SUMMARY

1. At 5.6 mm. stage, only the trabeculae and the anterior parachordial processes are chondrified.

   The pro-otic bridge is pro-cartilaginous and a basicranial fenestra surrounding the anterior end of the notochord is absent.

2. At 6 mm. stage, the parachordals and the floor of the auditory capsules are chondrified and the two are connected by a cartilaginous basicapsular commissure. Each parachordal chondrifies as a single unit.

   In the splanchnocranium, the quadrate, Meckel's cartilage, hyosymplectic, ceratohyal, and the ceratobranchials of the first two branchial arches are chondrified. A small median cartilaginous copula is present.

3. At 6.2 mm. stage, the two trabeculae unite with one another anteriorly to form a narrow trabecula communis.

   The ceratobranchials of the third branchial arch are chondrified.

4. At 6.4 mm. stage, the base of the auditory capsule is connected posteriorly by a basi-vestibular commissure and the basicapsular fenestra is divided into a small anterior and a longer posterior vacuity. The trabecula communis is prolonged as the ethmoid plate. A pair of orbital bars have appeared as independent cartilages which are not connected with other elements of the neuro-
cranium. Each orbital bar, near its middle, is produced mesially into a triangular epiphysial process.

In the splanchnocranium, basi and interhyal cartilages as well as ceratobranchials of the fourth and fifth branchial arches have appeared. A second copula behind the first has also developed.

5. At 7.5 mm. stage, the lateral wall of the auditory capsules have developed and the basicapsular fenestrae are reduced in size. The auditory capsule is produced forward into a post-orbital process. Tectum synoticum appears as paired cartilages which are connected posteriorly with the occipital arches. The epiphysial process of the orbital bars are now connected across the roof of the cranium to form an epiphysial bar.

In the splanchnocranium, the pterygoids now appear independently of the quadrate. The fifth pair of ceratobranchials fuse with one another anteriorly. A pair of pharyngobranchial cartilages have also appeared. The two elements of the copula now fuse together to form a single elongated rod-like copula.

6. At 8.2 mm. stage, the orbital bar on each side has fused posteriorly with the post-orbital processes of the auditory capsule.

In the splanchnocranium, the pterygoid extends backwards and rests on the quadrate. The hypohyal and
hypobranchial of the first branchial arch have also made their appearance.

7. At 9 mm. stage, the sides of the auditory capsule have curved upwards to form part of the roof of the neurocranium and anteriorly its base is produced to form a pro-otic process. The epiphysial bar shows a small taenia tecti medialis.

In the splanchnocranium, the basihyals have fused with the anterior copula and the hypobranchials of the second branchial arch have made their appearance. The fourth pair of epibranchials have also made their appearance.

8. At 9.7 mm. stage, the chondrocranium is tropitrabdic and the absorption of cartilage between the trabeculae and the parachordal just begins. The synotic cartilages have fused with one another over the roof of the cranium to form a synotic band and laterally with the wall of the auditory capsule. The lateral commissure is now complete. The sphenethmoid process of the orbital bar is connected with the lamina orbitonasalis and the sphenoseptal process of the two sides fuse with one another dorsally to form a sphenoseptal commissure. The nasal septum is fused dorsally with the sphenoseptal commissure and rests on the ethmoid plate.

In the splanchnocranium, the greater part of the symplectic portion of the hyosymplectic lies in contact
with the hinder part of the quadrate.

9. At 10 mm. stage, the anterior parachordal processes and the trabeculae cranii are now separated from each other by a wide gap.

In the splanchnocranium, the hypo- and epi-
branchial elements of the third branchial arch are chondrified.

10. At 12 mm. stage, the two occipital arches have fused with one another in the mid-dorsal line and with the tectum synoticum in front to form the roof of the cranium in the hinder region. The roof of the auditory capsule is now complete. The trabecula communis has increased in length but the trabeculae cranii have become still further reduced in length. The ethmoid plate extends forward as the rostrum. The nasal septum extends forward for some distance and takes part in the composition of the hinder region of the rostrum. The orbital bar becomes interrupted due to the absorption of cartilage between the epiphysial process and the sphenethmoid commissure.

In the splanchnocranium, the lower jaw is now longer than the upper jaw showing the "Hemiramphus stage" in the development and the Meckel's cartilage extends forward beyond the anterior limit of the rostrum. The epibranchials have appeared in the first and second branchial arches also.
11. At 16 mm. stage, the cartilaginous neurocranium consists of a smaller anterior and a much larger posterior region, the two being separated by a wide gap. The trabecula cranii have disappeared completely. The orbital bar between the sphenoseptal commissure and the epiphysial cartilage have now become practically absorbed. The rostrum has become further elongated and is now formed by the fusion of the nasal septum and the ethmoid plate along its entire length and a small pre-maxillary cartilage has appeared in front of it. A small basisphenoid cartilage has appeared behind the crossing of the optic nerves along the mid-ventral line of the cranium. The brain does not extend forward as far as the olfactory fossae but remains far behind. The interorbital septum is membranous. The orbit communicates with the olfactory fossae through a cavum orbitonasale.

In the splanchnocranium, the Meckel's cartilage still extends forward beyond the anterior limit of the rostrum. Two more pairs of pharyngo-branchial cartilages appear of which one is fused with the one which appears at 7.5 mm. stage while the other remains separate.

The suspension of the upper jaw is methyostylic.

12. All the eye muscles except the inferior oblique muscle, are formed at 5.6 mm. stage but the latter appears at 6 mm. stage.
13. A posterior myodome is absent.

14. The anterior myodome becomes fully developed at 16 mm. at the hinder end of the nasal septum. They are separated off from one another along their entire length by a cartilaginous septum which arises from the ethmoid plate even at 12 mm. stage before the formation of the myodomes. The superior and inferior oblique muscles of the eye arise from these myodomes.

15. The olfactory nerve passes forward through the cavum orbitonasales.

16. In earlier stages, the rami ophthalmicus of the trigeminal and facialis nerves run external to the orbital cartilage and the sphenoseptal commissure to enter the olfactory fossae. At 16 mm. stage, however, posteriorly they run external to the orbital cartilage but anteriorly become enclosed in a foramen distinct from the foramen olfactorium advehens to pass into the olfactory fossa.

17. There is no separate palatine foramen and the ramus palatinus of the facial nerve passes out through the facial foramen along with ramus hyomandibularis.

18. The glossopharyngeal and the vagus nerves pass out from the cranial cavity through a common fissura metotica.

19. The lateral aortae receives all the four efferent branchial arteries. The third and fourth efferent
branchial arteries open in the lateral aortae separately but close together at 5.6 mm. stage and in later stages join together to open by a single aperture.

20. At 5.6 mm. stage, the two lateral aortae are connected with each other by a small transverse commissure at the level of the opening of the third and fourth efferent branchial arteries. In later stages, this commissure gradually shifts backwards and disappears altogether at 6.4 mm. stage.

21. Both the orbital artery as well as the orbitonasal artery are present. In later stages, the orbital artery is divided to supply the opercular region and gives off a secondary affarent pseudobranchial artery to the pseudobranch. Anteriorly, the orbitonasal artery passes through the cavum orbitonasales and the foramen olfactorium advehens into the nasal fossa along with the olfactory nerve.

22. In earlier stages, the efferent pseudobranchial artery opens in the internal carotid artery and the ophthalmica magna artery arises from the latter. By 7.5 mm. stage, however, the efferent pseudobranchial artery ceases to open into the internal carotid artery and becomes directly continuous with the ophthalmica magna artery.

23. The vena capitis medialis persists in the hinder region along with the secondary vein upto 6.2 mm. stage,
though even at 5.6 mm. stage it is not continuous anteriorly with the portion which gives off the hypophysial vein so that the latter seems to arise from the secondary vein in front of the root of the trigeminal nerve. The vena capitis medialis runs internal to both the glossopharyngeal and the vagus nerve roots. The secondary vein, however, runs external to the glossopharyngeal but internal to the vagus nerve roots.

24. The vena capitis lateralis is absent and there is no trace of venous loops from the head vein around any of the branches of the vagus nerve.

25. Anteriorly, the superior orbital sinus receives an orbitonasal vein from the ethmoid region where it is formed by the union of two veins. The orbitonasal vein enters the cavum orbitonasales through the foramen olfactorium advehens.