

Excretory Products and their Elimination



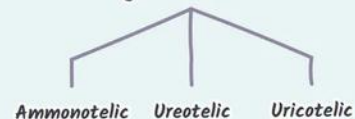
nitrogen leaves the body in one of three chemical forms, and the kidney is only one of the organs that manage it

Why nitrogenous waste needs a strategy

- protein and nucleic acid breakdown releases nitrogen, mainly as toxic ammonia, which the body must remove or convert
- how an animal handles that ammonia depends heavily on how much water it can afford to spend
- three chemical strategies exist, each a different trade between toxicity and water cost

Three modes of nitrogen excretion

Nitrogenous wastes



the three chemical forms nitrogen leaves the body in. Each name marks the exact compound excreted, ammonia, urea or uric acid

Each strategy, one line

Ammonotelic

excretes ammonia directly, needs large volumes of water; most bony fish, aquatic amphibians

Ureotelic

converts ammonia to less toxic urea in the liver before excreting it; humans and most mammals

Uricotelic

converts ammonia to nearly insoluble uric acid, excreted as a paste, minimal water lost; birds, reptiles, insects

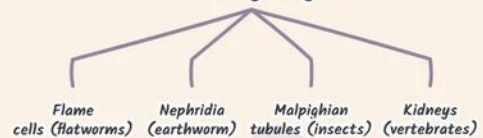
Modes of excretion across the animal kingdom



- not every animal uses a kidney: the organ that filters wastes differs by group, though the underlying job, removing metabolic waste, stays the same
- protonephridia (flame cells) in flatworms, nephridia in annelids like the earthworm, malpighian tubules in insects, and kidneys in vertebrates are each a different solution to the same problem

One job, four different organs

Excretory organs



four different structures, one shared job: filtering nitrogenous waste out of the body fluid

