

Protein Metabolism

Amino acids from ingested protein

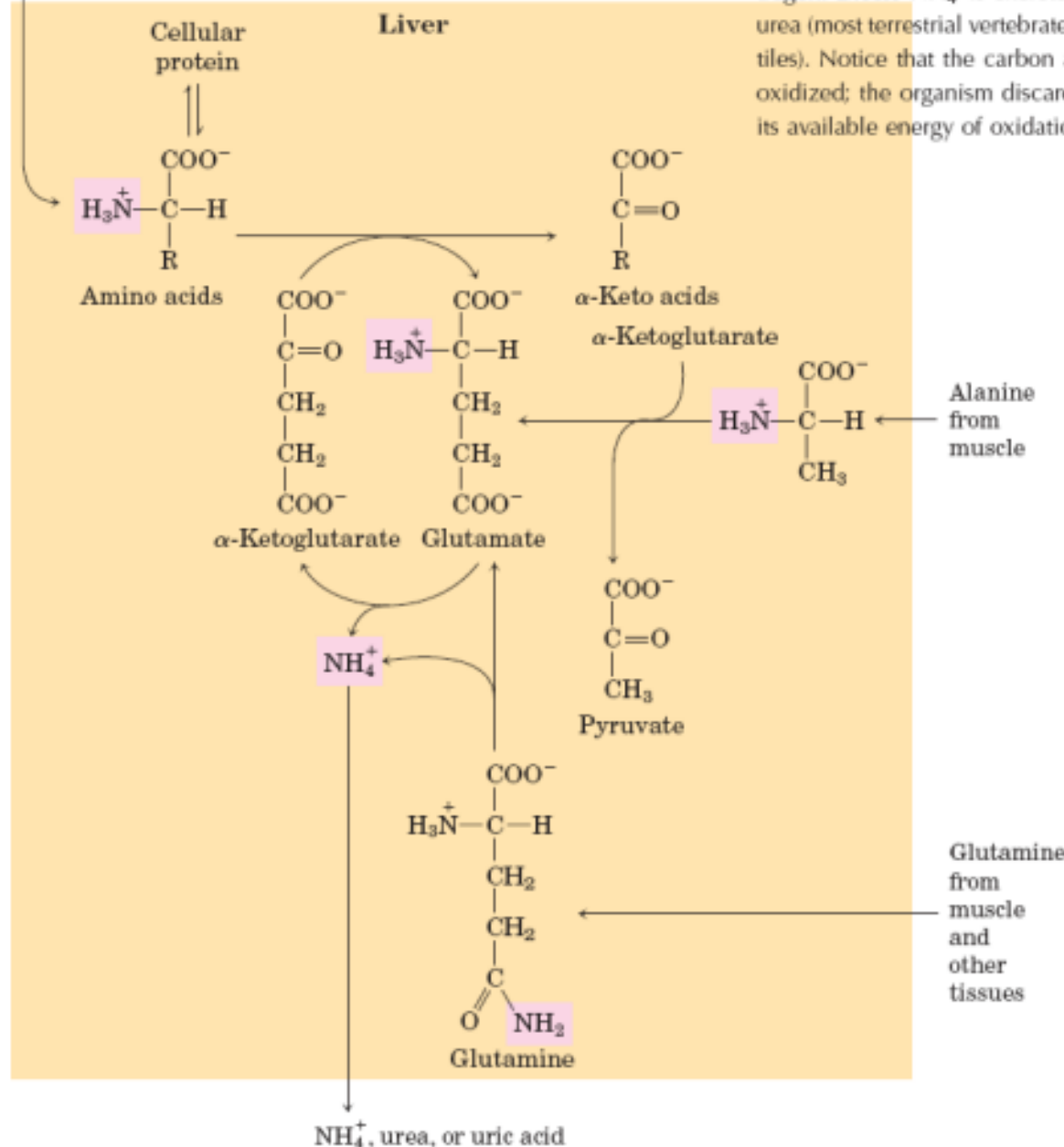
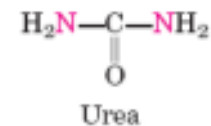


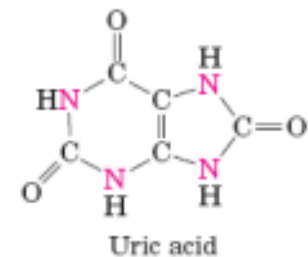
FIGURE 18-2 Amino group catabolism. (a) Overview of catabolism of amino groups (shaded) in vertebrate liver. (b) Excretory forms of nitrogen. Excess NH_4^+ is excreted as ammonia (microbes, bony fishes), urea (most terrestrial vertebrates), or uric acid (birds and terrestrial reptiles). Notice that the carbon atoms of urea and uric acid are highly oxidized; the organism discards carbon only after extracting most of its available energy of oxidation.

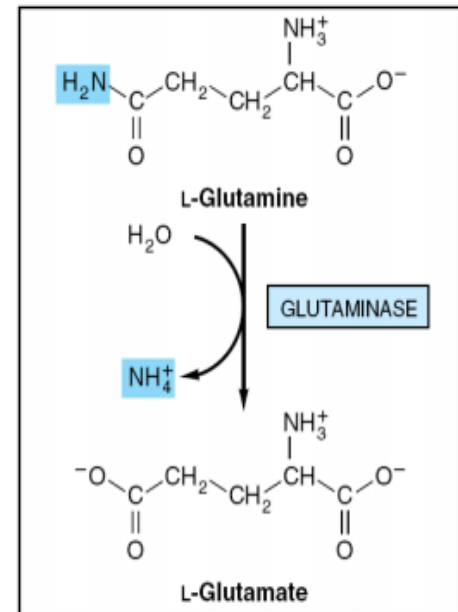
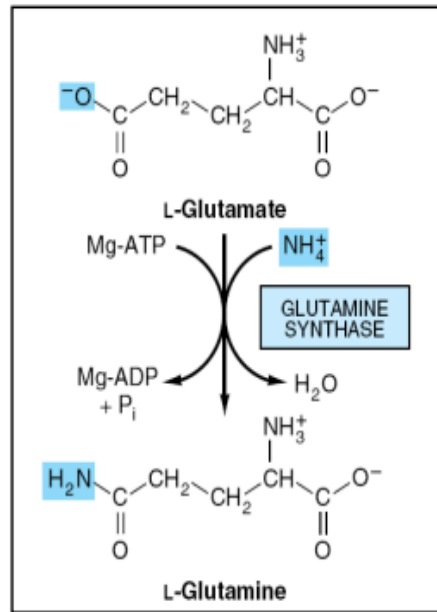
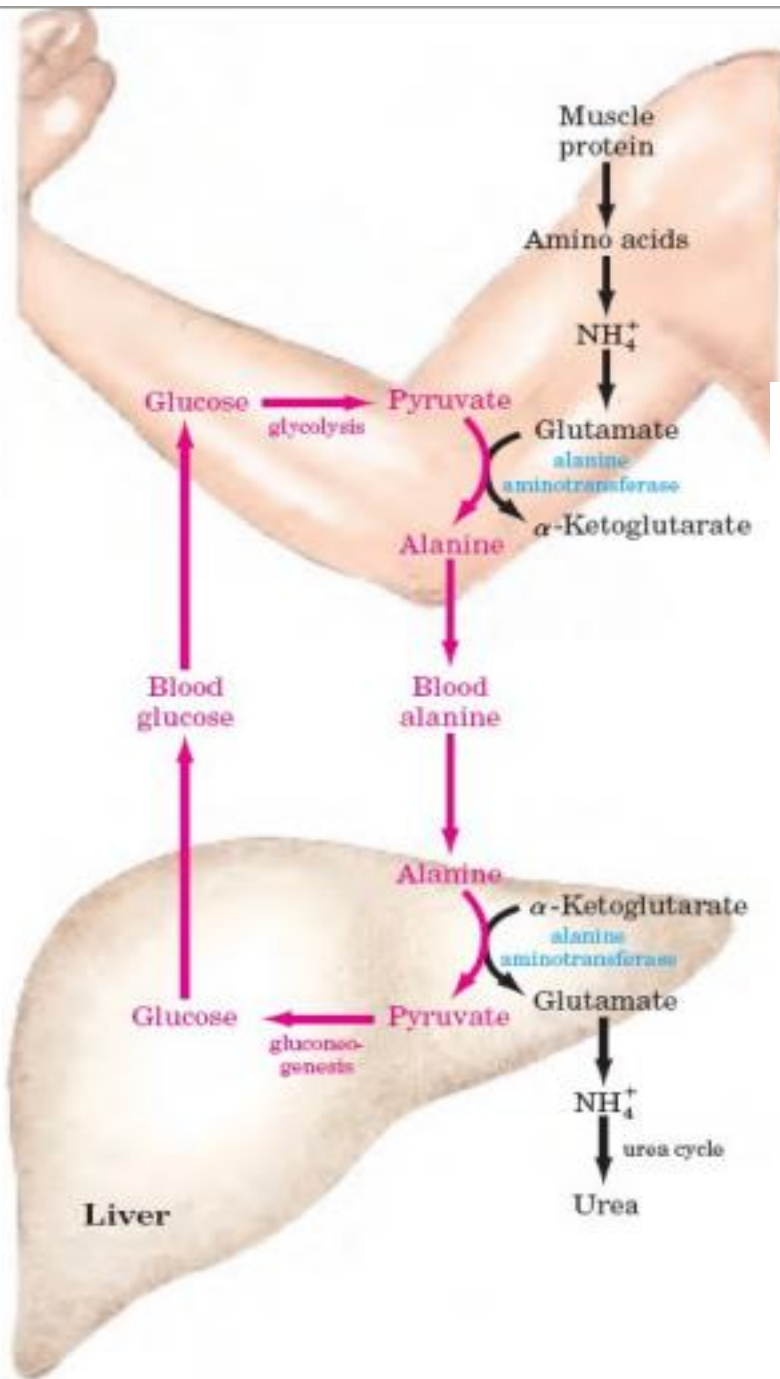


Ammonotelic animals: most aquatic vertebrates, such as bony fishes and the larvae of amphibia

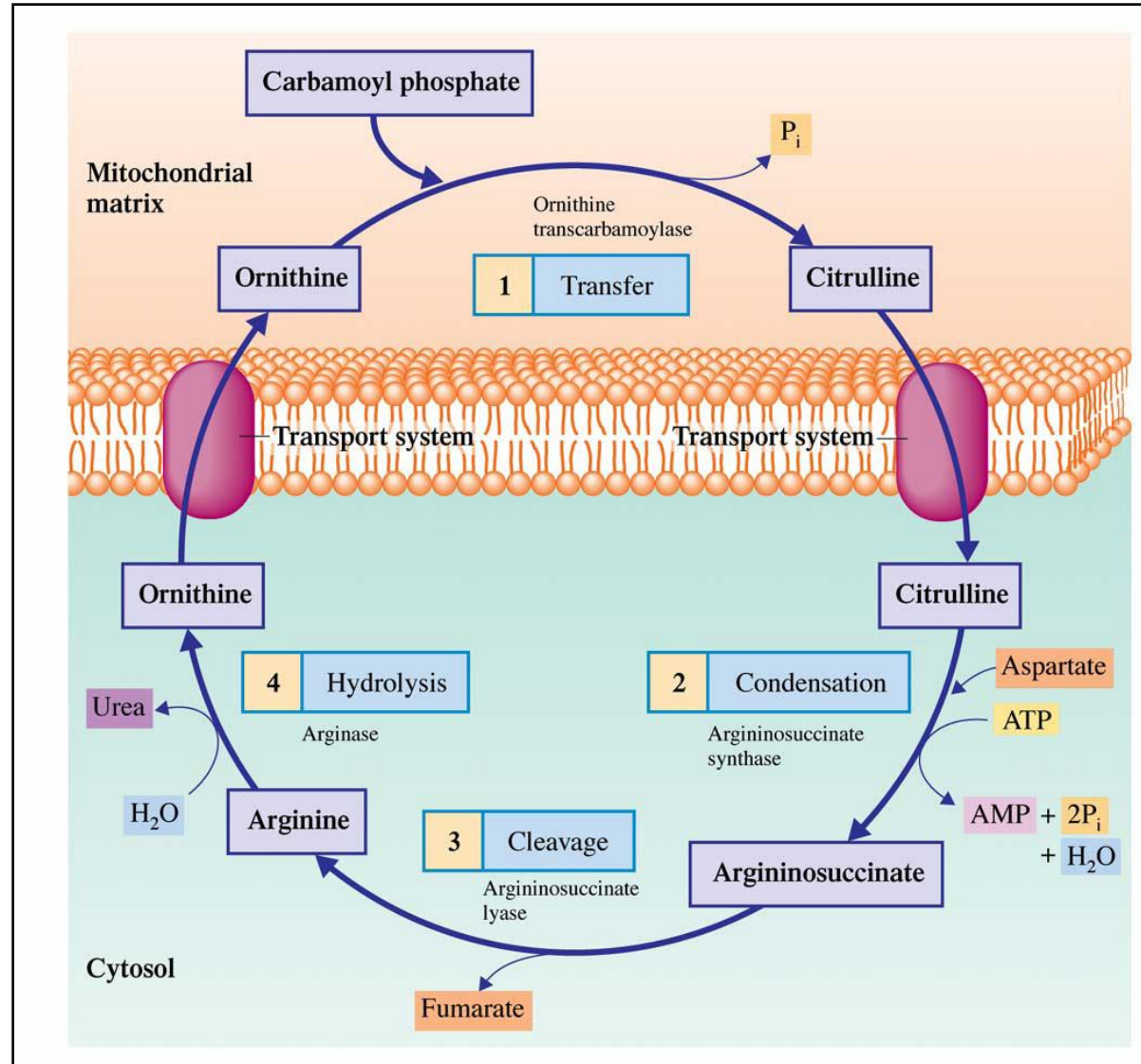


Ureotelic animals: many terrestrial vertebrates; also sharks





The **four-step** urea cycle in which **carbamoyl phosphate** is converted to **urea**.



Fates of C skeletons of 20 amino acids.

