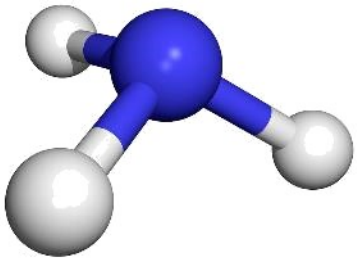
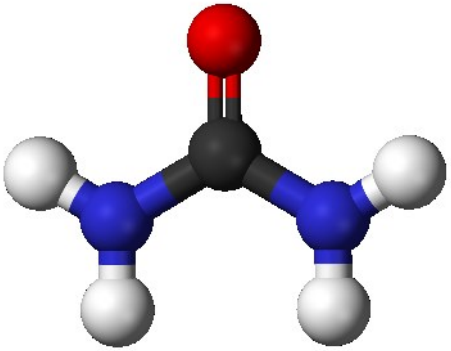
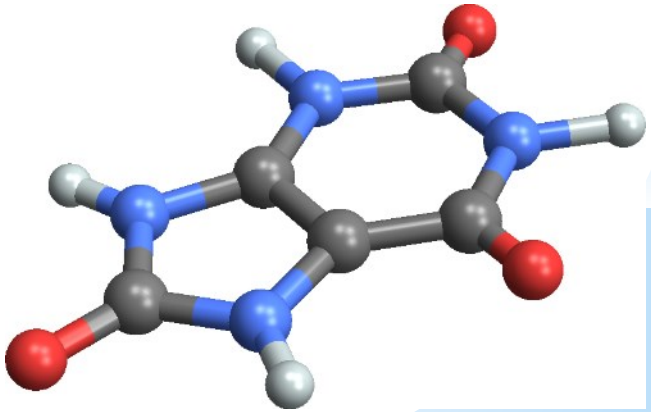
Excretion of nitrogenous compounds

Ammonia, urea and uric acid







Three nitrogenous waste products

All animals have to excrete waste products in some form.
Nitrogenous waste comes from the breakdown of proteins (the amine group in amino acids) and it is particularly important to excrete because it is toxic.

Compound	Chemical Formula	Toxicity	Water Solubility	Animals
Ammonia	NH_3	High	High	Aquatic Animals
Urea	$(NH_2)_2CO$	Moderate	Moderate	Terrestrial Animals
Uric Acid	$C_5H_4N_4O_3$	Low	Low	Reptiles and Birds

Ammonia

Aquatic invertebrates, fish and larval amphibians (e.g. tadpoles) excrete ammonia.

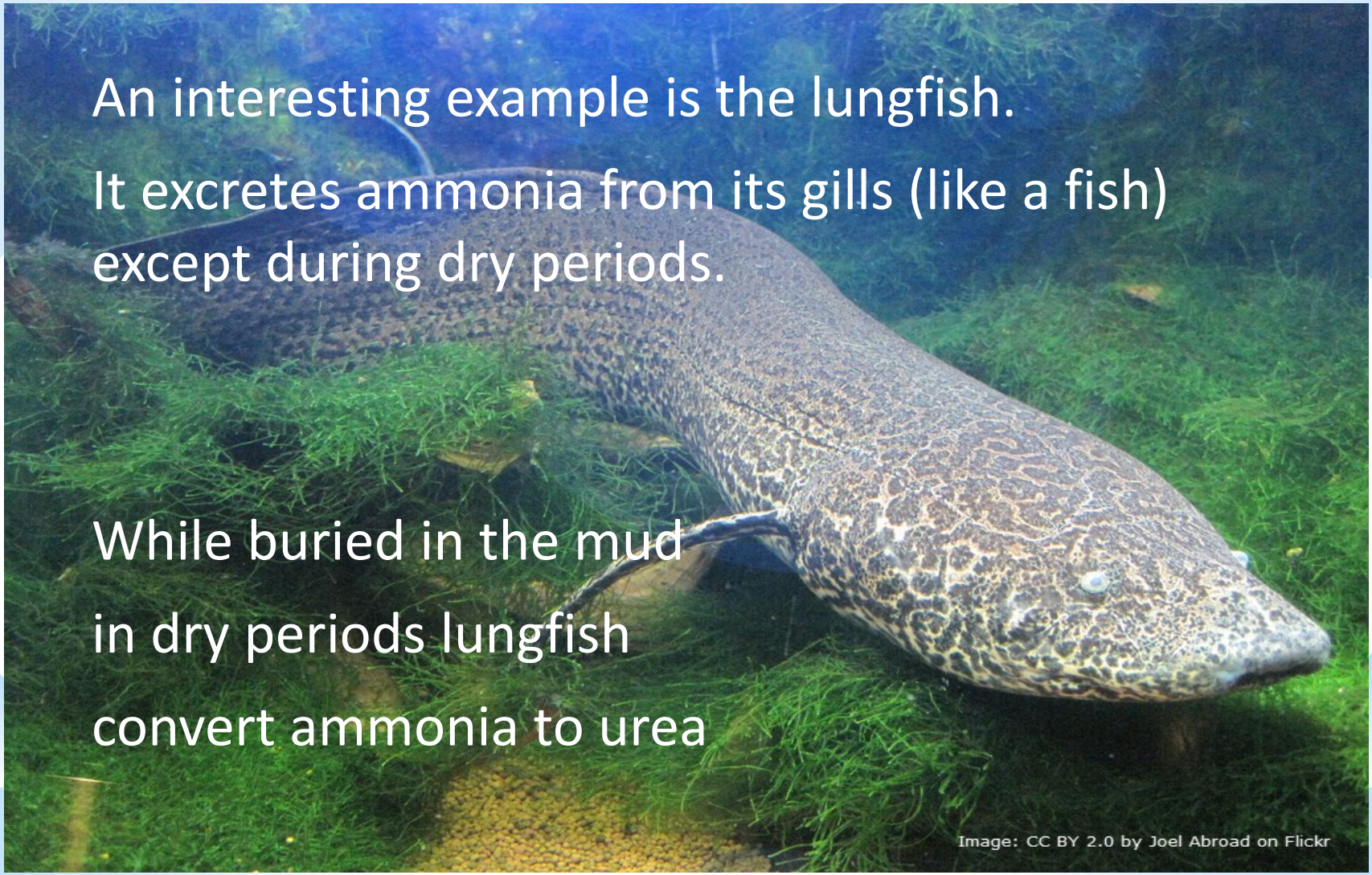
This can be done quickly as there is a lot of water in the environment and ammonia is very soluble.

Terrestrial animals

When terrestrial animals began to evolve they had to conserve water.

Most land animals convert ammonia to urea or uric acid which require less water for excretion and they are less toxic than ammonia.

Lungfish and amphibians



An interesting example is the lungfish.

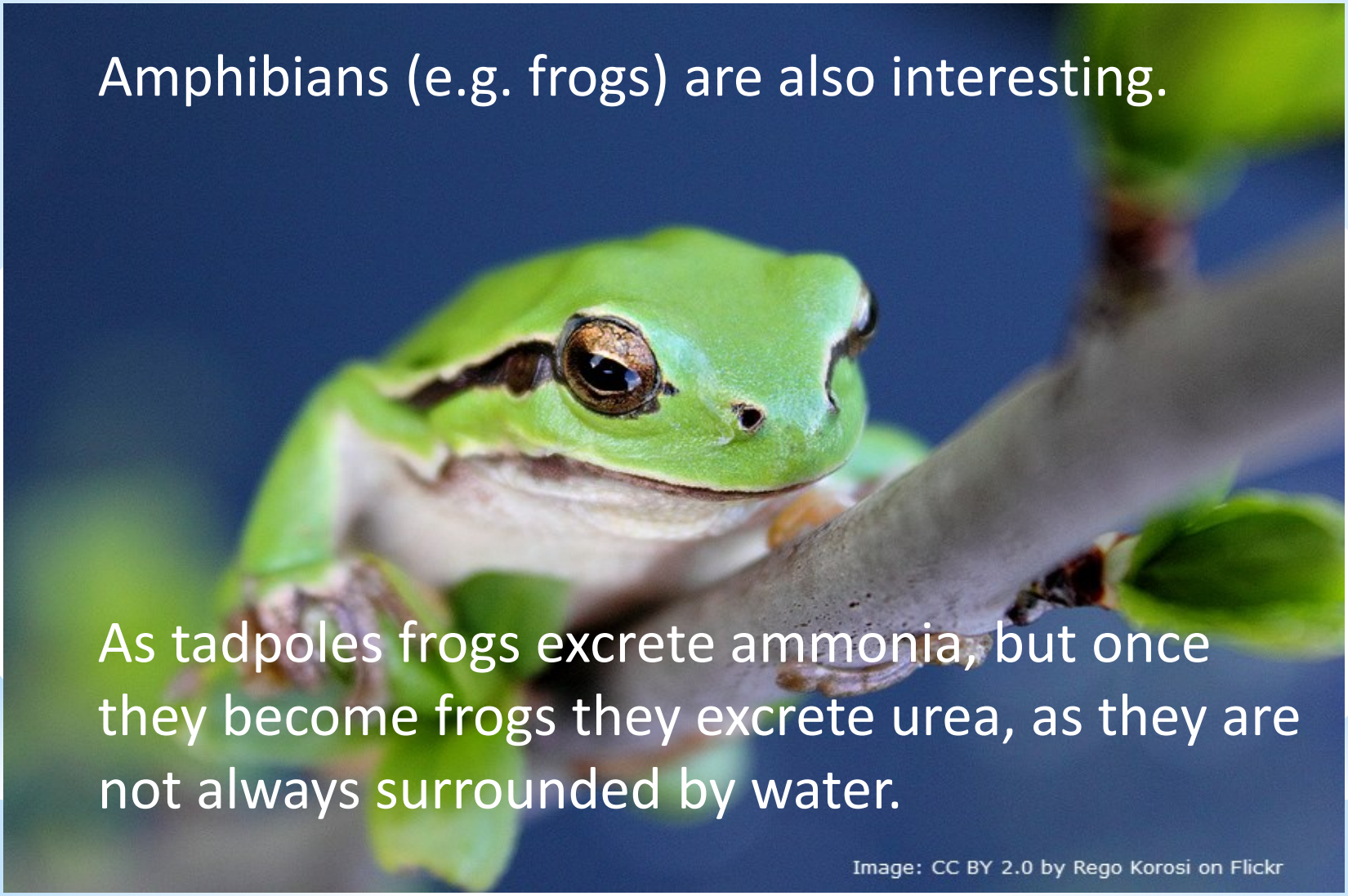
It excretes ammonia from its gills (like a fish) except during dry periods.

While buried in the mud

in dry periods lungfish

convert ammonia to urea

Amphibians


Amphibians (e.g. frogs) are also interesting.
As tadpoles frogs excrete ammonia, but once they become frogs they excrete urea, as they are not always surrounded by water.
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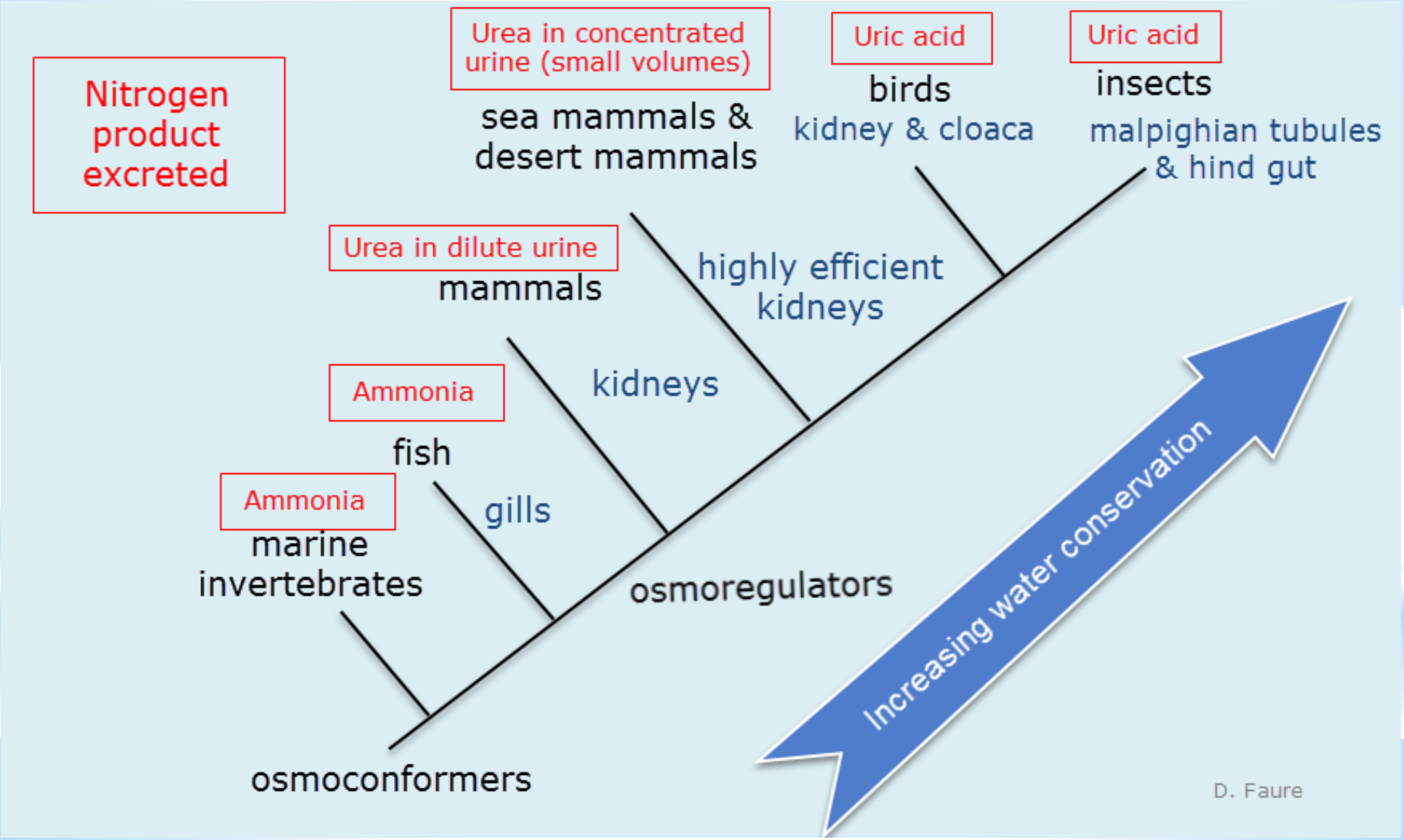
Increasing water conservation



References

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