



Biology Data Book

Second Edition

VOLUME I

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III. DEVELOPMENT AND GROWTH

25. TIME VARIATIONS IN DEVELOPMENTAL STAGES: MAMMALS AND BIRDS

For mammals, hours and days were counted from time of fertilization. For birds, one day was allowed for intrauterine development and added to the incubation age (lines 4-

10). Sex differentiation most often occurs at Stage 30, but varies between Stages 28 (rat) and possibly 35 (opossum).

Identification of Stage [Standard Stage ^{1/}]	Man	Ham- ster	Monkey, rhesus	Opos- sum	Rabbit	Rat	Sheep	Swine	Chick- en	Hawk	Spar- row
1 2 cells [2]	38 hr	16 hr	24 hr	40 hr	8 hr	24 hr	30 hr	30 hr	3 hr	.....	.....
2 4 cells [3]	48 hr	40 hr	36 hr	56 hr	11 hr	48 hr	34 hr	40 hr	3¼ hr	.....	.....
3 Beginning of implantation [7-8]	6½ da	4½ da	9 da	6 da	7 da	6 da	10 da	.....	.....	.....	.....
4 Primitive streak [12]	19 da	6½-7 da	19 da	6½ da	6½ da	8½ da	13 da	11 da	1½ da	.....	1½ da
5 13- to 20- somite embryo [16]	27 da	8 da	25 da	9 da	9 da	10½ da	17 da	16 da	3 da	4½ da	2½ da
6 Formation of tail bud [18]	29 da	8½ da	26 da	9½ da	9½ da	11½ da	18 da	17 da	3¼ da	.....	3¼ da
7 End of embryonic period [25]	36 da	9 da	28 da	10 da	10 da	12½ da	21 da	20 da	5 da	9 da	5 da
8 End of metamorphosis [33-34]	60 da	13½ da	40 da	12 da	14 da	16½ da	32 da	35 da	8½ da	13½ da	8 da
9 Closed eyelids [35]	70 da	.....	48 da	12¼ da	19 da	18 da	42 da	50 da	13 da	23 da	11 da
10 Open eyelids [36]	140 da	.....	.....	72 da ^{2/}	42 da ^{3/}	38 da ^{4/}	84 da	90 da	21 da	.....	20 da ^{5/}
11 Birth or hatching	267 da	16 da	164 da	12½ da	32 da	22 da	150 da	112 da	22 da	36 da	14 da

^{1/} As described by Witschi. ^{2/} 60 da after birth. ^{3/} 10 da after birth. ^{4/} 16 da after birth. ^{5/} 6 da after hatching.

Contributor: Witschi, Emil

General Reference: Witschi, E. 1956. Development of Vertebrates. W. B. Saunders, Philadelphia.

26. EQUIVALENT NUMERICAL DESIGNATIONS FOR STAGING SYSTEMS: AMPHIBIANS AND FISHES

Phase [Standard Stage ^{1/}]	<i>Rana pipiens</i> ^{2/}	<i>Pelobates fuscus</i> (<i>Rana fuscus</i>)	<i>Bufo vulliceps</i>	<i>Xenopus laevis</i>	<i>Ambys- toma macu- latus</i> ^{3/}	<i>Triturus vulgaris</i>	<i>Ambys- toma mexi- canum</i> ^{4/}	<i>Salmo gairdneri</i> (<i>S. irideus</i>)
1 Cleavage [1-6]; blastula [7]	2-7;8,9	1-2;3	1-7;8,9	1-6;7-9	1-6;7,8	0-5;6	1-6;7	1-6;7
2 Gastrula [8-11]	10-12	4-5	10-13	10-12	9-12	7-12	8-11	8-11
3 Primitive streak [12]	13	6	13	12.5	13	13	12	12
4 Neurula [13-17]	14-17	7-10	14-17	13-23	14-22	14-20	13-17	13-17
5 Tail bud [13-24]; larva [25]	18-24;25,I	11-17;18	18-24;25-27	24-44;47	23-39;40	21-36;40	18-24;25	18-24;25 ^{5/}
6 Incipient [26-29]	II-XVII	19-25	28-40	48-57	41-46	38-52	26-29	
7 Meta- Climactic I [30]	XVIII,XIX	26	41	58	Stage 30	53-55		
8 mor- Climactic II [31]	XX	27	42	59-61	Stage 31	56		
9 phosis Climactic III [32]	XXI,XXII	28,29	43	62-64	Stage 32			
10 Climactic IV [33]	XXIII,XXIV	30	44-46	65-66				
Reference	8	6,7	3	4	5	2,8	1	8

^{1/} As described by Witschi [8]. ^{2/} Arabic numbers after Shumway [6], Roman after Taylor and Kollros [7]. A complete table for *R. pipiens* is given in reference 8. ^{3/} Harrison's series, being incomplete, is extended by standard stages

(stages 30-32). ^{4/} The primitive perennibranchiate salamanders (e.g., *Necturus*, *Proteus*, *Cryptobranchus*), much like *A. mexicanum*, stop development at about stage 29, without entering climactic metamorphosis. ^{5/} Adult fish.

Contributor: Witschi, Emil

References

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- [4] Limbaugh, B. A., and E. P. Volpe. 1957. Amer. Mus. Nov. 1842.
- [5] Nieuwkoop, P. D. 1956. Normal table of *Xenopus laevis* (Daudin). North Holland Publ. Co., Amsterdam.
- [6] Shumway, W. 1940. Ibid. 78:139.
- [7] Taylor, A., and J. J. Kollros. 1946. Ibid. 94:7.
- [8] Witschi, E. 1956. Development of Vertebrates. W. B. Saunders, Philadelphia.