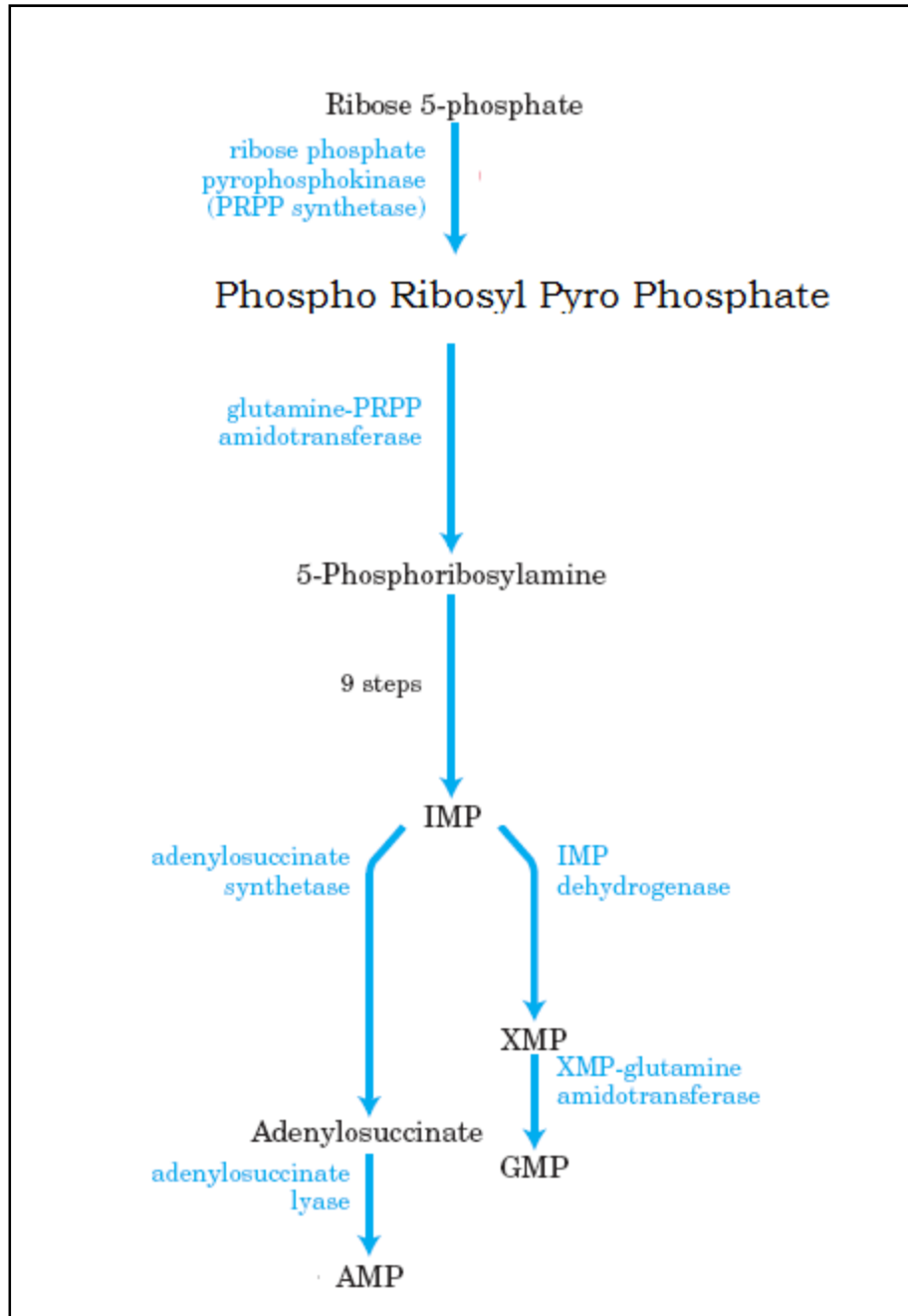


BIOSYNTHESIS OF NUCLEOTIDES

The nucleotides are synthesized by two pathways viz. *De-Novo* Pathway: this pathway leads to synthesis of nucleotides from the precursors namely amino acids (Glutamic acid and Aspartic acid), ribose-5-phosphate, CO_2 , NH_3 .

Salvage pathway: Synthesis of nucleotides by recycling free bases and nucleotides released from nucleic acid breakdown (or simply DNA or RNA degradation).

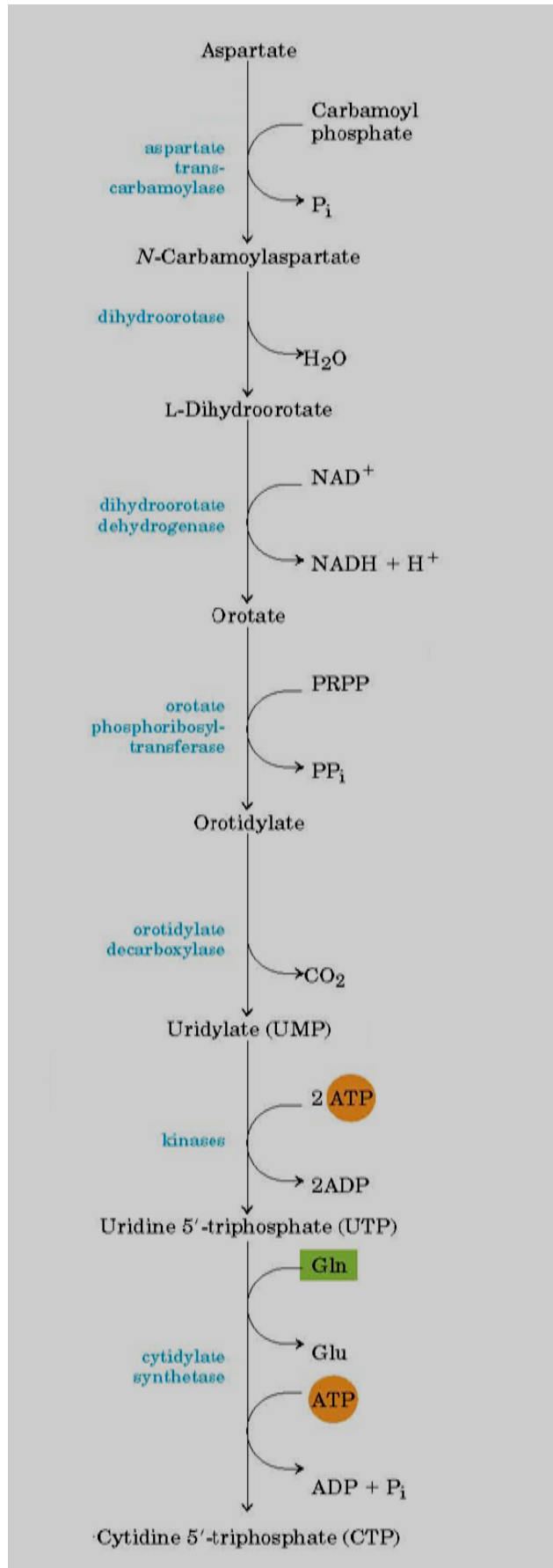
De Novo SYNTHESIS OF PURINES

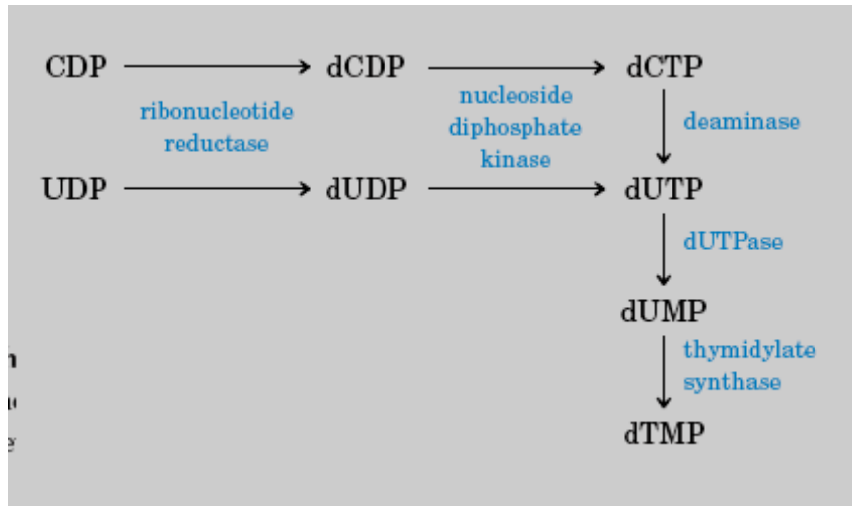


IMP stands for Inosine Monophosphate, XMP stands for Xanthine Monophosphate.

SYNTHESIS OF PYRIMIDINES:

Aspartic acid is the precursor of pyrimidine synthesis. The ribonucleotides are converted to deoxy-ribonucleotides by the enzyme Ribonucleotide Reductase.





SALVAGE PATHWAY

The free purines and pyrimidines bases are constantly released in cells during metabolic degradation of nucleotides. These free bases are reused to make nucleotides, in a pathway much simpler than *de Novo* pathway. The enzymes required for this pathway are phosphoribosyl transferases. This group of enzymes join free nitrogenous bases to ribose sugar making a nucleotide.

Ex.

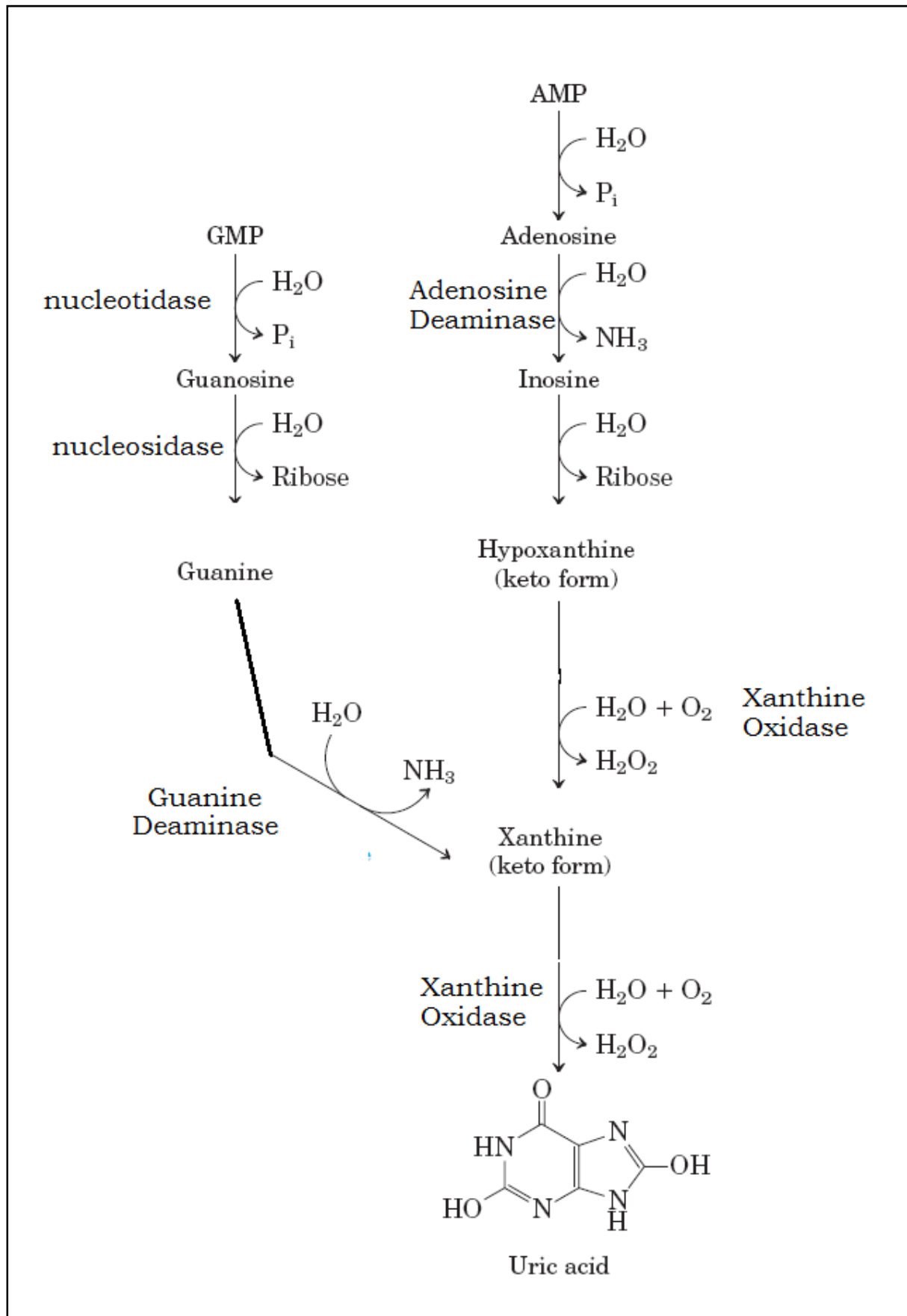
1. Adenosine phosphoribosyl transferase catalyses the reaction of free adenine base and phosphor-ribosyl pyro-phosphate (PRPP).
$$\text{Adenine} + \text{PRPP} \longrightarrow \text{AMP} + \text{PP}_i$$
2. Hypoxanthine Guanine Phosphoribosyl Transferase makes GMP from free Guanine base.
$$\text{Guanine} + \text{PRPP} \longrightarrow \text{GMP} + \text{PP}_i$$

DEGRADATION OF PURINES AND PYRIMIDINES

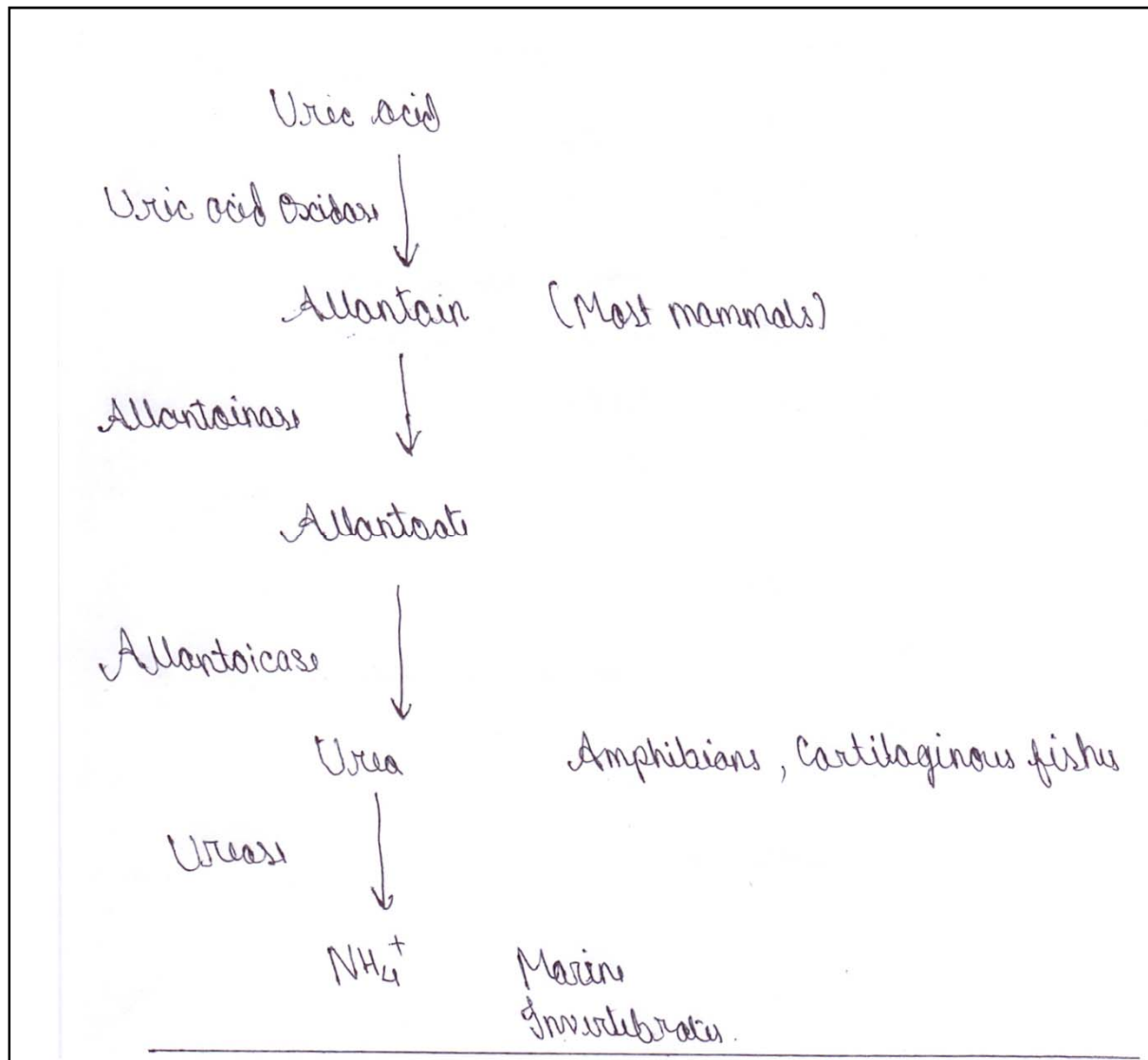
DEGRADATION OF PURINES:

The purine nucleotides are degraded in following steps:

1. Removal of phosphate group by nucleotidase. This converts nucleotide to nucleoside.
2. The ribose sugar is removed by nucleosidase. This separates the purine base from ribose sugar.
3. *The ultimate product of purine degradation is uric acid.*



The uric acid is excreted as such by reptiles, birds, primates and insects.



DEGRADATION OF PYRIMIDINES:

The degradation of pyrimidines generally leads to production of ammonia which is further converted to urea. The degradation of thymine nucleotide is shown below.

