and eighth months ossification of the vertebral arches takes place; and about the same time the costal centers for the lateral parts make their appearance. The junctions of the vertebral arches with the bodies take place in the lower vertebræ as early as the second year, but are not effected in the uppermost until the fifth or sixth year. About the sixteenth year the epiphysial plates for the upper and under surfaces of the bodies are formed; and between the eighteenth and twentieth years, those for the lateral surfaces make their appearance. The bodies of the sacral vertebræ are, during early life, separated from each other by intervertebral fibrocartilages, but about the eighteenth year the two lowest segments become united by bone, and the process of bony union gradually extends upward, with the result that between the twenty-fifth and thirtieth years of life all the segments are united. On examining a sagittal section of the sacrum, the situations of the intervertebral fibrocartilages are indicated by a series of oval cavities (Fig. 99).

Coccyx.—The coccyx is ossified from *four* centers, one for each segment. The ossific nuclei make their appearance in the following order: in the first segment between the first and fourth years; in the second between the fifth and tenth years; in the third between the tenth and fifteenth years; in the fourth between the fourteenth and twentieth years. As age advances, the segments unite with one another, the union between the first and second segments being frequently delayed until after the age of twenty-five or thirty. At a late period of life, especially in females, the coccyx often fuses with the sacrum.

THE VERTEBRAL COLUMN AS A WHOLE.

The vertebral column is situated in the median line, as the posterior part of the trunk; its average length in the male is about 71 cm. Of this length the cervical part measures 12.5 cm., the thoracic about 28 cm., the lumbar 18 cm., and the sacrum and coccyx 12.5 cm. The female column is about 61 cm. in length.

Curves.—Viewed laterally (Fig. 111), the vertebral column presents several curves, which correspond to the different regions of the column, and are called cervical, thoracic, lumbar, and pelvic. The **cervical** curve, convex forward, begins at the apex of the odontoid process, and ends at the middle of the second thoracic vertebra; it is the least marked of all the curves. The **thoracic** curve, concave forward, begins at the middle of the second and ends at the middle of the twelfth thoracic vertebra. Its most prominent point behind corresponds to the spinous process of the seventh thoracic vertebra. The **lumbar** curve is more marked in the female than in the male; it begins at the middle of the last thoracic vertebra, and ends at the sacrovertebral angle. It is convex anteriorly, the convexity of the lower three vertebræ being much greater than that of the upper two. The **pelvic** curve begins at the sacrovertebral articulation, and ends at the point of the coccyx; its concavity is directed downward and forward. The thoracic and pelvic curves are termed primary curves, because they alone are present during fetal life. The cervical and lumbar curves are compensatory or secondary, and are developed after birth, the former when the child is able to hold up its head (at three or four months), and to sit upright (at nine months), the latter at twelve or eighteen months, when the child begins to walk.

The vertebral column has also a slight **lateral** curvature, the convexity of which is directed toward the right side. This may be produced by muscular action, most persons using the right arm in preference to the left, especially in making long-continued efforts, when the body is curved to the right side. In support of this explanation it has been found that in one or two individuals who were left-handed, the convexity was to the left side. By others this curvature is regarded as being produced by the aortic arch and upper part of the descending thoracic aorta—a view which is supported by the fact that in cases where the viscera are transposed and the aorta is on the right side, the convexity of the curve is directed to the left side.

Surfaces.—**Anterior Surface.**—When viewed from in front, the width of the bodies of the vertebræ is seen to increase from the second cervical to the first thoracic; there is then a slight diminution in the next three vertebræ; below this there is again a gradual and progressive increase in width as low as the sacrovertebral angle. From this point there is a rapid diminution, to the apex of the coccyx.