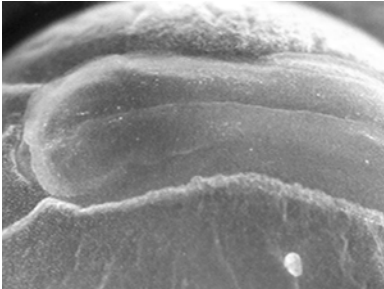


MONODELPHIS STAGING REFERENCE SERIES

All photographs taken immediately after removing embryo from uterus, with no preparation. Ages are mean age, calculated from time of mating. See data on age/stage relations at end of series.

STAGE 22

Approximately 10.1 days after mating



first somites
onset of neural crest migration
preotic and otic sulci present
notochord visible in midline groove

STAGE 23

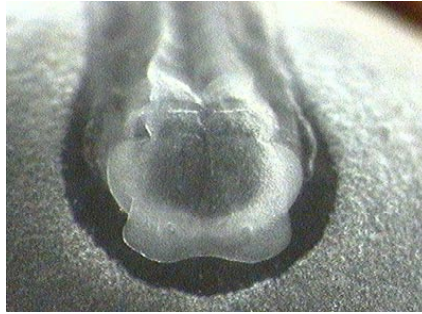
Approximately 10.25 days



first arch mesenchyme condensing into recognizable mass
first appearance of optic pit (slit like)
~ 4 somites
no heart tubes
no sensory anlagen

STAGE 24

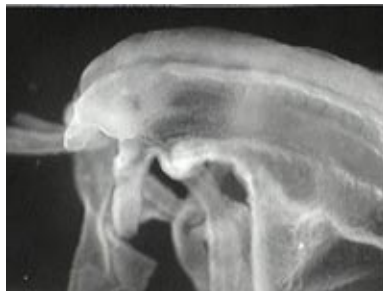
Approximately 10.54 days



no contact of neural folds
 optic pits and otic placode visible; optic pits rounded
 6-8 somites
 forebrain = diencephalon only (identified by optic pit) – thin flap projection anteriorly on embryo
 migration of second arch neural crest
 robust mass of mesenchyme/neural crest in future 1st arch/frontonasal region

STAGE 25

Approximately 10.6 days



first contact of neural folds; closed up to otic capsule
 fusion of heart tube
 12-13 somites
 optic vesicles project ventrally
 otic placodes well-formed cups
 migration of post-otic neural crest
 first evidence of cephalic flexure
 rhombomeres clear
 spread of neural crest into frontonasal processes
 first and second arches clear

STAGE 26

Approximately 10.75 days



definitive cephalic flexure
 no closure of neural fold anterior to myelencephalon
 head fold in amnion, to about level of otic placode
 forelimb thickening
 maxillary process begins to differentiate
 optic pits begin to project laterally (diencephalic floor has expanded)
 olfactory placode

STAGE 27

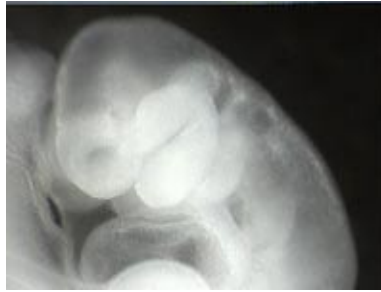
Approximately 10.8



cervical flexure near level of cervical spinal cord.
 15-18 somites
 major cranial neural crest migration complete
 otocyst still open; olfactory pit appears
 neural tube open anterior to otic capsule
 eye begins to appear on lateral surface of embryo; beginnings of lens induction (check)
 amniotic head fold back to cervical region
 forelimb bud broad fin-like ridge
 3rd arch distinct
 maxillary process differentiated

STAGE 28

Approximately 11.3 days



otocyst and anterior neuropore closed
 head fold of amnion extends to forelimb bud
 no deep naso-oral groove
 maxillary process beginning to fuse with naso-frontal process
 primary lumbar flexure -- i.e. a dorsal flexure in lumbar region
 forelimb bud becomes bud rather than ridge (longer than wide)
 lens placode beginning
 first three pharyngeal arches well defined
 up to 25 somites

STAGE 29

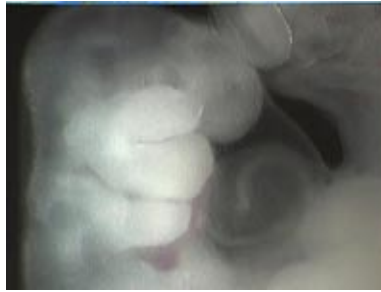
Approximately 11.7 days



distinct nasal-oral groove
 tail bud
 club-like enlargement of distal part of forelimb
 hind limb ridge; not yet bud
 pharyngeal membrane breaks down
 trachea separates from esophagus
 cranial ganglia send processes to CNS
 otocyst gets endolymphatic duct

STAGE 30

Approximately 11.75



secondary lumbar flexure (sharply flexed ventrally)
flattening of forelimb club to paddle
hindlimb bud
posterior neuropore closed
nasal-oral groove
sensory ganglia connected to spinal cord
motor branches going out to limb buds
all cranial nerves present except motor to eye

STAGE 31

Approximately 12.2 days



loss of nasal-oral groove
frontal processes
auricular tubercles
fusion of mandibular and hyoid arches
prominent digital ridges on forelimbs
hind limb still bud stage
motor nerves to eye appear

STAGE 32

Approximately 13.4 days



hind limb club like
definite digital buds on forelimb
no eye folds
cartilage appearing
pigment in eye

STAGE 33

Approximately 13.75 days



upper and lower eyelid folds
clear digits apparent
mouth open, tongue protruding
digits not present on hind limb
lateral palatine processes
membrane bones in maxilla and mandible

BIRTH

Approximately 14.5 days

Age/stage relation based on documented mating (data as of July, 2002)

Stage	number	mean age	min	max
20	1	10.00		
22	3	10.11	10.00	10.33
23	4	10.28	10.25	10.29
24	4	10.54	10.25	10.75
25	12	10.61	10.50	11.13
26	8	10.74	10.54	10.83
27	5	10.81	10.54	11.00
28	8	11.38	11.00	11.75
29	2	11.75	11.71	11.79
30	7	11.77	11.33	12.67
31	3	12.21	11.50	12.75
32	3	13.44	13.38	13.50
33	3	13.78	13.50	14.25

