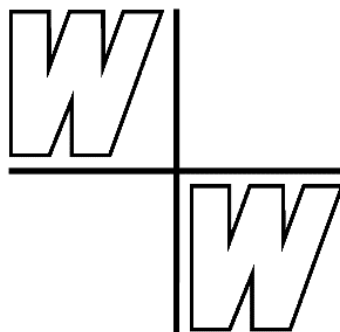


Data Collection on Intergeneric Hybrids and Basic Types: **AMPHIBIA**

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<https://www.wort-und-wissen.org/artikel/data-collection-basic-types/>

AMPHIBIA

3 orders, 68 families, 420 genera, 8500 (extant) species + many
extinct taxa

amphibians = Amphibien

Only a selection of the 68 families is listed below.

Systematics according to en.wikipedia 2024/2025. But be aware that the taxonomy in Amphibia is much in flux.

Arrangement according to the orders.

3 orders:

Anura: 48 families.

Gymnophiona: 10 families.

Urodela = Caudata: 9 families.

Summary:

8 intergeneric hybrids, in 2 families.

3 preliminary basic types:

Ambystomatidae 2: 36. 0 IG

Hylidae subfamily Hylinae 19: 174. 1 IG

Salamandridae Pleurodelinae tribe Molgini 13: 93. 7 IG

Abbreviations:

° = taxa actually not accepted in the rank of a genus, e.g. *Cerasus*° (= *Prunus* p. p.)

10: 50 etc. The numbers behind the names of families etc. refer to extant genera and species

IS = interspecific hybrid. IG = intergeneric hybrid. IST = intersubtribal hybrid.

IT = intertribal hybrid. ISF = intersubfamilial hybrid. IF = interfamilial hybrid.

SO = somatic hybrid by cell fusion; normally these hybrids are asymmetric

AS = asymmetric hybrids, they do not equally express maternal and paternal features.

HY = assumed intergeneric hybridogeneous origin of a taxon.

nat. hyb. = natural hybrid art. hyb. = artificial hybrid.

Colors within the crosses:

Red letters: intergeneric hybrids (incl. former IG).

Gray letters: hybridity unconfirmed or erroneous.

Green letters: notes on tribes, subfamilies etc. involved in the hybridization.

Yellow shaded: Notes concerning basic types.

General literature: on Amphibia

Hennigan T (2013a) An initial estimate toward identifying and numbering the amphibian kinds within the orders Caudata and Gymnophiona. Answers Research Journal 6, 17–34. <https://answersresearchjournal.org/amphibian-kinds-caudata-gymnophiona/> order Caudata

Hennigan T (2013b) An initial estimate toward identifying and numbering the frog kinds on the ark: order Anura. Answers Research Journal 6, 335–365. <https://answersresearchjournal.org/frog-kinds-order-anura/> order Anura. Detailed considerations to created kinds in Anura with many photos

Melander SL & Mueller RL (2020) Comprehensive analysis of salamander hybridization suggests a consistent relationship between genetic distance and reproductive isolation across tetrapods. Copeia, 108 (4), 987–1003. <https://doi.org/10.1643/CH-19-319> a comprehensive list of salamander hybrids (order Urodela/Caudata)

Anura = Salientia 3 suborders, 48 families, 325 genera, 7500 species

frogs and toads = Froschlurche

Archaeobatrachia: 4 families, 7 genera.

Mesobatrachia: 6 families, 18 genera.

Neobatrachia: 38 families, 300 genera.

Hennigan (2013a) suggests that 140 extant created kinds of Anura were on the Ark.– Of course, this is only an initial estimate that needs to be examined more closely, particularly in the field of hybrid research.

Anura: Bufonidae 35: 600 (suborder Neobatrachia)

true toads = Kröten

IS: Wilson et al. (1974) list 28 IS in *Bufo*.

Bufo communis × *Hyla arborea* **Bufonidae** × **Hylidae** Hertwig 1918 (larvae early dying + parthogenetic frogs, true hybrids only interspecific)

Bufo calamita × *Hyla arborea* **IF** **Bufonidae** × **Hylidae** Zhu 1934

Bufo vulgaris × *Rana*^o (= *Pelobates*) *fusca* **IF** **Bufonidae** × **Pelobatidae** Born 1883, 1886 (only up to the gastrula stage), Zhu 1934, see also Bogart et al. 1969

References:

Bogart JP, Blair WF & Hubbs CV (1969) Comments on the „cytologically verified“ hybrids between *Bufo* and *Rana*, two genera of anura amphibians. Cytogenetics 8, 30–34.

Born G (1883) Beiträge zur Bastardierung zwischen den einheimischen Anurenarten. Pflügers Archiv für Physiologie 32, 453–518.

Born G (1886) Biologische Untersuchungen. II. Weitere Beiträge zur Bastardierung zwischen den einheimischen Anuren. Archiv für mikroskopische Anatomie 27, 192. **Only interspecific hybrids go further than the gastrula-stage.**

Hertwig G (1918) Kreuzungsversuche an Amphibien I. Wahre und falsche Bastarde. [Cross-breeding tests on amphibians. Real and fake bastards.] Archiv für Mikroskopische Anatomie 91, 203–271.

<https://link.springer.com/article/10.1007/BF02978933>

Zhu X (1934) Research on Guanhzhou frogs interbreed. [in Chinese] Scient. Nat. Univ. Sunyatswni 6, 219–262.

Anura: Dicroglossidae 15: 212 (suborder Neobatrachia)

Alam MS, Islam MM, Khan MMR et al. (2012) Postmating isolation in six species of three genera (*Hoplobatrachus*, *Euphlyctis* and *Fejervarya*) from family Dicroglossidae (Anura), with special reference to spontaneous production of allotriploids. Zool. Science 29 (11), 743–752.

Anura: Hylidae 38: 1036. 1 IG (suborder Neobatrachia)

treefrogs = Baumfrösche

The subdivision varies much.

Preliminary **basic type Hylidae subfamily Hylinae (or tribe Hylini)** (19: 174). The very distant genera *Pseudacris* and *Hyla* are connected by hybridization (according to Caviedes-Solis et al. 2020, 2523+2526 they have a divergence time of approximately 55 million years). Because of different phylogenies (Caviedes-Solis et al. 2020, fig. 1 versus <https://en.wikipedia.org/wiki/Hylidae>) it is not clear, if the two basal genera *Trachycephalus* and *Dendropsophus* are included in that basic type.

Hyla × *Pseudacris* **Hylinae** Wilson et al. 1974 (*H. crucifer* × *P. nigrita*, *triseriata*, *H. regilla* × *P. triseriata*)

References:

- Caviedes-Solis IW, Kim N & Leaché AD (2020) Species IUCN threat status level increases with elevation: a phylogenetic approach for Neotropical tree frog conservation. *Biodivers Conserv* 29, 2515–2537. <https://doi.org/10.1007/s10531-020-01986-8>
- Wilson AC, Maxson LR & Sarich VM (1974) Two types of molecular evolution: evidence from studies of interspecific hybridization. *Proc. Natl. Acad. Sci. USA* 71, 2843–2847. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC388568/pdf/pnas00060-0257.pdf>

Anura: Leptodactylidae s.l. 50: 2129 (suborder Neobatrachia) **southern frogs = Südfrosche**

5 subfamilies (sometimes Ceratophryinae elevated in family rank: 3: 12)

Ceratophrys cranwelli × *Lepidobatrachus ilanensis* (→ *Chacophrys pierottii*)

Ceratophryinae Lynch 1982 („probable“), but Frittsch et al. 1987 and Maxson et al. 1987 demonstrate that *Chacophrys* is not an intergeneric hybrid between these two genera.

References:

- Frittsch B, Drewes R & Ruibal R (1987) The retention of the lateral-line nucleus in adult anurans. *Copeia* 1987, 127–135.
- Lynch JD (1982) The relationships of the frogs of the genus *Ceratophrys* (Leptodactylidae) and their bearing on hypotheses of Pleistocene forest refugia in South America and punctuated equilibrium. *Syst. Zool.* 31 (2), 166–179.
- Maxson RD, Moberg KD & Maxson LR (1987) Data from hybrid species supporting the MC'F assortment-exclusion hypothesis. *Mol. Biol. Evol.* 4, 70–73.
<http://mbe.oxfordjournals.org/cgi/reprint/4/1/70.pdf>

Anura: Ranidae s.l. 50: 850 (suborder Neobatrachia) **true frogs = Echte Frösche**

The subdivisions of Ranidae are still a matter of dispute.

Ranidae s. str. = 20 genera!

References:

- Hertwig G (1918) Kreuzungsversuche an Amphibien I. Wahre und falsche Bastarde. [Cross-breeding tests on amphibians. Real and fake bastards.] *Archiv für Mikroskopische Anatomie* 91, 203–271.
<https://link.springer.com/article/10.1007/BF02978933>
- Moore JA (1946). Studies in the development of frog hybrids. I. Embryonic development in the cross *Rana pipiens* × *Rana sylvatica*. *J. Exp. Zool.* 101, 173–220.

Moore JA (1958). Transplantation of nuclei between *Rana pipiens* and *Rana sylvatica*.
Exp. Cell Res. 14, 532–540.

Gymnophiona 10 families, 33 genera, 214 species
caecilians = Schleichenlurche

Urodela = Caudata 3 suborders, 9 extant families, 62
genera, 760 species + many extinct taxa
salamanders and newts = Schwanzlurche

It is matter of debate if the name Urodela is restricted to the extant taxa of Caudata or vice versa.

3 suborders:

Cryptobranchoidea 2 families.

Salamandroidea 7 extant families.

Sirenoidea 1 family, 2 genera.

Hennigan (2013b) proposes the following families as possible created kinds on the Ark: Ambystomatidae, Amphiumidae, Cryptobranchidae, Dicamptodontidae (now part of Ambystomatidae), Hynobiidae, Plethodontidae (possibly genus-level), Rhyacotritonidae, Salamandridae (possibly genus level). – However, this needs to be studied in more detail.

Urodela: Ambystomatidae 2: 36 (suborder Salamandroidea)
mole salamanders = Quersahnmolche

Ambystoma 32 (incl. *Linguaelapsus*°), *Dicamptodon* 4 (formerly Dicamptodidae).
Axolotl etc. = *Ambystoma mexicana*, Gey barredtiger salamander = *Ambystoma mavortium*.

Probably **basic type Ambystomatidae** (2: 36), cf. Brophy & Kramer (2007, as created kind), due to many IS and common characteristics. It is unresolved if the related *Dicamptodon*, which was at that time placed in a separate family, belongs to the same basic type.

IS: *Ambystoma*: see Brophy & Kramer (2007).

en.wikipedia (2025): *Ambystoma platineum* is a hybrid. Hybrid all-female populations are the result of hybridization. – *Ambystoma mexicana* × *A. mavortium* (art. hyb., internet) – Hybrid salamanders are a problem in nature (see internet).

Melander & Mueller (2020): *Ambystoma* 9 IS, *Dicamptodon* 1 IS (sub Dicamptodidae).

References:

Brophy TR & Kramer PA (2007) Preliminary results from a baraminological analysis of the moles salamanders (Caudata: Ambystomatidae). Occasional Papers of the BSG 10, 10–24.

Urodela: Cryptobranchidae 2: 8 (suborder Cryptobranchoidea)
giant salamanders = Riesensalamander

Andrias 7, *Cryptobranchus* 1.

IS in *Andrias*: Melander & Mueller (2020), Takaye et al. (2023)

<https://doi.org/10.1002/ece3.10698>, Takahashi et al. (2026)

<https://www.frontiersin.org/journals/environmental-science/articles/10.3389/fenvs.2026.1776979/full>

Urodela: Hynobiidae 9: 90 (suborder Cryptobranchoidea)
Asiatic salamanders = Winkelzahnmolche

IS: Melander & Mueller (2020): *Hynobius* 1 IS, *Onychodactylus* 1 IS, *Salamandrella* 1 IS

Urodela: Plethodontidae 28: 500 (suborder Salamandroidea)
lungless salamanders = Lungenlose Salamander

IS: Melander & Mueller (2020): *Aneides* 1 IS, *Batrochoseps* 1 IS, *Bolitoglossa* 1 IS, *Desmognathus* 4 IS, (*Ensatina*), *Eurycea* 3 IS, *Hydromantes* 1 IS, *Plethodon* 20 IS.

Urodela Proteidae 2: 9 + many extinct taxa (suborder Salamandroidea)
olms = Olme

Necturus 8, *Proteus* 1.

IS: Melander & Mueller (2020): *Necturus* 1 IS.

Urodela: Salamandridae 21: 140 + extinct taxa. 7 IG (suborder Salamandroidea)

true salamanders and newts = Echte Salamander und Molche

3 subfamilies:

Pleurodelinae 16: 122

Molgini 13: 92 *Calotriton* 2, *Cynops* 10, *Euproctus* 2, *Ichthyosaura* 1 (= *Mesotriton* 1), *Notophthalmus* 3 *Lissotriton* 10, *Neurergus* 5, *Ommatotriton* 3, *Pachytriton* 10, *Paramesotriton* 14, *Taricha* 4, *Triturus* 9 (incl. *Triton*°).

Pleurodelini 3: 31 *Echinotriton* 3, *Pleurodeles* 3, *Tylotriton* 25.

Salamandrinae 4: 16 *Chioglossa* 1, *Lyciasalamandra* 7, *Mertensiella* 1, *Salamandra* 7
Salamandrinidae 1: 2 *Salamandrina* 2

The members of tribe Molgini (13: 92) in the Salamandridae subfamily Pleurodelinae are connected by hybridization and belong to the same basic type. This is the largest part of the family. It is very probable that the basic type covers the whole family. Some hybrids (e.g. in Ferrier 1967) connecting subfamily Salamandrinae do not succeed early (maternal) stages of development and do not include expression of chromosomes of both parents, but in the case of *Triturus* × *Salamandra* the hybrid is reported to be a true hybrid.

IS: Melander & Mueller (2020): *Chioglossa* 1 IS, *Cynops* 1 IS, *Lissotriton* 3 IS, *Natophthalmus* 1 IS, *Ommatotriton* 2 IS, *Pleurodeles* 1 IS, *Salamandra* 3 IS, *Salamandrina* 1 IS, *Taricha* 3 IS, *Triturus* 9 IS.
Arntzen (2024): *Triturus* IS.

Ambystoma × *Pleurodeles* IF Ambystomatidae × Salamandridae Ferrier 1967 („dies soonest“)

Diemyctilus^o (= *Triturus* p. p.) × *Triturus* IS Pleurodelinae Brandom 1962

Euproctus asper × *Pleurodeles waltlii* Pleurodelinae Ferrier 1967 (only up to early stages of development)

Ichthyosaura × *Lissotriton* Pleurodelinae (Schreitmüller 1910; Wolterstorff 1925: 280, 289; Bataillon 1927; Bataillon & Tchou Su 1932; Lantz 1934; Pariser 1935, 1936; Mancino et al. 1976; Macgregor et al. 1990); all citations from Dubois & Raffaelli 2009

Ichthyosaura × *Ommatotriton* Pleurodelinae Macgregor et al. 1990; cited by Dubois & Raffaelli 2009

Ichthyosaura × *Triturus* Pleurodelinae (Bataillon 1927; Bataillon & Tchou Su 1932; Pariser 1935, 1936) all citations from Dubois & Raffaelli 2009

Lissotriton × *Ommatotriton* (= *Triturus* p. p.) Pleurodelinae Wolterstorff, 1925: 279; Macgregor et al. 1990, cited by Dubois & Raffaelli 2009

Lissotriton × *Triturus* Pleurodelinae Poll 1909; Wolterstorff 1909a-b, 1910, 1911, 1925: 279; Bataillon 1927; Bataillon & Tchou Su 1932; Pariser 1932, 1935, 1936; Hamburger 1935; Mancino et al. 1976, 1977, 1978, 1979; Macgregor et al. 1990) Mancino et al. 1997 (*L. meridionalis* × *T. carnifex*) cited by Dubois & Raffaelli 2009

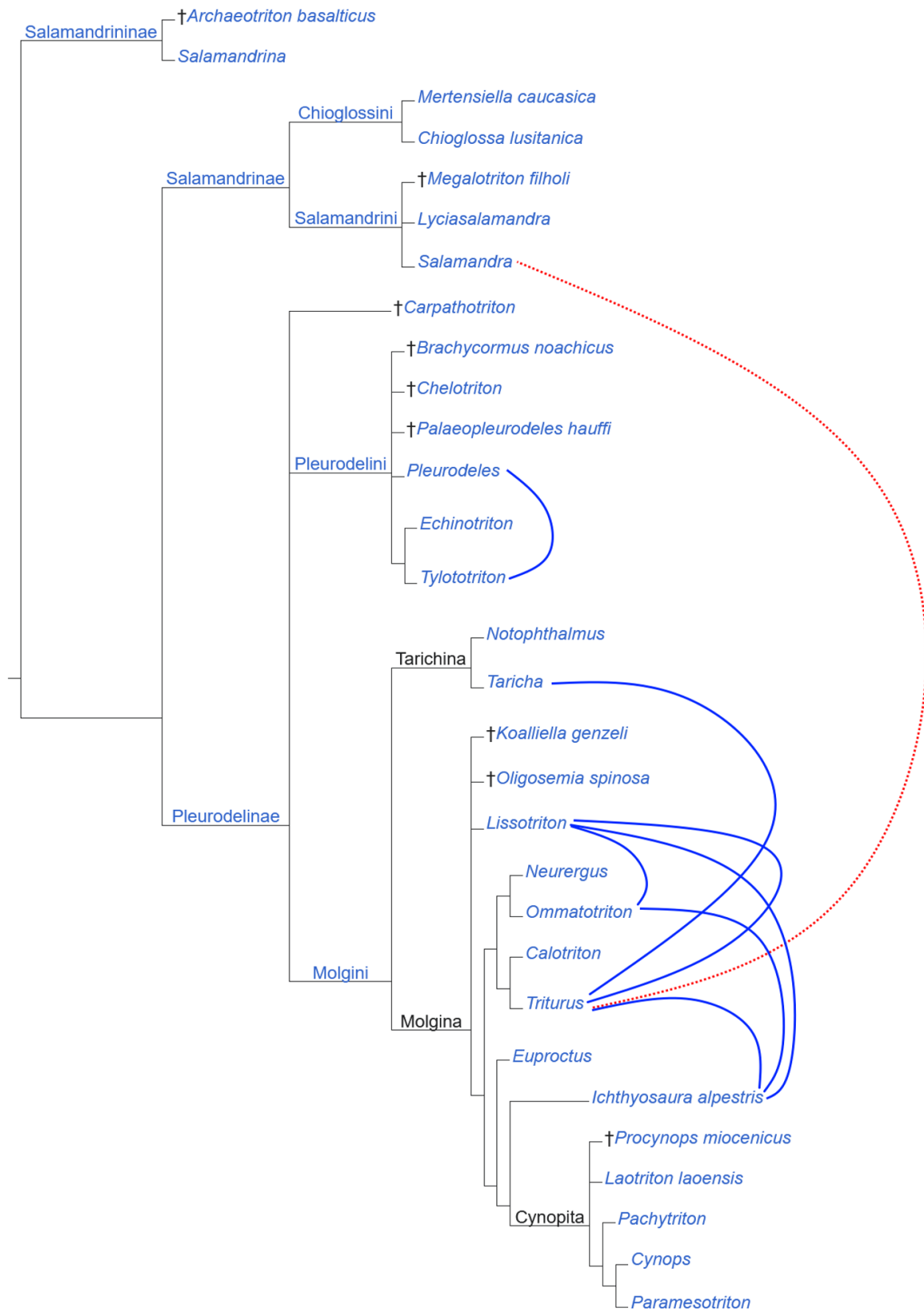
Pleurodeles waltlii × *Triturus* Pleurodelinae Ferrier 1967 (only until early stages of development)

Pleurodeles waltlii × *Tylototriton verrucosus* Pleurodelinae Ferrier et al. 1971 (viable)

Pleurodeles waltlii × *Salamandra salamandra* ISF Pleurodelinae × Salamandrinae Ferrier 1967 (only until early stages of development)

Salamandra salamandra × *Triturus* (= *Triton*^o) *helveticus* ISF Salamandrinae × Pleurodelinae Baltzer et al. 1938, Schönmann 1938 (lethal, true hybrid, until the very young gastrula stage), Baltzer & Schönmann 1951, Ferrier 1967 (only until early stages of development)

Taricha (= *Triturus* p.p.) × *Triturus* **Pleurodelinae** Brandom 1962



Salamandridae: hybridization in the phylogeny based on Pyron & Wiens (2011, doi:10.1016/j.ympev.2011.06.012) and Haaramo (2011, <http://www.helsinki.fi/~mhaaramo/metazoa/deuterostoma/chordata/amphibia/lissamphibia/urodela/urodela.html#>)

Cryptobranchioidei) from en.wikipedia (2025, CC-BY-SA 4.0). The red dotted line marks a true hybrid lethal at a very early state of development.

References on Salamandridae:

- Arntzen JW (2024) Hybridization and introgression in deeply differentiated salamander species – molecular genetics and a reappraisal of Dr. Louis Vallée's osteological data. *Contrib. Zool.* <https://doi.org/10.1163/18759866-bja10067>
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- Baltzer F, Schönmann W, Lüthi H et al. (1939) Analysis of nuclear lethality in urodele bastards. *Archiv für Exp. Zellforschung* 22, 276–281.
- Boehringer F (1938) On the nuclear relations and the development of the merogonal amphibian bastard *Triton* ♀ × *Salamandra* ♂. *Wilhelm Roux Archiv für Entwicklungsmechanik der Organismen* 138 (3–4), 376–422.
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- Ferrier V (1967) Étude cytologique des premiers stades du développement de quelques hybrides létaux d'Amphibiens Urodèles. [Article in French, English summary p. 255: A cytological study of the first stages of development of some lethal hybrids of urodele amphibians.]. *Embryol. Exp. Morph.* 18 (2), 227–257. <http://dev.biologists.org/content/18/2/227.full.pdf>
- Ferrier V, Beetschen JC & Jaylet A (1971) Realization of a viable intergeneric hybrid between 2 European and Asiatic amphibian urodeles (female *Pleurodeles waltlii* × male *Tylototriton verrucosus*, Salamandridae) [Article in French] *Comptes Rendus Acad. Sci. D* 272, 3079–3082.
- Ferrier V & Jaylet A (1978) Experimental gynogenesis in the newt species *Pleurodeles waltlii* and *P. poireti*. *Chromosoma* 69, 65–80.
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