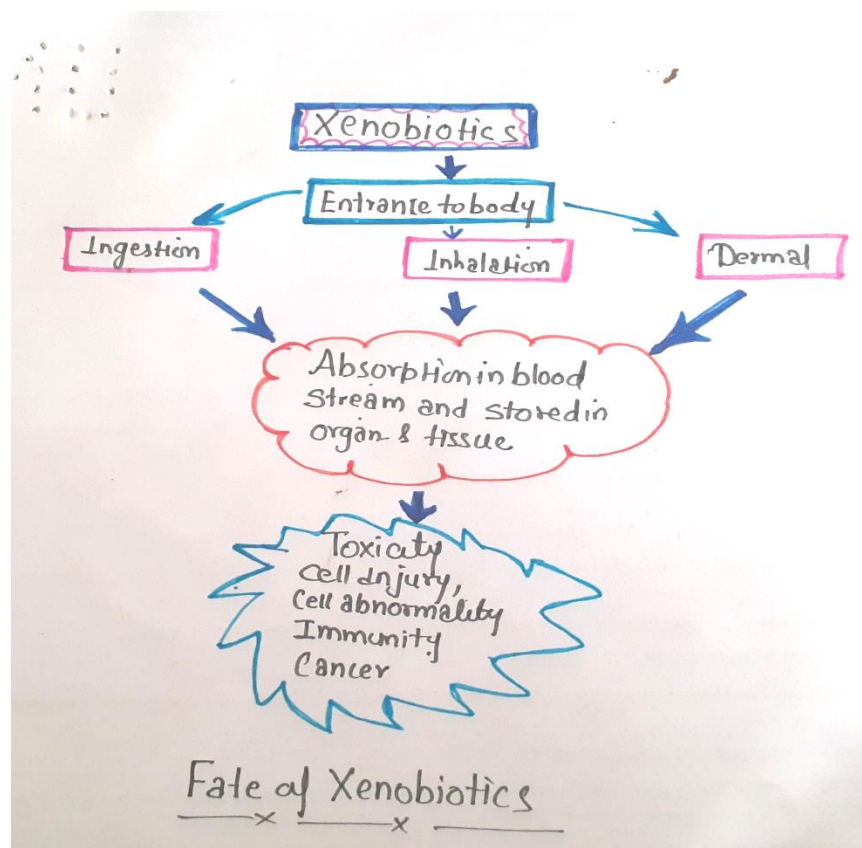


BIODEGRADATION OF XENOBIOTICS

1. It is derived from a greek word "XENOS" meaning 'foreign or strange
2. Xenobiotics are those chemicals which are man-made and do not occur naturally in nature.
3. They are usually synthesized for industrial or agricultural purposes e.g. aromatics, pesticides, hydrocarbons, plastics , lignin etc.
4. They are also called RECALCITRANTS as they can resist degradation to maximum level

SOURCES OF XENOBIOTICS

1. **Petrochemical industry** -oil/gas industry, refineries. - produces basic chemicals e.g. vinyl chloride and benzene
2. **Plastic industry** - closely related to the petrochemical industry - uses a number of complex organic compounds -such as anti-oxidants, plasticizers, cross-linking agen.
3. **Pesticide industry** - most commonly found. -structures are benzene and benzene derivatives,
4. **Paint industry** - major ingredient are solvents, - xylene, toluene, methyl ethyl ketone, methyl
5. **Others-** Electronic industry, Textile industry, Pulp and Paper industry, Cosmetics and Pharmaceutical industry, Wood preservation etc.



- A. BIODEGRADATION OF PESTICIDES-** E.g. Thirum (fungicide) is degraded by a strain of *Pseudomonas* and the degradation products are dimethylamine, proteins, sulpholipids, etc
- B. BIODEGRADATION OF PLASTICS-** The process of breaking these chains and dissolving the polymers into smaller fragments is called hydrolysis. E.g. *Pseudomonas* sps. Further breakdown of the remaining components by acidogenic (fermentative) bacteria into ammonia, ethanol, carbon dioxide, and hydrogen sulfide. E.g. *Streptococcus acidophilus*
- C. BIODEGRADATION OF PETROLEUM-** Petroleum compounds are categorized into 2 groups
1. Aliphatic hydrocarbon (alkane, alcohol, aldehyde) are degraded aerobically.
 2. Aromatic hydrocarbons (benzene, phenol, toluene, catechol) are degraded anaerobically.
- D. POLYCHLORINATED BIPHENYLS (PCBs)-** Synthesized chemicals from petro-chemical industry used as lubricants and insulators in heavy industry. ***Aspergillus niger***- filamentous with cytochrome p450 that attacks lower chlorinated PCB **Soil bacteria** breaks down PCBs via dioxygenase pathways. Most identified seem to be *Pseudomonas* species, *Achromobacter*, *Acinetobacter*, *Alcaligenes*, *Arthrobacter*, *Corynebacterium*, *Rhodococcus*, *Burkholderia* .