

A light and electron microscopic study of the limb long bones perichondral ossification in the quail embryo (*Coturnix coturnix japonica*)

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SUMMARY

The perichondral ossification of the limb long bones in the quail embryo is investigated, in this study, by means of light and electron microscopy. Longitudinal sections of the humerus, radius, ulna, femur, tibia and fibula stained with haematoxylin-eosin were examined by the light microscope. Ultrathin cross sections were selected for the electron microscope as well. Light microscopic analysis showed that the ossification began at the same time in the long bones of the wing and leg. At the embryonic day 6, all the cartilaginous rudiments consisted of three zones. The central zone composed of hypertrophic chondrocytes, a second zone on either side of the central zone, which consisted of flattened cells and a third zone, which represented the epiphyseal region. A thin sheath of osteoid and a bi-layered perichondrium-periosteum surrounded the central zone of the cartilaginous rudiments of the long bones. The perichondrium consisted of a layer of osteoblasts, in contact with the cartilage, and a layer of fibroblasts. At the embryonic day 7, the thickness of the calcified osteoid ring increased and a vasculature appeared between the layer of osteoblasts and the layer of fibroblasts. At the embryonic day 8, a second sheath of periosteal bone began to be formed. Concurrently, vascular and perivascular elements began to invade the cartilage. The ossification spread towards the distal ends of both the diaphysis. At the electron microscopic level, the osteoblasts of the perichondrium showed cytoplasmatic characteristics of cells involved in protein synthesis. The perichondral ossification is the first hallmark of the osteogenesis in the long bones. The observations reported above, are in accordance with previous studies in the chick embryo.