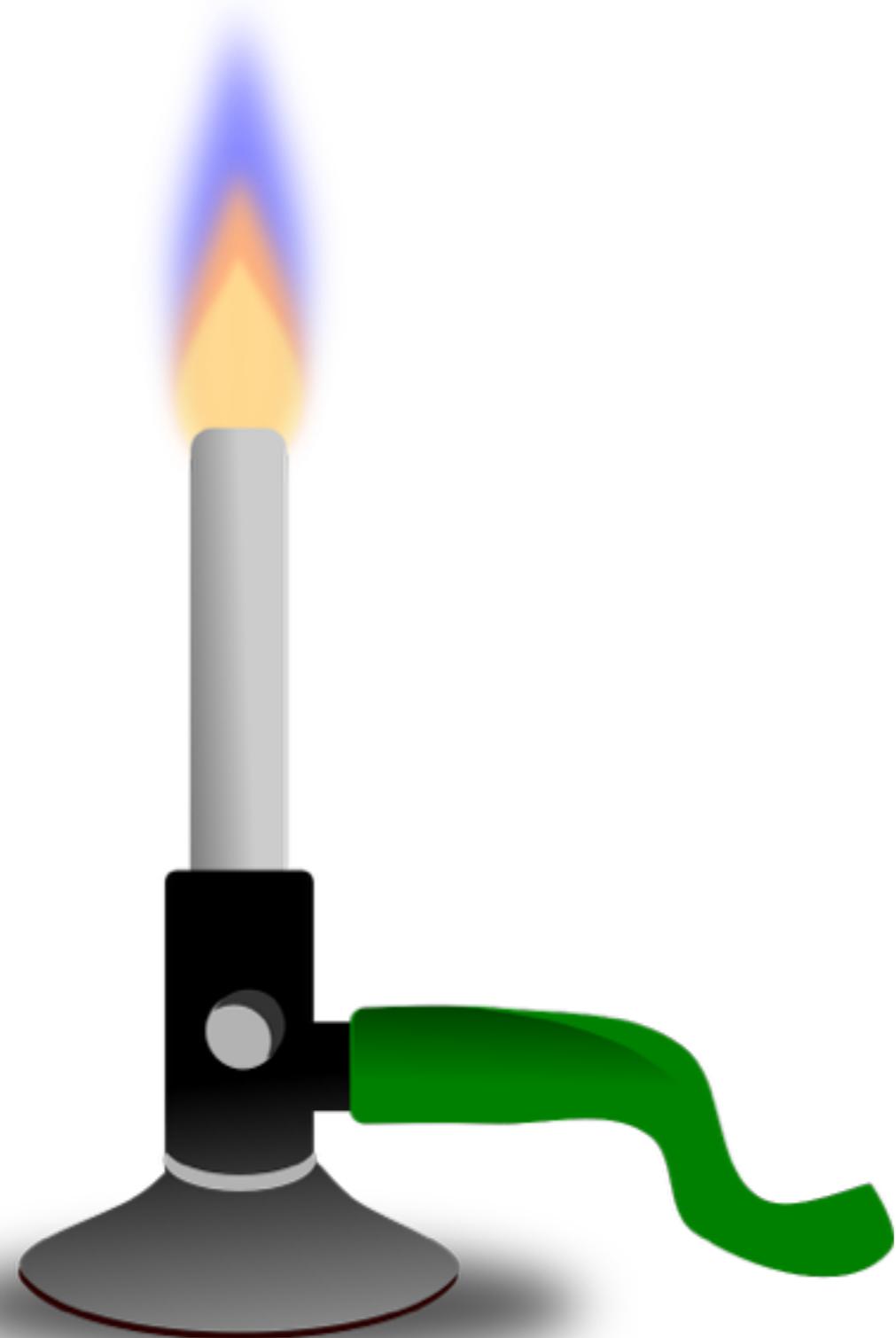
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Personal Protection

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
- Even after wearing gloves



Arlington County - CC-BY-SA-2.0



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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

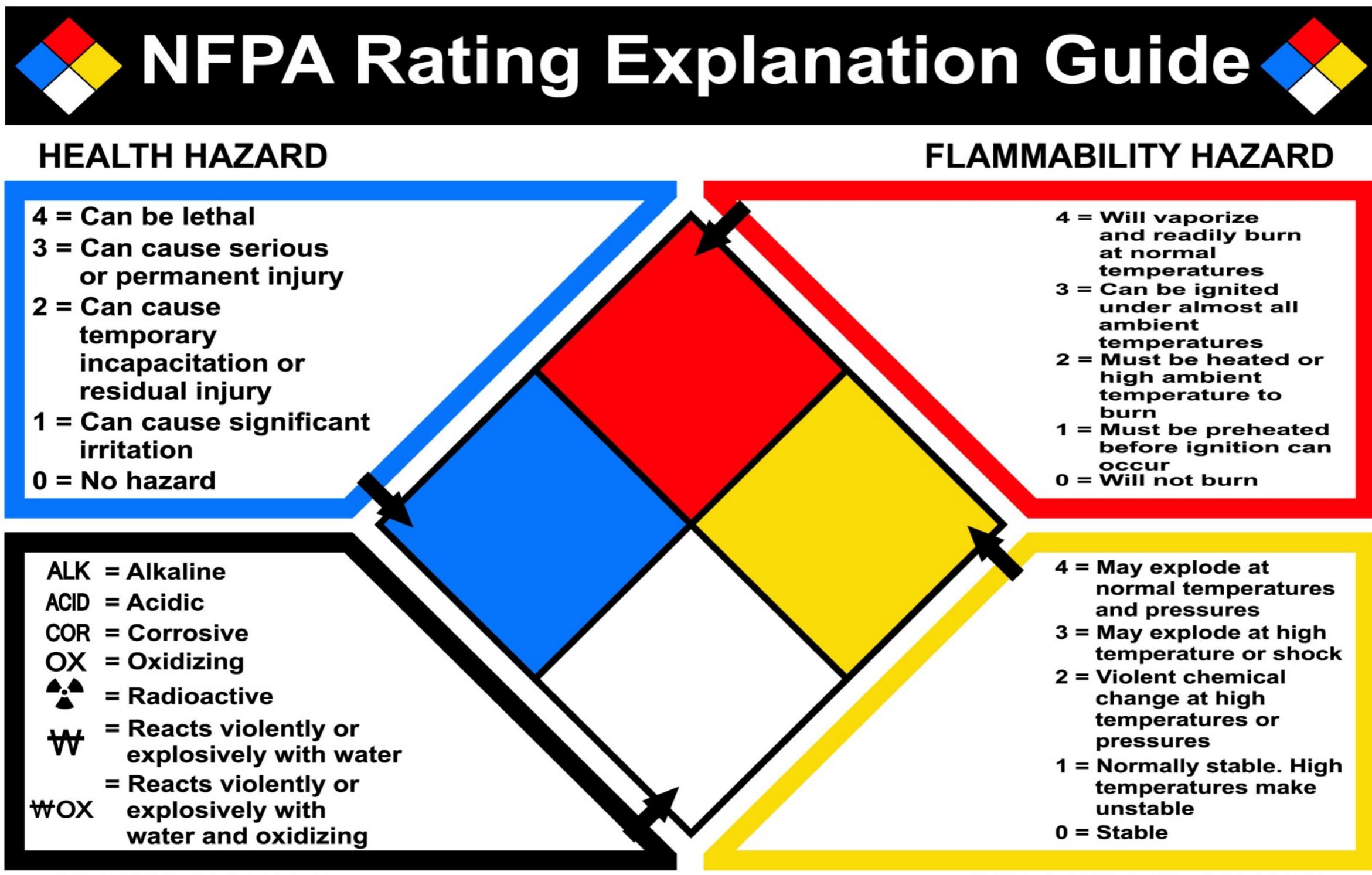


Compressed



NFPA safety diamond

NFPA diamonds are often used as well



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



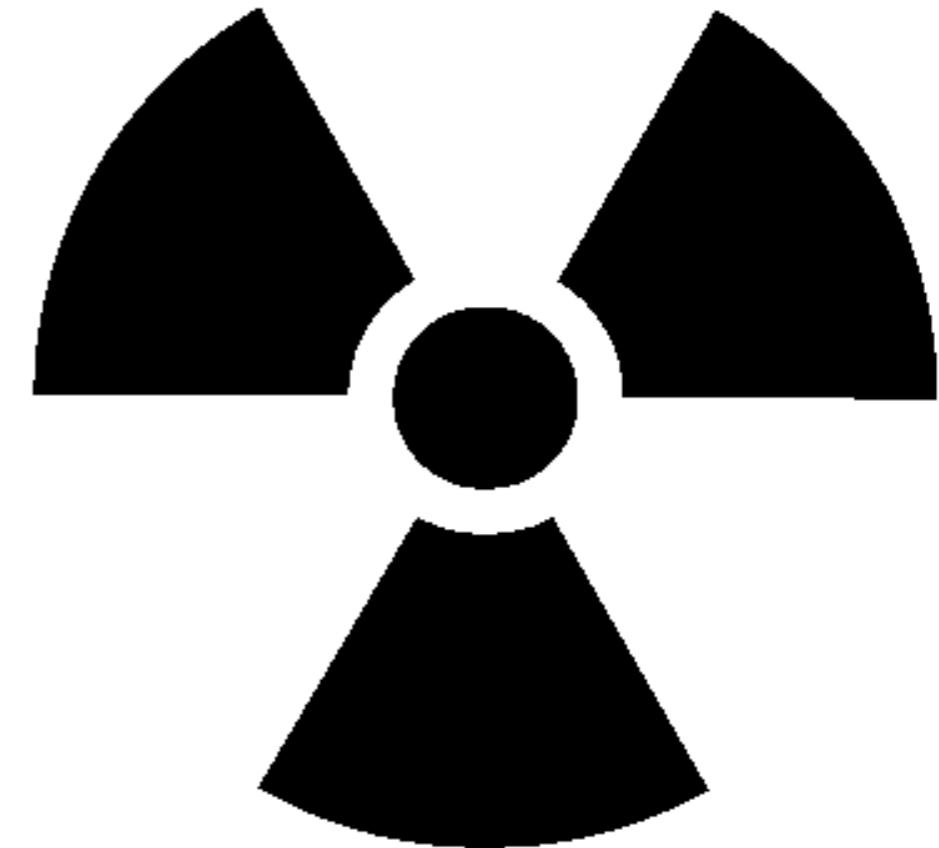
Special labels

Do not bring anything with such label to the lab

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 off 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!



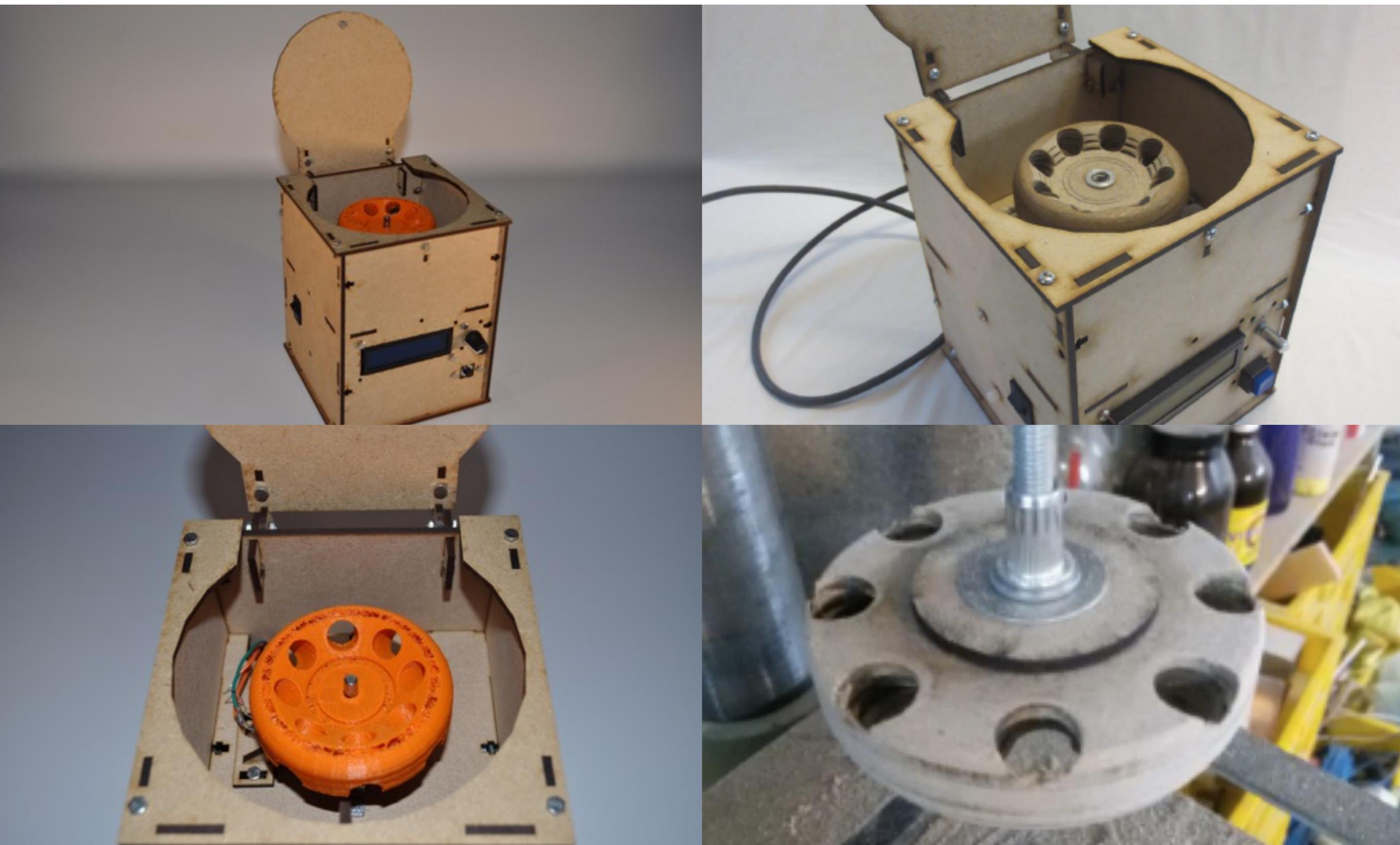
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BioHacker Ethics



Responsibility?





DIYBio Code of Ethics

Transparency

Emphasize transparency and the sharing of ideas, knowledge, data and results.

Safety

Adopt safe practices.

Open Access

Promote citizen science and decentralized access to biotechnology.

Education

Help educate the public about biotechnology, its benefits and implications.

Modesty

Know you don't know everything.

Community

Carefully listen to any concerns and questions and respond honestly.

Peaceful Purposes

Biotechnology must only be used for peaceful purposes.

Respect

Respect humans and all living systems.

Responsibility

Recognize the complexity and dynamics of living systems and our responsibility towards them.

Accountability

Remain accountable for your actions and for upholding this code.



Fear





Errorarium – Adam Zaretsky





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