Lectures on Anatomy and Physiology as Applied to Practical Nursing.*

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The diagram given in the last Lecture shows that the bony skeleton is designed essentially to carry all the other tissues of the body. The *Skull*, for instance, carries the brain, the *Spinal Column* carries the head, chest, and upper extremities, and contains the *Spinal Cord*, while, in its turn, it is borne by the lower extremities, the hip bones, thighs, legs, and feet.

It is worthy of notice also that the bones are so arranged as to form three distinct cavities in the body, which differ from each other in accordance with the duties which each has to perform. Thus the *Skull* is entirely composed of thick bones because its contents, the brain, do not alter in size and require to be most carefully protected from injury. The *Thorax* or chest is only surrounded by thin bones like hoops and closed in above and below by muscles, because the heart and lungs which fill the cavity are always expanding and contracting and so demand elasticity, whilst the extreme importance of the organs requires a certain amount of bony covering to diminish the chances of external injury.

In like manner, the abdominal and pelvic cavity is closed by muscles above where the processes of digestion demand the possibility of easy expansion, and partly closed by bones below where organs like the bladder and the womb are situated, which require more protection from external injury, more firm ligamentary support to fixed bony structures, and, at the same time, ample power of expansion. As we proceed with these Lectures, we shall frequently observe the wonderful simplicity of the mechanical arrangements of the human body—of which the constitution of the skeleton offers the first illustration.

Now, it is obvious to anyone who looks at the skeleton that there is an immense variety in the shape of the bones. Some are long, some are short; some are flat, some are rounded, and some are of no describable shape at all. For the purpose of these Lectures, we need not trouble ourselves at all about their shapes. But what we must most clearly understand and remember is that the *constitution* of the bones—wherever they may be and whatever their form—is always identically the same. Bony tissue, in fact always consists of a hard outer case, the body—which, in the case of long bones, is termed the *shaft*—and which is covered with a fibrous skin which is called the *periosteum*; and a hollow cavity which contains a fatty material that is popularly known as the "marrow." Through both the periosteum and marrow run the blood vessels which nourish the bone. There are two distinct parts in the constitution of bones; *compact* tissue which is dense and heavy, and *cancellous*

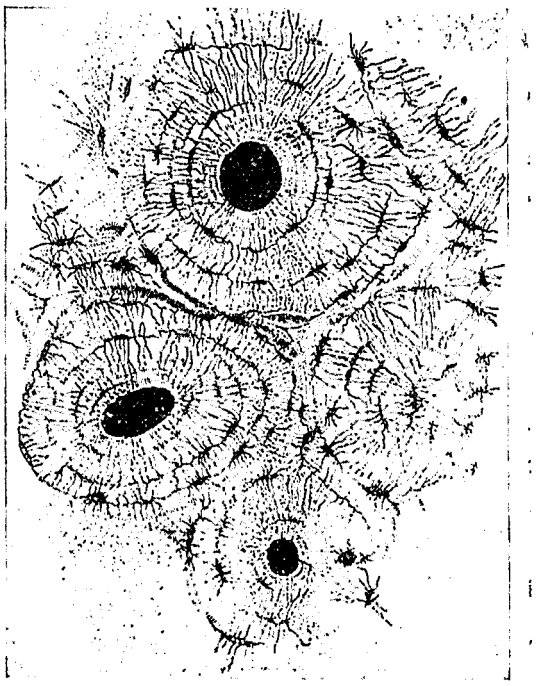

Fig. 8.—Transverse Section of compact bony tissue, showing four Haversian canals with their concentric rings.

tissue which is light, and takes its name from its fancied resemblance to lace. The reason for these differences is very obvious in view of the objects for which the bones respectively are used. The compact tissue predominates in bones where great strength is required, as for example, in the thigh bone and the hips; where lightness and mobility is required, the bone is chiefly composed of cancellous tissue, as for example, in the blade bone of the shoulder, or in the bones of birds.

This illustration (Fig 8) shows very well the appearance of a thin shaving of bone taken from *across* the humerus or arm bone, and placed under the microscope. It shows a multitude of small irregular spaces which are

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