

Endocrine Disruption Caused by
Organotin Compounds in Gastropod
Molluscs: from a Molecular Mechanism
to Population-level Effects

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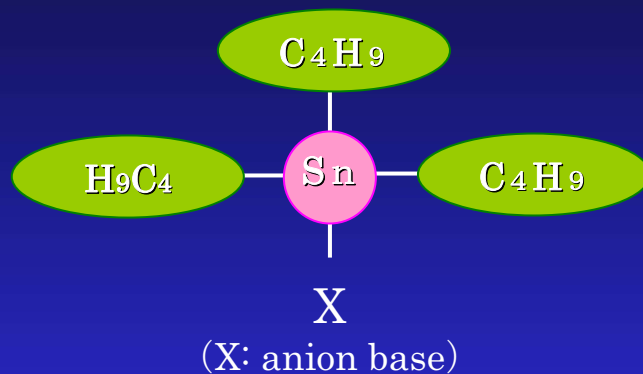
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Imposex: Maculinization of Female Gastropods

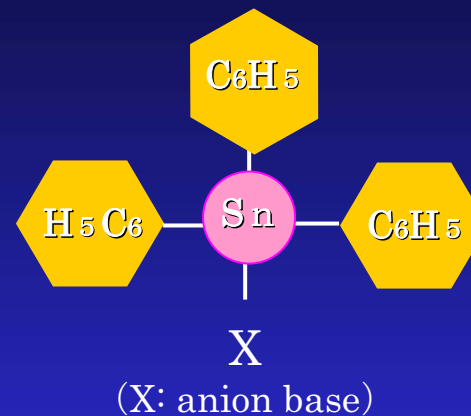
- A superimposition of male genitalia (penis and vas deferens) on females
- Observed in **over 150 species** (including **39 Japanese species**) (up to July 2004)
- Irreversible syndrome
- Reproductive failure at severely affected stages, leading to population decline/mass extinction
- Typically induced by tributyltin (TBT) and triphenyltin (TPhT) at very low concentrations (e.g. approximately 1 ng/L)

Organotin Compounds

➤ Chemical Structure



Tributyltin Compounds
(TBTs)
14 Substances



Triphenyltin Compounds
(TPhTs)
7 Substances

➤ Uses

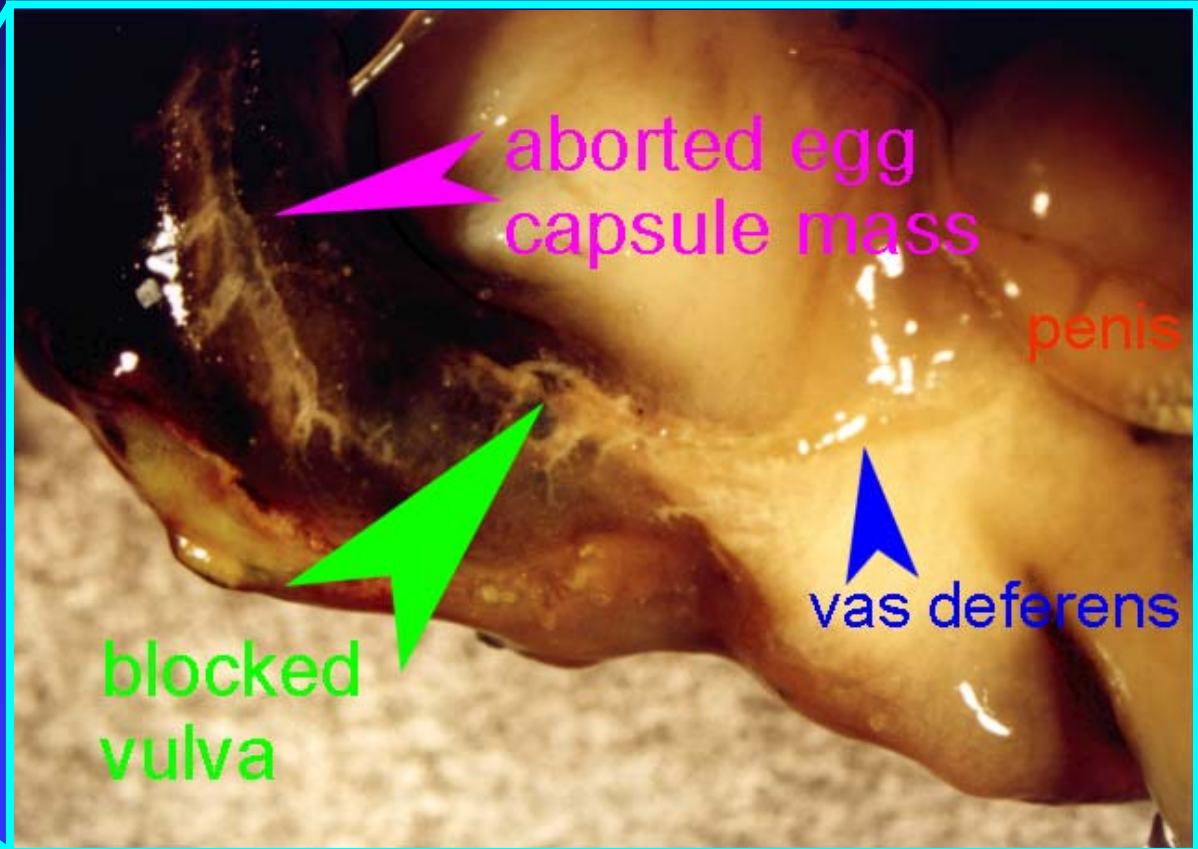
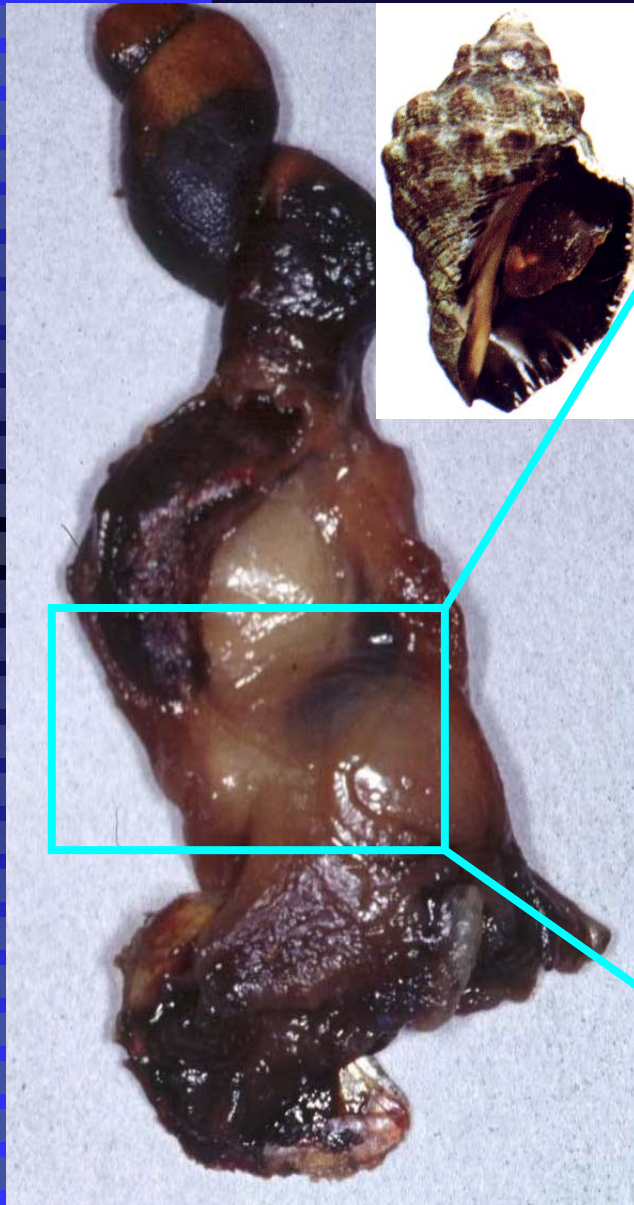
Antifouling Paints for Ships and Fishing Nets,
Agricultural Chemicals, etc.

Topics of Today's Talk

- Imposex of the rock shell (*Thais clavigera*)
- Imposex of the ivory shell (*Babylonia japonica*)
- Masculinization of female abalone (*Haliotis madaka* and *H. gigantea*)
- Mode of action of organotins on the development of imposex

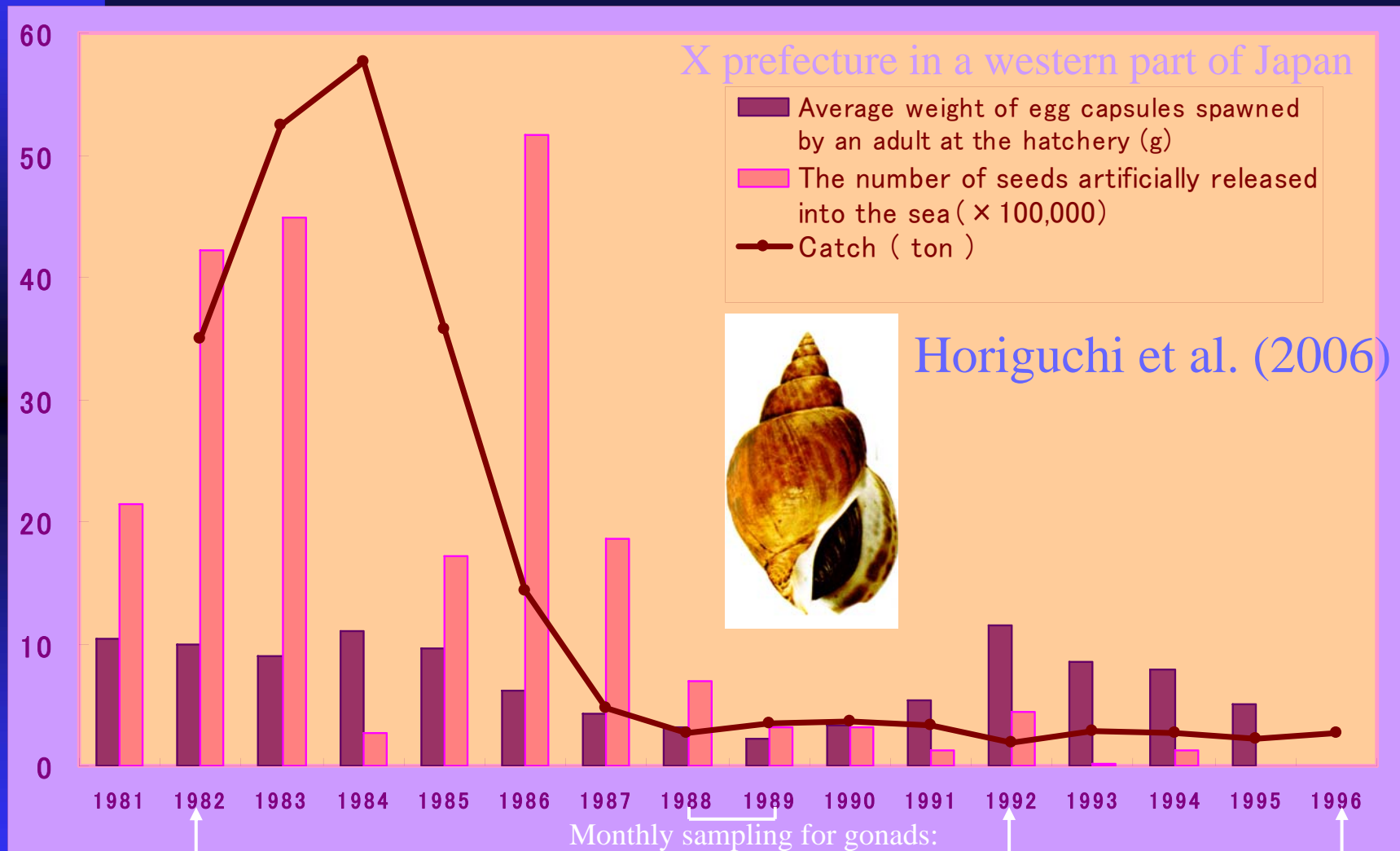
Imposex of the rock shell

(Thais clavigera)



Caused by TBT and TPhT
Ovarian spermatogenesis involved

Drastic Decrease of Total Catch and Spawning Ability, Following the Occurrence of Imposex in *B. japonica*



First observation for imposex of the ivory shell in X prefecture

Monthly sampling for gonads:

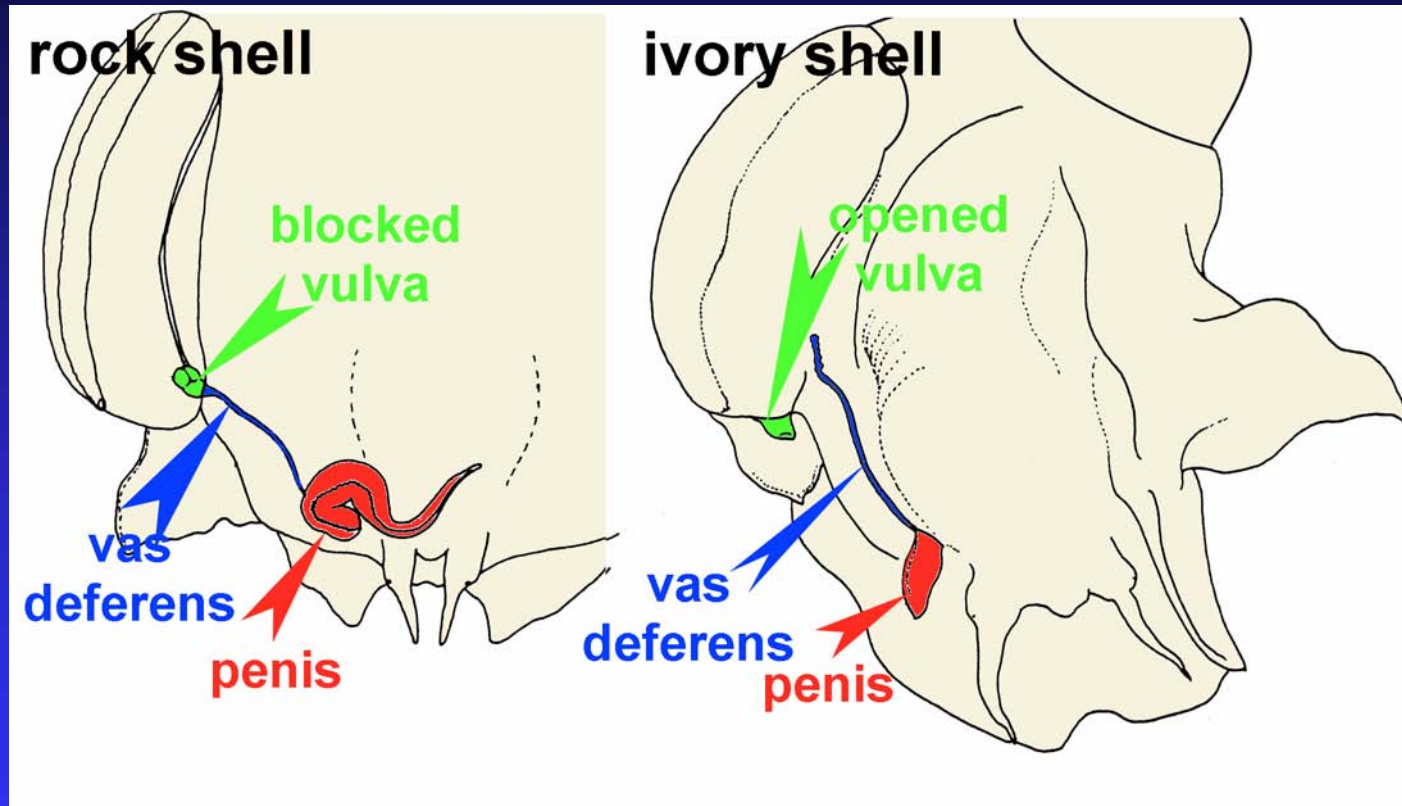
♀ (including imposex) 92

♂ 43

Introduction of adult ivory shell as brood stock from another prefecture

Closure of the hatchery

No Oviduct Blockage Observed in the Imposex-Exhibiting Ivory Shell

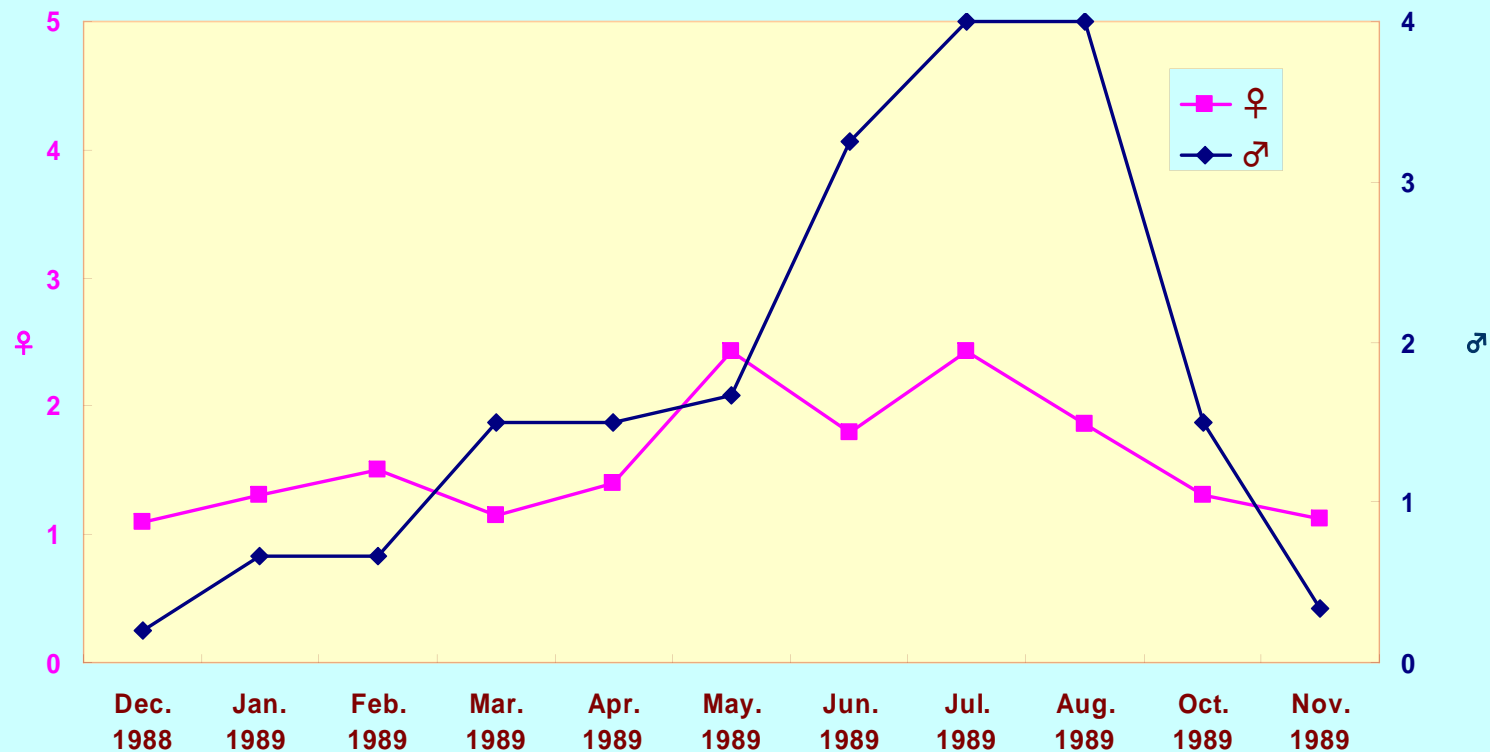


Difference of imposex symptoms between the rock shell (left) and the ivory shell (right)

Horiguchi et al. (2006)

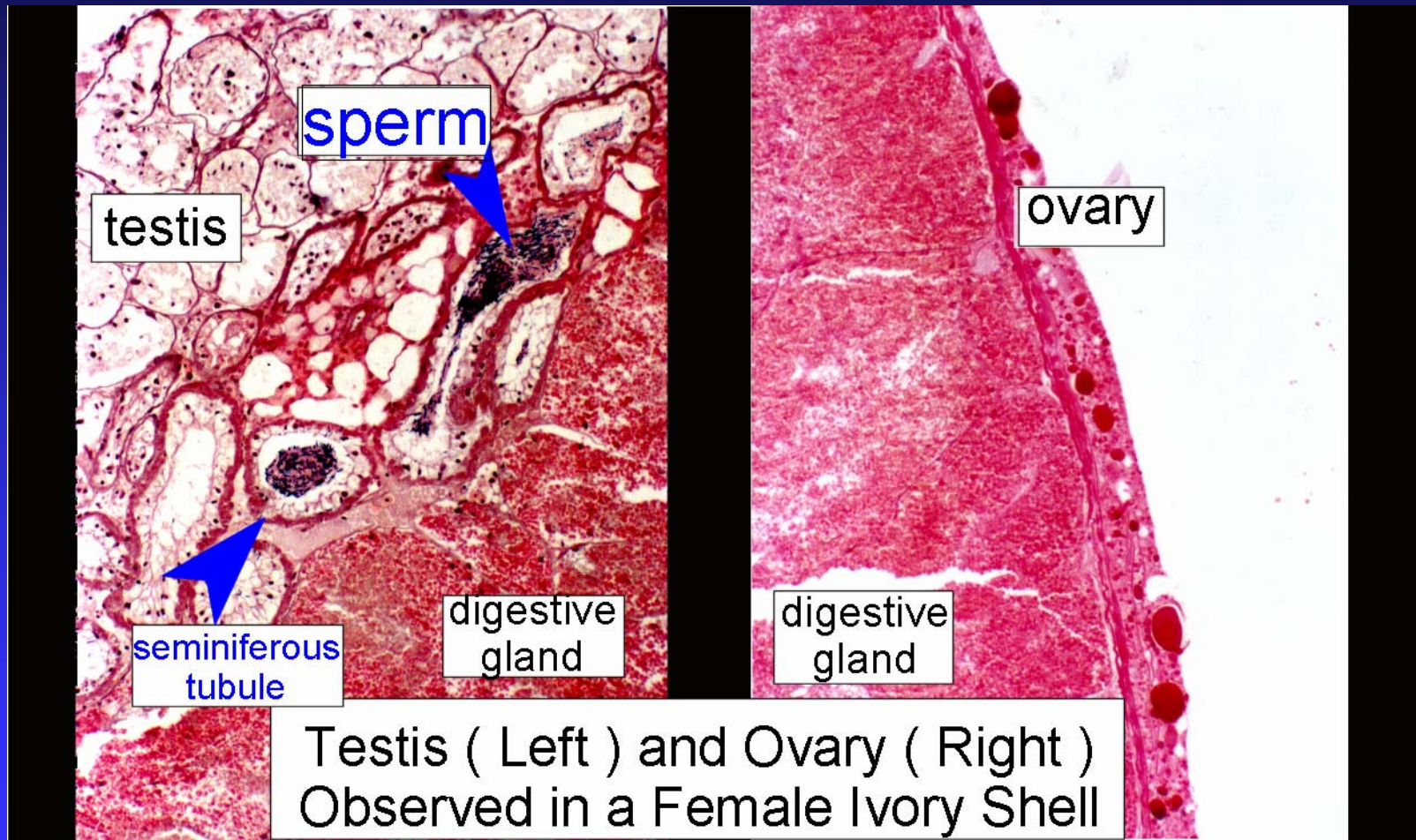
Sexual Maturation of Gonads in the Ivory Shell, *Babylonia japonica*

Population reproductive developmental scores in *Babylonia japonica*
(from a prefecture located in the western part of Japan)



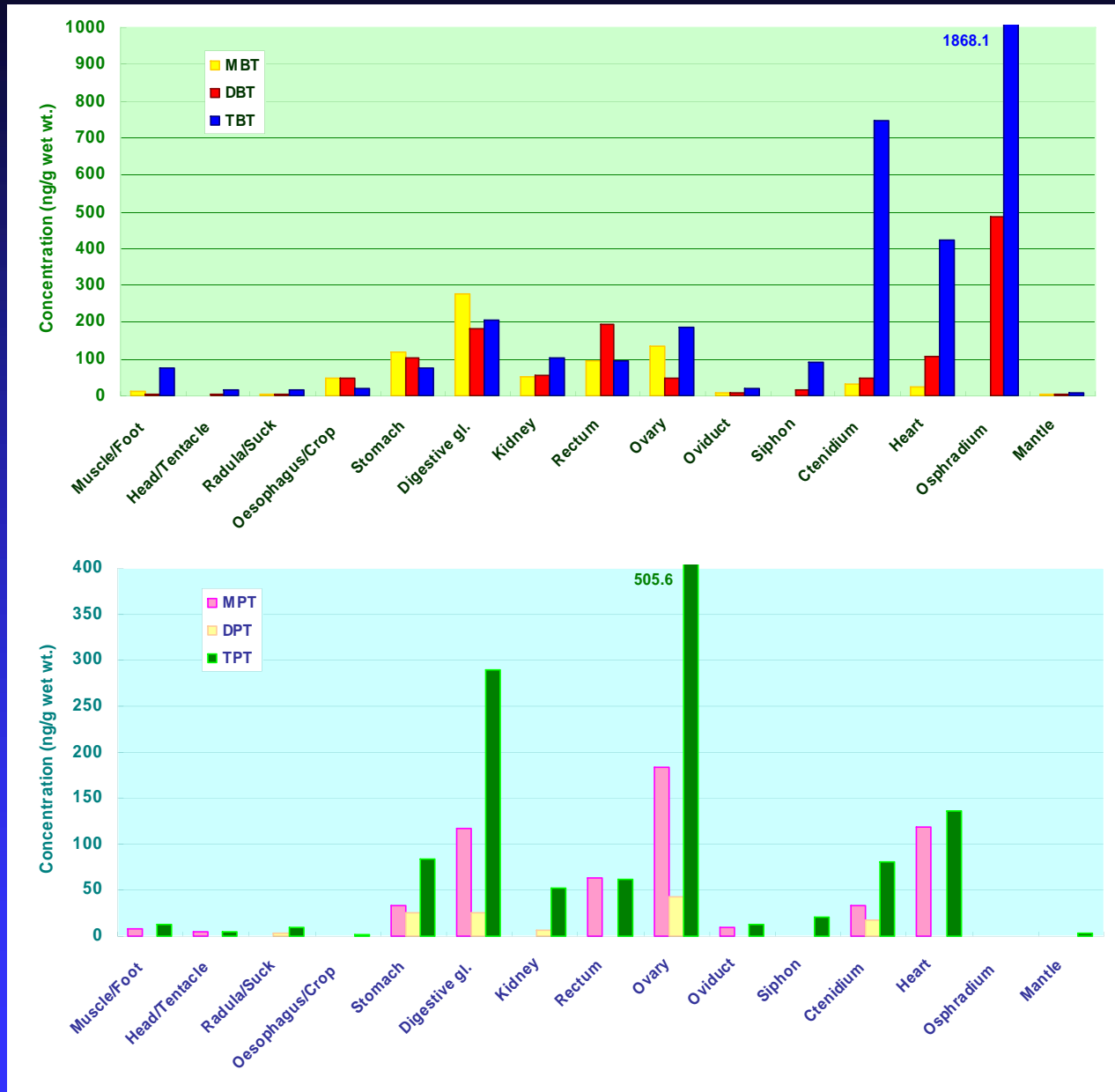
Horiguchi et al. (2006)

Spermatogenesis in Ovary of the Ivory Shell, *Babylonia japonica*



Horiguchi et al. (2006)

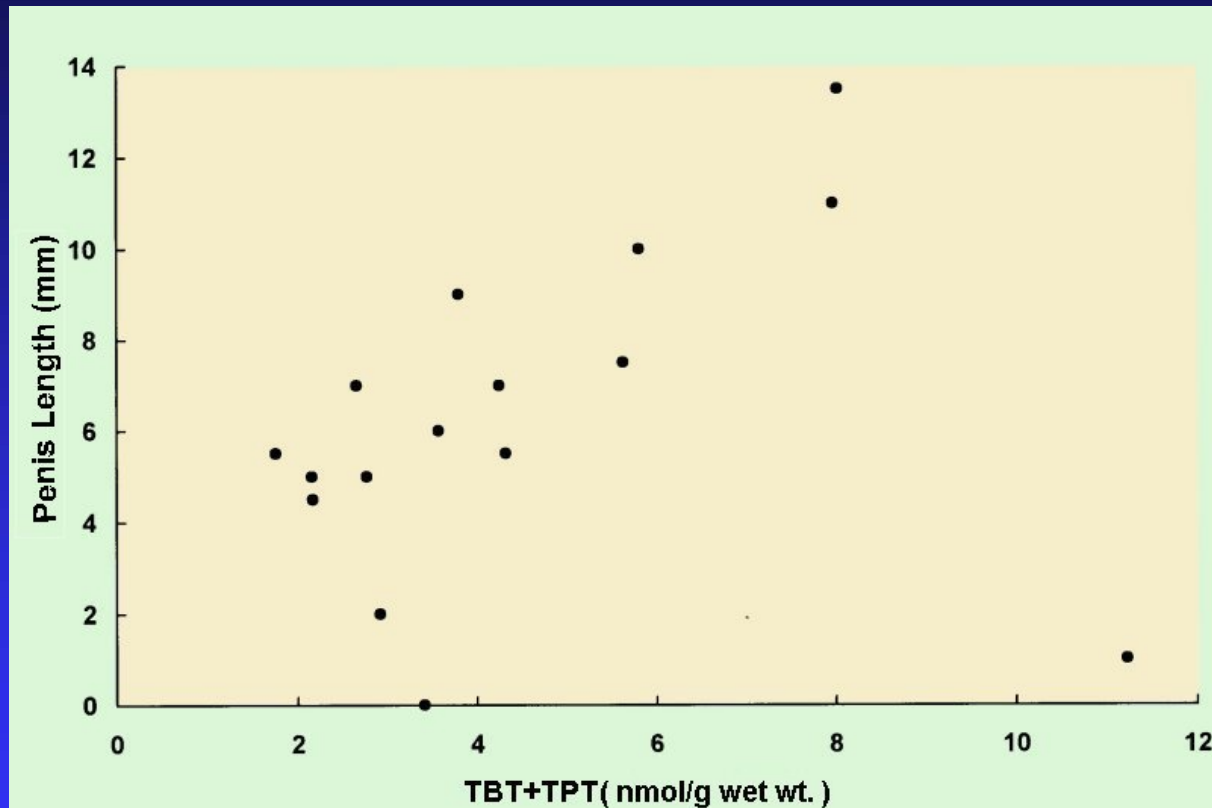
Tissue Distribution of Organotin in *B. japonica*



Imposex-exhibiting females (X prefecture, Japan, June 1991)

Horiguchi
et al. (2006)

Imposex and Organotin Compounds in the Ivory Shell, *Babylonia japonica*



The relationship between organotin (TBT and TPhT) concentration in ovary and penis length in imposex-exhibiting females

Horiguchi et al. (2006)

Temporal Trend of Total Catch of Abalone in Japan (1926 – 1999)



Difference of the Shells between Wild and Artificially-Produced Abalone

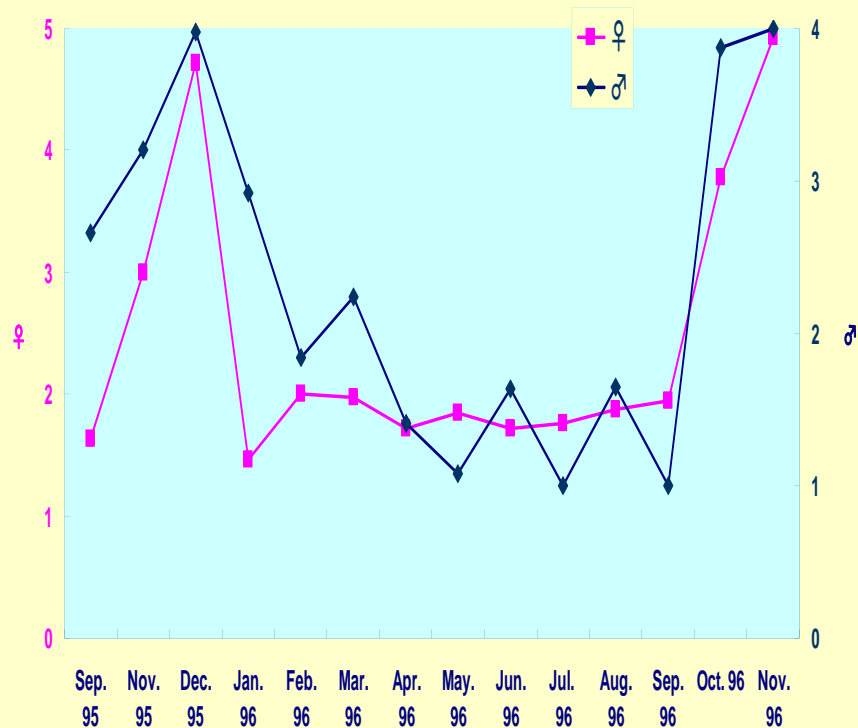


Wild Giant Abalone

Artificially-Produced One

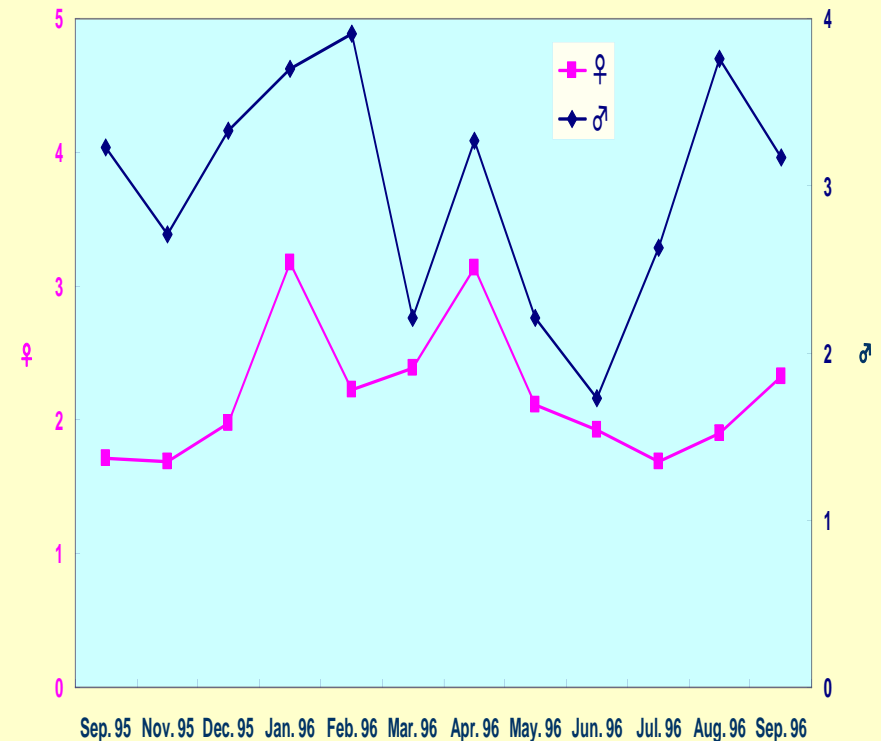
Reproductive cycle of the giant abalone, *Haliotis madaka*

The population reproductive developmental score in the giant abalone from a reference site (Site A)



Site A (reference)

The population reproductive developmental score in the giant abalone from a site representative of population decline (Site B)



Site B (population decline)