



Centrum pro výzkum  
toxických látek  
v prostředí

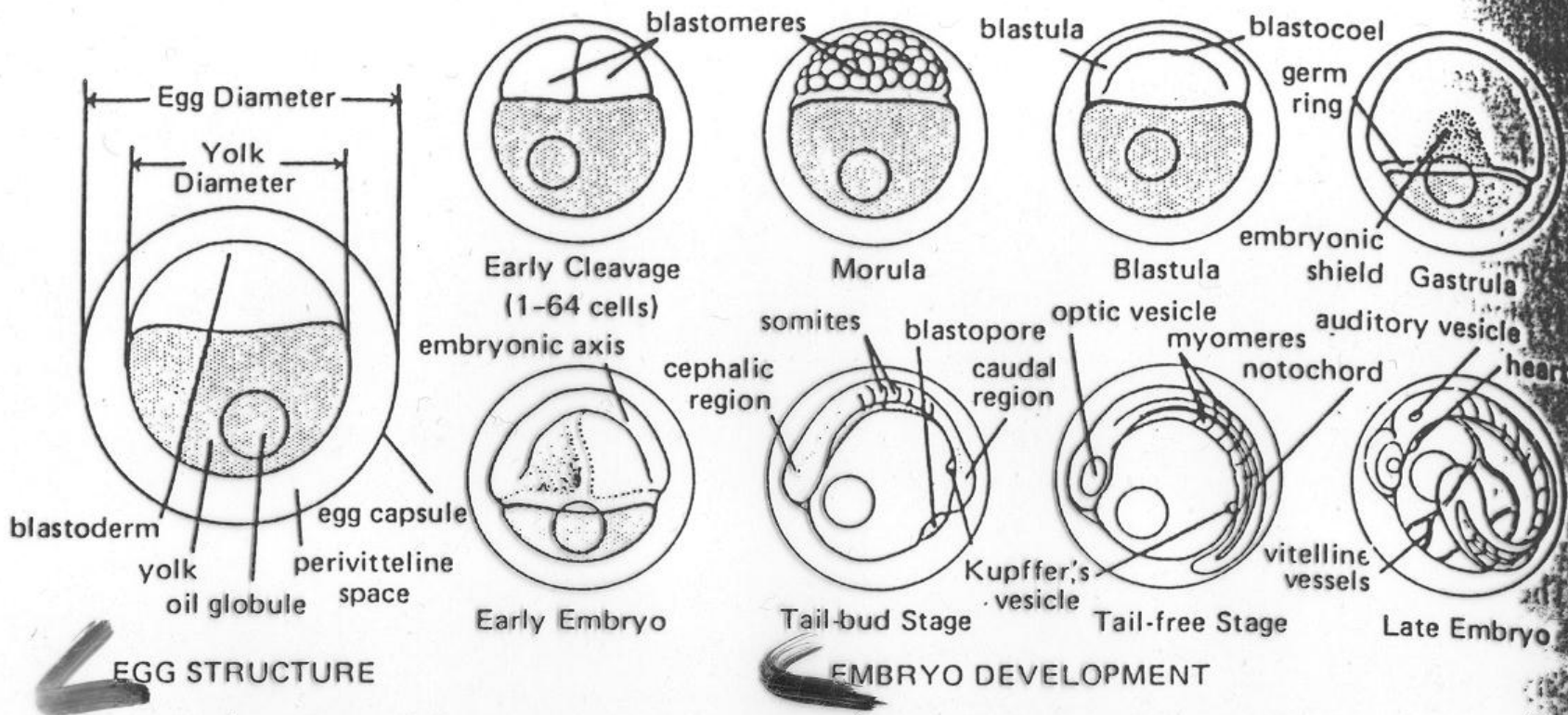
# Ekotoxikologie rybích modelů

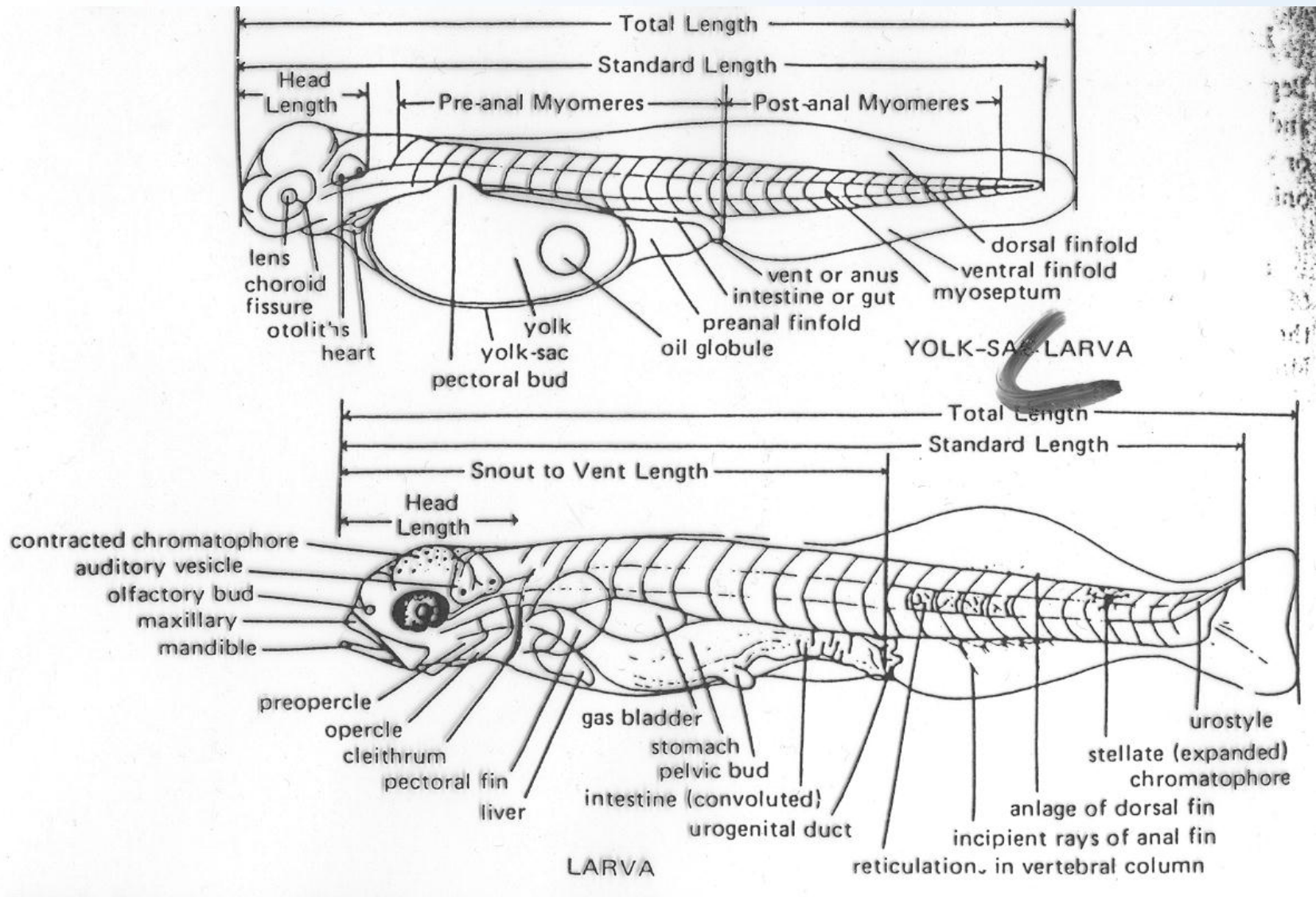
## BM pro MU



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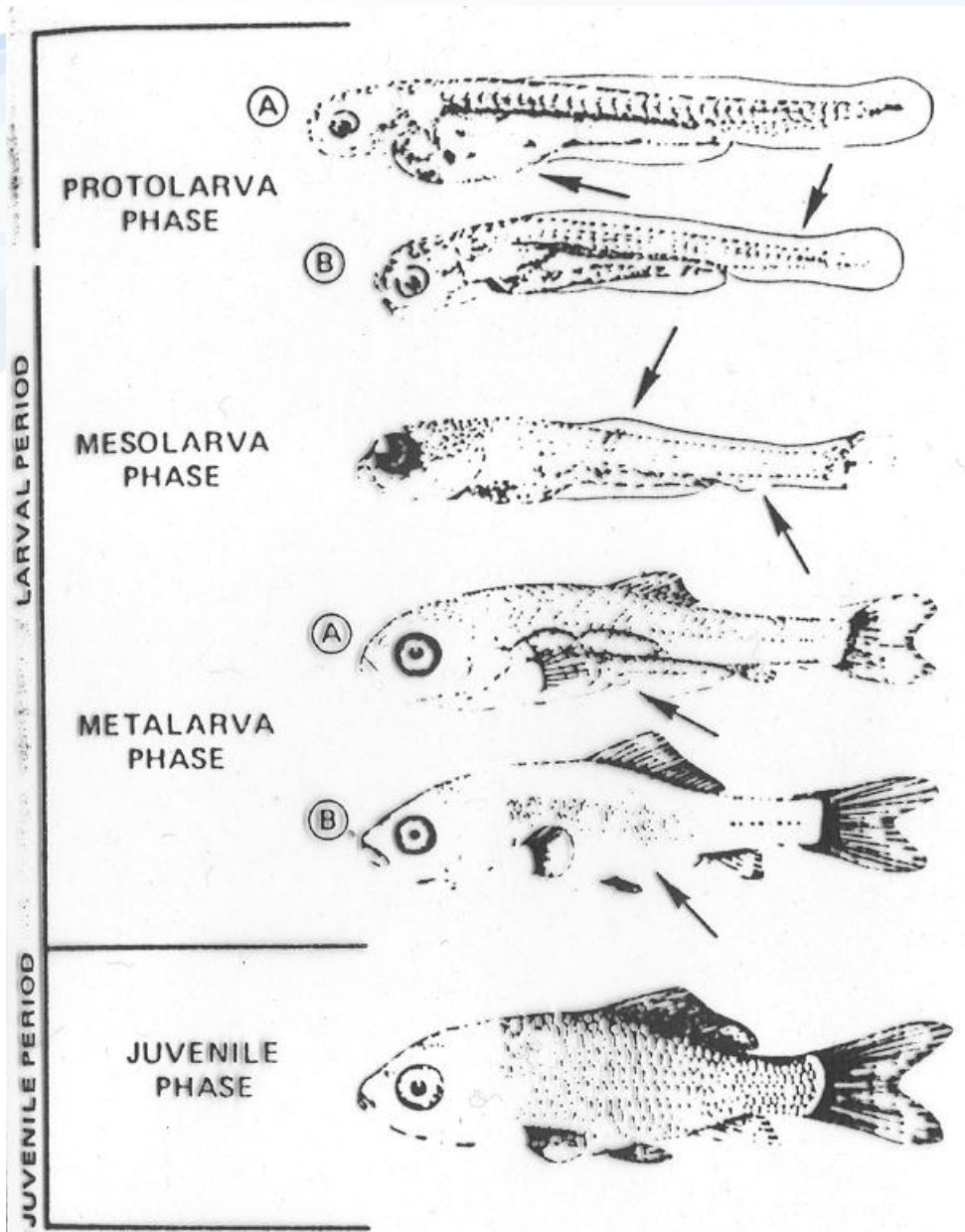
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Diagrammatic representation of morphology and development of embryonic and larval periods of typical teleost (modified from Jones et al. (1978))





**Sequence showing morphological changes separating larval fish into phases, (Drawings from Jones et al. (1978).) Protolarva: (a) Just hatched with large yolk**

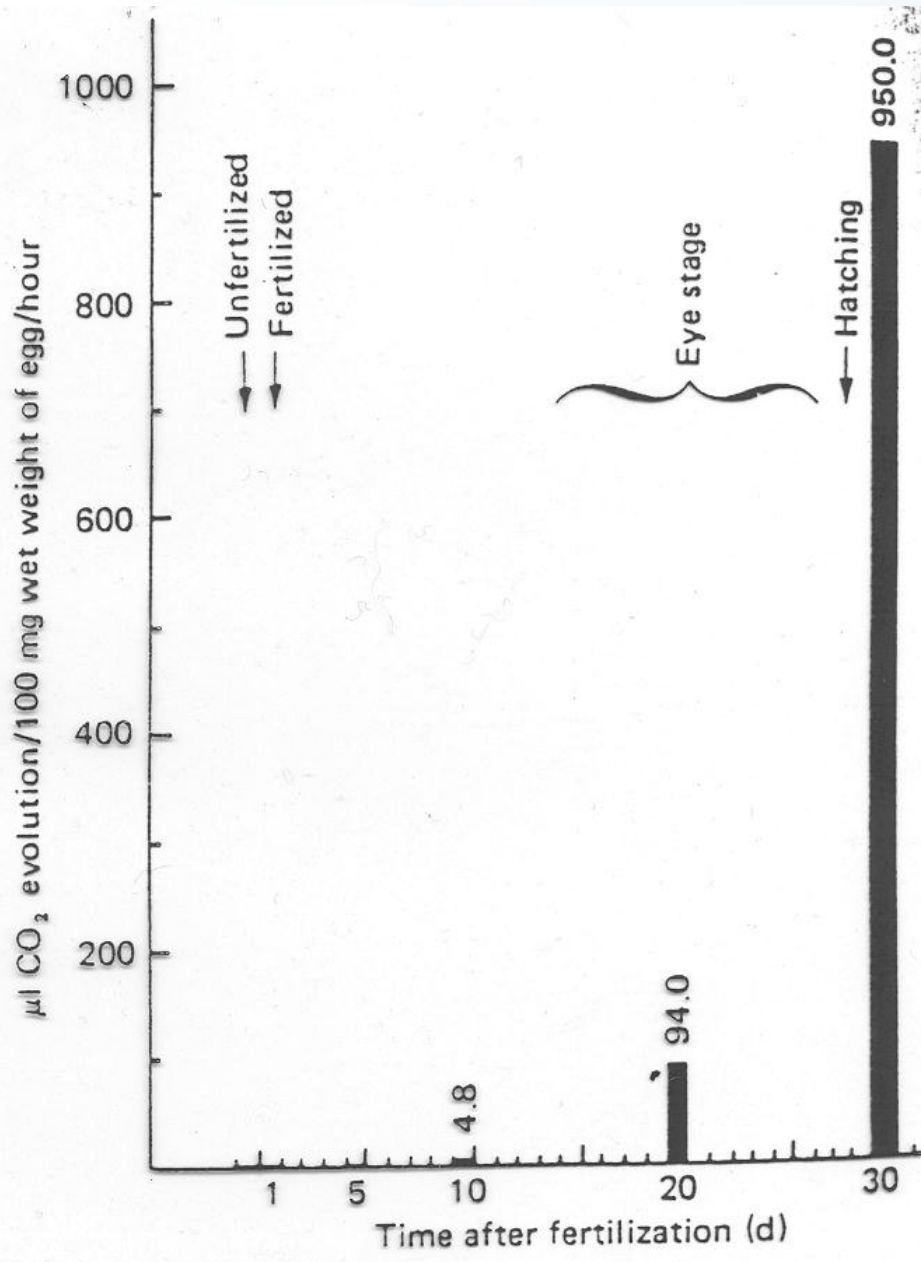
sac and complete median fin fold; (b) yolk almost gone approaching shift to exogenous food, median fin fold still complete. Mesolarva. Feeding on exogenous food and distinct fin rays apparent in median fin folds. Metalarva: (a) Rays in median fins well developed and pelvic fin bud just apparent; (b) fins well developed, but preanal median fin fold still present. Juvenile: Full complement of fins and no median fin folds remaining.



# Ekotoxikologické parametry je nutno používat PROMYŠLENĚ- mění se během ontogeneze

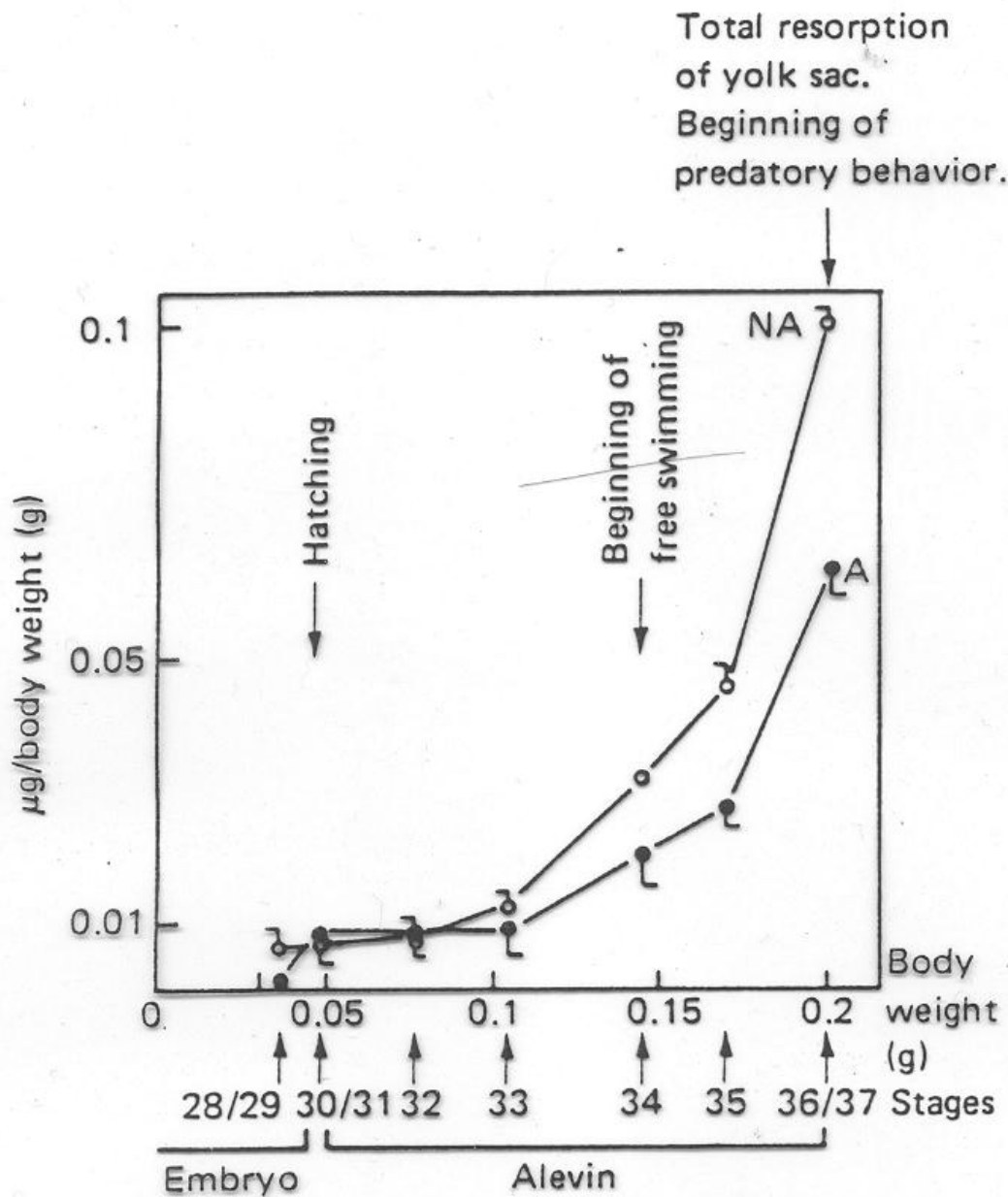
- **Morfologické parametry** (máme definovaný materiál??? Stáří, pohlaví, genotyp....)
  - Délka
  - Hmotnost
  - Vývoj orgánů
  - Malformace, atd.
- **Behaviární – chování jedinců a populací**
  - Rychlost, směr, plynulost plavání
  - Chování v hejně
  - Lovná aktivita, příjem potravy
  - Rozmnožovací aktivita, ... „odchylky od normálu“
- **Biochemické parametry**
  - Vysoce citlivé
  - Nedostatek srovnávacích dat- ...co je normál, kontrola??
  - Variabilita v populaci a v průběhu ontogeneze





**Acetylcholinesterase activity of rainbow trout embryo homogenate during development.** Activity is expressed as microliters of CO<sub>2</sub> dissolved per 100 mg of egg (wet weight) per hour.





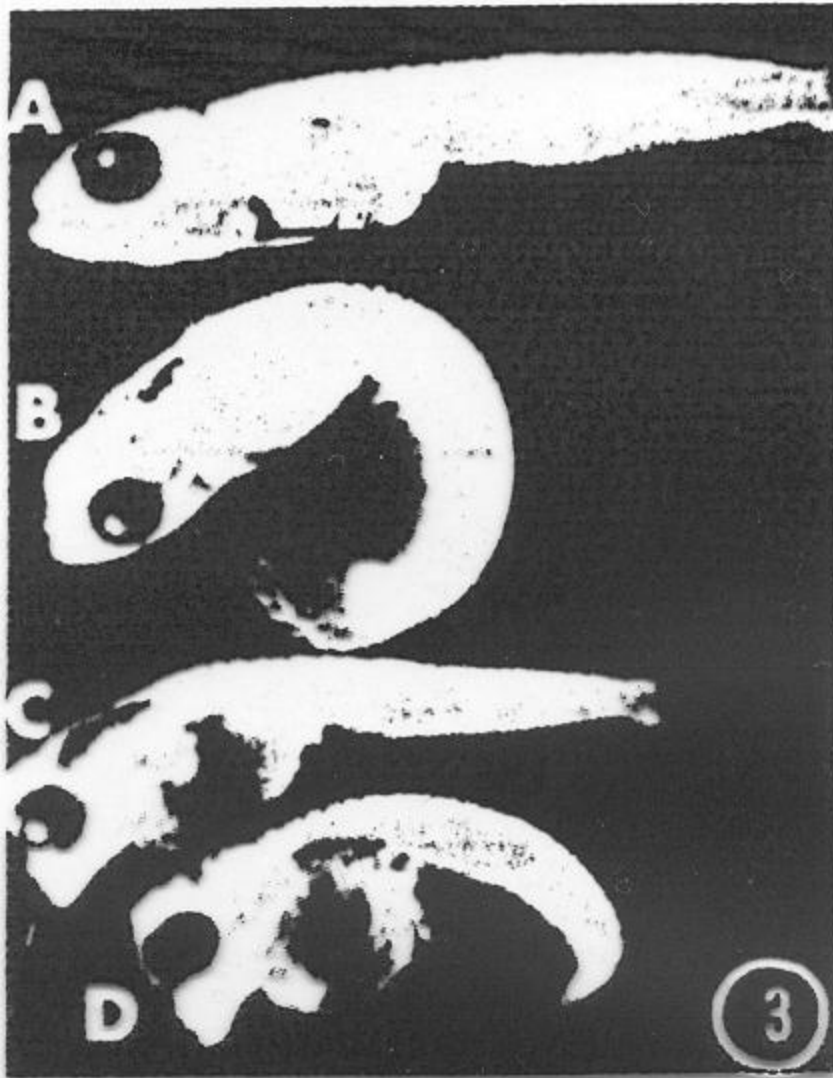
**Adrenalin (A) and noradrenalin (NA) contents in embryos and larvae of rainbow trout in relation to body weight (wet).**

Each point represents the average for 6-12 animals.



## One-day posthatch larval *Fundulus*, approximately X 13.

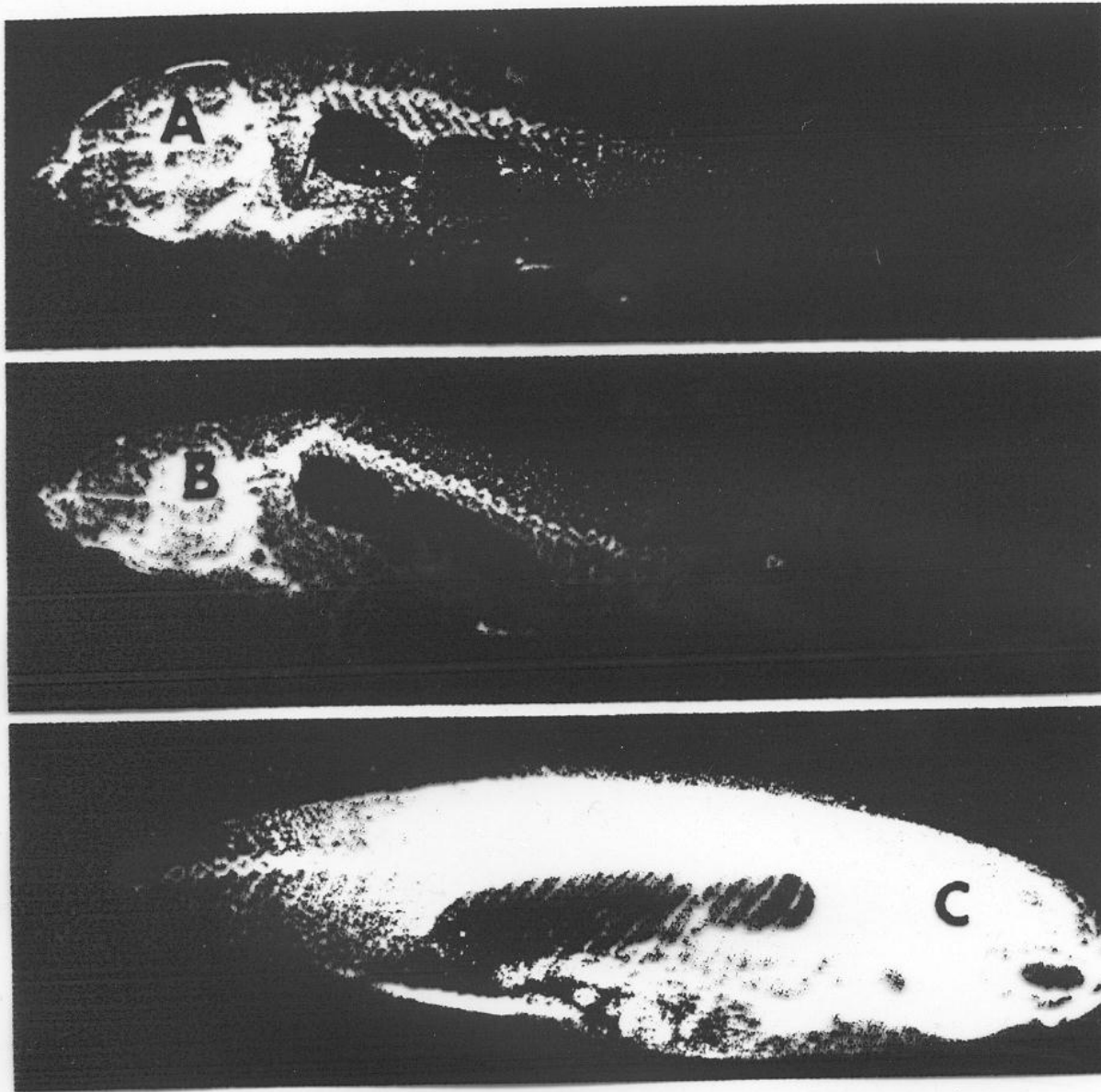
(a) Control; (b-d) treated with 0.02 mg/l methyl mercury in ovo, showing that inability to uncurl after hatching (b and d) can occur independently of craniofacial anomalies (c and d). (Modified from Weis and Weis (1997).)



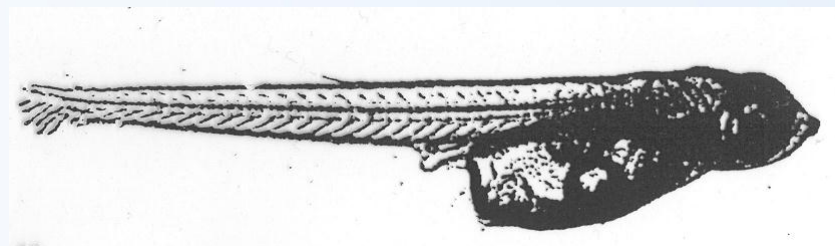
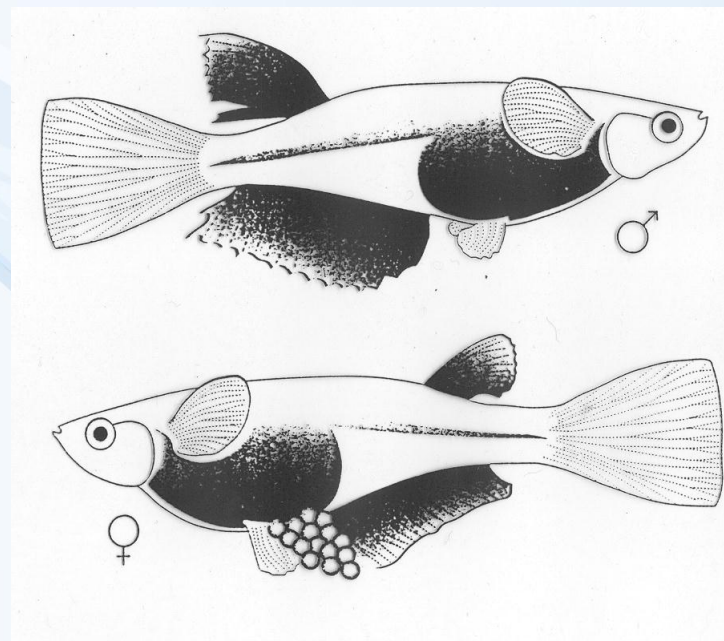
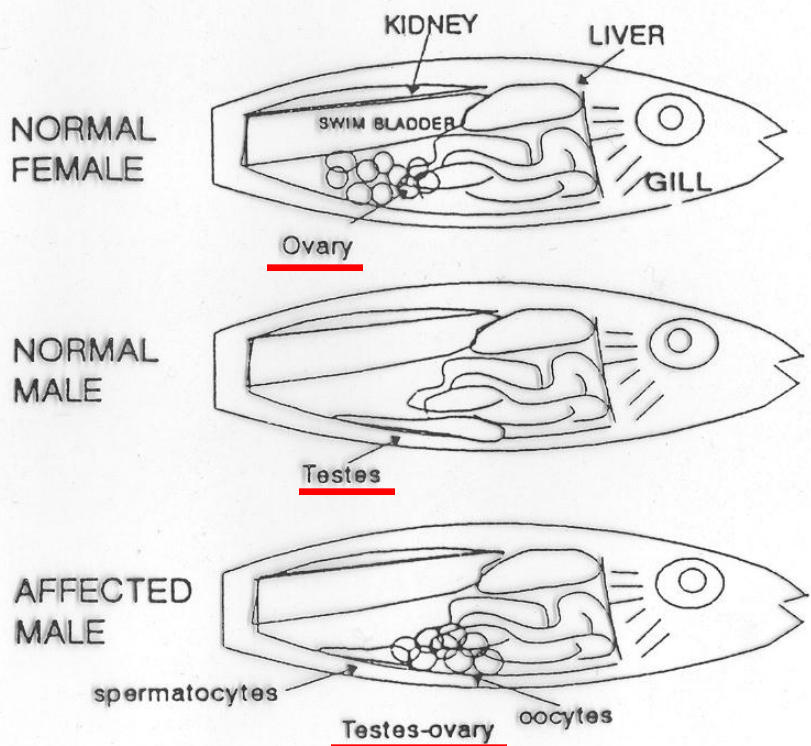


## Effects of toxaphene on structure of fathead minnow backbones.

(a and b) Radio graphs representative of fish exposed to 55 ng/l toxaphene; (c) control fish. Arrows point to areas of backbone affected.



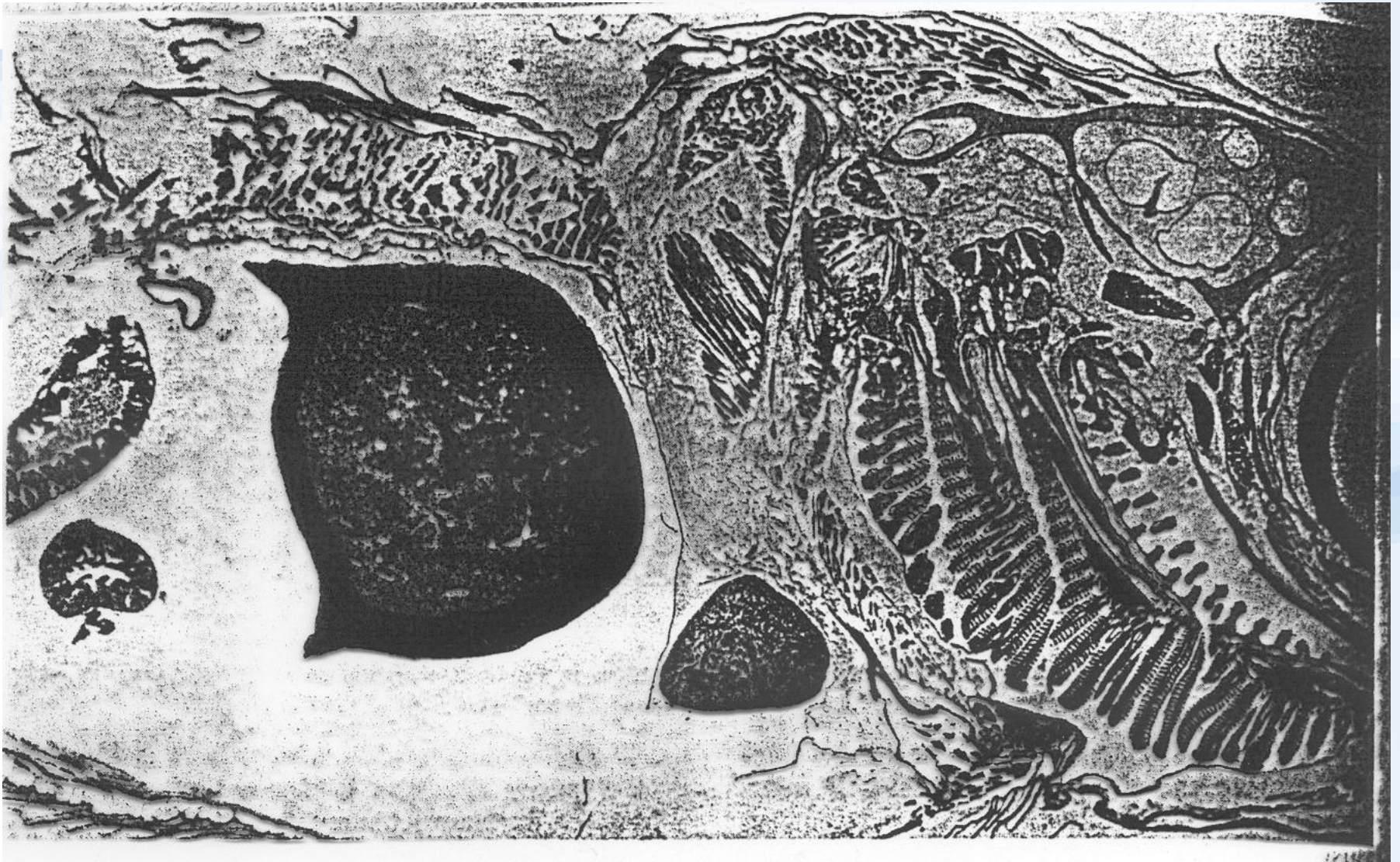
# Endocrine linked gonadal responses in Japanese Medaka



Stage 36

Right lateral view x25

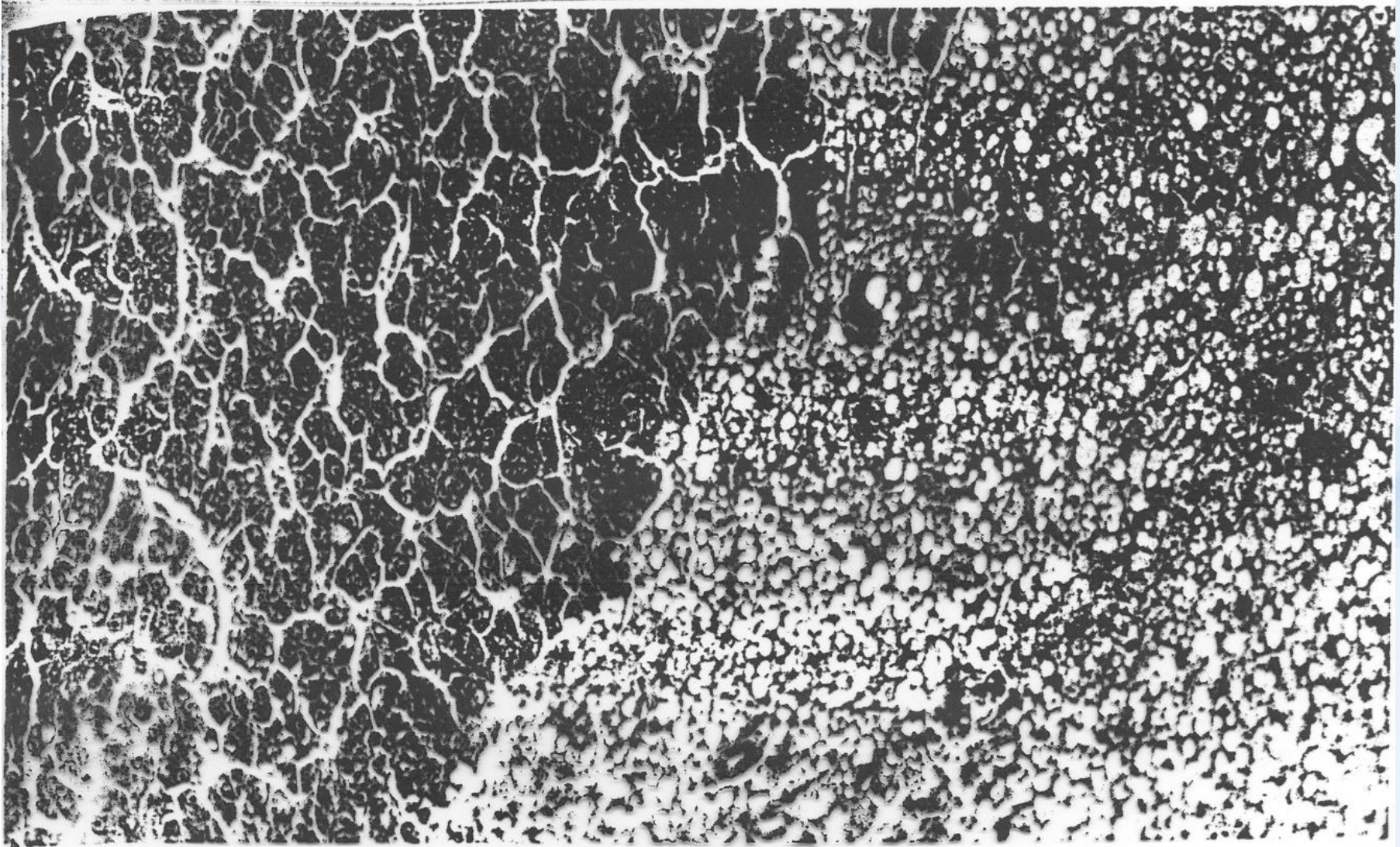




**Hepatocellular carcinoma in center of liver from medaka exposed to 10mg/L diethylnitrosane and sampled at 6th month.**

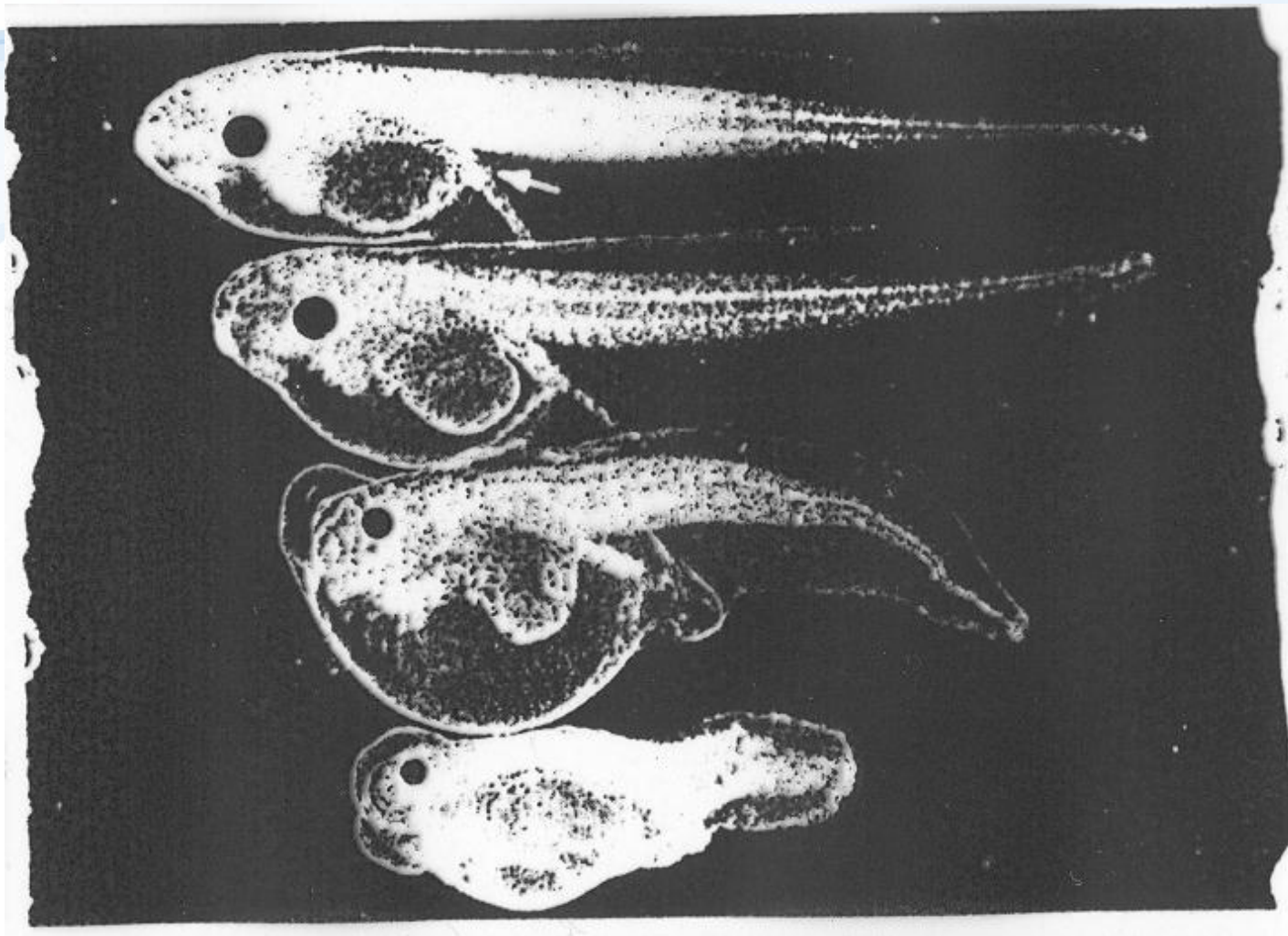


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Well-differentiated **hepatocellular carcinoma**. Note uniformity of cells in carcinoma and evenness of border between lesion and normal liver. From a **guppy exposed to acetylaminofluorene** and sampled at 24 mo.





Increasing concentrations of a developmental toxicant. The effects of **increasing concentration of the teratogen hydroxyurea**. Note that as the concentration increases, the malformations become more severe. Concentrations from top to bottom are control, 0.2, 0.4, and 0.7 mg/ml. (Photo by M. A. Hull.)





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