

**Stage 20 Earliest Signs of Fingers**

12 Days, 7–9 mm

**External Form**

The most conspicuous changes take place in the extremities. The “handplate” is no longer roundish. Even in younger members of this group there is a slightly angular contour (Fig. 182). The developing angles correspond to the finger rays [184]. The posterior footplate is now demarcated from the lower part of the leg. The somites are clearly visible from the tail to the mid-trunk region. The spinal ganglia may be seen through the skin in transparent specimens.

*Length.* 7–9 mm, measured in a direct crown-rump line.

**Circulatory System**

*Arteries.* The second aortic arch has disappeared. The third, fourth, and sixth are of variable caliber, but symmetric (Fig. 191).

*Heart.* The truncus arteriosus is being partitioned. The septum membranaceum is still incomplete.

*The septation of the atrium* (Fig. 192) began in the preceding period. This important event is illustrated in Figs. 193–196. These sections were taken from embryo KT 630. Its nominal age is 12 days, but its developmental age is 11 1/2 days.

**Intestinal Tract**

Profound transformations in the intestinal tract are occurring.

In the *pharyngeal region*, the anlage of the *tongue* is delimited from the lower jaw by a furrow (Fig. 190).

The anlagen of the *teeth* appear as slight epithelial thickenings. A continuous dental lamina is not apparent anteriorly [76].

Lateral to the mid-sagittal plane, the furrow in front of the tongue gives rise to the out-budding ductus submaxillaris.

The *thyroid primordium* is closely attached to the arcus aortae. It is displaced very deep and its connection with the slight indentation of the foramen caecum is becoming indistinct (Fig. 197, *dashed line*). The cells of the thyroid are strongly eosinophilic. Sometimes, they seem to form rosettes. True formation of follicles, however, does not occur until a much later phase [147]. The third and fourth *pharyngeal pouches* are now budding out. The 3rd produces the thymus and parathyroid anlage [146]. They still connect with the pharyngeal epithelium, but the uniting epithelial bridges contain many decaying cells.

The fourth pouch yields the so-called ultimo-branchial body [146].

The *lung buds* (Figs. 188 and 189) have not only secondary (lobar), but tertiary (segmental) bronchi. The pleural cavity is in broad communication with the peritoneal cavity (Fig. 198, ductus pleuro-peritonealis).

The stomach is greatly distended, and there are regional differences in the epithelium (Fig. 188). Both rudiments of the pancreas are in contact with each other.

Within the *liver*, there are megakaryocytes, and as previously mentioned, blood is being formed.

## Urogenital Tract

The *mesonephros* contains distinct tubules, but no well-formed glomeruli. Evidently mesonephric glomeruli remain primitive in mice, and perhaps they never function.

The *metanephros* has only two polar tubes (pelvic poles) in younger specimens (KT 643/2), but many secondary buds in older (KT 634/8) specimens of this group [102].

The *ureter* is relatively narrow and opens into the Wolffian duct, which still ends blindly within the epithelium of the urogenital sinus.

The uro-rectal septum has not yet reached the cloacal membrane (Fig. 198).

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FIG. 182. Embryo, from the right. Albino of a control series, fixed, on millimeter scale.

*Tr* = nasolacrimal groove.

10:1

FIG. 183. Embryo from the left, life photograph.

KT 942, 11 days 23 h. 9:1

FIG. 184. Explanation of Fig. 183.

*O* = otic vesicle, *NS* = nostril, *F* = choroid fissure, *I*. = first branchial pouch, *Hl* = hindlimb bud, *Tr* = nasolacrimal groove.

FIG. 185. Eye, frontal section.

*Pi* = pigment epithelium, *Lf* = lens fibers.

KT 943/11, 12 days. 130:1

FIG. 186. Primordium of vertebral column, thoracic region. Frontal section.

*N* = spinal nerve, *Iv* = intersegmental vessels, *If* = intrasegmental fissure (sclerotomic fissure), *a* = cranial sclerotomic half, *b* = caudal sclerotomic half, *CH* = notochord.

KT 941/3, 12 days, 8 mm length. 100:1

FIG. 187. Sagittal section through cervical ganglia.

*N XII* = nervus hypoglossus, *Gc2* = ganglion cervicale 2, *At* = atlas, *A.v.* = arteria vertebralis.

35:1

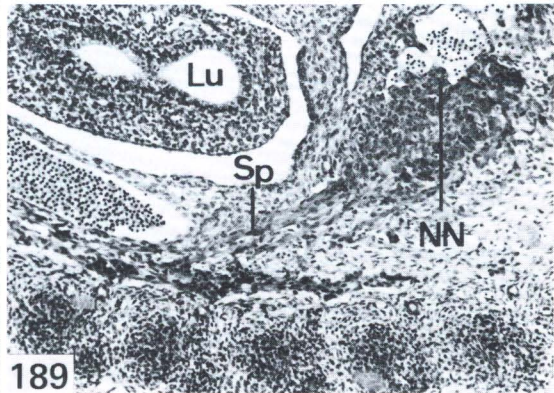
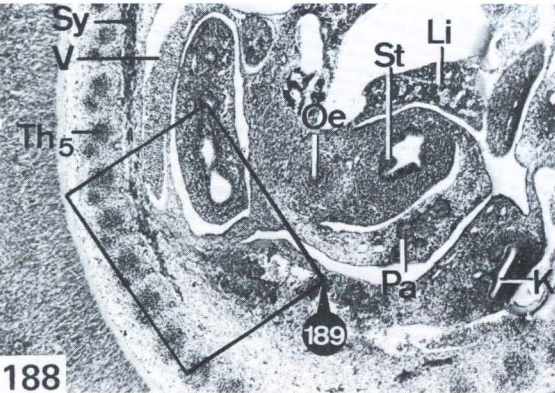
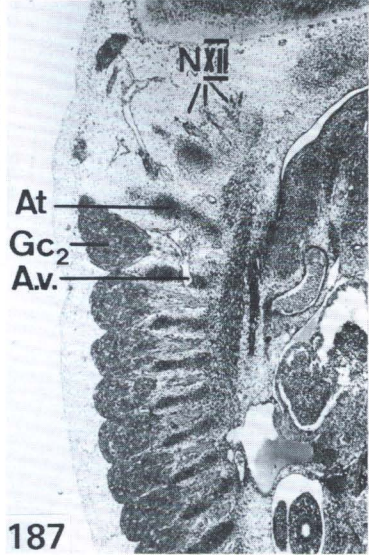
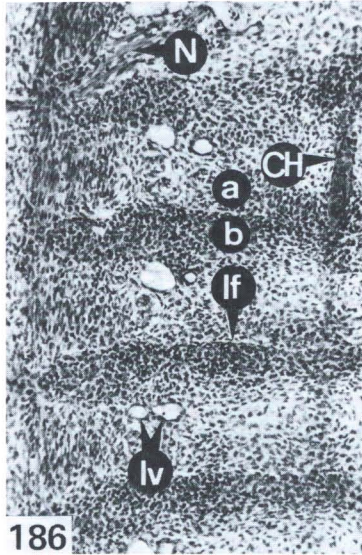
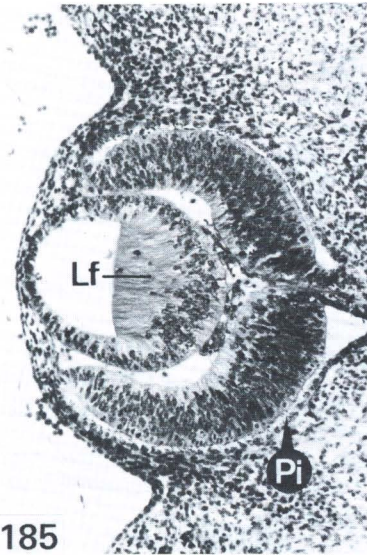
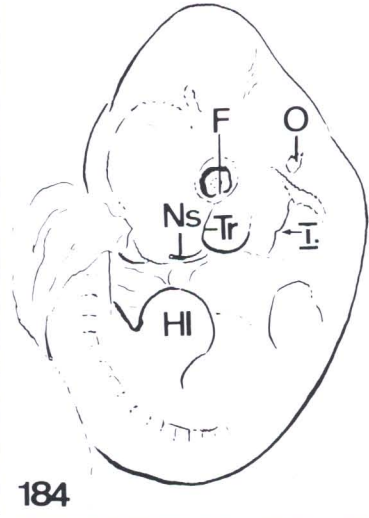
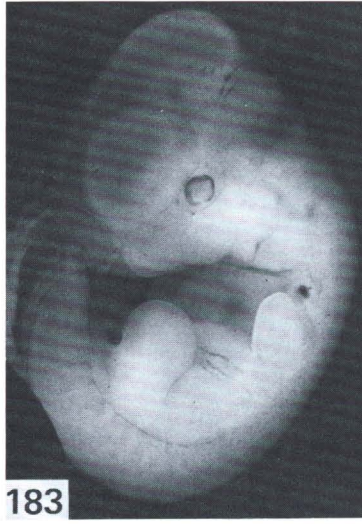
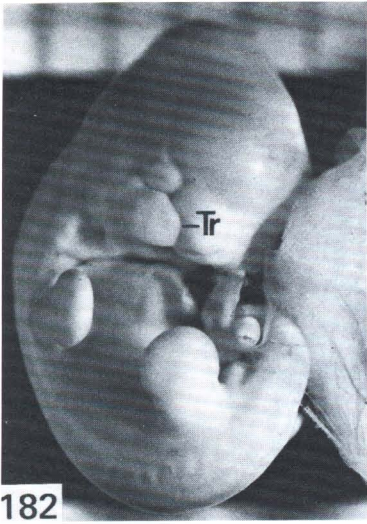
FIG. 188. Sagittal section through lower thoracic and abdominal region.

*Oe* = esophagus, *St* = stomach, *Li* = liver, *Pa* = pancreas, *K* = kidney, *Sy* = sympathetic trunk, *Tbs* = caput costae 5, *V* = vena cardinalis posterior sinistra.

KT 943/8, 12 days. 40:1

FIG. 189. Detail of Fig. 188.

*Lu* = left lung, *Sp* = nervus splanchnicus, *NN* = suprarenal gland. 100:1



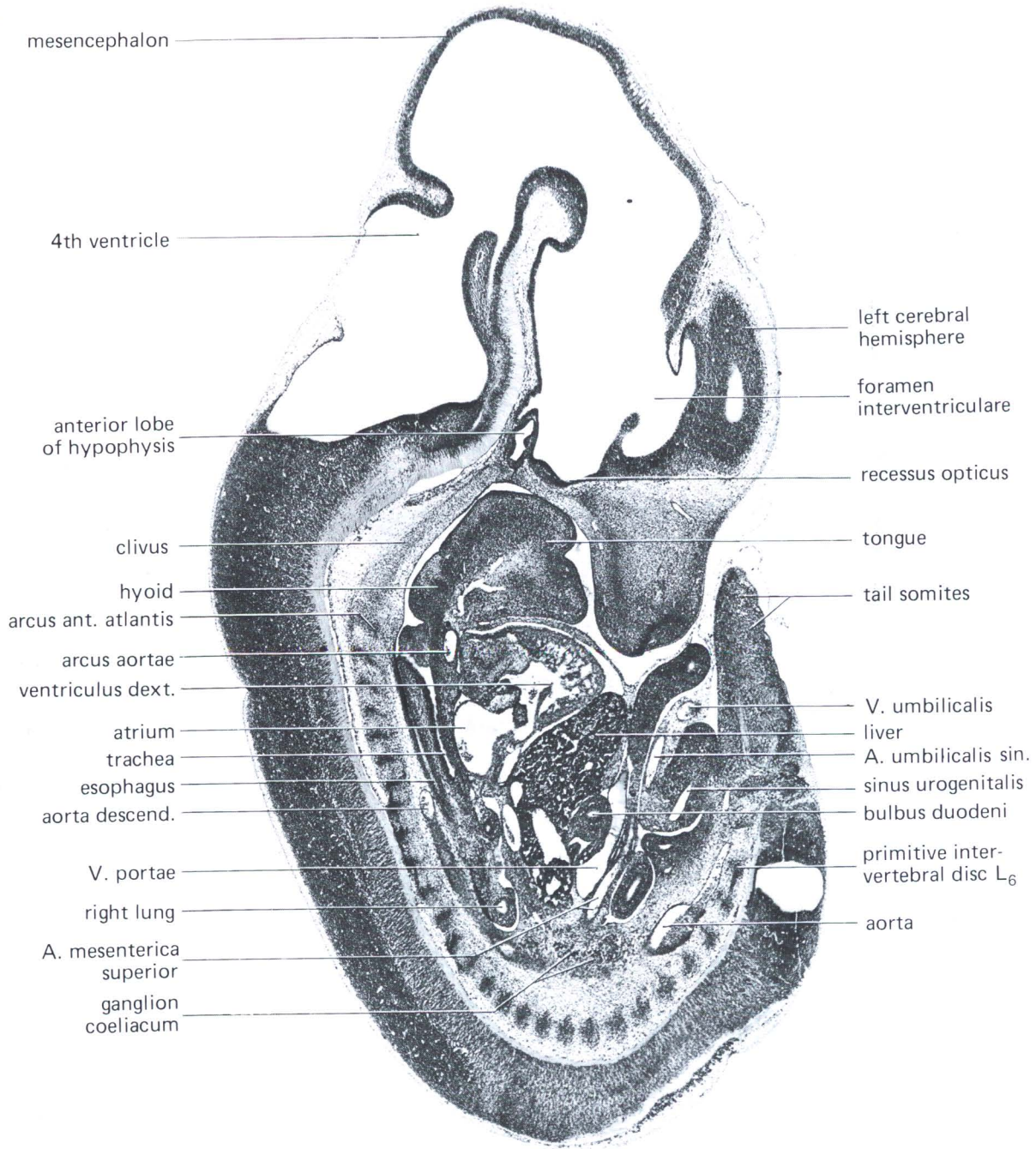


FIG. 190. Sagittal section.  
KT 943/8, 12 days, 8 mm length

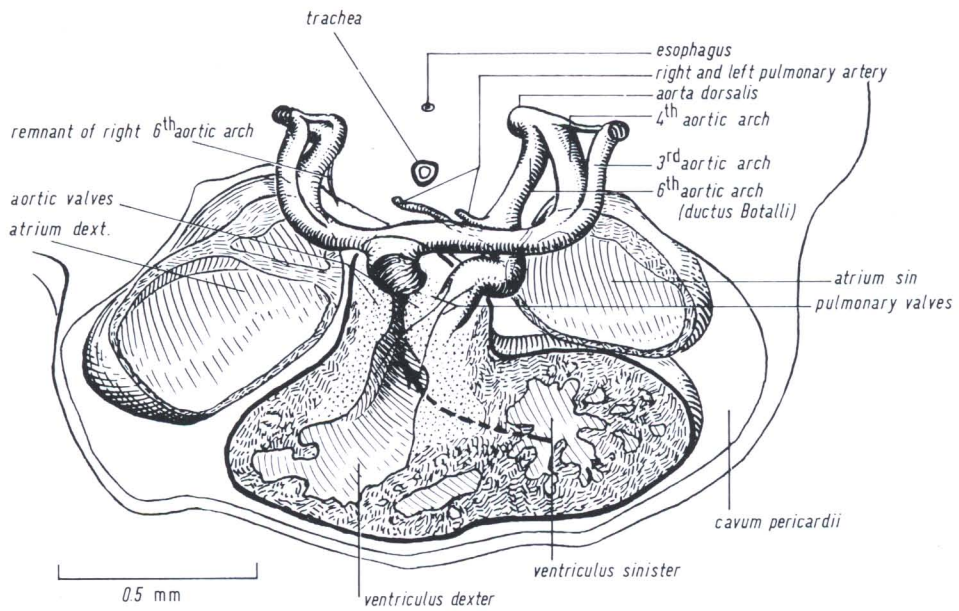


FIG. 191. Frontal section and reconstruction of the arterial trunk. Arrow indicates the aortal pathway. Septum membranaceum still incomplete. Beginning formation of semilunar valves. KT 943/11, 12 days

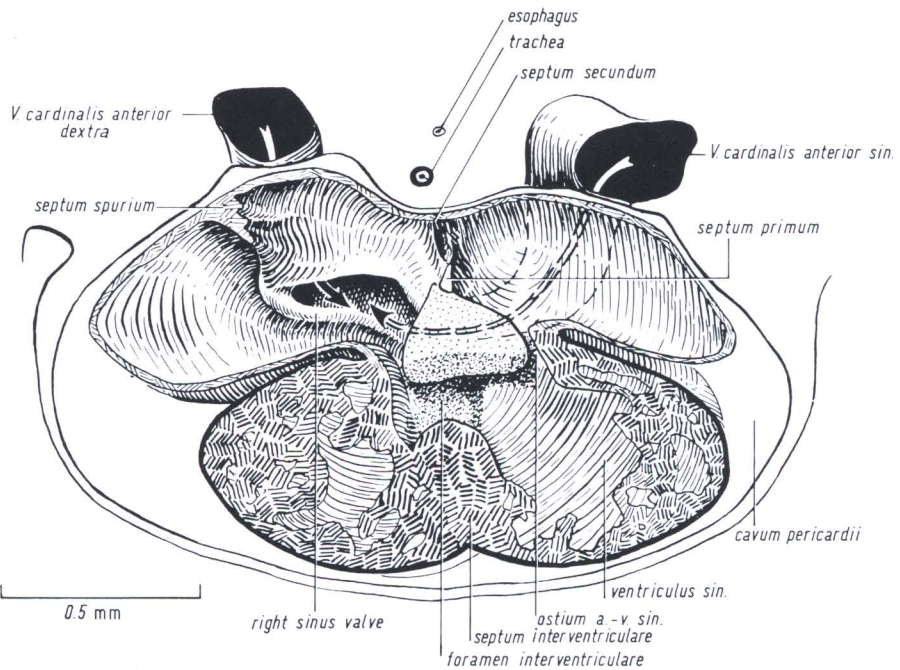


FIG. 192. Frontal section and reconstruction of the atrium. Arrows indicate the blood flow of the sinus venosus. Clear area indicates upper atrio-ventricular cushion; stippled area indicates lower cushion. KT 943/11, 12 days

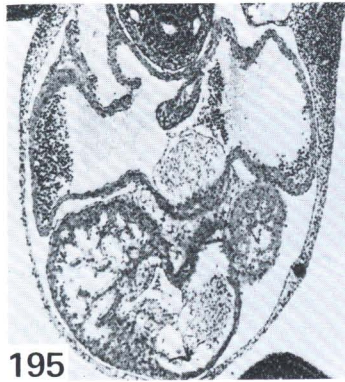


193

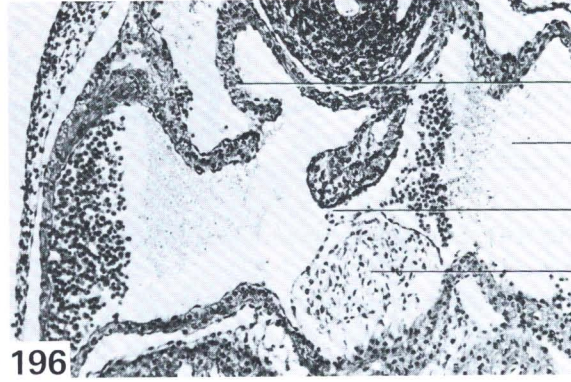


194

trachea  
foramen 2  
atrium sin.  
a-v. cushion



195



196

left sinus valve  
atrium sin.  
foramen 1  
a-v. cushion

FIG. 193–196. Low and medium magnification of cross sections through the heart. Nominal age 12 days. Formation of foramen primum and secundum. KT 630, 55:1 and 100:1

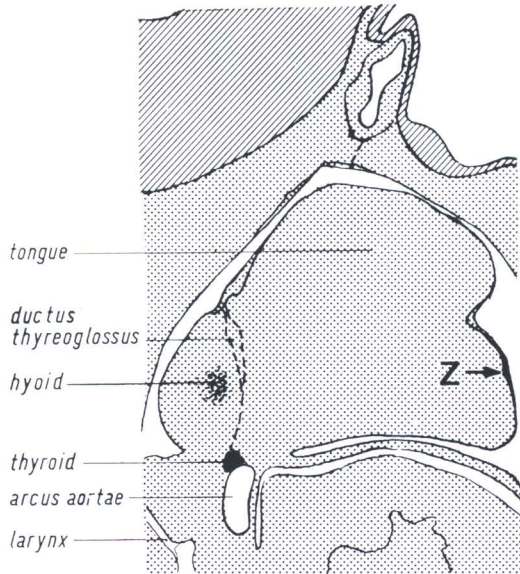


FIG. 197. Sagittal section of oral and pharyngeal region with thyroid primordium. The thyreo-glossal duct (*broken line*) is interrupted; Z indicates thickening of the mandibular epithelium. Lip furrow and lower incisivus will develop from here.

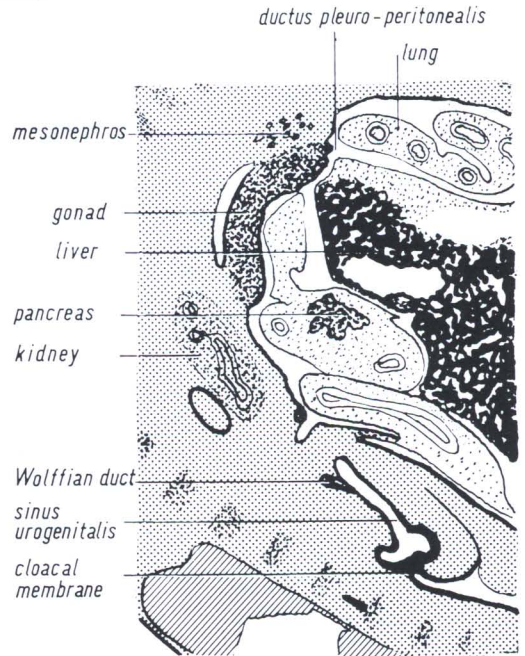
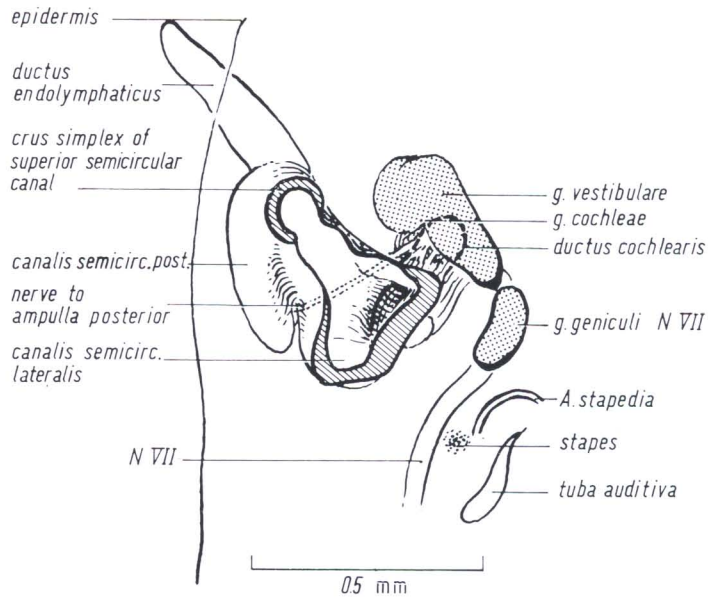


FIG. 198. Urogenital apparatus, sagittal section. KT 943/8, 12 days, 8 mm length

FIG. 199. Reconstruction of the labyrinth, sagittal section. The major part of the lateral and upper semicircular ducts are cut away.  
 KT 943/7, 12 days, 8 mm length



The gonads are still in the indifferent state (Fig. 198). Sexual differentiation is usually apparent histologically at 12 1/2 days and sometimes at 12 days [118].

The suprarenal is distinct and is composed of cellular cords representing the cortex [137] (Fig. 189).

## Central Nervous System

In this phase, the pineal gland appears as a discrete evagination in the most posterior part of the diencephalic roof (not visible in the section shown in Fig. 190). In the anterior part of the roof, near the interventricular foramen, there are still numerous pycnoses [166].

*Eye.* The posterior wall of the lens vesicle is markedly thickened as a result of differentiation of lens fibers (Fig. 185).

*Otocyst.* The subdivisions of the labyrinth are easily recognized. The semicircular canals, however, are still flat pouches, which are not yet tubular. The cochlear duct is short (Fig. 199, dashed line). The vestibular ganglion has larger cells than the cochlear ganglion (most of which is hidden in Fig. 199).

The auditory capsules still consists of mesenchyme, which will soon chondrify.

Material	Age	
KT 620-21	11 days 22 h	6 embryos: 8, 8, 8.5, 8.5, 8.8 mm
KT 941-43	11 days 23 h	5 embryos: 7.6-8.3 mm
KT 622-23	12 days	7 embryos: 7, 7.5, 8.2, 8.6, 9, 9, 9.1 mm
KT 628	12 days 3 h	5 embryos: 6-8 mm
KT 629	12 days 3 h	6 embryos: approximately 8 mm
KT 636	12 days 2 h	7 embryos: 7.5-8.7 mm