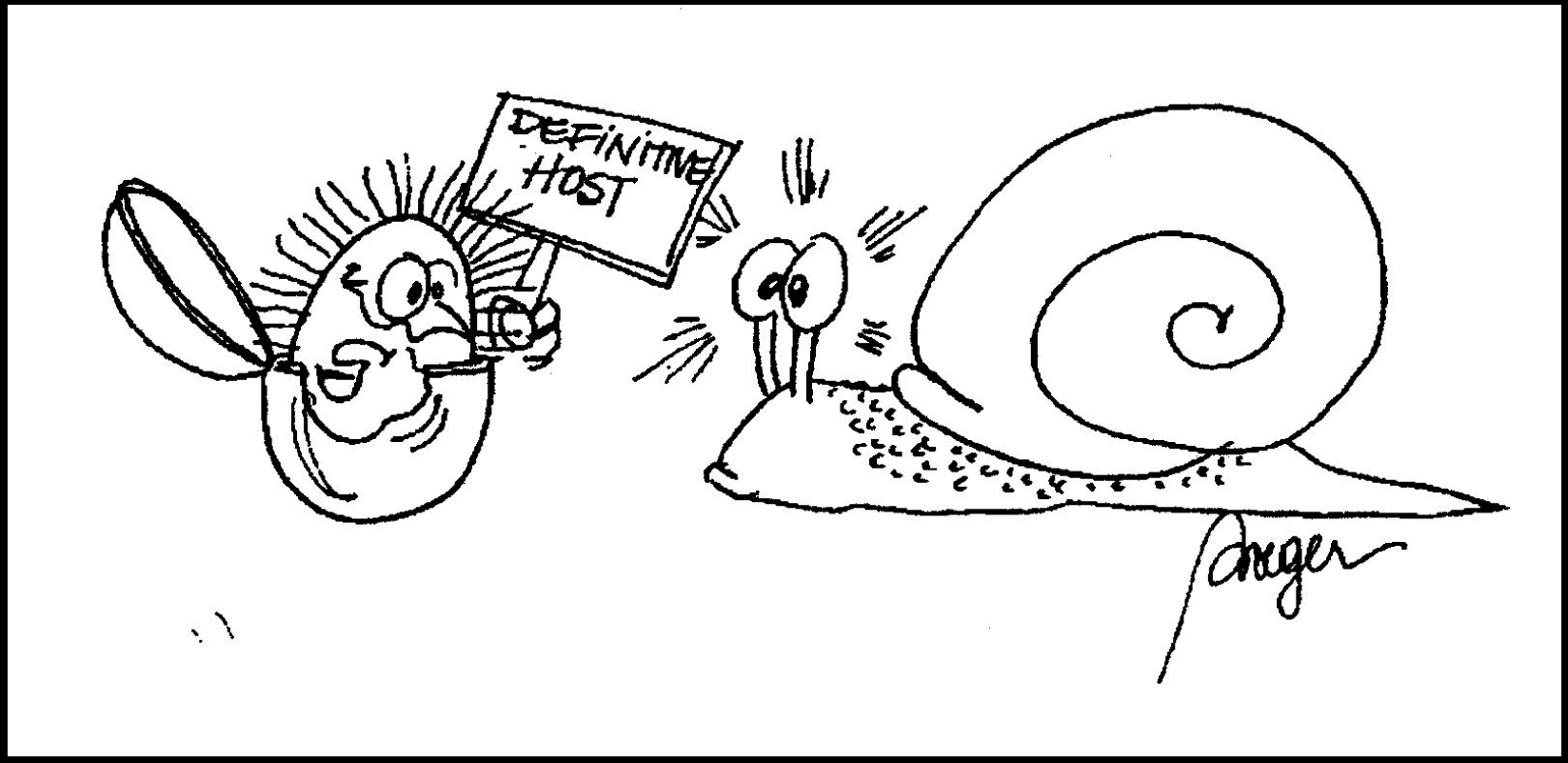
Overview of Common Types of Parasite Life Cycles

Definitions of Hosts

Many parasites have more than one host in their life cycle. These hosts have different roles and are given specific names.



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- **Paratenic host (Transport host) – a host in which a parasite survives without undergoing further development. A paratenic host accumulates and maintains stages of a parasite, and although beneficial, is not essential to the life cycle.**

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- **Vector- any agent, either animate or inanimate (such as wind, water, or arthropod) that transmits an infectious organism.**

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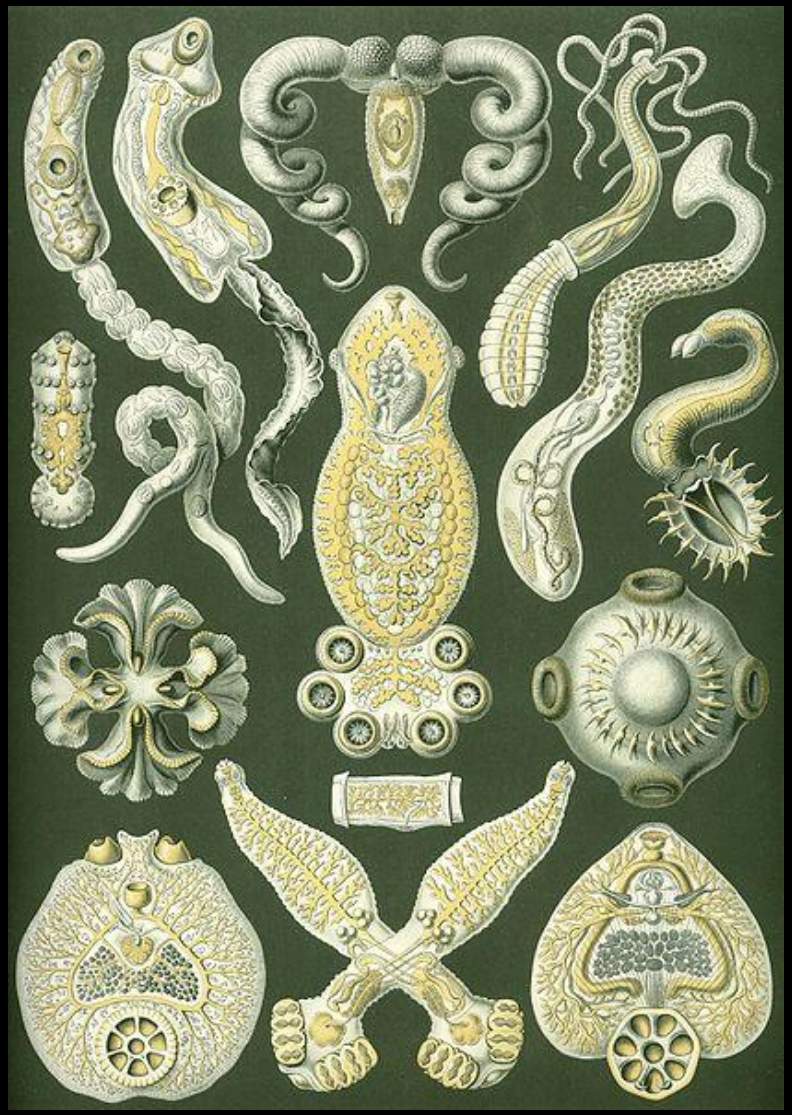
- **Mechanical Vector- a vector which transmits a parasite by mechanical means only. It may be living or non-living and is not essential for the parasite's life cycle.**

Outline

- **Monogenea: Direct Life Cycles and Autoinfection (Complex or Simple?)**
- **Trematoda (Digenea): Complex Life Cycles**
- **Difficulty of Solving Life Cycles Example Cestodes (Tapeworms)**

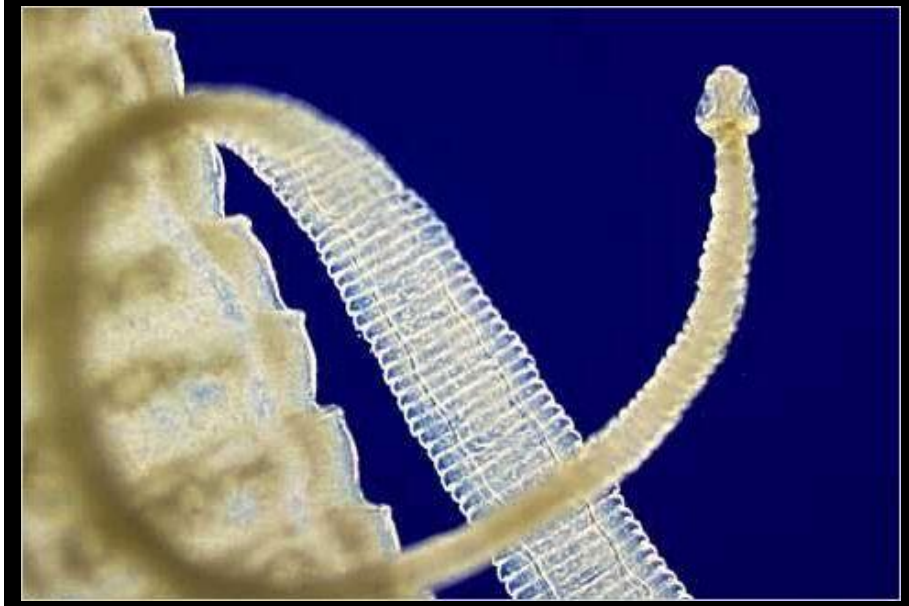
Platyhelminthes



Phylum Platyhelminthes

Class Trematoda

Subclass Digenea

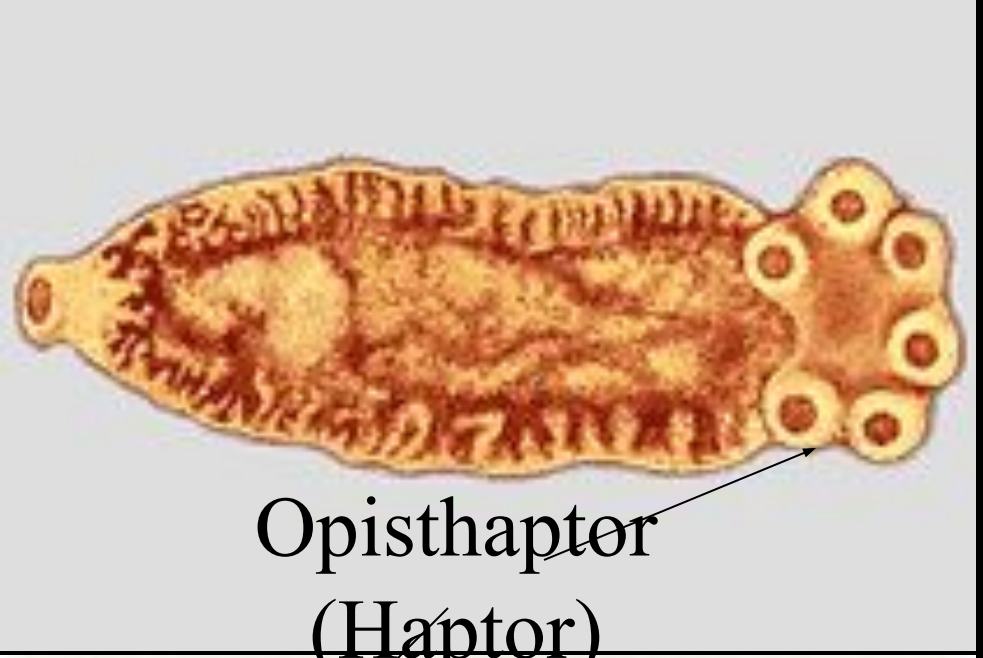


Class Cestoidea

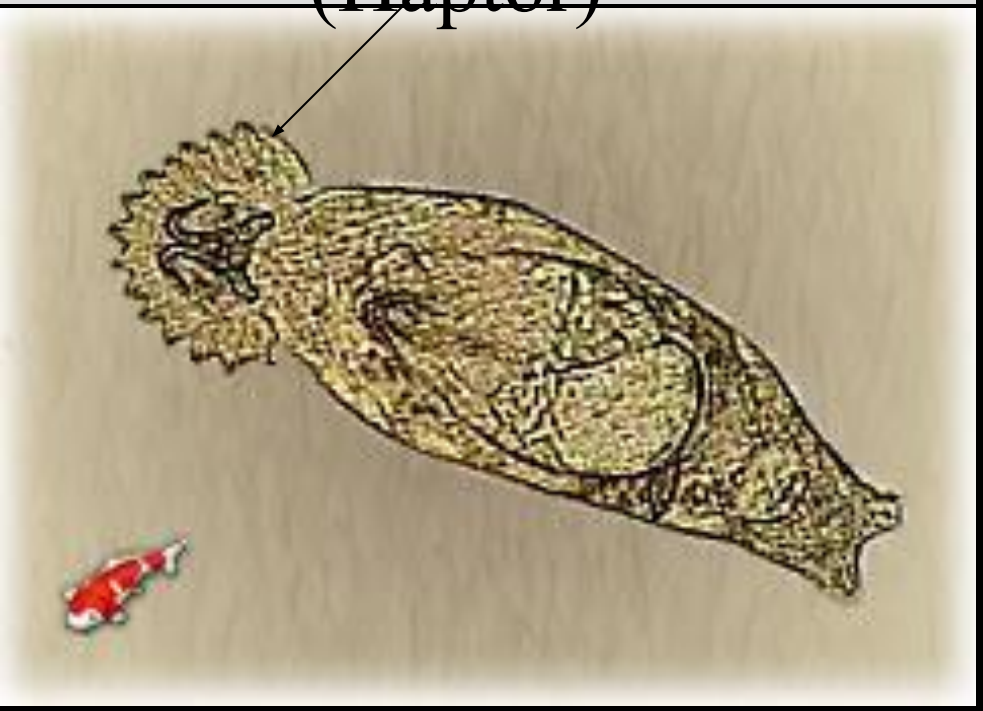
Class Monogenea

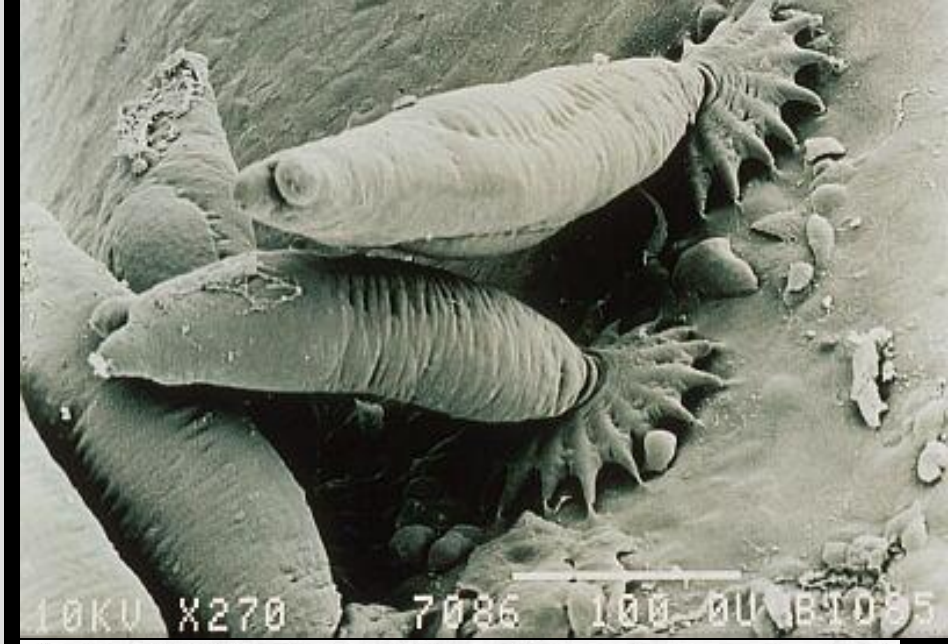
Class Monogenea:

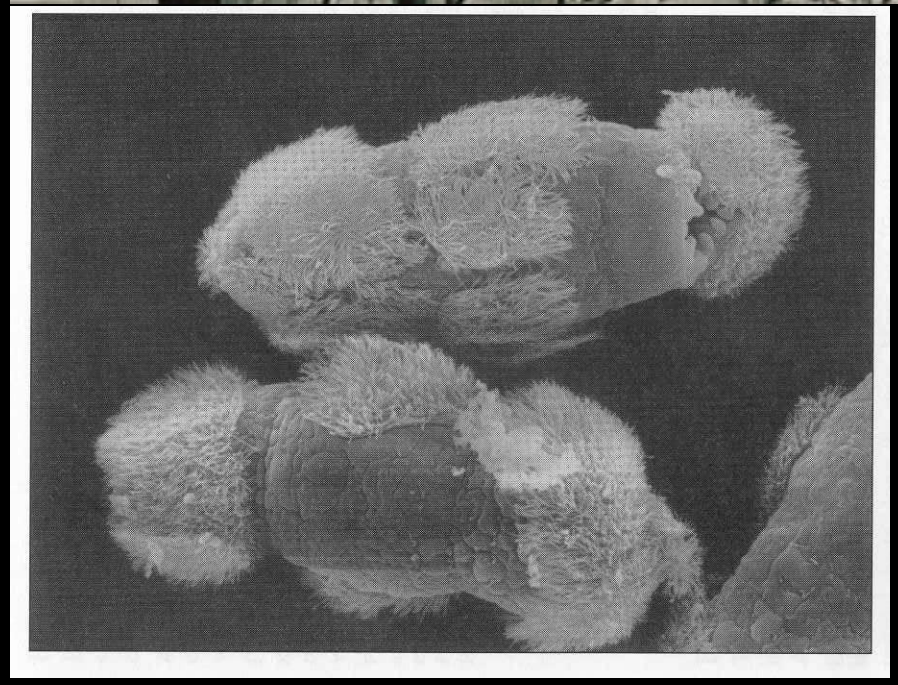
- Most ecto-parasites of fish.
- Some endo-parasites of urinary bladder and mouth of amphibians and reptiles.
- Body covered by tegument.
- Posterior hooks with opisthaptor (haptor).
- Direct life cycle with single host.



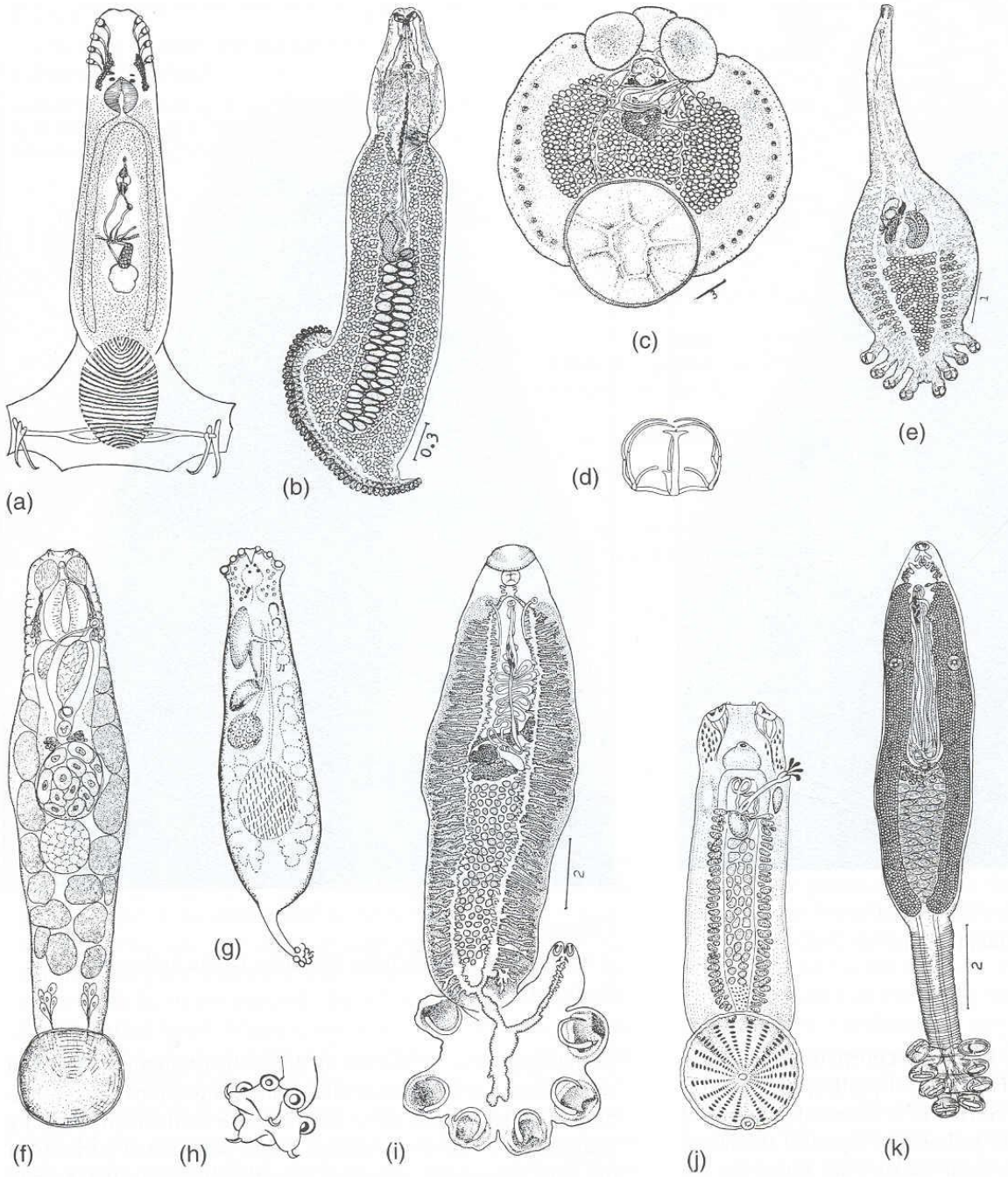
Opisthaptor
(Haptor)

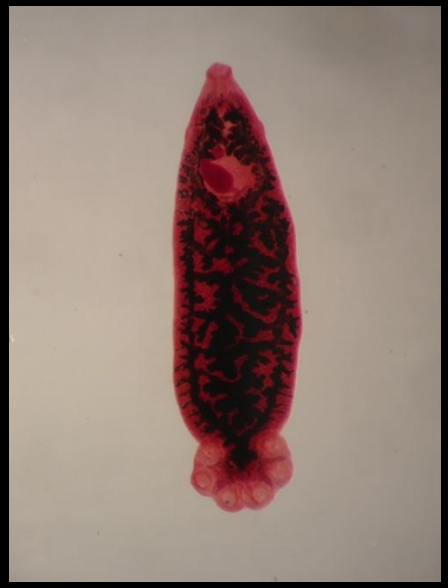


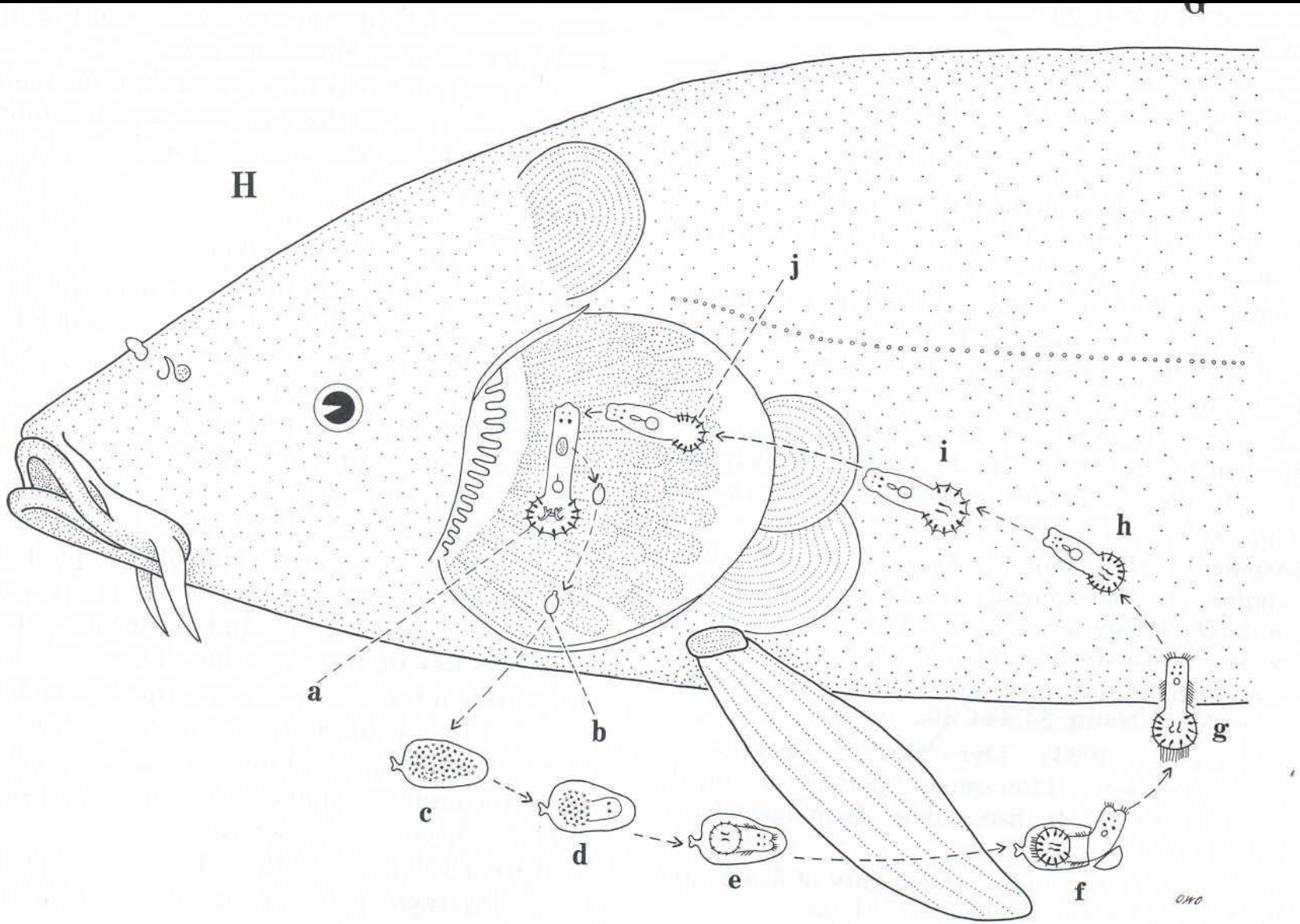




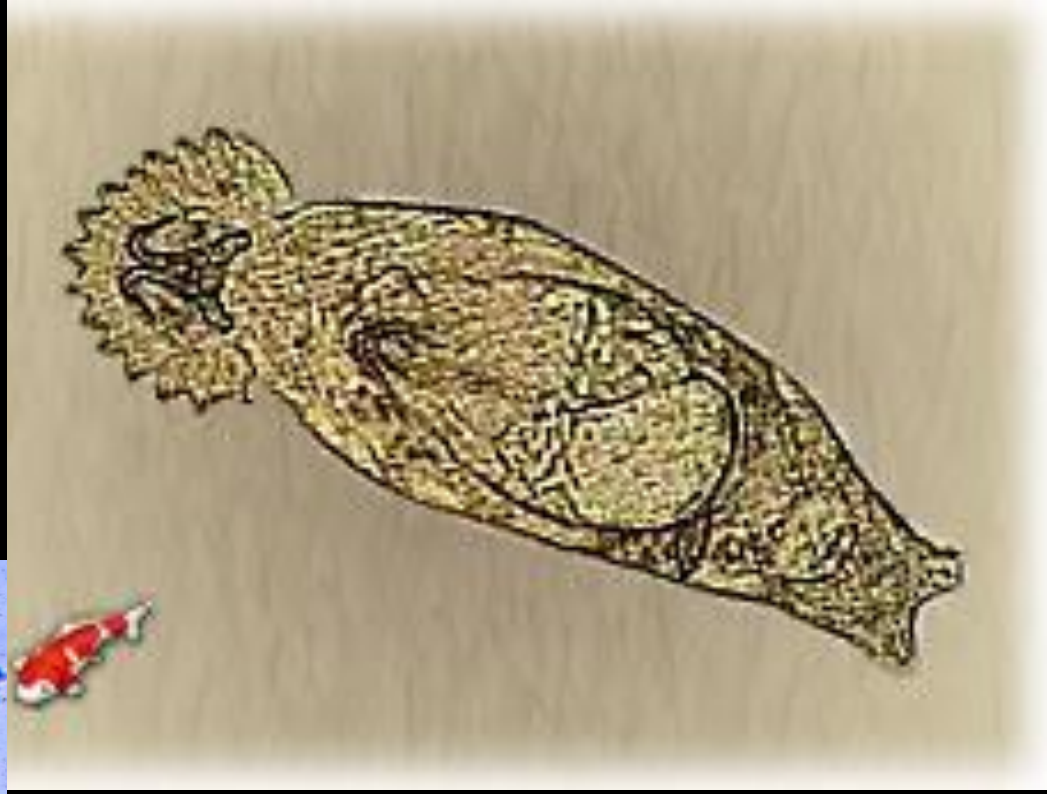
Ciliated larva


(a)
(b)
0.3
(c)
5
(d)
(e)
1
(f)
(g)
(h)
(i)
2
(j)
(k)
2





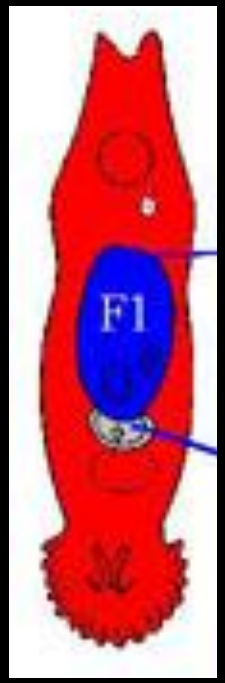
Life cycle of Ecto parasitic monogenean

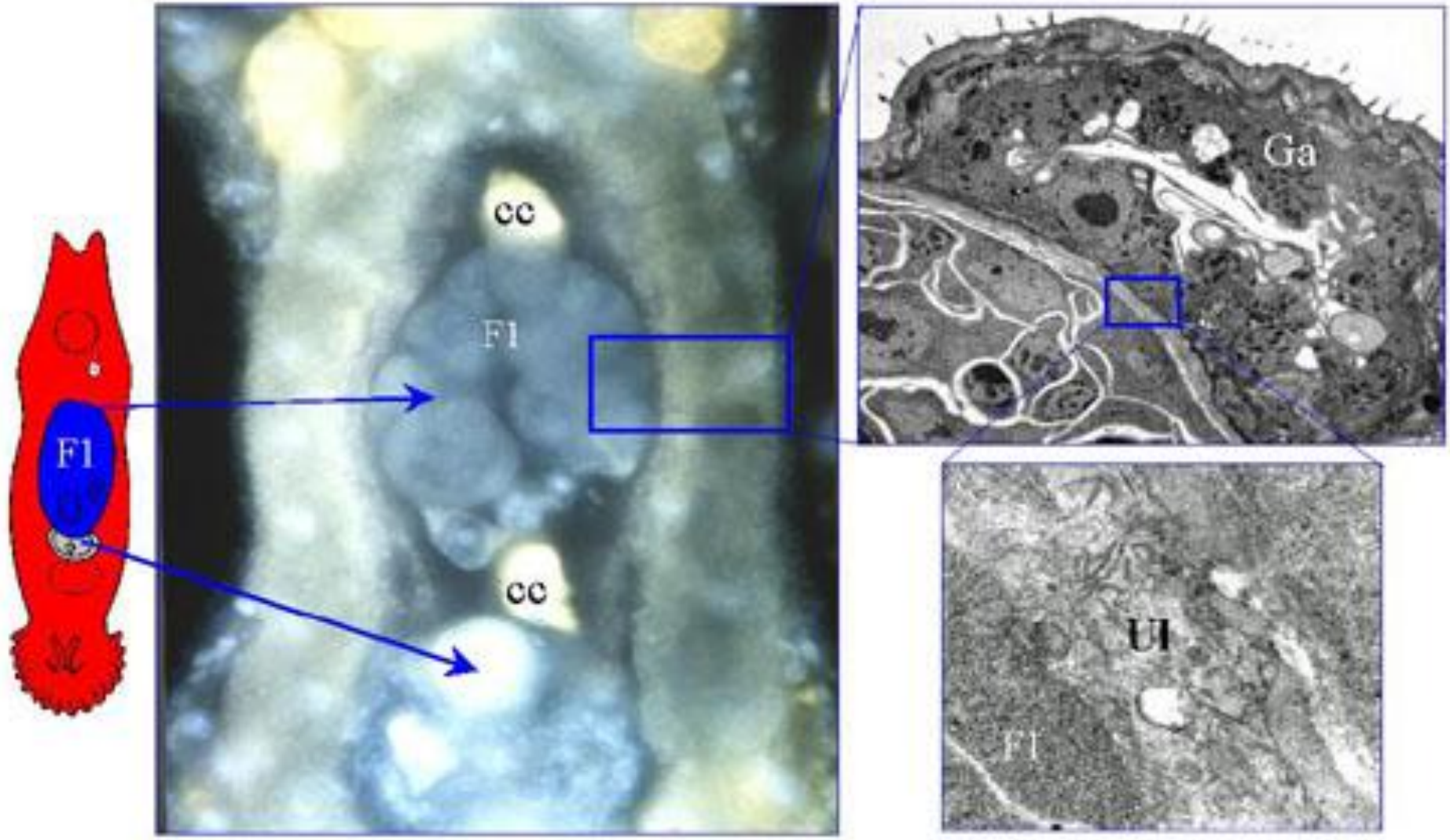


Gyrodactylus sp.

Adult worms contain several generations of embryos boxed one inside another and are often referred to as "Russian Dolls".

Each parasite gives birth to a fully grown worm which attaches to the host alongside its parent and this can lead to exponential population growth.

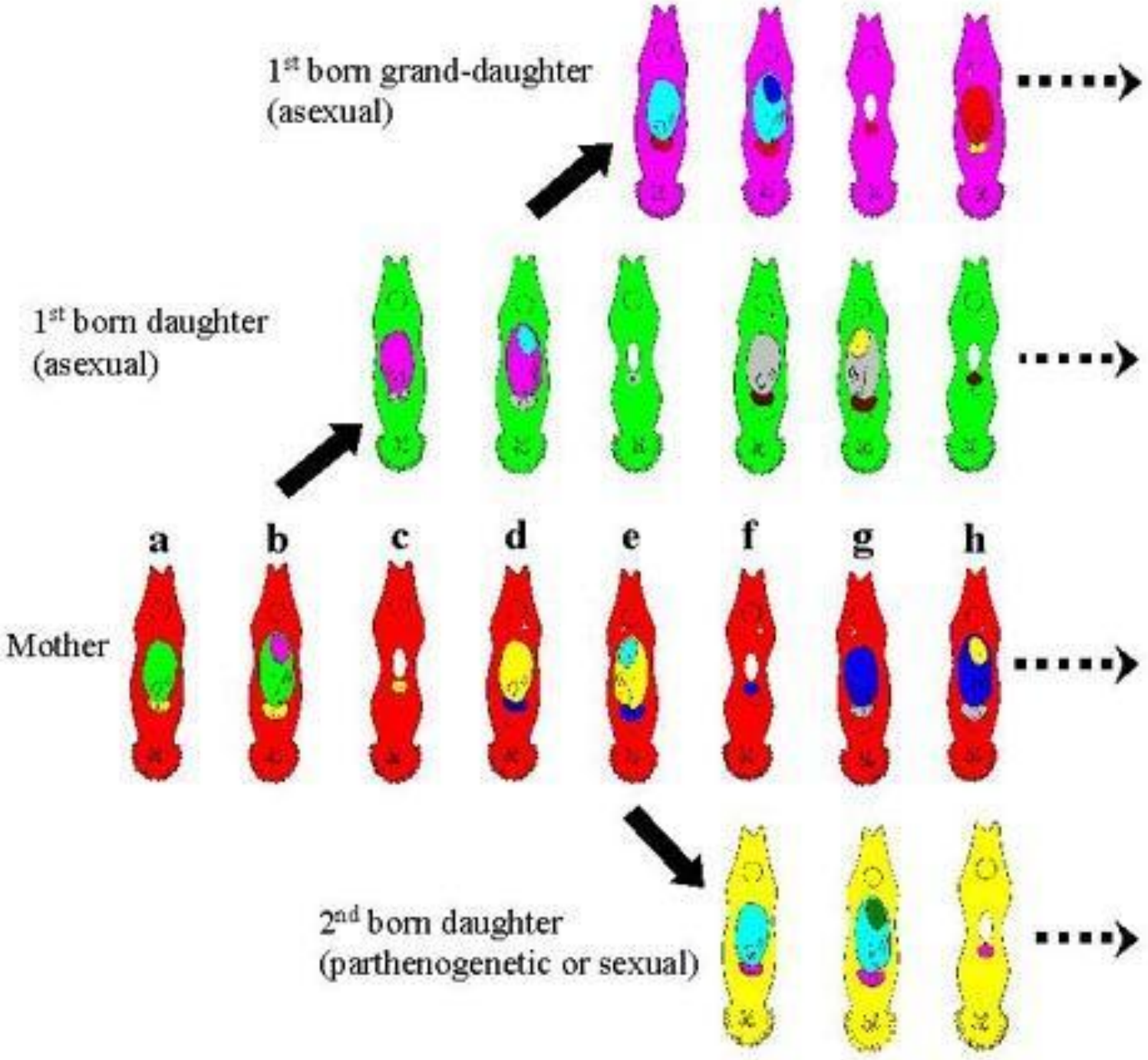


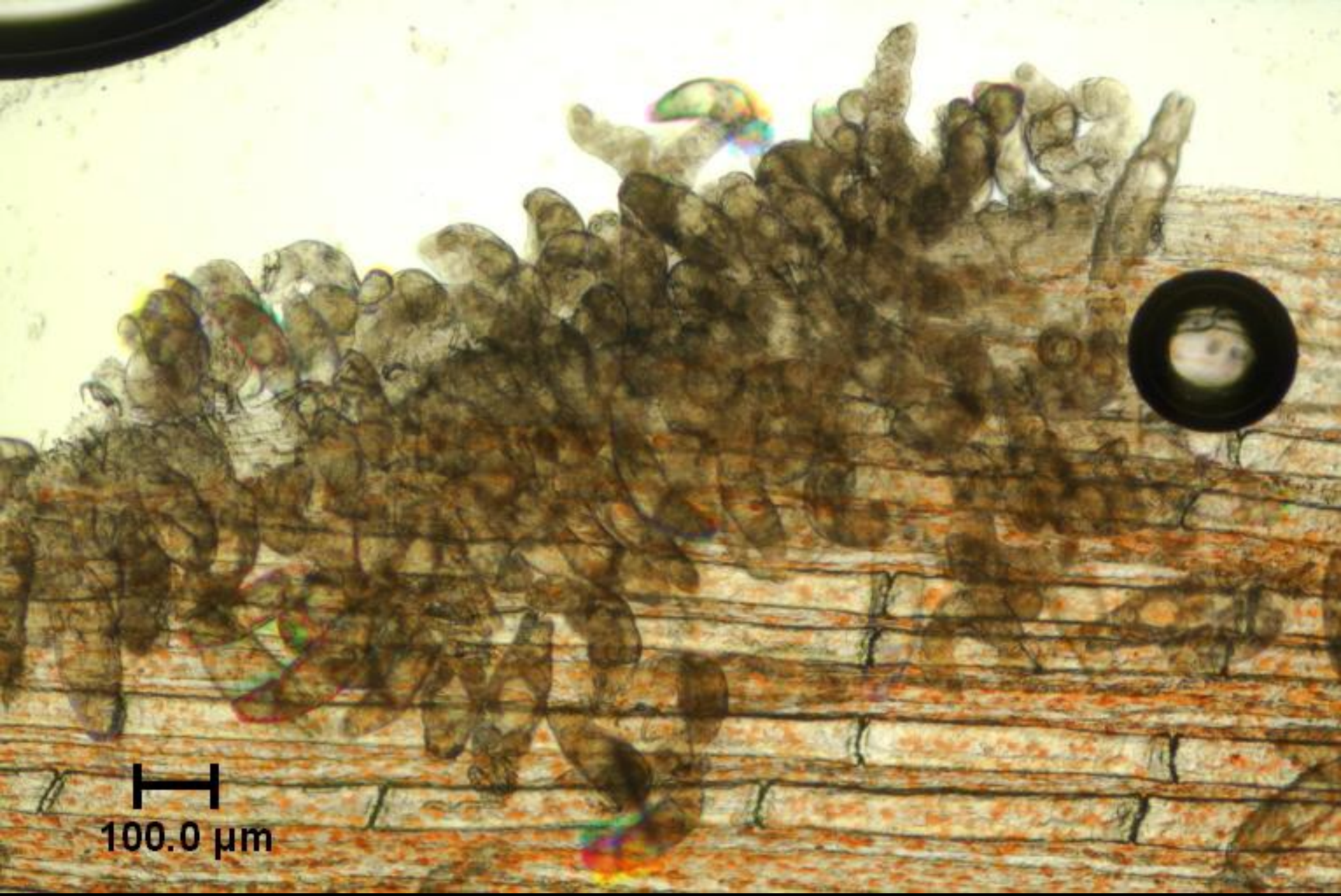


The embryo is separated from the parental by a metabolically-active uterus lining, which appears to form a "placental-type" role. The F2 embryo (not shown) derives its nutrients directly from the F1 embryo.

Gyrodactylus

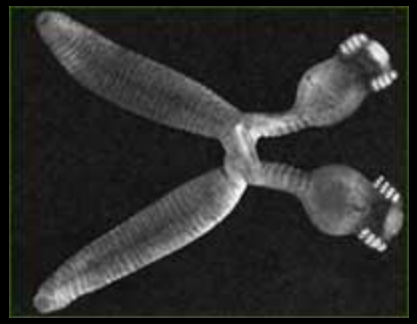
- **The reproductive biology of *Gyrodactylus* is further complicated as different modes of reproduction (asexual, parthenogenesis and sexual) may be involved in the life cycle of an individual worm.**


1st born grand-daughter
(asexual)
1st born daughter
(asexual)
a
b
c
d
e
f
g
h
Mother
2nd born daughter
(parthenogenetic or sexual)



Gyrodactylus sp.

Diplozoon paradoxum



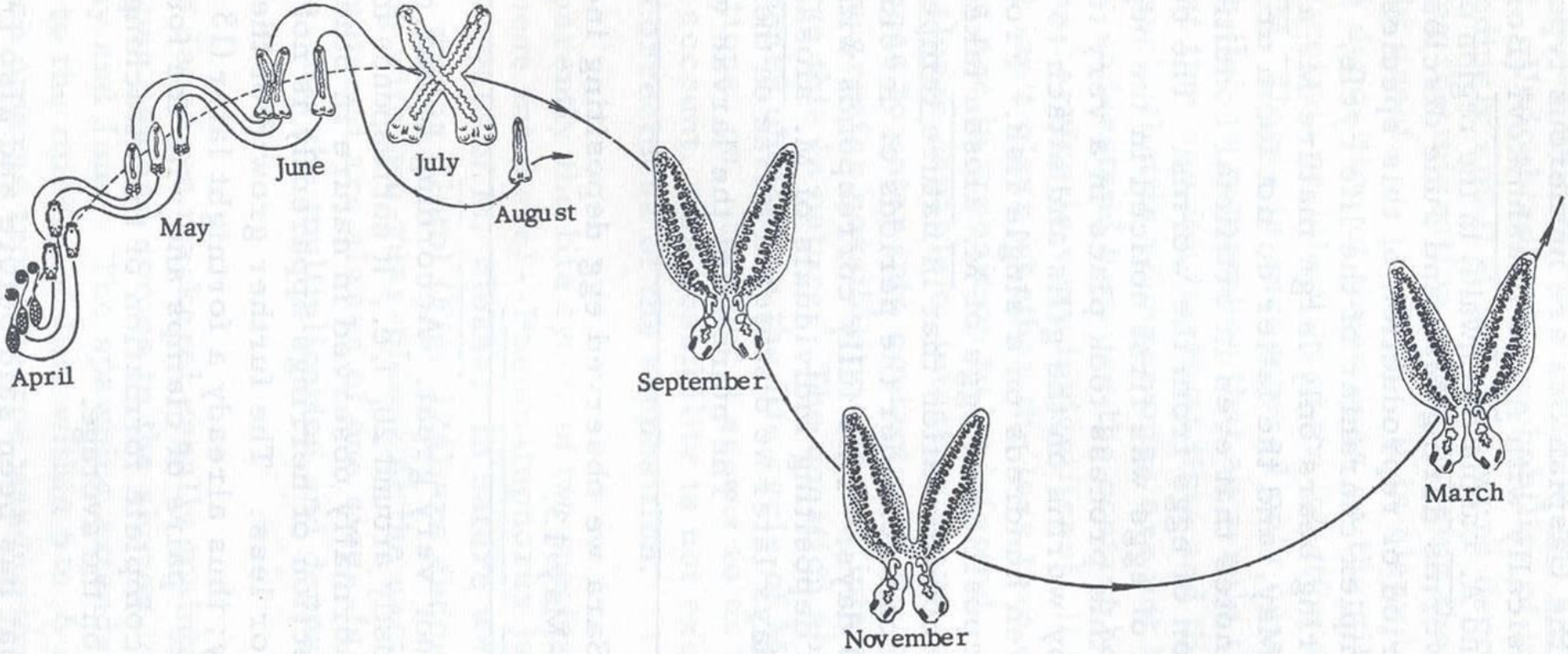
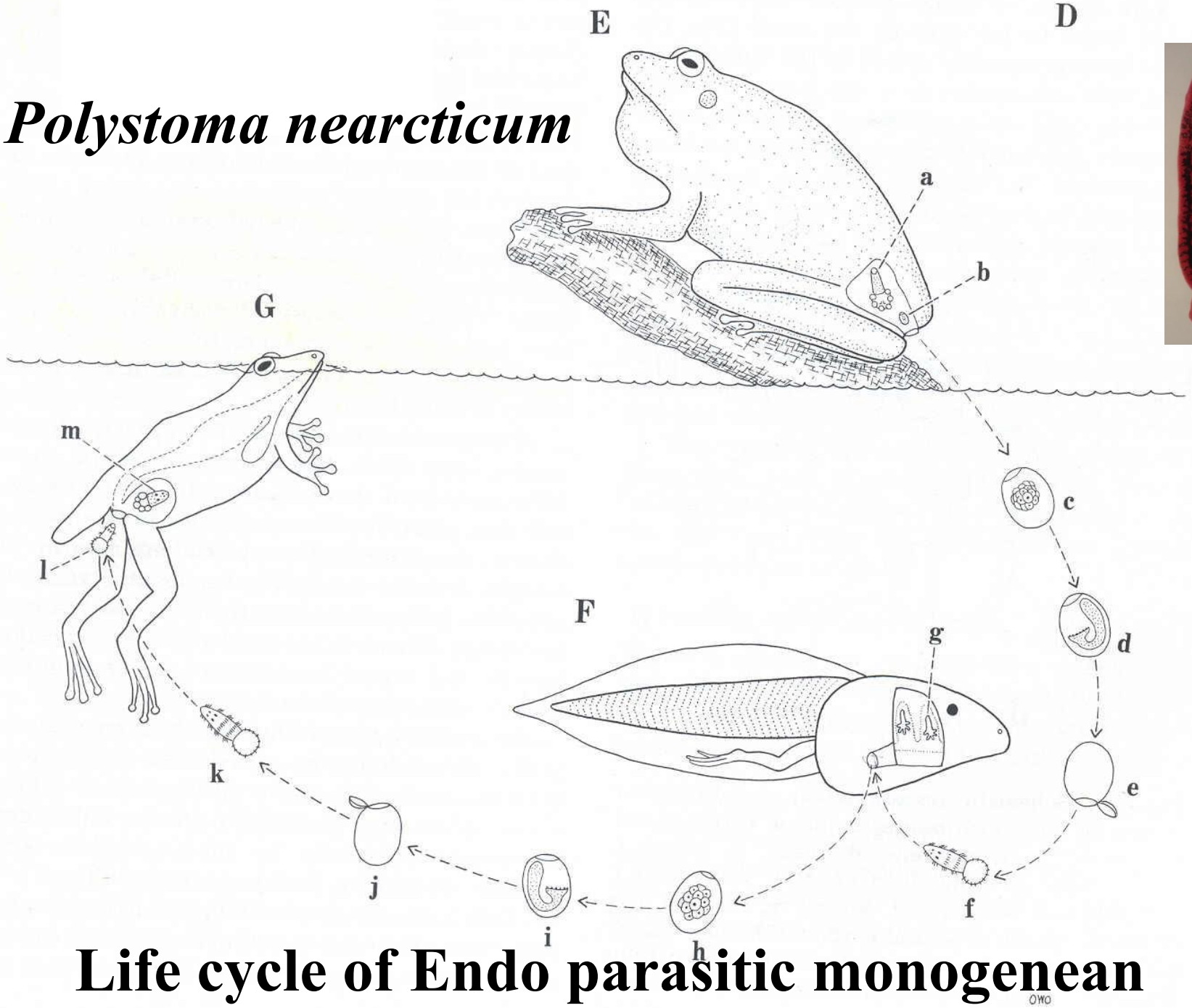


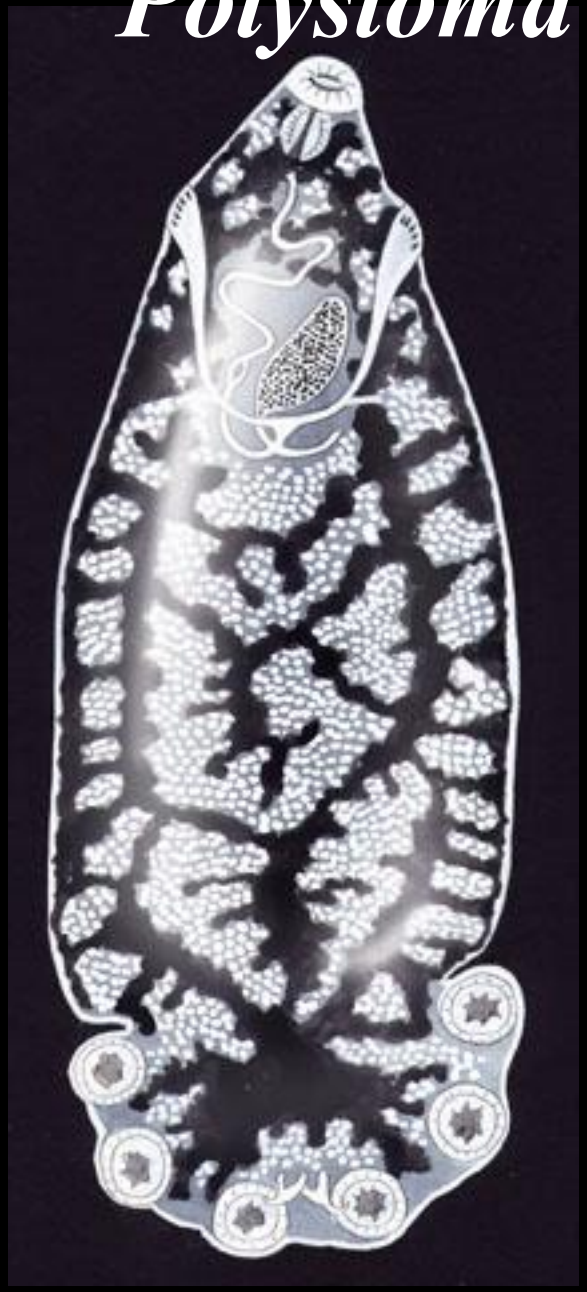
Fig. 122. Diplozoon paradoxum Nordmann, schematic representation of the life cycle. In addition to the normal development, the fate of the little larvae which did not pair up is indicated in the diagram. Explanation in text.

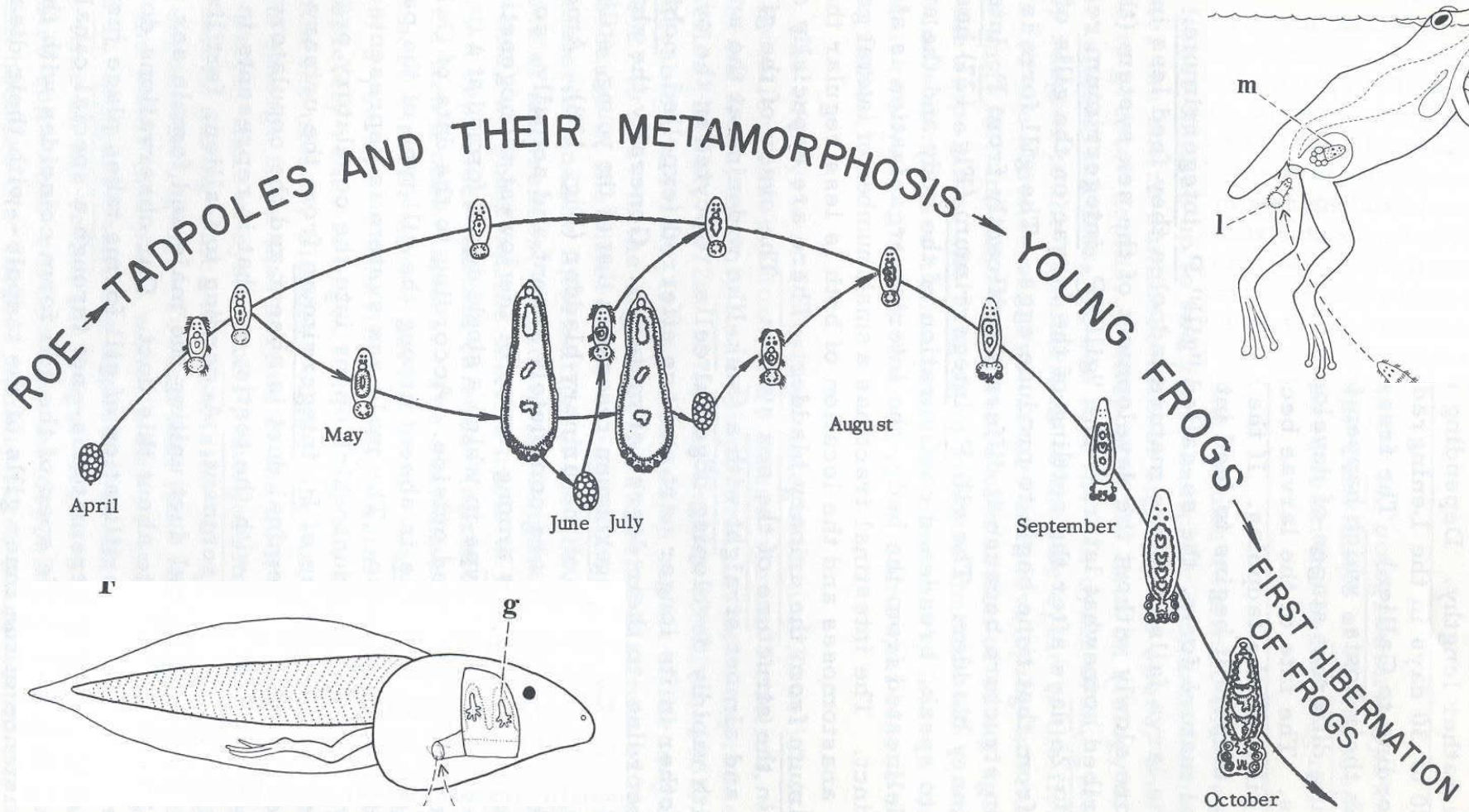
Polystoma nearcticum



Life cycle of Endo parasitic monogenean

Polystoma nearcticum




ROE → TADPOLES AND THEIR METAMORPHOSIS → YOUNG FROGS → FIRST HIBERNATION OF FROGS
April
May
June
July
August
September
October
m
l
f
g

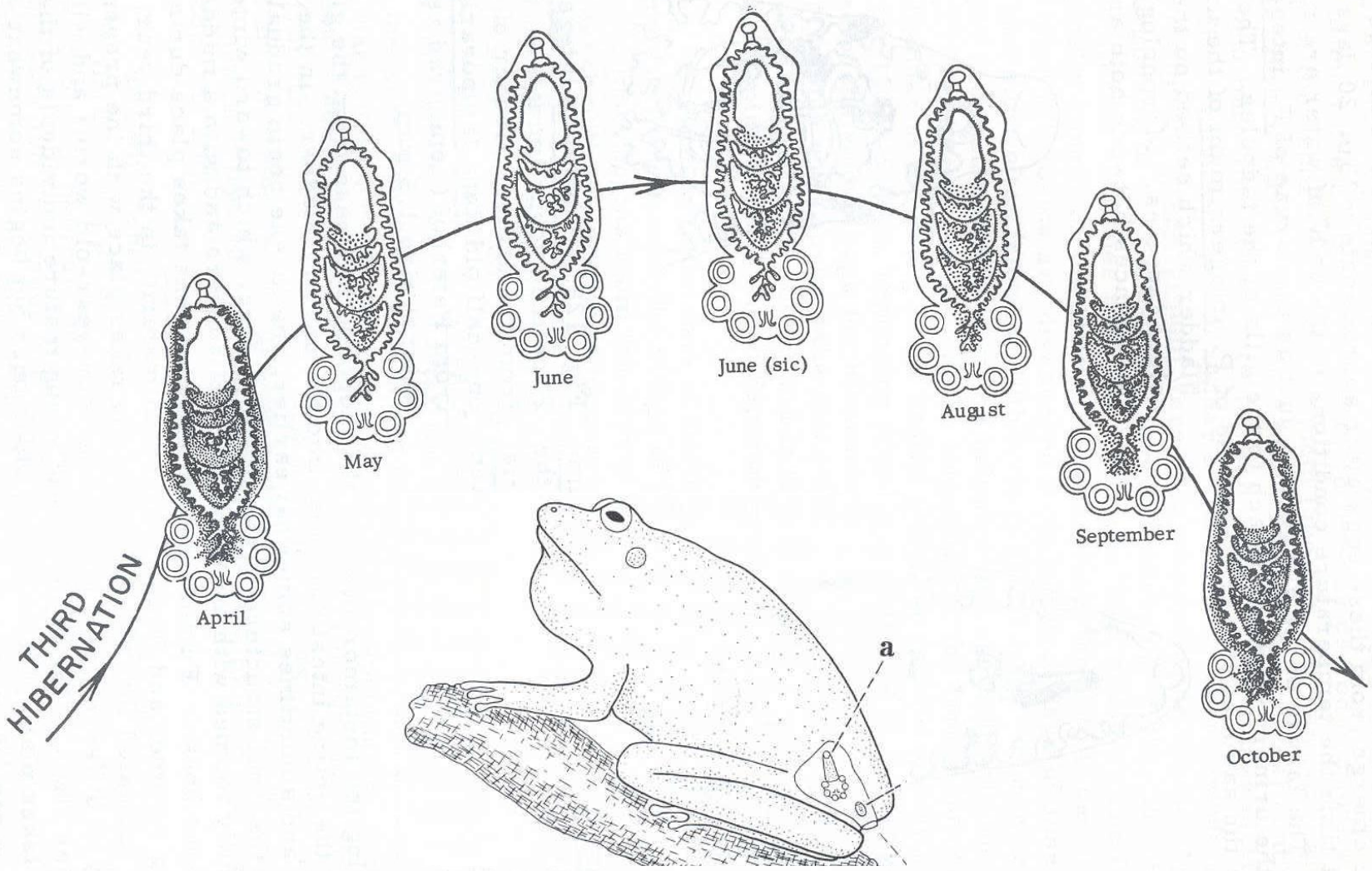


Fig. 126. Polystoma integerrimum Froelich, schematic representation of the life cycle. On the top--first year of existence; bottom--fourth year of existence.

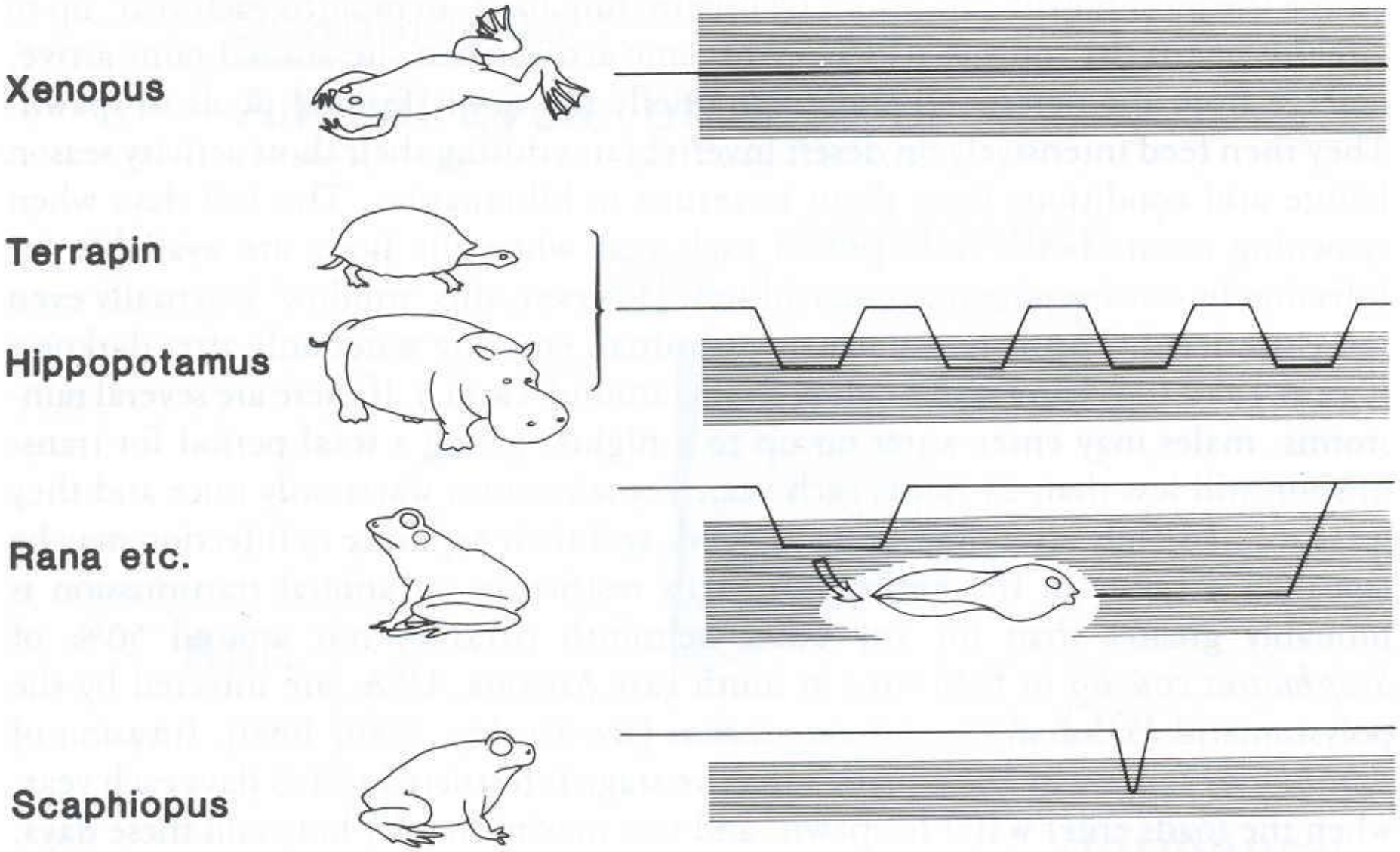


Figure 6.1. *Polystomatid monogeneans*: correlation of parasite transmission with host behaviour.

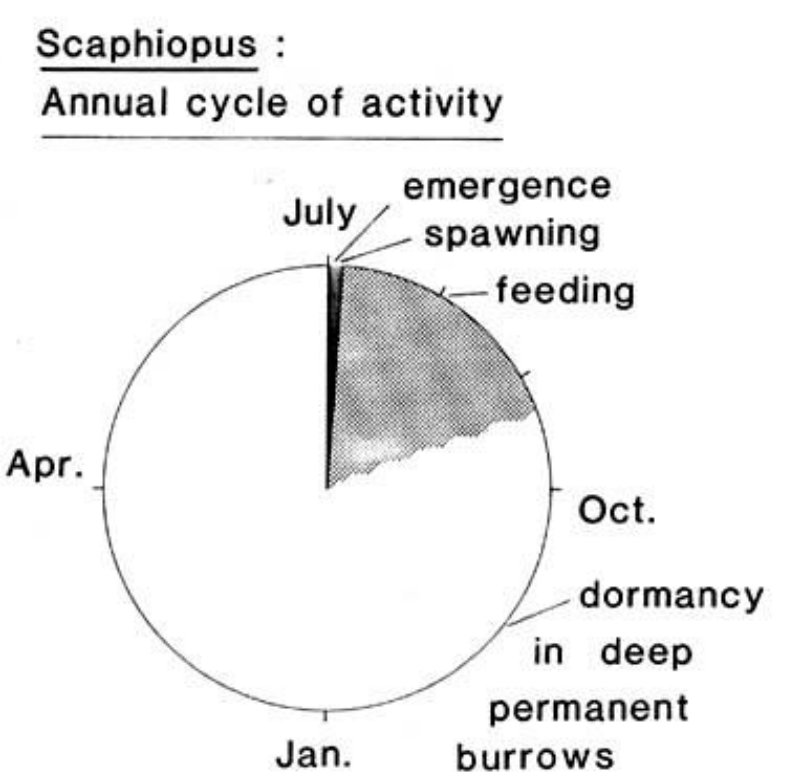

Spadefoot toad

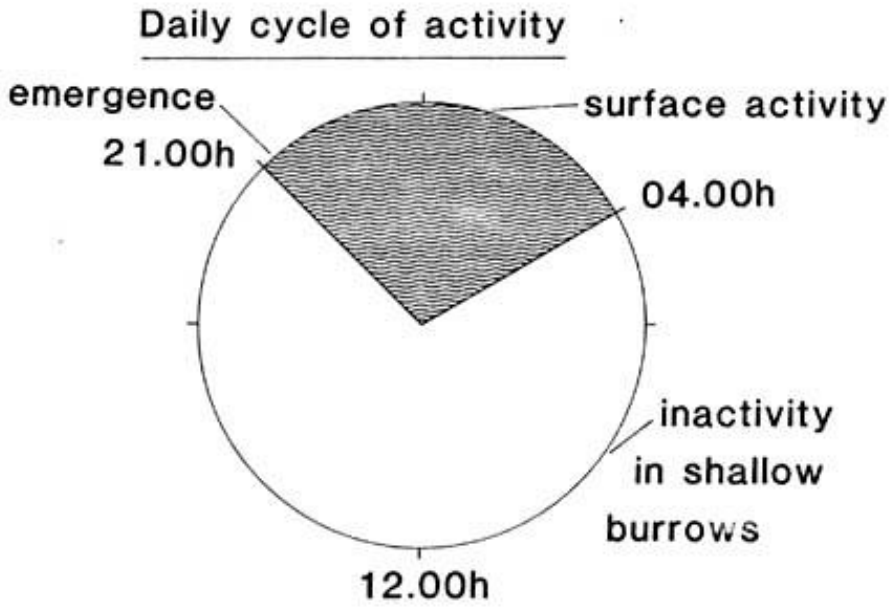
Tadpole of Spadefoot toad

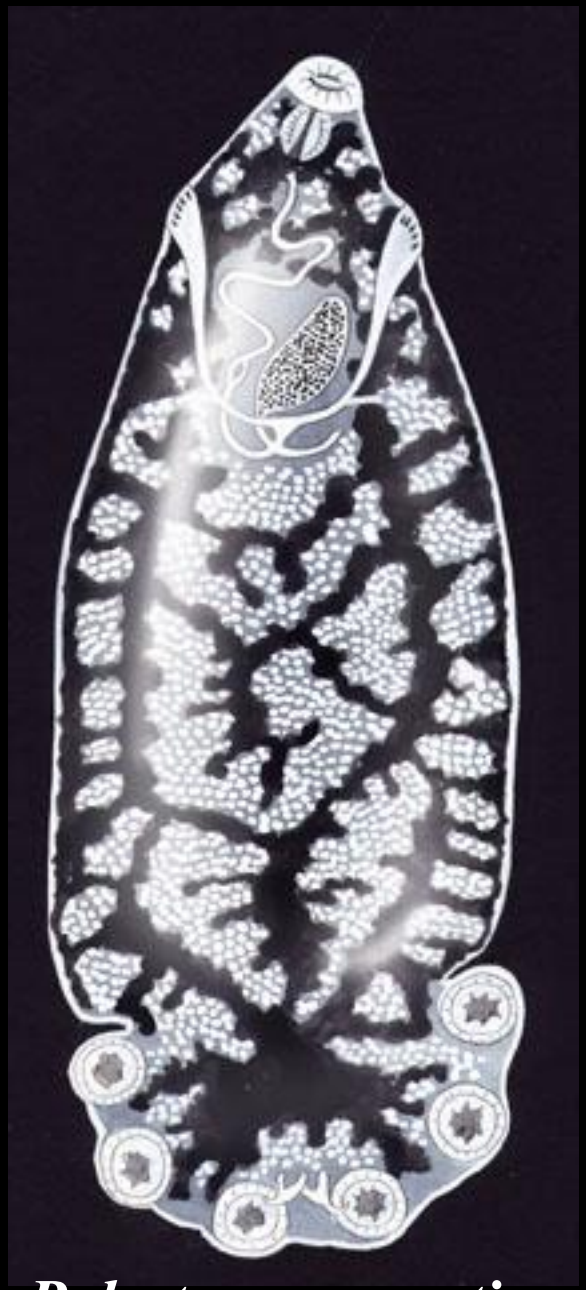
Tadpoles of Spadefoot Toads

Temporal adaptation

Spadefoot toads are parasitized by a Monogenean *Pseudodiplorchis americanus*



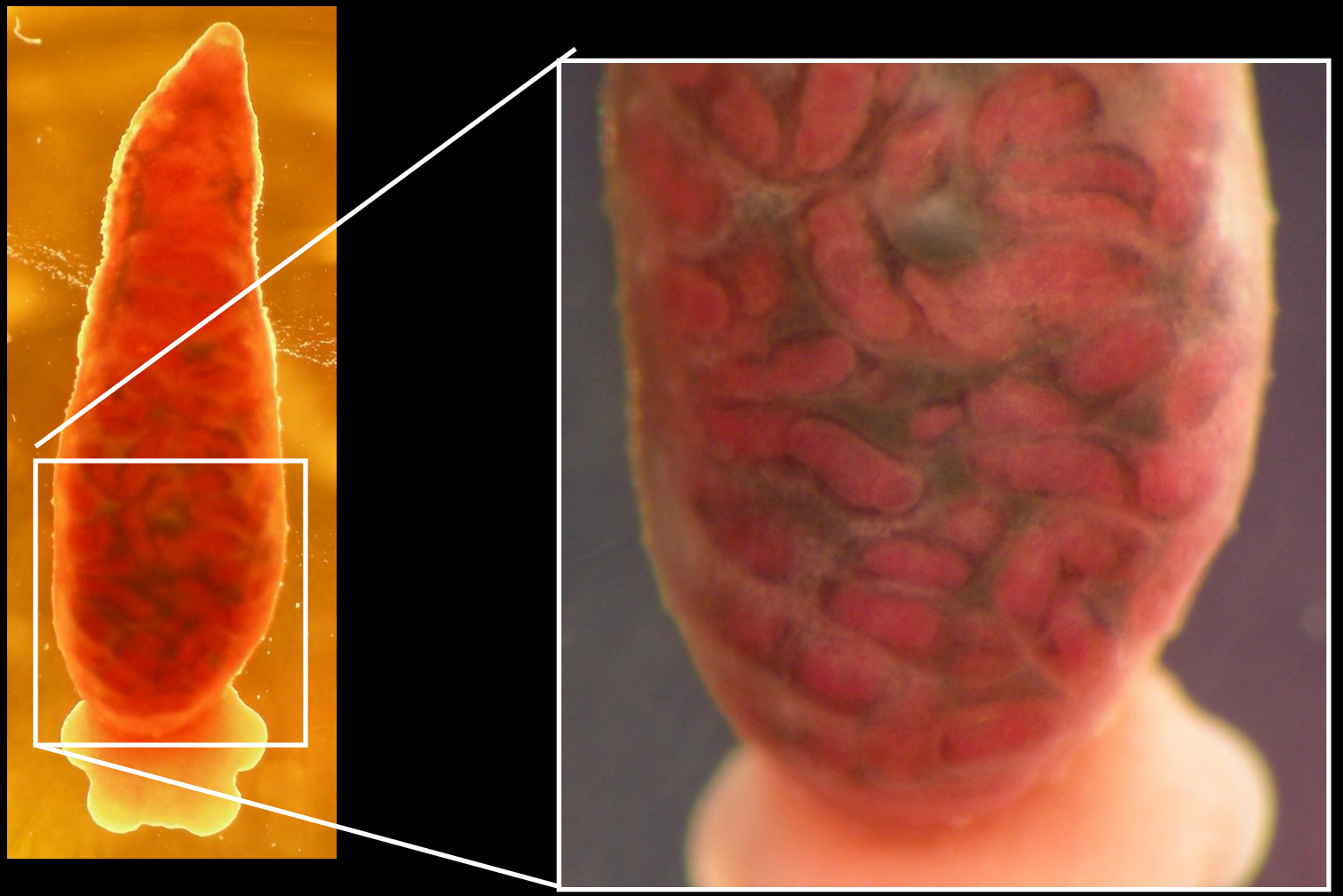




Polystoma nearcticum

Pseudodiplorchis americanus

Pseudodiplorchis americanus



Pseudodiplorchis americanus

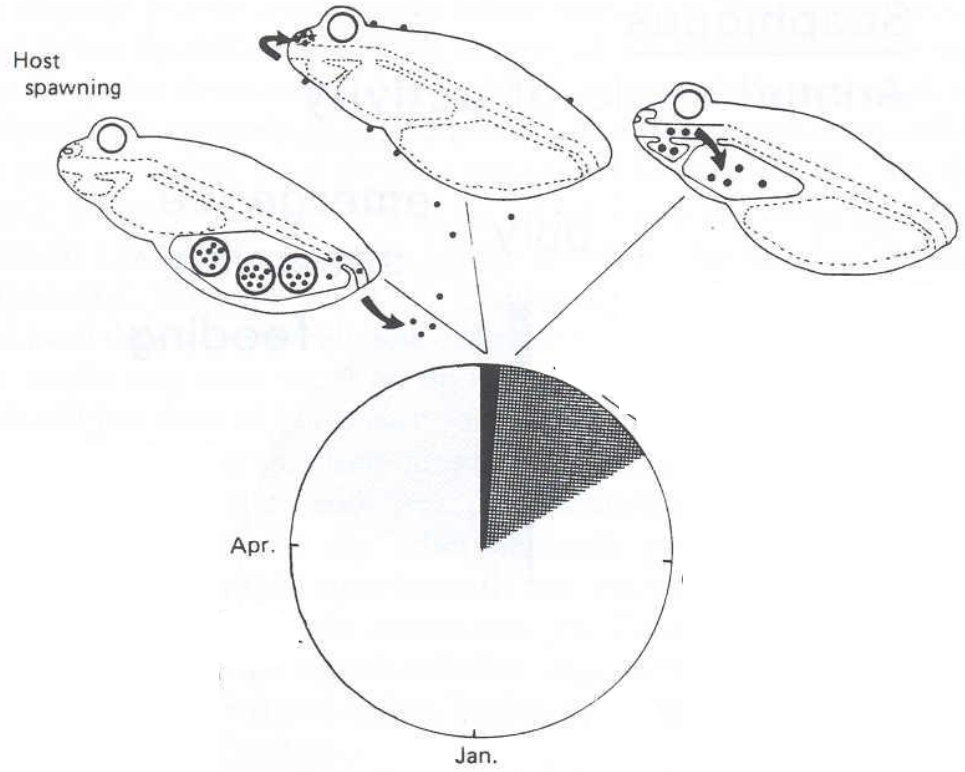
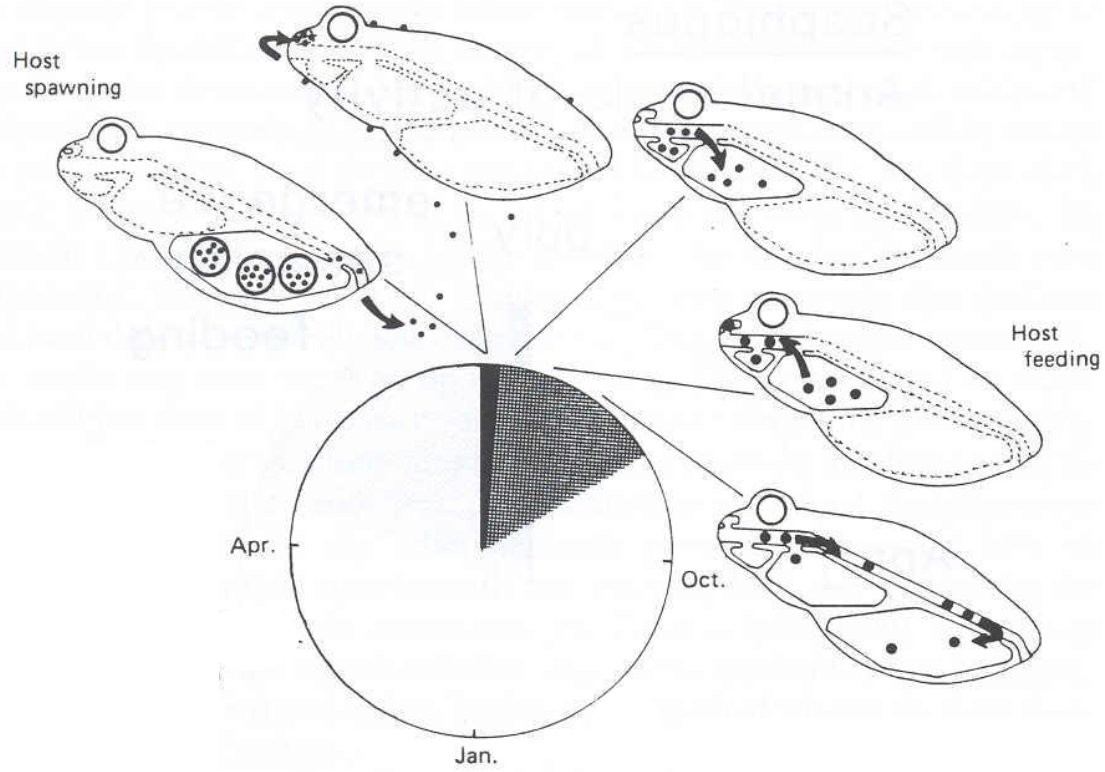


Figure 6.3. The life cycle events of *Pseudodiplorchis americanus* correlated with the annual activity cycle of the host, *Scaphiopus couchii*: transmission during host spawning (▼); juvenile development and internal migration during host feeding (▽); maturation and accumulation of embryos *in utero* during host hibernation (▽). The cycle follows one cohort of parasites, but adult worms (⊛) producing infective stages (•••) in one season's transmission may also survive to reproduce again a year later. Additionally, juveniles failing to migrate may remain in the respiratory tract throughout hibernation and then migrate to the bladder after the resumption of host activity.



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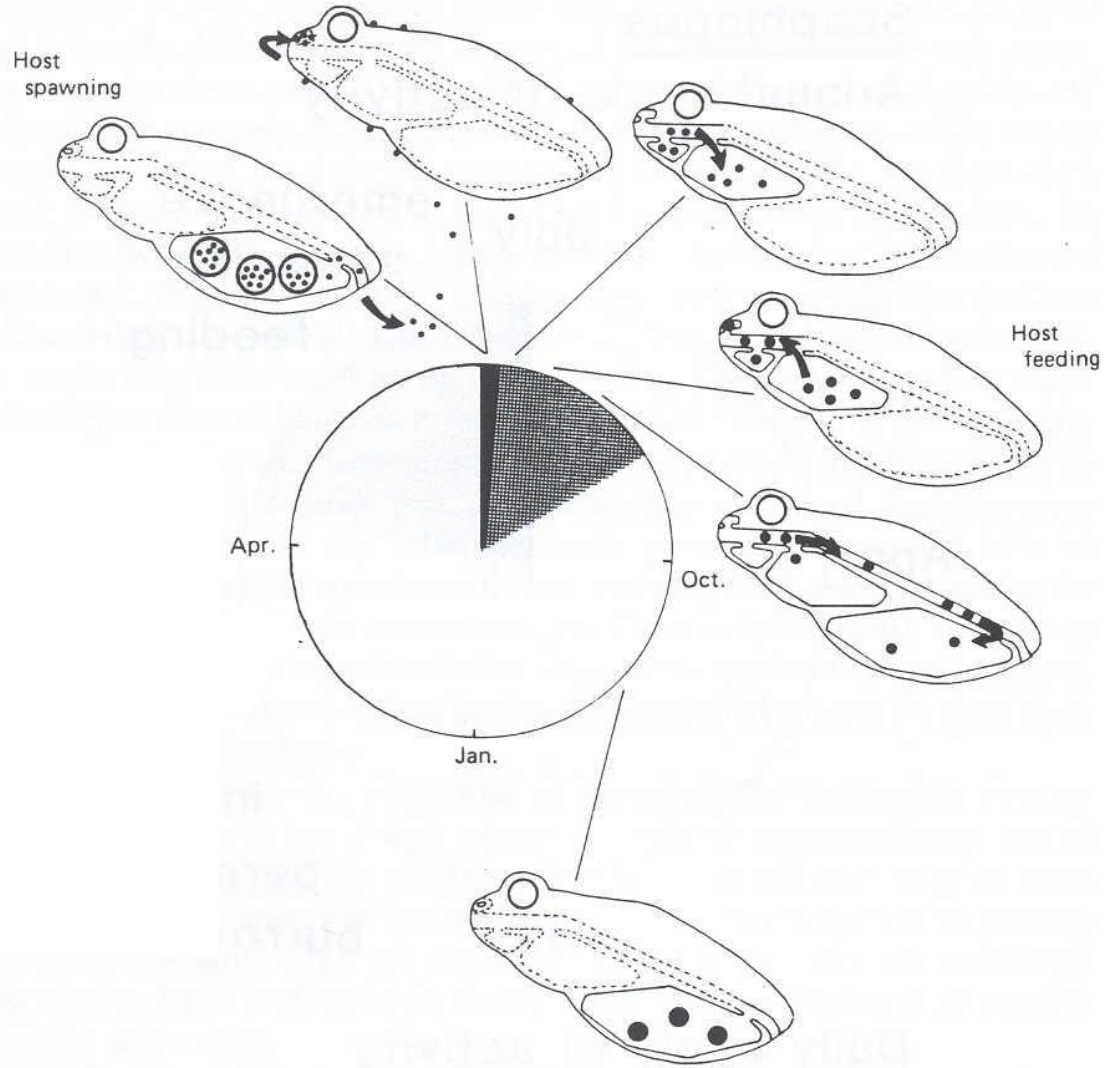

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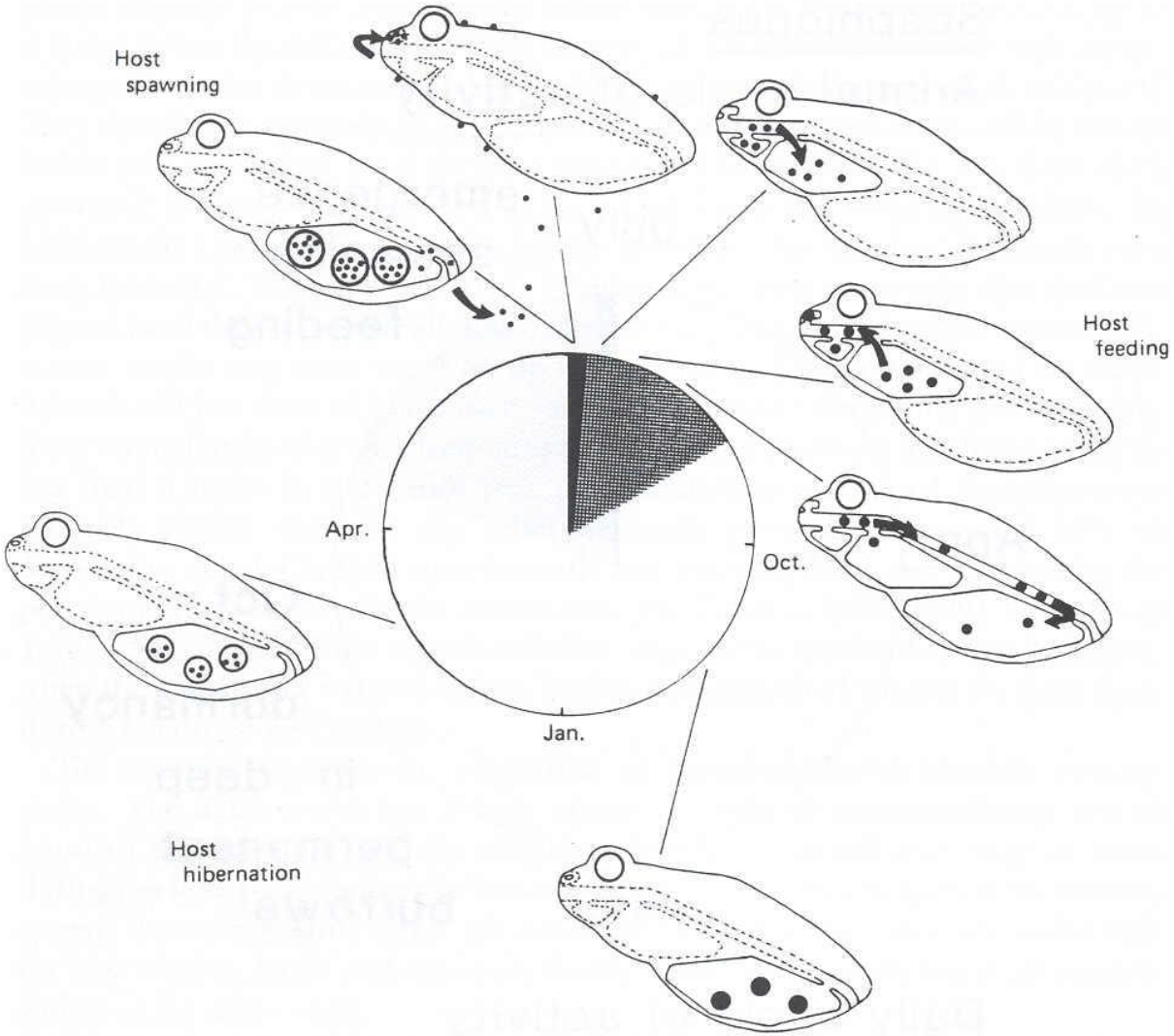

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Bufo regularis

mesic habitats

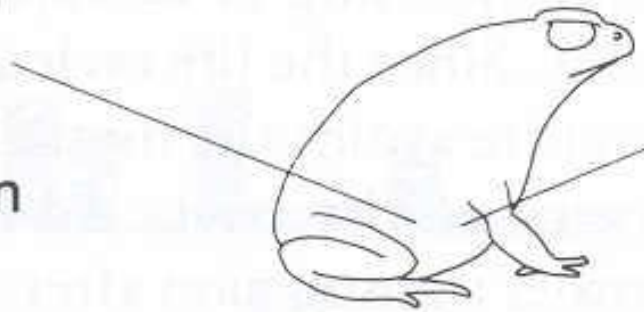
Polystoma

A

internal

auto-reinfection

1 x 1



arid habitats

Eupolystoma

B

internal

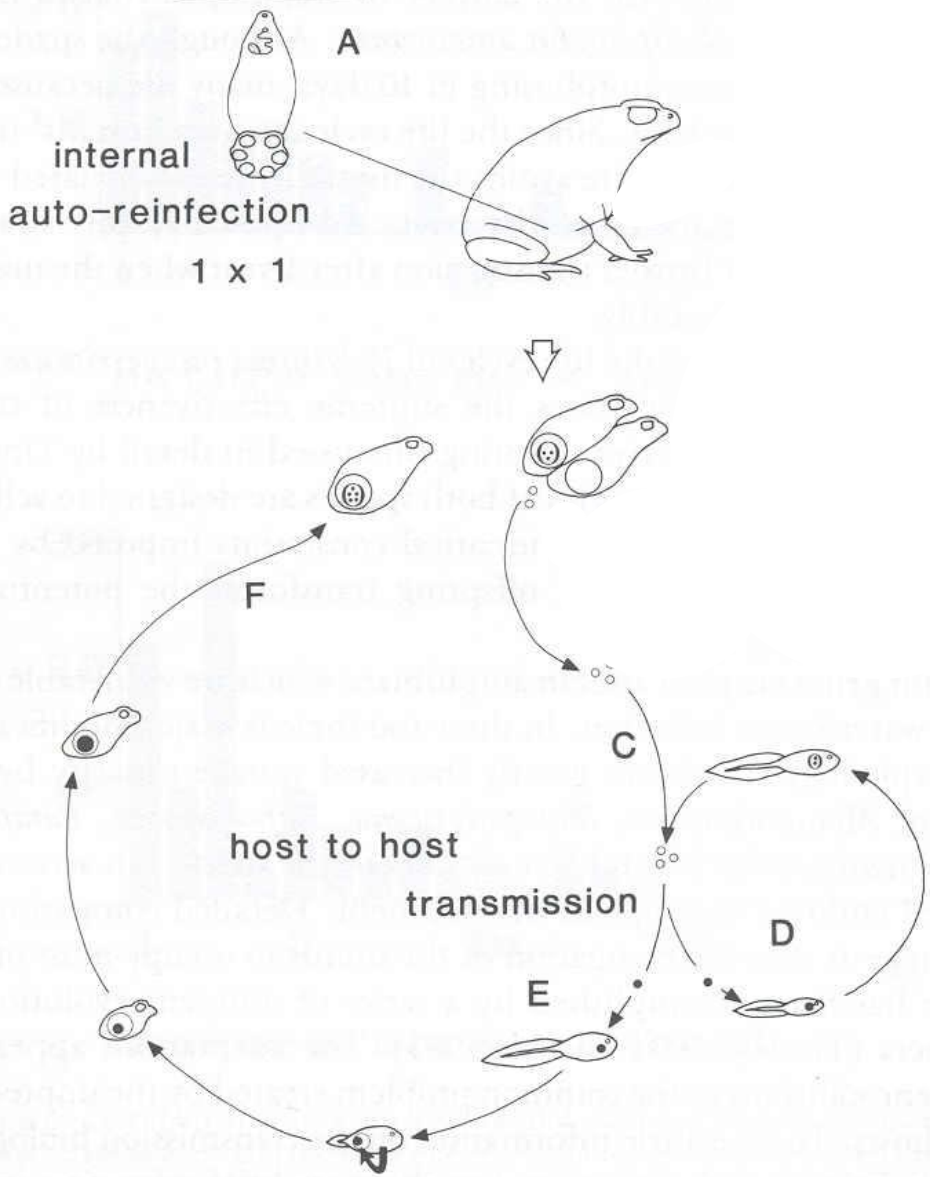
auto-reinfection

1 x >100

Bufo regularis

mesic habitats

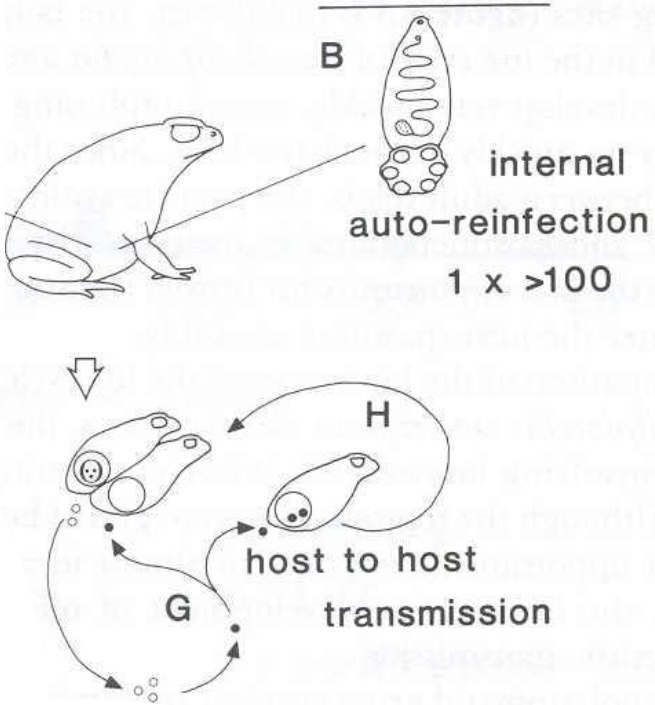
Polystoma

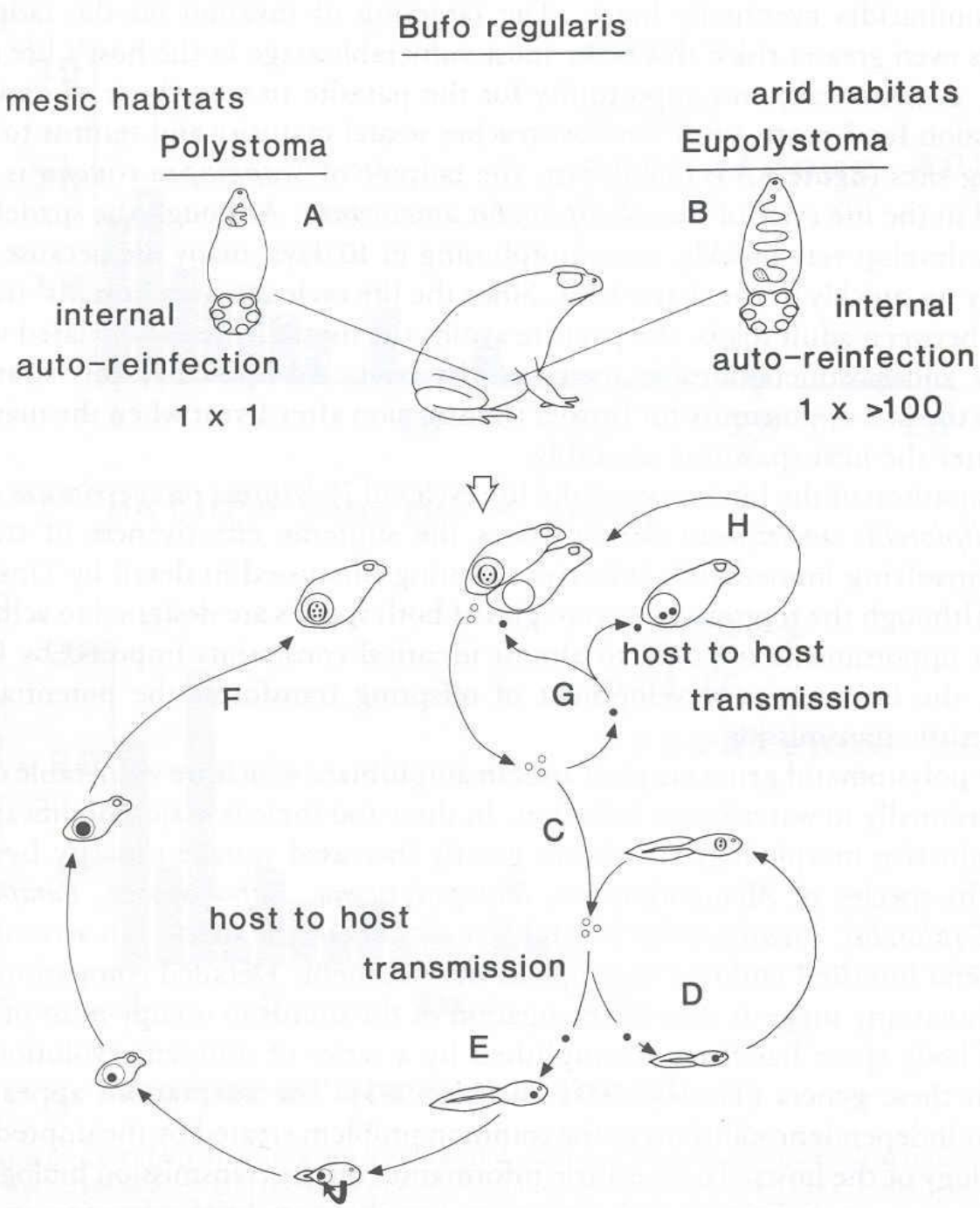


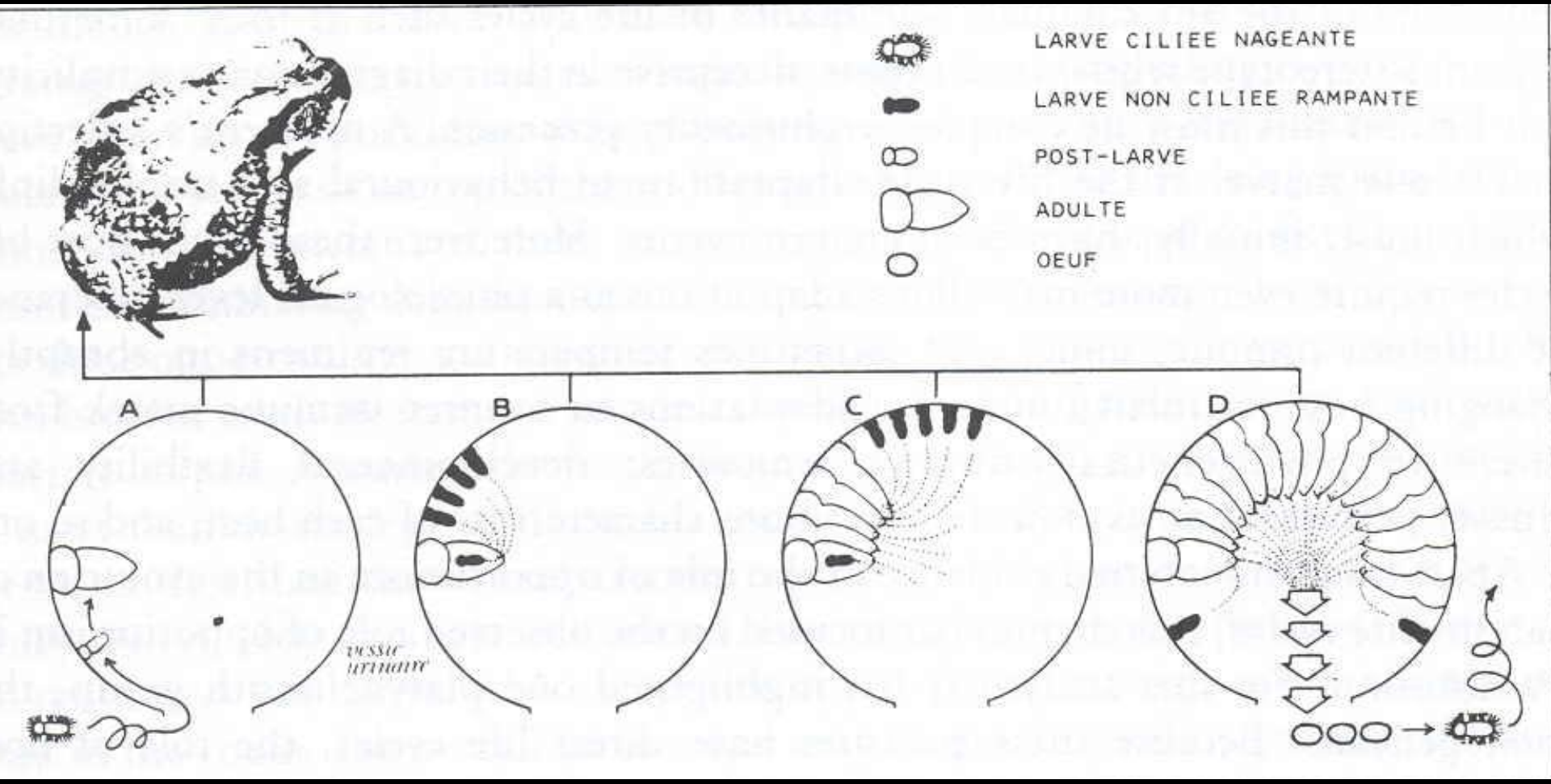
Bufo regularis

arid habitats

Eupolystoma




Bufo regularis
mesic habitats
Polystoma
A
internal
auto-reinfection
1 x 1
arid habitats
Eupolystoma
B
internal
auto-reinfection
1 x >100
H
host to host
transmission
G
F
C
host to host
transmission
D
E



Autoinfection

Oculotrema hippopotami