

***Fish Reproductive Biology***

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Sex Ratio  
Maturity  
Fecundity  
Maturity Length

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***Types of Egg***

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- Pelagic Egg\*
- Semi-bouyant Egg
- Demersal Egg\*

\* Marine Fish

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***Pelagic Egg***

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- Economics species of pelagic fish
- Density less than sea water
- Usually finds oil droplet or oil globule

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 **Properties of Pelagic Egg**

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- Less Yolk Sac = Less Internal Food Supply
- After Hatching :
  - Early External Feed
  - Rich External Food Supply in Nursery Ground
  - Must Drift to Feeding Ground On Time

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<i>Short Mackerel; Rastrelliger brachysoma</i>	<i>Indian Mackerel; Rastrelliger kanagurta</i>
	
<b>Pelagic Egg</b>	

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 **Demersal Egg**

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- Mostly adhesive
- Many types of substrate
  - rock or any materials
  - aquatic plants / algae
  - hole
  - bubbles

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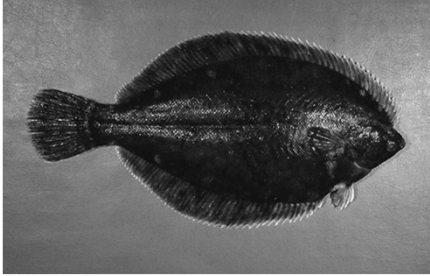
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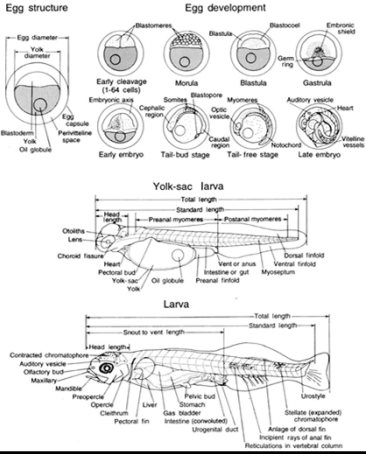
Winter Flounder, *Pseudopleuronectes americanus*



Demersal Egg

Horizontal lines for notes.

Fish Egg and Larva




Horizontal lines for notes.

Sex Ratio

Decorative header with star patterns and the title 'Sex Ratio'.

Horizontal lines for notes.

 **Sex Ratio**

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- **Community Structure**
- **Ratio : depends on reproductive behavior**
- **Reproductive behavior (scattered, harem, external fertilization)**

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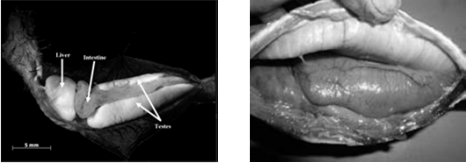
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 **Fish Gonad**

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**Male Testes**      **Female Ovaries**

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 **Maturity**

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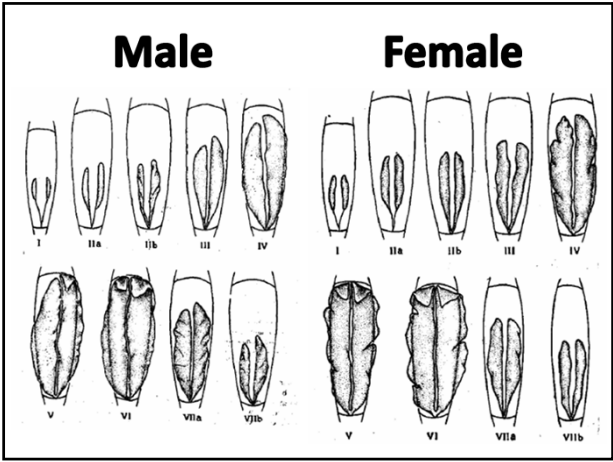
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### Stages of Ovarian Development

Stage	Description	Ovary	Eggs
1	Resting	Thread-like, translucent, small and undeveloped	None visible to naked eye
2	Developing	Medium to large, cream/orange, opaque and almost filling body cavity	Oocyte visible and opaque
3	Ripe	Ovary full and almost filling body cavity	Hydrated oocyte visible, translucent, large and round
4	Ovulated	Ovary completely filling body cavity	Eggs in oviduct and can be extruded with gentle pressure
5	Spent	Ovary small, flaccid and bloody	Can be found some residual eggs

*Applied from De Silva et al. (1985); Pankhurst and Carragher (1991); King (1995).*

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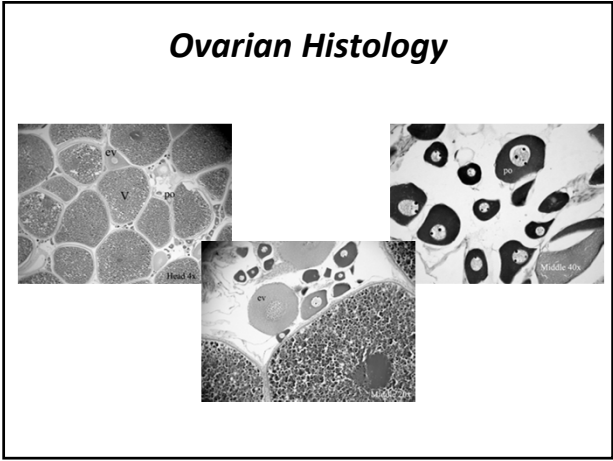
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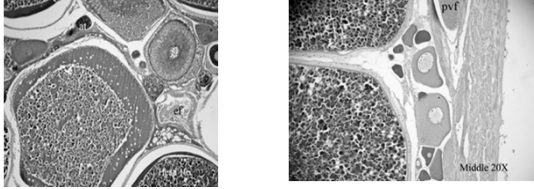
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**Ovarian Histology**



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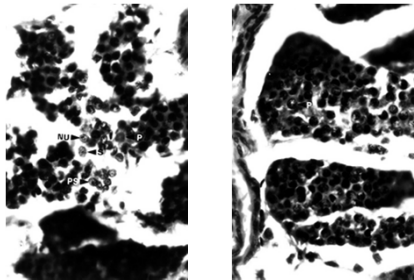
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**Testis Histology**



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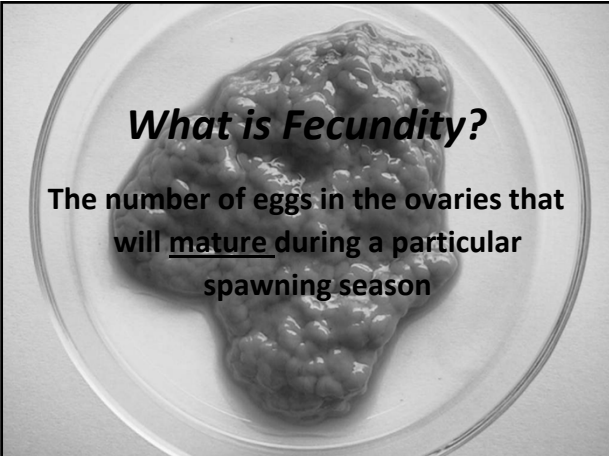
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**What is Fecundity?**

The number of eggs in the ovaries that will mature during a particular spawning season



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### **Types of Fecundity**

- Absolute Fecundity
- Relative Fecundity
- Population Fecundity
- Age-Specific Fecundity
- Length-Specific Fecundity

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### **Egg Counting Methods**

- Actual Count
- Volumetric Method
- Gravimetric Method

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### **Spawning Season and Gonad Indices**

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## Gonad Indices

- Tools for statistically and graphically comparing gonadal states (as between seasons and size classes)
- Several types of indices can be used
  - Gonad Index ( G.I. )  $G.I. = \frac{W}{L^3} * 10^8$

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## Gonad Indices

- Gonadosomatic Index ( G.S.I.)

$$G.S.I. = \frac{W}{B} * 100$$

where W = weight of both gonads  
 B = weight of the fish (body weight)  
 L = length of the fish

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## Gonad Indices

- The gonadal weight (W) is also related to body size (S) as

$$W = aS^b$$

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**Gonad Indices**

- Then the third gonadal index can be calculated by
  - Relative Gonadal Index ( R.G.I. )

$$R.G.I. = \frac{aW}{S^b}$$


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**Gonad Weight**

- Spawning ground → Highest GW

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**Length at 50% Maturity :  $L_m$**

- $L_m$  : Size at 50% maturity, mostly focus on Female
- Apply from selection Ogive curve (will mention on Level II)
- Logistic Function

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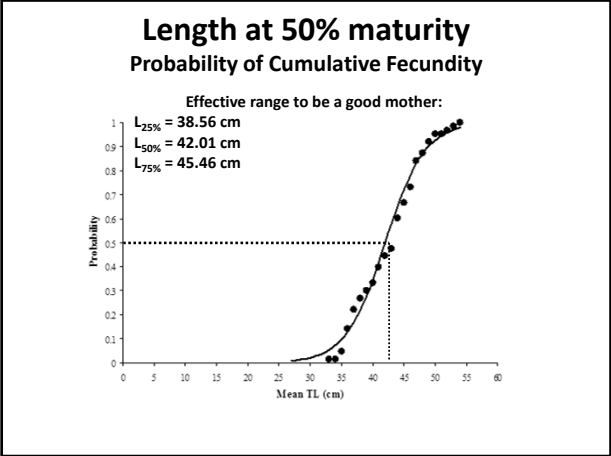
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<http://fishbio.fish.ku.ac.th>  
**Mattson's Method**

$$L_m = L_\infty \left( \frac{1}{1 + \left( \frac{M}{3K} \right)} \right)$$

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**THE END**

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