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Decompression sickness is an unresolved phenomenon.

A Possible Advantage for Pulmonary O2 Sequestration in Deep Dives

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Control of Water and Salt Balance in Terrestrial Animals

CHAPTER 29

Kidneys and Excretion (with Notes on Nitrogen Excretion)

Basic Mechanisms of Kidney Function

Primary urine is introduced into kidney tubules by ultrafiltration or secretion. The predominant regulatory processes in kidney function: After primary urine forms, solutes and water are recovered from it for return to the blood, and some solutes are added from the blood.

Urine Formation in Amphibians

The proximal convoluted tubule reabsorbs much of the filtrate—returning it to the blood plasma—without changing the osmotic pressure of the tubular fluid. The distal convoluted tubule can differentially reabsorb water and solutes, thereby regulating the ratio of water to solutes in the body fluids.

BOX 29.1 Quantity versus Concentration

BOX 29.2 Methods of Study of Kidney Function: Micropuncture and Clearance

ADH exerts an elaborate pattern of control over nephron function. The bladder functions in urine formation in amphibians. The amphibian excretory system has mechanisms to promote excretion of urea.

Urine Formation in Mammals

The nephrons, singly and collectively, give the mammalian kidney a distinctive structure.

Comparative anatomy points to a role for the loops of Henle in concentrating the urine. Countercurrent multiplication is the key to producing concentrated urine.

BOX 29.3 Countercurrent Multipliers versus Countercurrent Exchangers

The regulatory roles of the kidney tubules in overview: the concentrating and diluting kidney and the control of transitions. Modern molecular methods create new frontiers in the study of kidney function.

Urine Formation in Other Vertebrates

Freshwater and marine teleost fish differ in nephron structure and function. The reptiles other than birds have nephrons like those of amphibians, but birds have some mammalian-type nephrons.

Urine Formation in Decapod Crustaceans

Urine Formation in Molluscs

Urine Formation in Insects

The Malpighian tubules form and sometimes modify the primary urine. The hindgut modulates urine volume and composition in regulatory ways.

Nitrogen Disposition and Excretion

Ammonotelism is the primitive state. Urea is more costly to synthesize but less toxic than ammonia. Uric acid and related compounds remove nitrogen from solution.

BOX 29.4 Why Are Mammals Not Uricotelic?

CHAPTER 30

Water, Salts, and Excretion at Work: Mammals of Deserts and Dry Savannas

Desert and Dry-Savanna Environments

The Relations of Animals to Water

Large body size is a physiological advantage in terms of water costs. Coexisting species are diverse in their relations to drinking water. Water conflicts threaten animals and people. All species of large herbivores require considerable amounts of preformed water. Water and food resources in the deserts and dry savannas are often complex.

The Dramatic Adaptations of Particular Species

Oryxes represent the pinnacle of desert survival.

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