

15 Days

Comparable to homo
2 months
(30–40 mm)

Stage 23 Toes Separate

15 Days, 12–14 mm

External Features

The most prominent feature to define this group is the separation of *toes* and “fingers” (Figs. 235 and 236). They are clearly divergent and will not become parallel until much later. The *pinna* covers more than half of the external auditory meatus. In the unfixed state, the superficial veins are often distinctly visible (Fig. 235).

In fixed specimens, the discrete elevations of the hair follicles may be seen all over the body. The eyelids are still open (Fig. 237). The 65 somites cannot be detected by external inspection.

Length. The length varies from 11.5 to 14 mm. In sagittal sections there are no important differences from the previous and the following stage.

Circulatory System

In the *heart*, the atrio-ventricular and semilunar valves are well developed. The stems of the coronary vessels are distinctly visible. The walls of the ventricles are smooth externally; internally, there are numerous indentations of small sinuses. The thickness of the wall is difficult to determine because the angle of section varies. The left ventricle seems to have a thicker wall than the right.

Arteries and *veins* now have the final fetal configuration, providing a larger umbilical circulation than yolk-sac circulation (Fig. 147). The details of the vascular system of this period will not be described.

Intestinal Tract

The oral and nasal cavities are completely separated by the palatal processes, which are now fusing with the nasal septum.

The *salivary glands* are distinct glandular trees. Most branches are solid epithelial cords leading to slender excretory ducts. The initial budding occurred at 12 days.

The enamel-organs of the incisors (Fig. 233, not labeled) are in an advanced stage of development. The newly arisen enamel organs of the first molars have a stellate reticulum (Fig. 226). The cartilage of the *larynx* and of the upper trachea is well developed.

The *thyroid* is subdivided into numerous small buds. Between these buds, abundant blood vessels can be observed. Follicles have not yet formed.

The *parathyroid* is now embedded in the thyroid. The ultimobranchial body is enclosed by thyroid tissue, and is said to give rise to the parafollicular cells.

The *thymus* can be recognized as a definite lymphatic organ. It is divided into lobules, which are not yet separated into medullary and cortical zones. In the center, there are many free lymphocytes. They are thought to be of mesenchymal rather than epithelial origin.

The *larynx* and *trachea* have a cartilaginous skeleton. The *lung* tissue is still rather compact, and it is more intensely vascularized than previously (compare Figs. 223 and 252).

Gut. Within the small intestine, numerous relatively thick villi have developed. In the large intestine, crypts are forming.

The *stomach* is distinctly separated into two parts. The glandular part has a tall columnar epithelium, which forms tiny folds. To the left, it is joined by the nonglandular portion, which has cuboidal and stratified epithelium. The musculature is arranged in several layers.

The *spleen* contains numerous blood vessels.

The *umbilical hernia* is still present.

Urogenital Tract

The *kidneys* contain centrally placed large glomeruli, with cuboidal perivascular cells. At the periphery of the organ, there is a wide zone of metanephric blastemal tissue, which borders the delicate capsule. Topographically, there is little change since 14 days (Fig. 228).

Sexual differentiation is greatly advanced.

The *ovary* has many dividing gonocytes, and they are often grouped in clusters.

In the *testis*, the solid seminiferous tubules are well differentiated. Near the surface, a condensation of cells forms the *tunica albuginea*. Diagnosis of sex is now very easy.

Central Nervous System

The *cortex* of the developing hemisphere is easily recognized at this stage. At the anterior boundary of the diencephalic roof, a small cellular area may be delimited, slightly anterior to the "Velum transversum" [158]. Some authors consider this cellular area to represent the paraphysis (Fig. 252, 16 days).

FIG. 235. Fetus of 14 days 23 h, 14 mm, life photograph. Distinct blood vessels.
KT 728. 4.7:1

FIG. 236. Different size in littermates of 14 days 20 h. Bouin fixation, 13.1 and 14.2 mm.
Nb = umbilical hernia.
KT 607 and 608. 4.5:1

FIG. 237. Eye, sagittal section, 14 days 23 h.
Lid = lower eyelid, *P* = pigmented layer, *C* = cornea, *G* = ganglion layer, *K* = nuclear layers.
KT 727. 105:1

FIG. 238. Hindfoot plate, 15 days 2 h.
Ti = tibia, *Ta* = talus, *Ca* = calcaneus, *Cu* = cuboid, *V* = metatarsale V.
KT 1030. 40:1

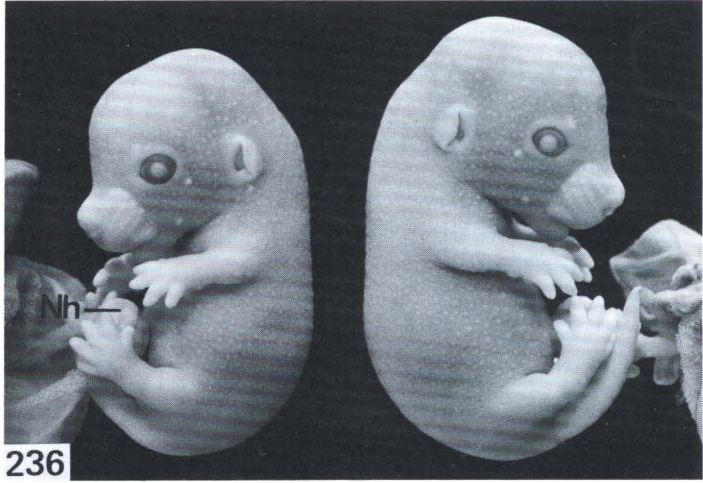
FIG. 239. Forefoot plate, 15 days 2 h.
Ra = radius, *Tr* = triquetrum, *Sc* = scaphoid-lunatum, *II.* = metacarpale II.
KT 1029. 40:1

FIG. 240. Radius, 15 days 2 h.
Ar = articulatio humero-radialis, *Ra* = radius.
KT 1029. 105:1

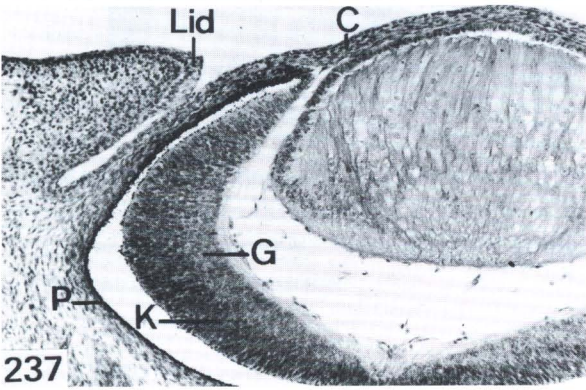
FIG. 241. Radius of Fig. 240 under high power.
K = periosteal bone. 270:1



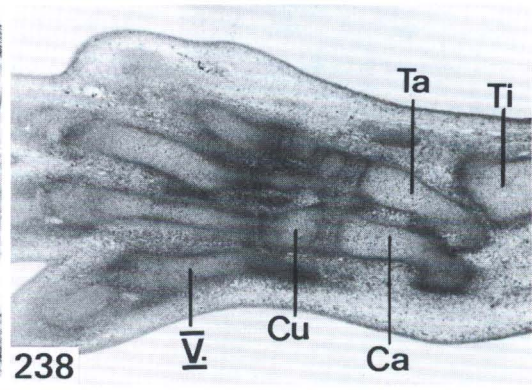
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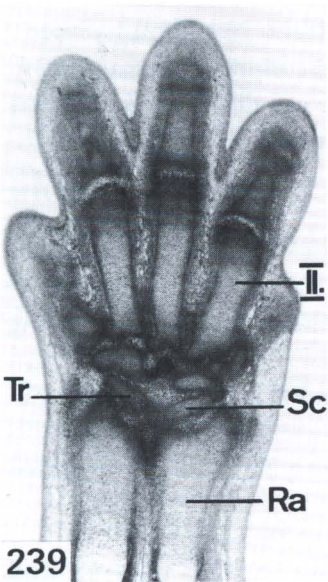
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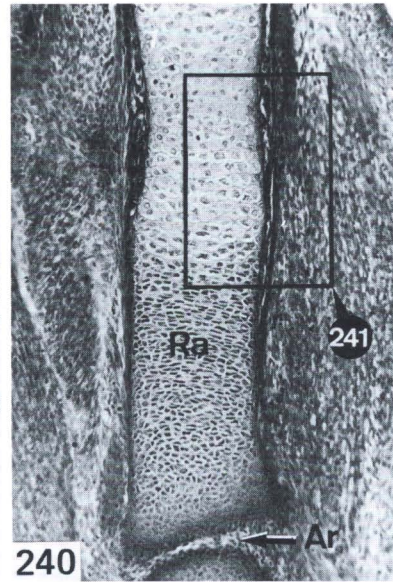
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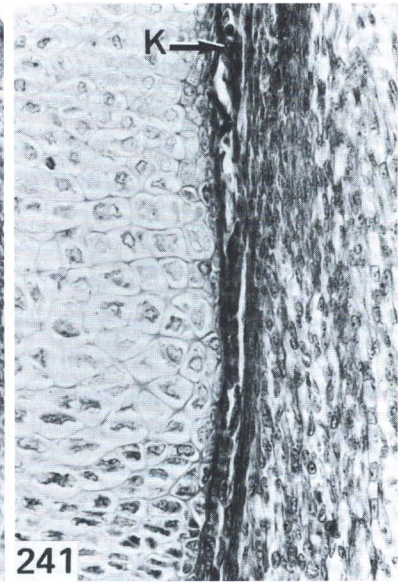
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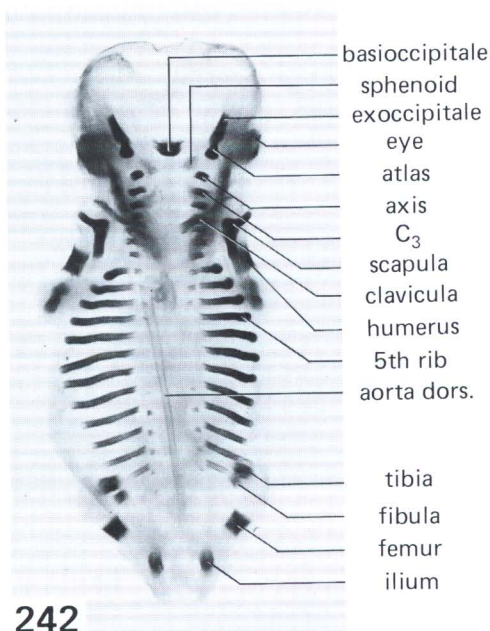
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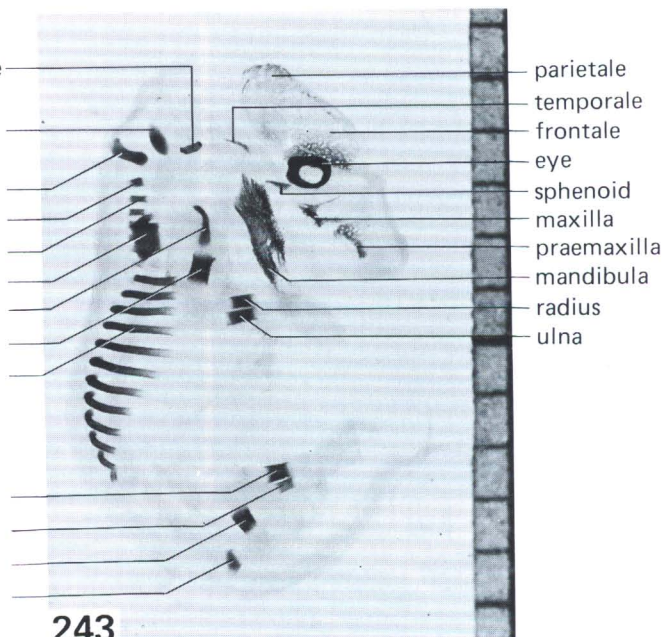


241



242

FIG. 242. Skeleton, dorsal view, 15 days 2 h. Alizarin-cleared preparation. KT 1032



243

FIG. 243. Right half of skeleton, lateral view, 15 days 2 h. Alizarin-cleared preparation. KT 1032

The *hypophysis* is no longer connected to the pharyngeal roof (Figs. 231–232).

The *epiphysis* (Fig. 252, 16 days) acquires a lobular shape, but still has a central lumen.

The *eyelids* are more prominent (Fig. 237). The retina near the pupillary margin still has only one layer of cells. Located adjacent to the optic nerve, the ganglion cell layer may be distinguished from the undifferentiated nuclear layers.

Skeletal System

Alizarine-stained cleared preparations show many ossification centers; some of them having arisen during the preceding stage.

In the *skull*, ossification of the *os temporale* has just started, and it is easily identified in lateral view (Fig. 243).

Ossification centers of some vertebral arches are visible, but they have not yet appeared within the vertebral bodies (Fig. 242).

In the pelvic girdle, only the *ossa ilii* are stainable.

During this period, the long bones of the extremities show only periosteal ossification in microscopic sections (Figs. 239–241).

Material	Age	
KT 727–28	14 days 23 h	6 embryos, 13.8–14 mm + 1 resorption
KT 1029–32	14 days 2 h	Several embryos from 11.5–12.5 mm