

## OUR PRIZE COMPETITION.

### DESCRIBE BRIEFLY THE STRUCTURE OF BONE. HOW IS BONE NOURISHED?

We have pleasure in awarding the prize this week to Miss Louise Aronovich, 2nd Western General Hospital, Leicester Road, Manchester.

#### PRIZE PAPER.

Bone is composed of organic and inorganic matter, and contains nearly 50 per cent. of water. In an adult the proportion of organic to inorganic matter is roughly 33 per cent. of the former, chiefly calcium phosphates, to 67 per cent. of the latter, chiefly collagen, though the proportion varies in different bones, and in the same bone at different ages.

The structure of bone appears to consist of two tissues—(a) compact, and (b) cancellous—whilst the ends of bone are covered by articular cartilage.

Bones are divided into long, short or irregular, and flat bones.

In long bones, such as the femur or humerus, the shaft consists almost entirely of a tube of compact bone surrounding a central canal known as the medullary canal, and normally filled with medulla, or marrow, which at each end gradually merges into loose, vascular, cancellous tissue. It is this cancellous tissue which, apart from maintaining the nutrition of bone, apparently effects the function of elaboration of the blood. In flat bones, such as the parietal, the compact tissue forms two plates, between which lies the cancellous tissue (known in the skull as diploe); and in short and irregular bones, such as the tarsus, a thin shield of compact tissue forms the outside, the interior being filled by cancellous tissue.

The marrow of bones is of two varieties:—(1) Red; (2) yellow.

Red marrow, which is highly vascular, is the tissue occupying the spaces of the cancellous tissue, and so maintains the nutrition of the spongy bone. Amongst the fat, marrow, and giant cells it contains are some coloured nucleated cells, called erythroblasts, from which the coloured corpuscles of the blood are developed. Yellow marrow, which consists of fat, colourless marrow cells, and blood vessels, fills the medullary cavity of long bones. The surface of bone, except where covered by articular cartilage, is ensheathed by an extremely vascular, closely adherent membrane. The dense tissue of the walls of the medullary cavity is traversed by a meshwork of narrow canals, lying parallel with the axis of the shaft.

These canals (Haversian) contain blood vessels, nerve filaments, and a little connective tissue.

The matrix or intercellular tissue is analogous to connective tissue, the ground substance being impregnated with lime salts.

Bone is nourished by (a) the nutrient artery, which passes through the nutrient foramen into the medullary cavity, and there breaks up into branches for the supply of the medulla, from which again small blood vessels are distributed to the interior of the bone. The articular extremities are pierced by other small blood vessels for the supply of the cancellous tissue, and thence extend into the Haversian cells. (b) By the periosteum, from which the small blood vessels pass perpendicularly through the small holes which exist on the surface of bone. These blood vessels also enter the Haversian cells, and thus complete communication is established between the two systems. By means of the lacunae (small irregular spaces) and canaliculi (very minute inter-communicating canals) peculiar to each Haversian system, the nutritive lymph exuded by the Haversian canals is distributed from place to place.

#### HONOURABLE MENTION.

The following competitors receive honourable mention:—Miss E. J. Steele, Miss A. B. Owen, Miss D. Stevenson, Miss L. Wilkin, Miss D. A. Woodward, Miss B. Barnes, Miss M. Forrest, Miss J. G. Gilchrist, Miss E. A. Noblett.

Miss E. A. Noblett writes:—A long bone is a hard, tough body, which is flexible and highly elastic within narrow limits, but readily breaks with a clean fracture if it is pressed too far. In early life the long bone is in three pieces, which unite as youth advances. The centre is a long piece of bone representing the shaft, and the piece at each end is known as the "epiphysis." These ends have a thin shell of ivory-like compact bone fashioned into a smooth articular surface covered with cartilage, which enables the relatively fixed end of the bone to play upon the corresponding surface of some other bone with which it is said to be articulated; while their interior is made up of spongy or cancellous tissue. In the spaces of this spongy bone is a red substance called "red bone marrow"; it is highly vascular. From these marrow cells large quantities of red blood-corpuscles are derived.

#### QUESTION FOR NEXT WEEK.

What would you do in the following emergencies while waiting the arrival of a physician:—(a) Apoplexy; (b) asphyxia from gas; (c) poisoning from an alkali?

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