Hamburger Hamilton Stages

Hamburger Hamilton Stages	Age	Identification of Stages
Before Laying		
Early cleavage	3.5-4.5 hr	Shell membrane of egg formed in isthmus of oviduct
During cleavage		Germ wall formed from marginal periblast
Late cleavage	4.5-24.0 hr	Shell of egg formed in uterus
After Laying		
1		Preprimitive streak (embryonic shield)
2	6-7 hr	Initial primitive streak, 0.3-0.5 mm long
3	12-13 hr	Intermediate primitive streak
4	18-19 hr	Definitive primitive streak, ±1.88 mm long
5	19-22 hr	Head process (notochord)
6	23-25 hr	Head fold
7	23-26 hr	1 somite; neural folds
7 to 8-	ca. 23-26 hr	1-3 somites; coelom

8	26-29 hr	4 somites; blood islands
9	29-33 hr	7 somites; primary optic vesicles
9+ to 10-	ca. 33 hr	8-9 somites; anterior amniotic fold
10	33-38 hr	10 somites; 3 primary brain vesicles
11	40-45 hr	13 somites; 5 neuromeres of hindbrain
12	45-49 hr	16 somites; telencephalon
13	48-52 hr	19 somites; atrioventricular canal
13+ to 14-	ca. 50-52 hr	20-21 somites; tail bud
14	50-53 hr	22 somites; trunk flexure; visceral arches I and II, clefts 1 and 2
14+ to 15-	ca. 50-54 hr	23 somites; premandibular head cavities
15	50-55 hr	24-27 somites; visceral arch III, cleft 3
16	51-56 hr	26-28 somites; wing bud; posterior

		amniotic fold
17	52-64 hr	29-32 somites; leg bud; epiphysis
18	3 da	30-36 somites extending beyond level of leg bud; allantois
19	3.0-3.5 da	37- 40 somites extending into tail; maxillary process
20	3.0-3.5 da	40-43 somites; rotation completed; eye pigment
21	3.5 da	43-44 somites; visceral arch IV, cleft 4
22	3.5-4.0 da	Somites extend to tip of tail
23	4 da	Dorsal contour from hindbrain to tail is a curved line
24	4.5 da	Toe plate
25	4.5-5.0 da	Elbow and knee joints
26	5 da	1st 3 toes
27	5.0-5.5 da	Beak
28	5.5-6.0 da	3 digits, 4 toes
29	6.0-6.5 da	Rudiment of 5th toe

30	6.5-7.0 da	Feather germs; scleral papillae; egg tooth
31	7.0-7.5 da	Web between 1st and 2nd digits
32	7.5 da	Anterior tip of mandible has reached beak
33	7.5-8.0 da	Web on radial margin of wing and 1st digit
34	8 da	Nictitating membrane
35	8.5-9.0 da	Phalanges in toes
36	10 da	Length of 3rd toe from tip to middle of metatarsal joint = 5.4±0.3mm; length of beak from anterior angle of nostril to tip of bill = 2.5mm; primordium of comb; labial groove; uropygial gland
37	11 da	Length of 3rd toe = 7.4±0.3mm; length of beak = 3.0 mm
38	12 da	Length of 3rd toe = 8.4±0.3 mm; length of beak = 3.1 mm

39	13 da	Length of 3rd toe = 9.8±0.3 mm; length of beak = 3.5 mm
40	14 da	Length of beak = 4.0 mm; length of 3rd toe = 12.7±0.5 mm
41	15 da	Length of beak from anterior angle of nostril to tip of upper bill = 4.5 mm; length of 3rd toe = 14.9±0.8 mm
42	16 da	Length of beak = 4.8 mm; length of 3rd toe = 16.7±0.8 mm
43	17 da	Length of beak = 5.0 mm; length of 3rd toe = 18.6±0.8 mm
44	18 da	Length of beak = 5.7 mm; length of 3rd toe = 20.4±0.8 mm
45	19-20 da	Yolk sac half enclosed in body cavity; chorio-allantoic membrane contains less blood and is "sticky" in living embryo
46	20-21 da	Newly-hatched chick

Brain: Mesencephalon

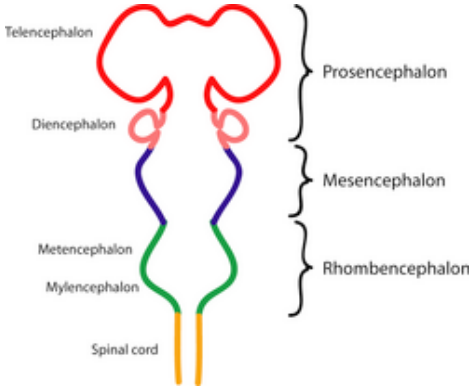
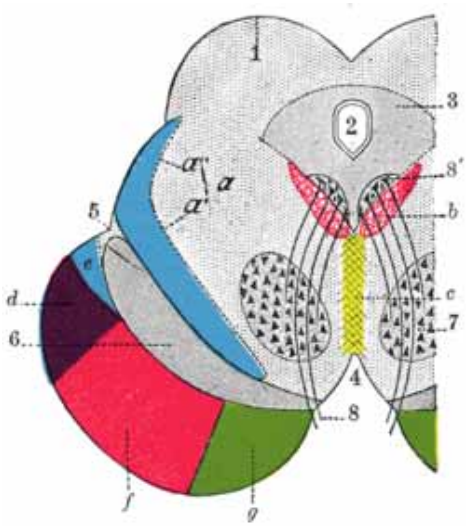


Diagram depicting the main subdivisions of the embryonic vertebrate brain. These regions will later differentiate into forebrain, midbrain and hindbrain structures.



Coronal section through mid-brain.
1. Corpora quadrigemina.
2. Cerebral aqueduct.
3. Central gray stratum.
4. Interpeduncular space.
5. Sulcus lateralis.
6. Substantia nigra.
7. Red nucleus of tegmentum.
8. Oculomotor nerve, with 8', its nucleus of origin.
a. Lemniscus (in blue) with a' the medial lemniscus and a" the lateral lemniscus.
b. Medial longitudinal fasciculus.
c. Raphé.
d. Temporopontine fibers.
e. Portion of medial lemniscus, which runs to the lentiform nucleus and insula.
f. Cerebrospinal fibers.
g. Frontopontine fibers.

Latin	*mesencephalon*
Gray's	*subject #188 800*
NeuroNames	*hier-445*
MeSH	*Mesencephalon*