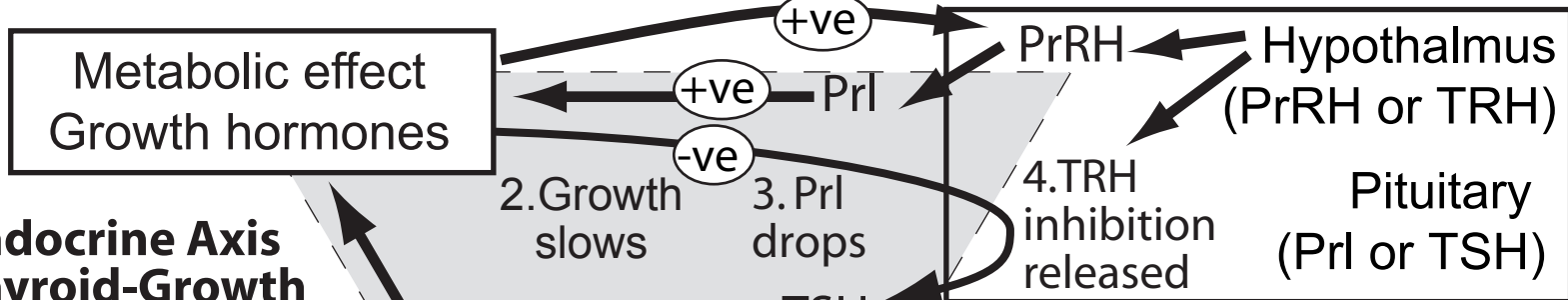


**Negative and positive Endocrine regulation:**

**Endocrine Axis: HP-prolactin/growth**

1. Larval growth high: +ve PrL, -ve TRH inhibited

**Endocrine Organ:**

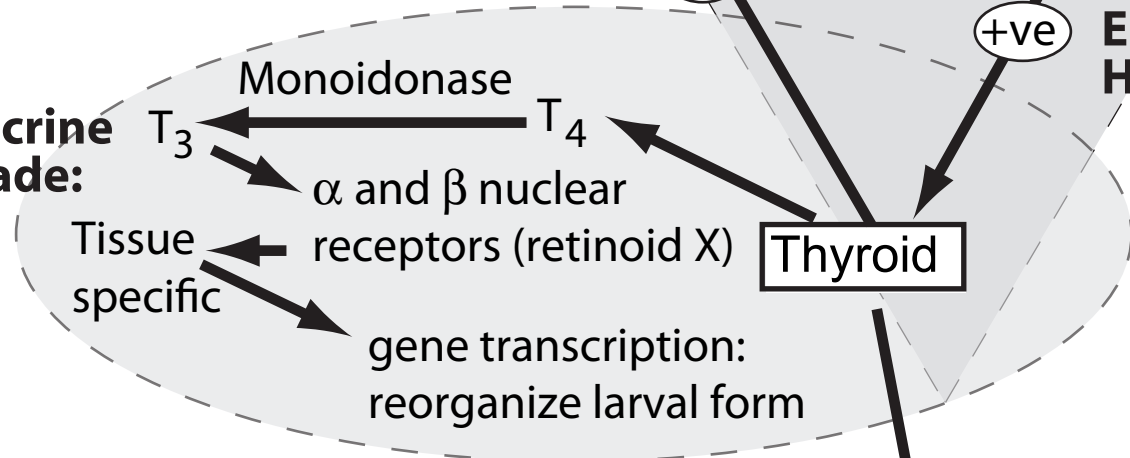


**Endocrine Axis: Thyroid-Growth**

2. Growth slows 3. PrL drops

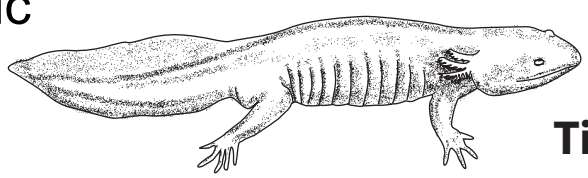
**Endocrine Axis: HP-thyroid**

**Endocrine Cascade:**



T3 induces Metamorphosis

Aquatic larval phase



Terrestrial adult phase



**Tissue specific effects:**  
 cell death (gills, tail fin)  
 pigmentation (melanin)  
 lung development  
 skull remodeling  
 hyoid remodeling



**LEGEND**

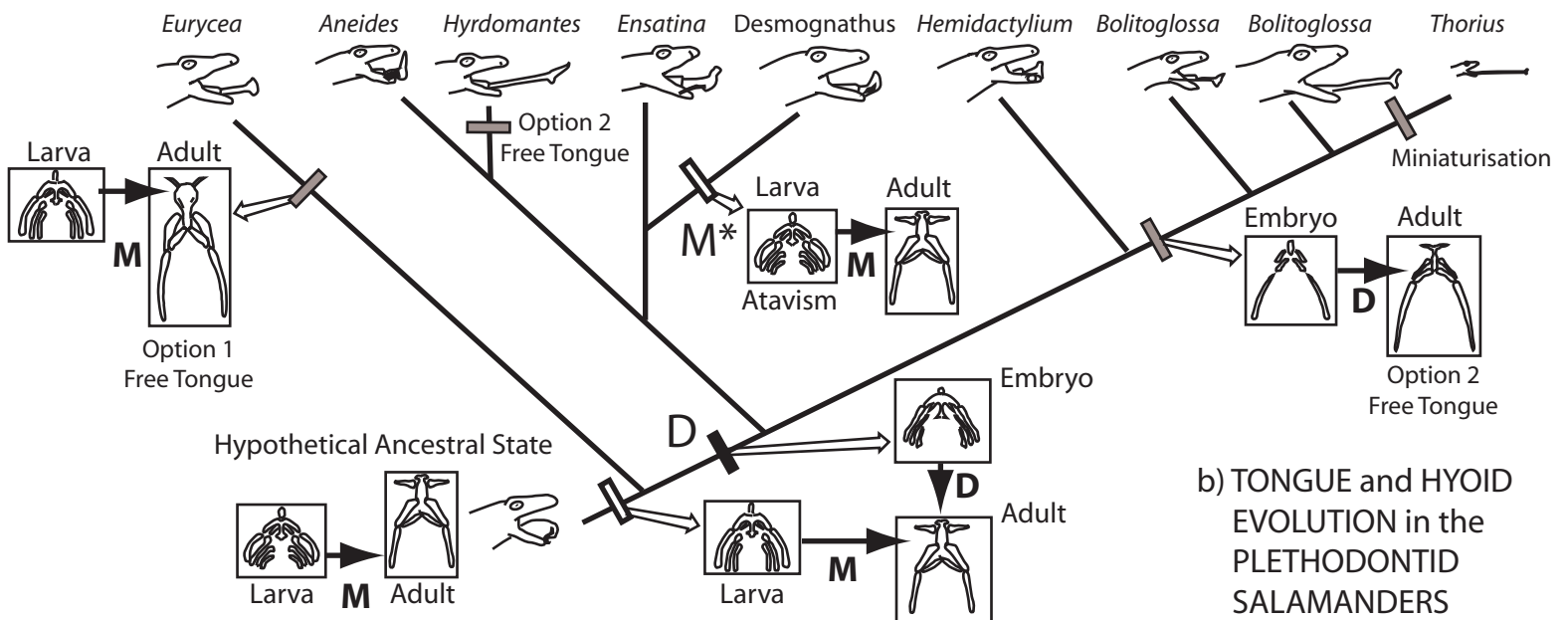
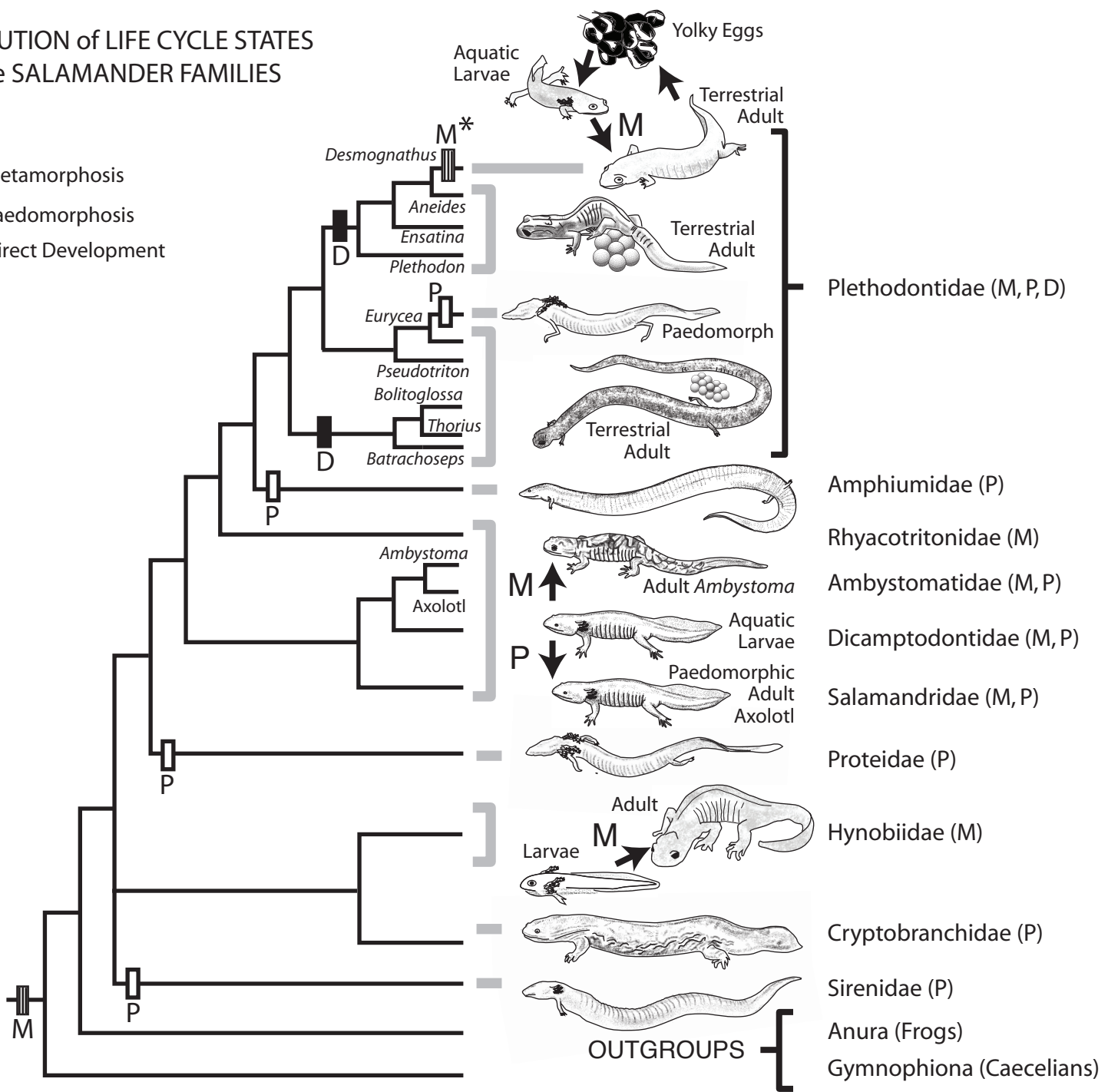
Prolactin Releasing Hormone	PrRH
Prolactin	Prl
Thyroxine Releasing Hormone	TRH
Thyroxine Stimulating Hormone	TSH
Thyroxine	T3, T4

**Hierarchical Structure of the Endocrine System:**

- Endocrine Organ
- Endocrine Cascade
- Positive-Negative Feedback Loops are made up of 3 endocrine axes

a) EVOLUTION of LIFE CYCLE STATES of the SALAMANDER FAMILIES

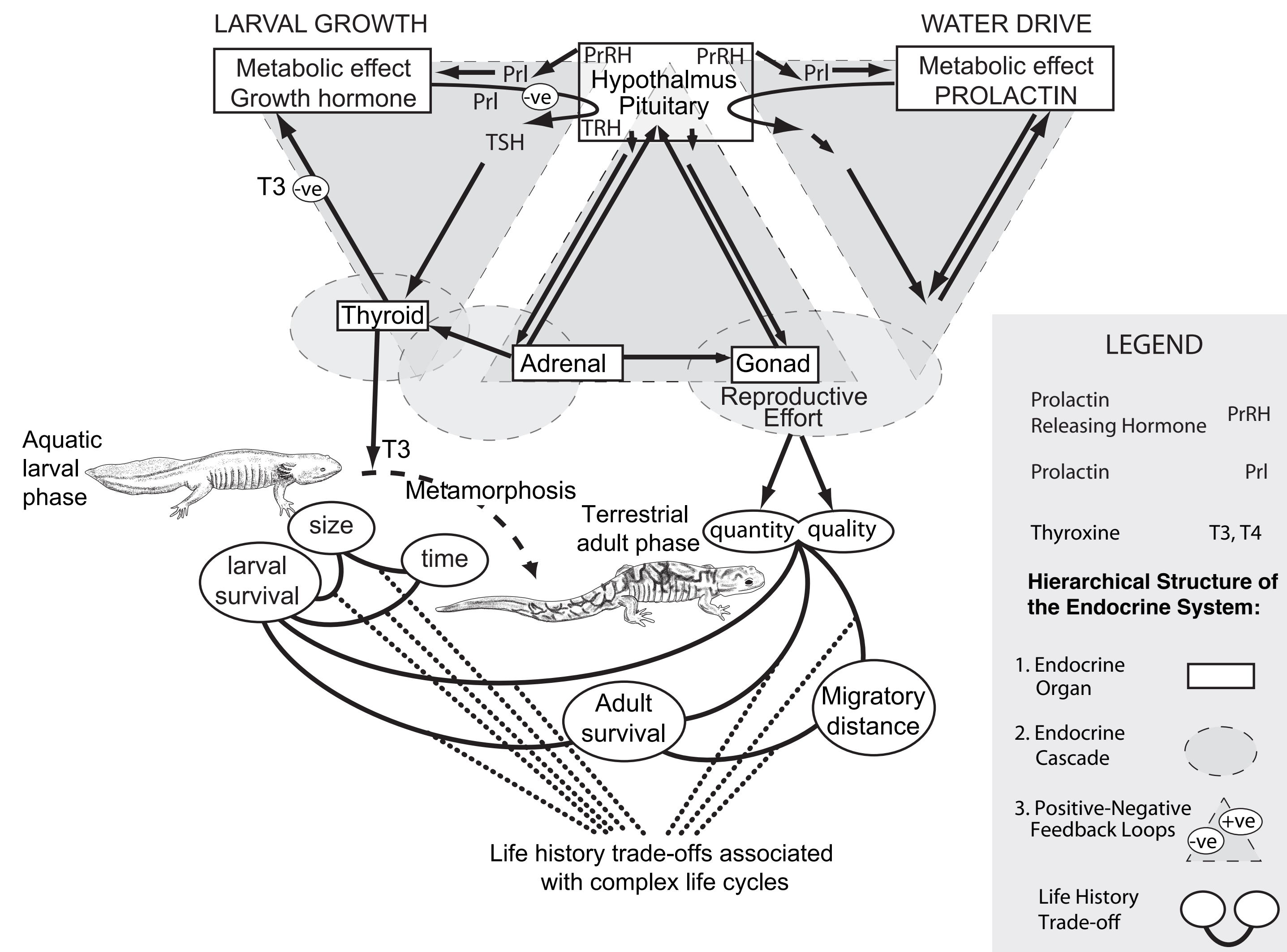
- M Metamorphosis
- P Paedomorphosis
- D Direct Development



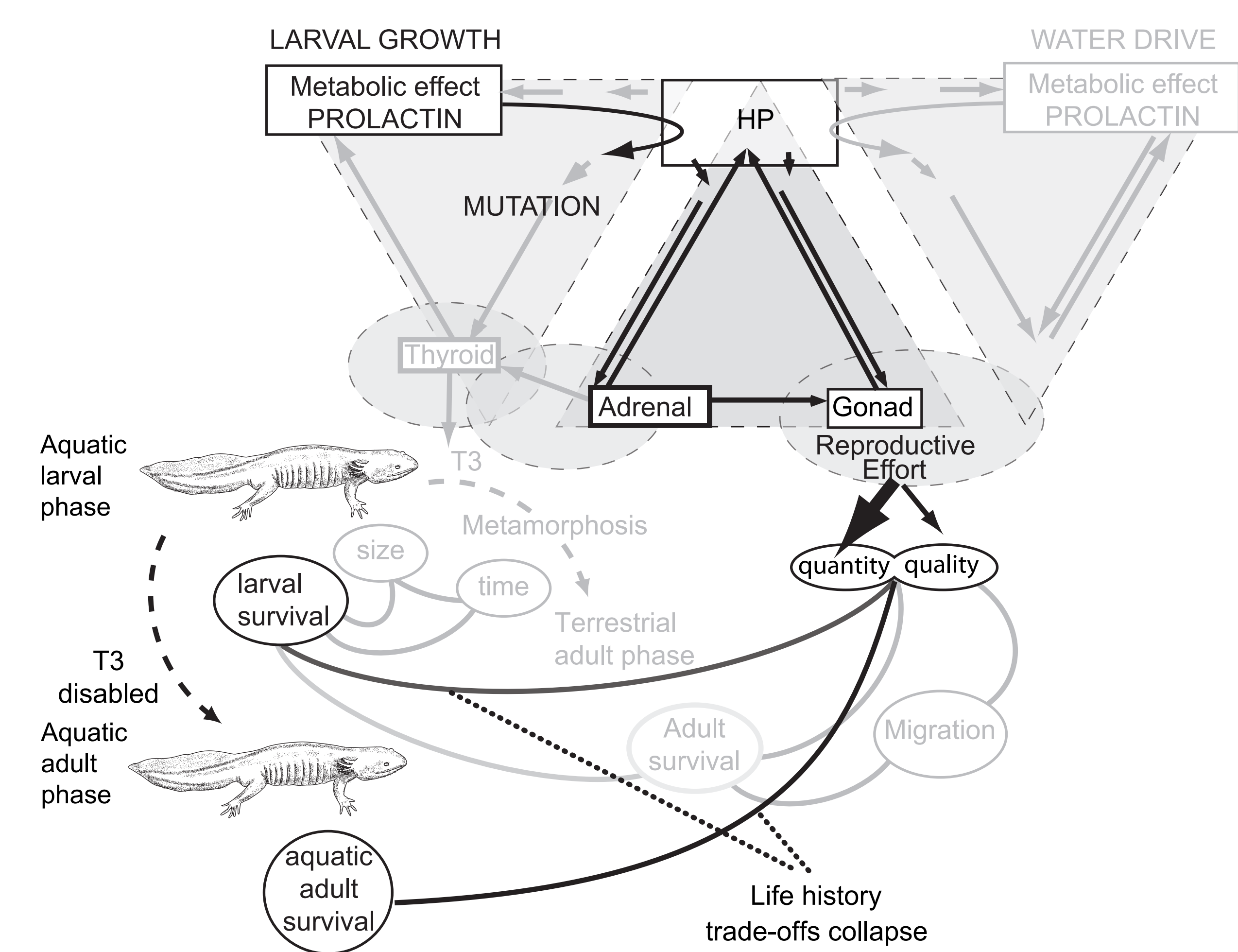
b) TONGUE and HYOID EVOLUTION in the PLETHODONTID SALAMANDERS



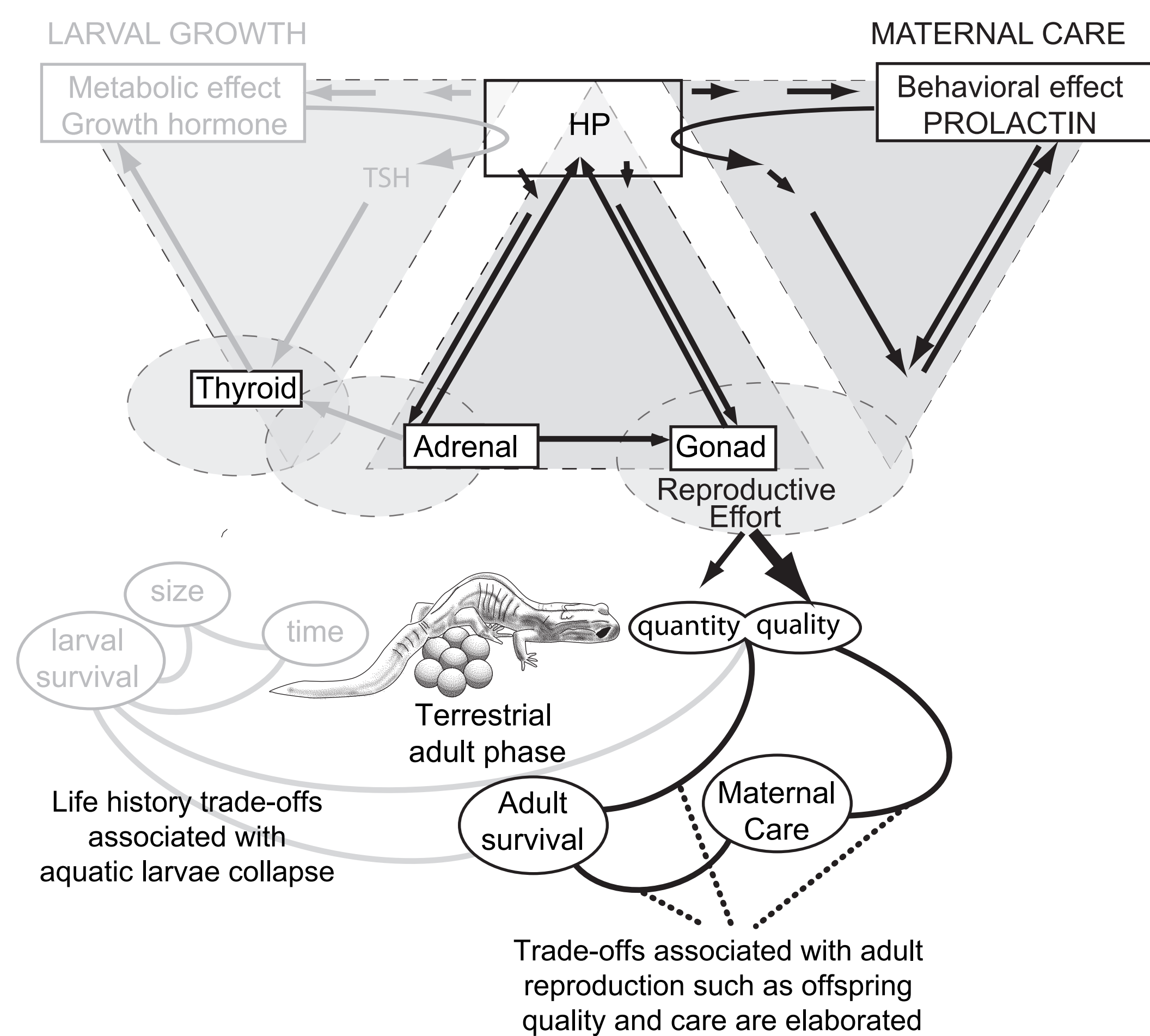
### a. Ancestral Complex Metamorphosis



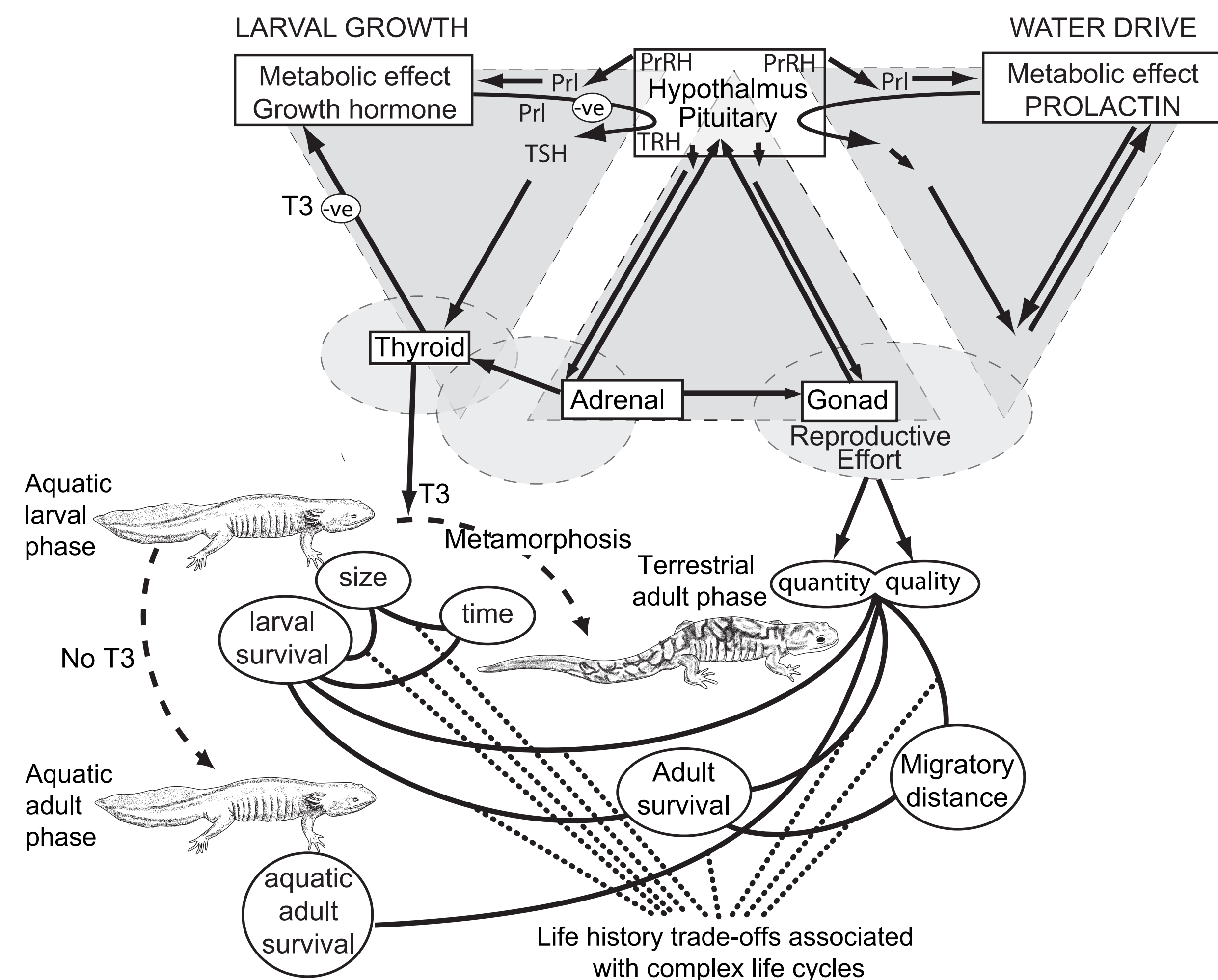
### b Collapse of adult trade-offs in paedomorphs



### c. Adult Trade-offs Associated with Direct Development



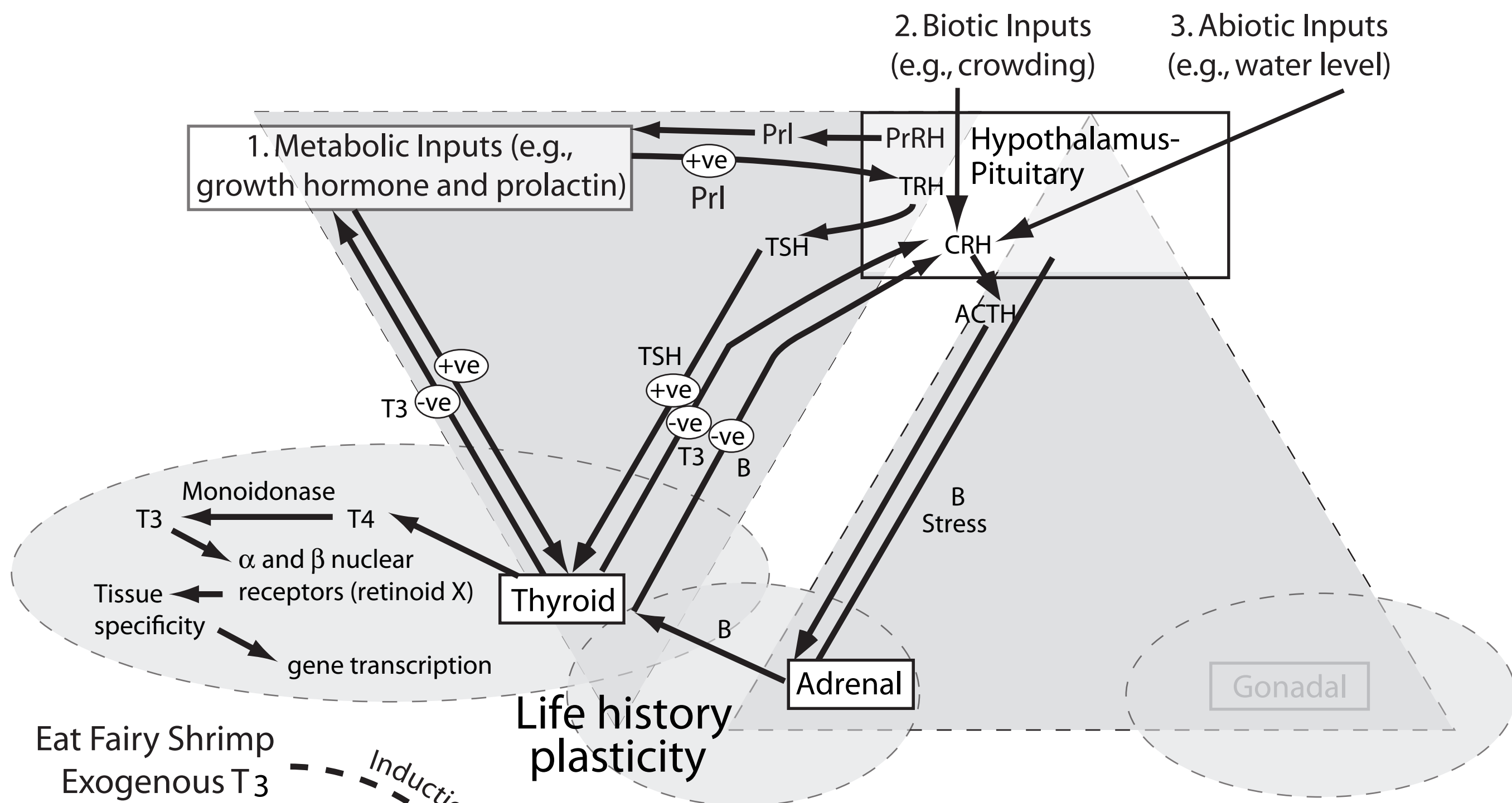
### d. Complex metamorphosis with an alternative paedomorph strategy



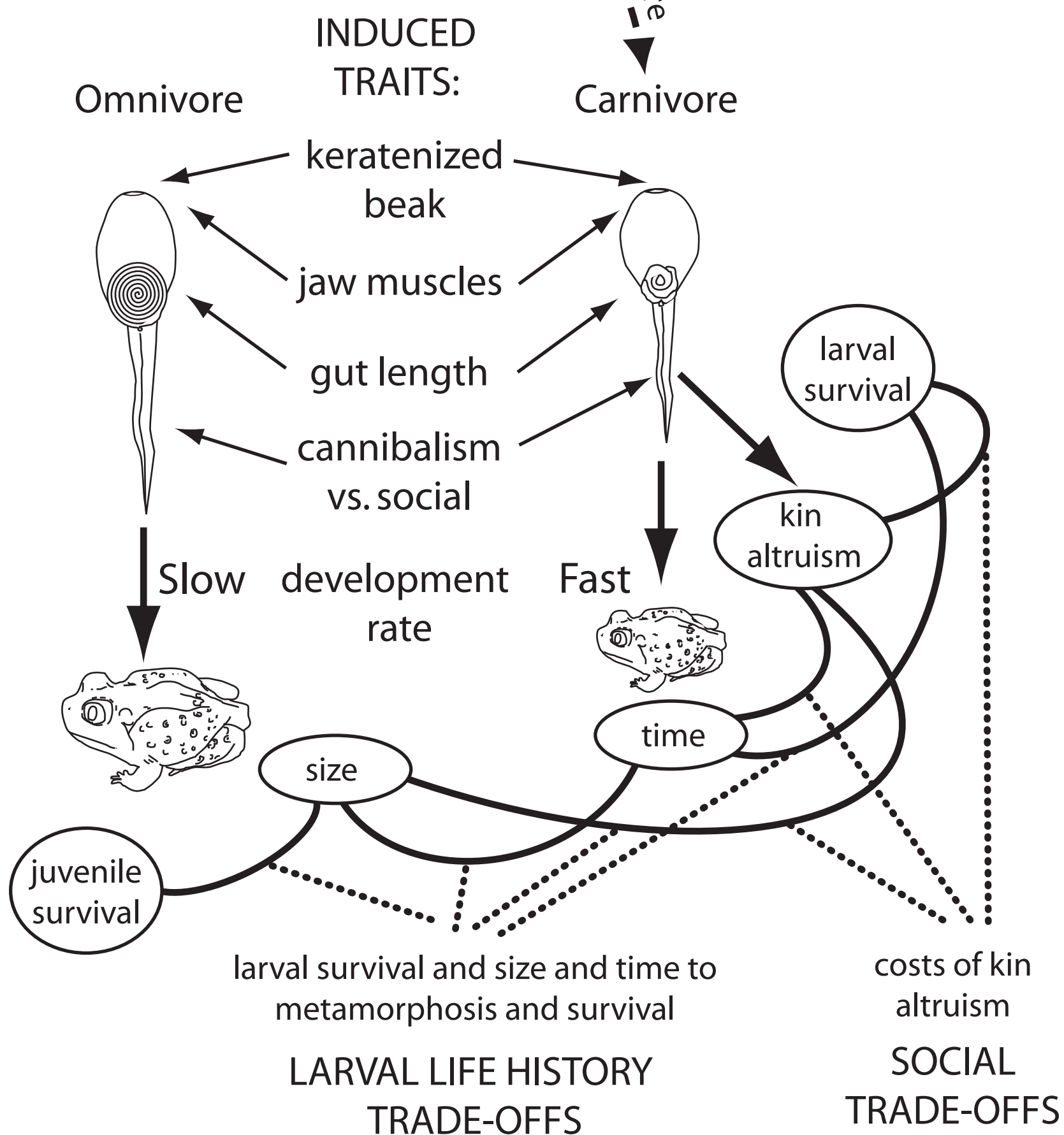


# ROAD MAP FOR ENDOCRINE EPISTASIS:

Physiological causes of life history plasticity and trade-offs and alternative pathways in larval spadefoot toads



Alternative pathways for larval development:



## LEGEND

### Hypothalamus-Pituitary Hormones:

Thyrotropin Releasing Hormone TRH  
 Corticotropin Releasing Hormone CRH  
 Prolactin Releasing Hormone PrRH  
 Thyroid Stimulating Hormone TSH  
 Adrenocorticotrophic hormone ACTH  
 Prolactin Prl

**Steroid Hormones:** Corticosterone B  
**Octopeptides:** Thyroxines T3 T4

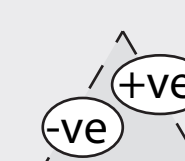
### Hierarchical Structure of the Endocrine System:

1. Endocrine Regulatory System/Organ(s)

2. Endocrine Cascade

3. Positive-Negative Feedback Loops

Life History Trade-off





# ROAD MAP FOR ENDOCRINE EPISTASIS:

Life-history trade-offs and plasticity in reproduction of side-blotched lizards

## LEGEND

### Hypothalamus-Pituitary Hormones:


Gonadotropin Releasing Hormone GnRH  
Thyrotropin Releasing Hormone TRH  
Corticotropin Releasing Hormone CRH


Thyroid Stimulating Hormone TSH  
Follicle Stimulating Hormone FSH  
Luteinising Hormone LH  
Adrenocorticotrophic hormone ACTH

### Steroid Hormones:


Corticosterone B  
Testosterone T  
Estrogen E

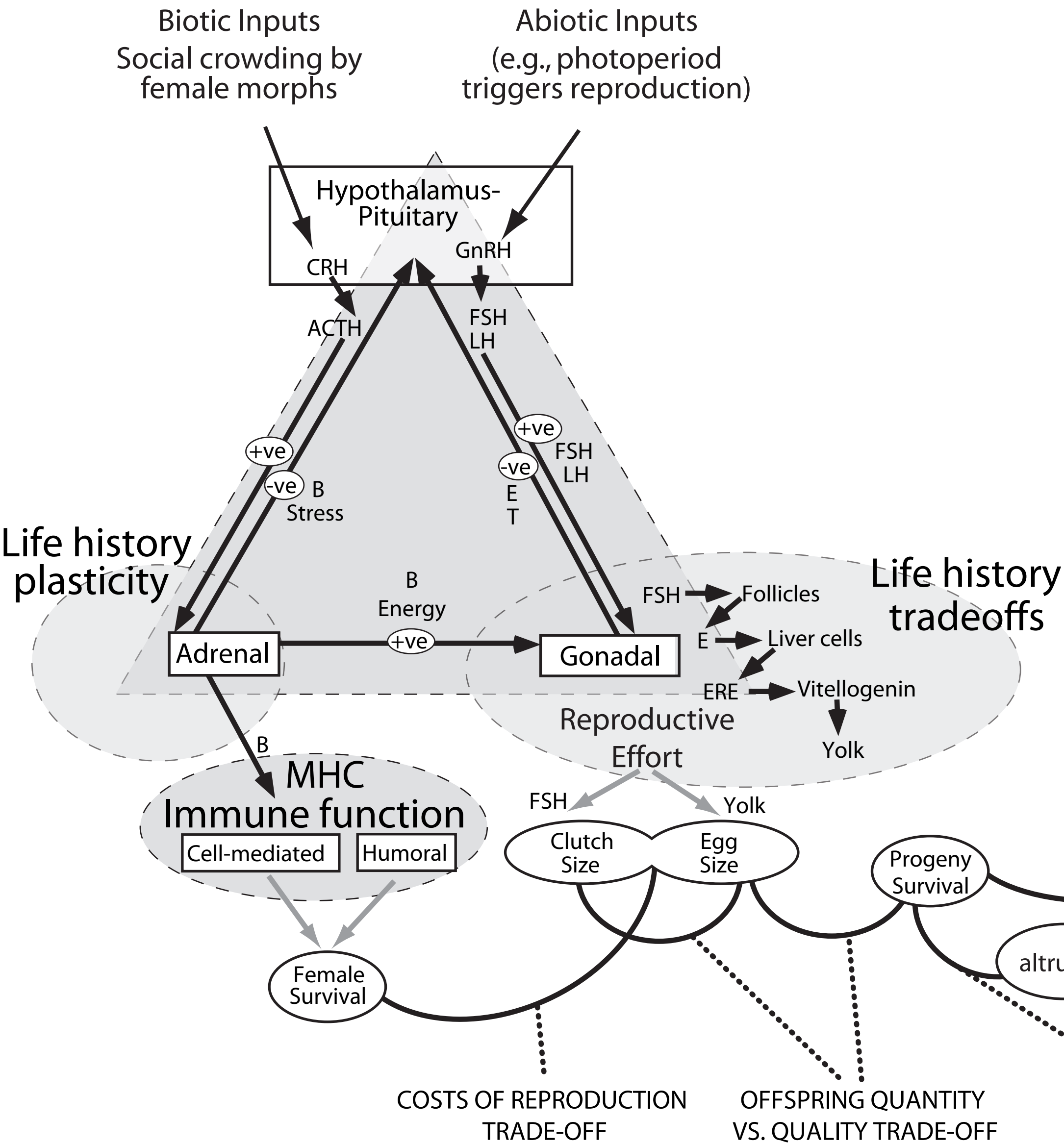
### Hierarchical Structure of the Endocrine System:

1. Endocrine Regulatory System/Organ(s) 

2. Endocrine Cascade 

3. Positive-Negative Feedback Loops 

Life History Trade-off 



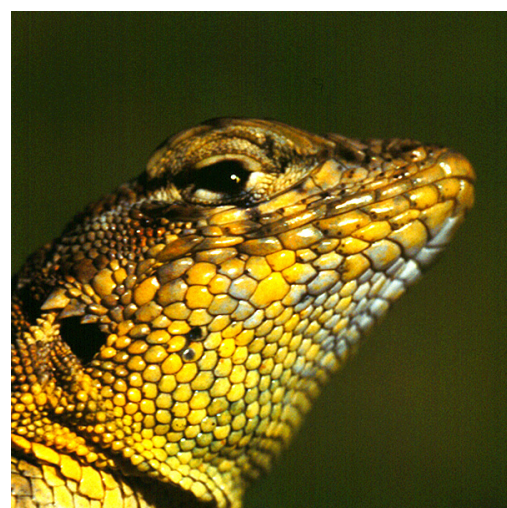
## Density-dependent survival trade-offs

r-strategist

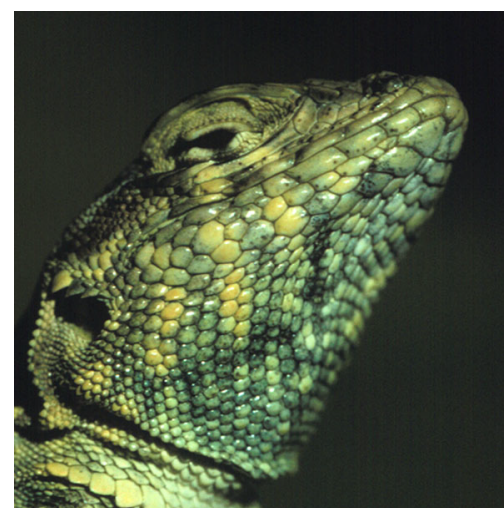


oo genotype

K-strategists



yy genotype



bb genotype

