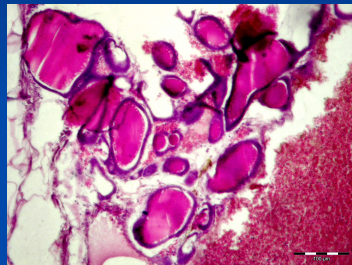
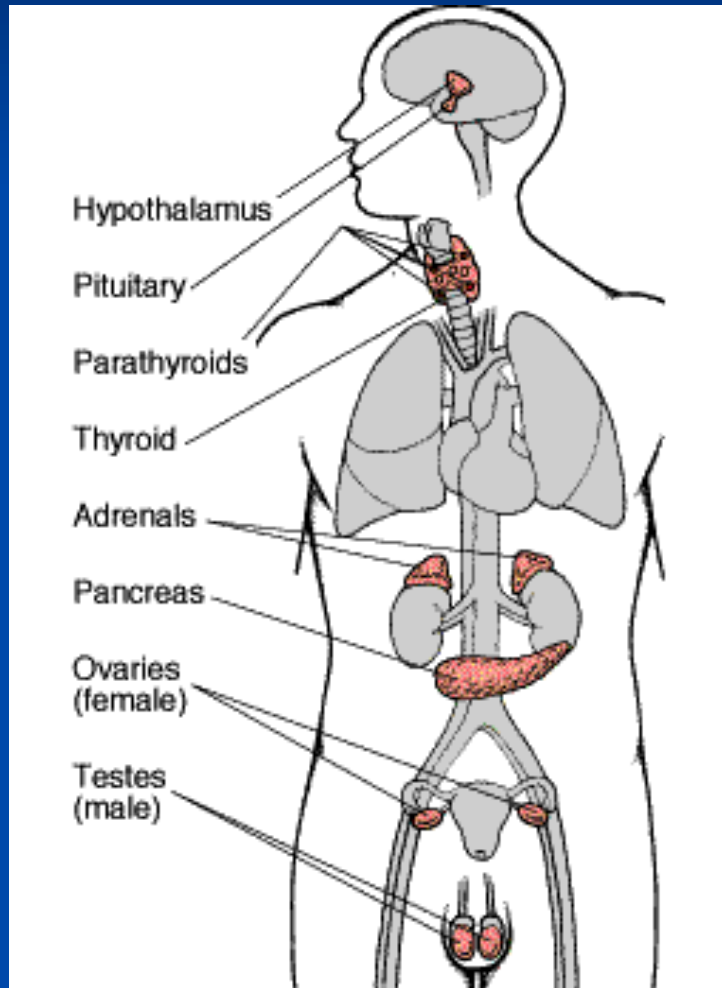


Endocrine Disruption in Seabass (*Dicentrarchus labrax*)



Joseph Schnitzler

The endocrine system is a network of glands that release many different hormones, sometimes in very tiny amounts



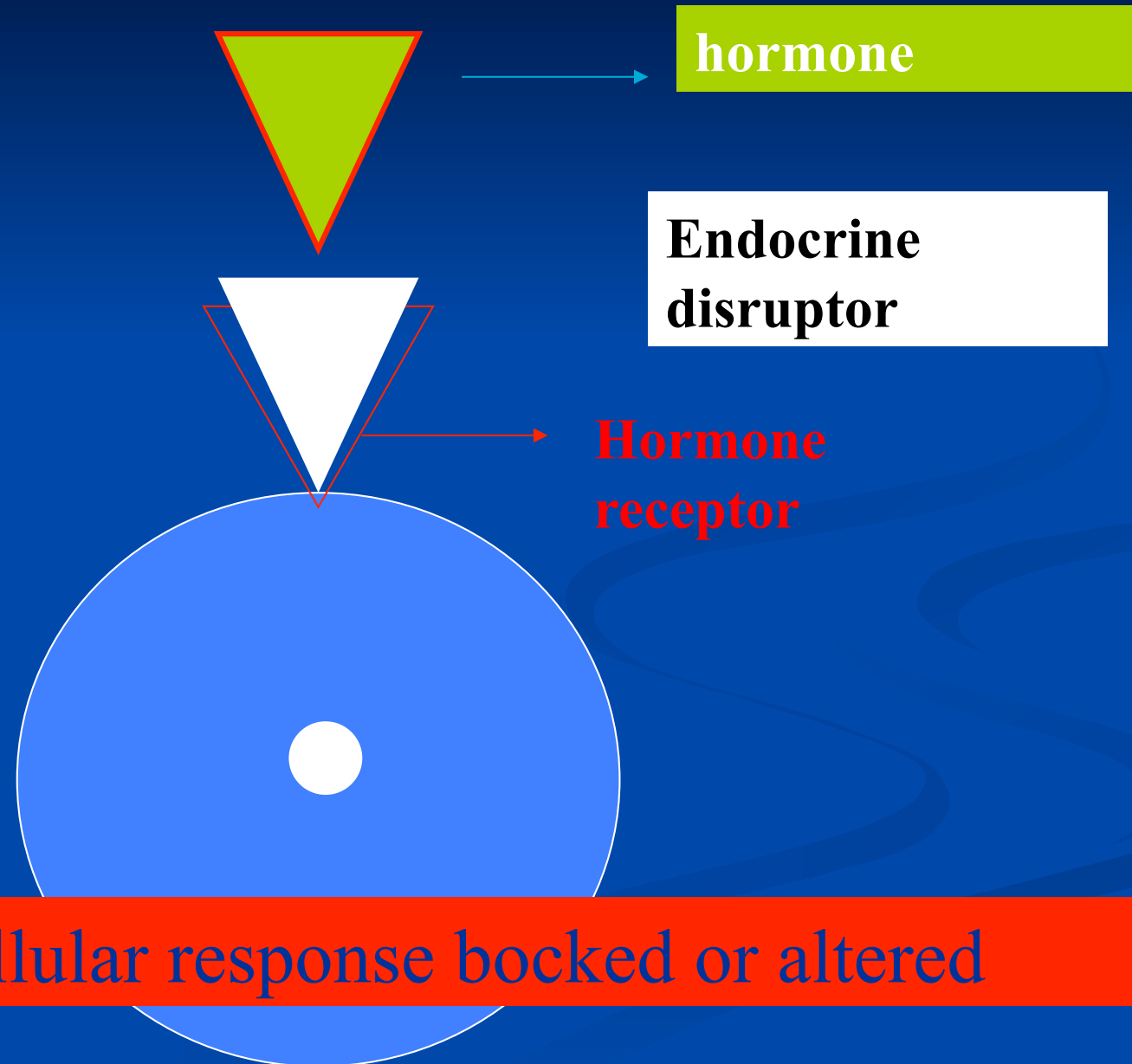
Hormones control growth, sexual and mental development, and many other functions

The systemic problem

“Many compounds introduced into the environment by human activity are capable of disrupting the endocrine system of animals, including fish, wildlife, and humans. The consequences of such disruption can be profound. . .”

- From the consensus statement of the inter-disciplinary scientists who met at Wingspread Conference in July 1991.

EDCs mimick hormones



Cellular response bocked or altered

Many studies link EDCs to:

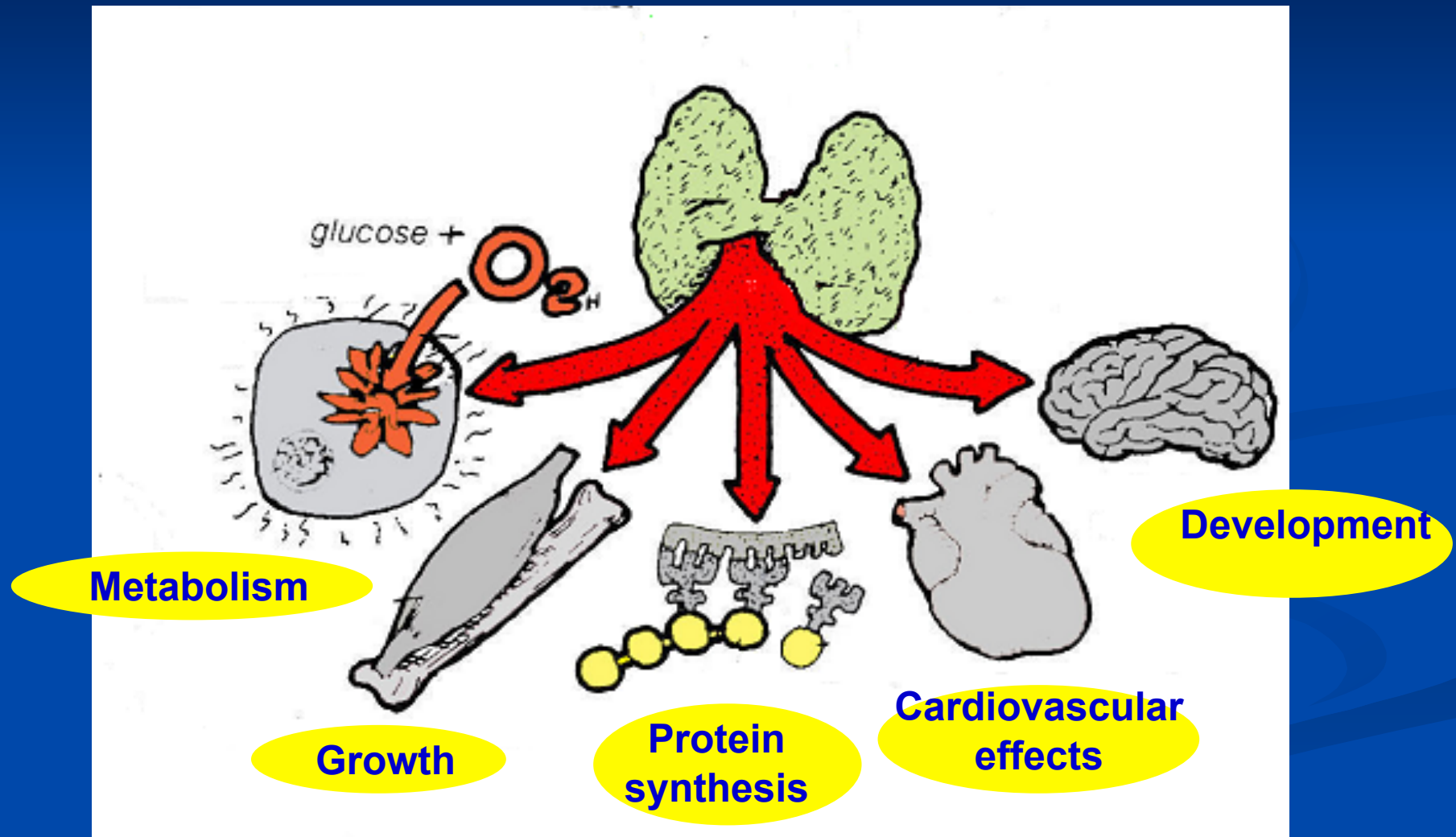
- Reproductive disorders
- Immune system dysfunction
- Certain cancers, especially of reproductive organs
- Birth defects of the penis and falling sperm counts
- Neurological effects
- Attention deficit disorder and poor memory
- Low IQ

Animal evidence surrounds us

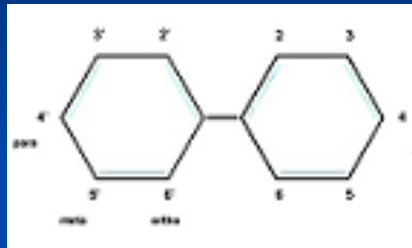
- Like many other mammals affected by EDCs, otters from the Lower Columbia River are infertile because the males' penises are too small to mate
- Alligators affected by pesticides cannot reproduce
- Male fish develop female hormones
- In birds, eggshells are so thin that chicks cannot survive



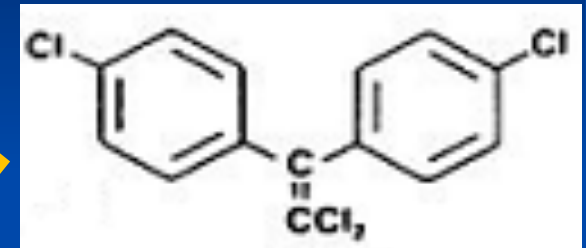
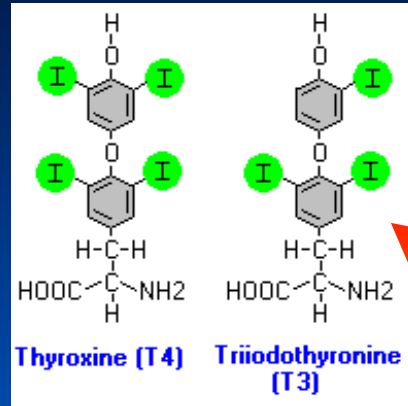
Thyroid hormones plays a crucial role in:



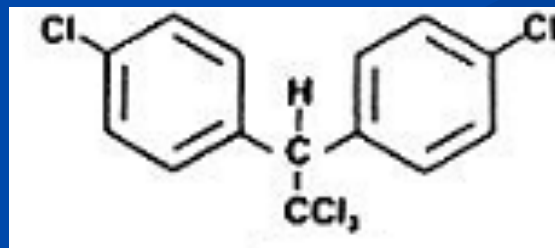
organochlorinated pollutants:



Polychlorobiphenyls
(PCBs)



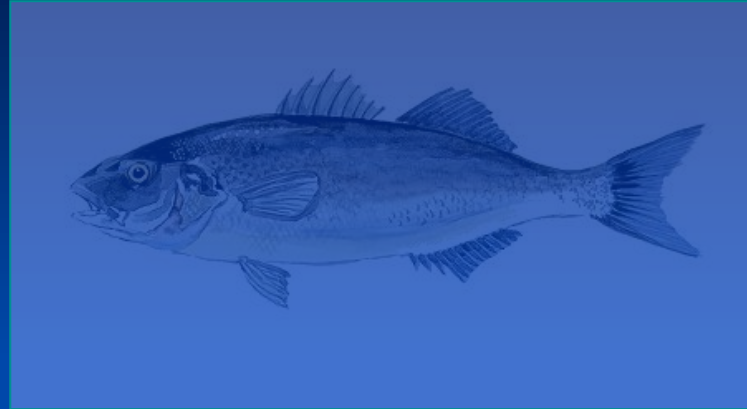
Dichloro-diphenyl-
dichloroethylen (DDE)



Dichloro- diphenyl-
trichlorethane (DDT)

- similar structures as thyroid hormones
- may generate an endocrine disruption

➤ Seabass (*Dicentrarchus labrax*):



- easily accessible, large distribution and relatively abundant
- optimal size
- long lived animals at the top of the food web
- sedentary habits



Perfect for sentinel species

Sampling:

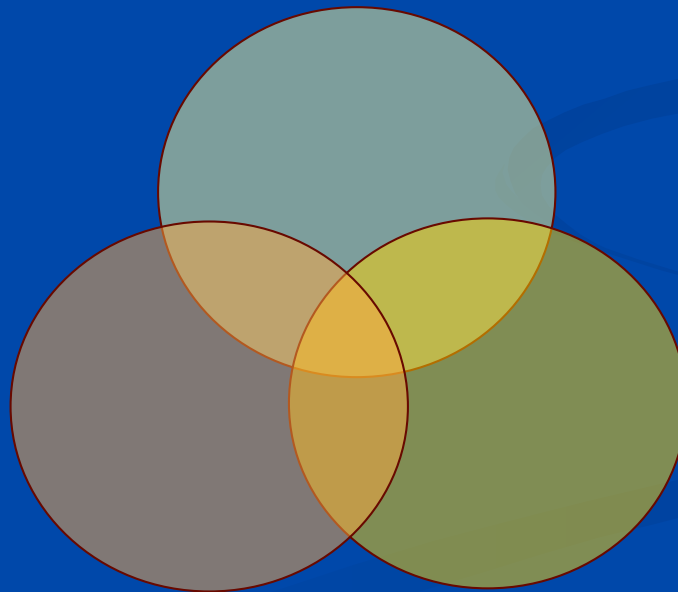


- 15 wild seabass
- 31 aquaculture seabass

The aim of this study was:

- to assess some test methods for detecting endocrine disruption,
 - a better understanding of their effects
- and to see if the seabass fit as sentinel species.

Concentration of PCBs and DDTs



Histomorphometry of thyroid tissue

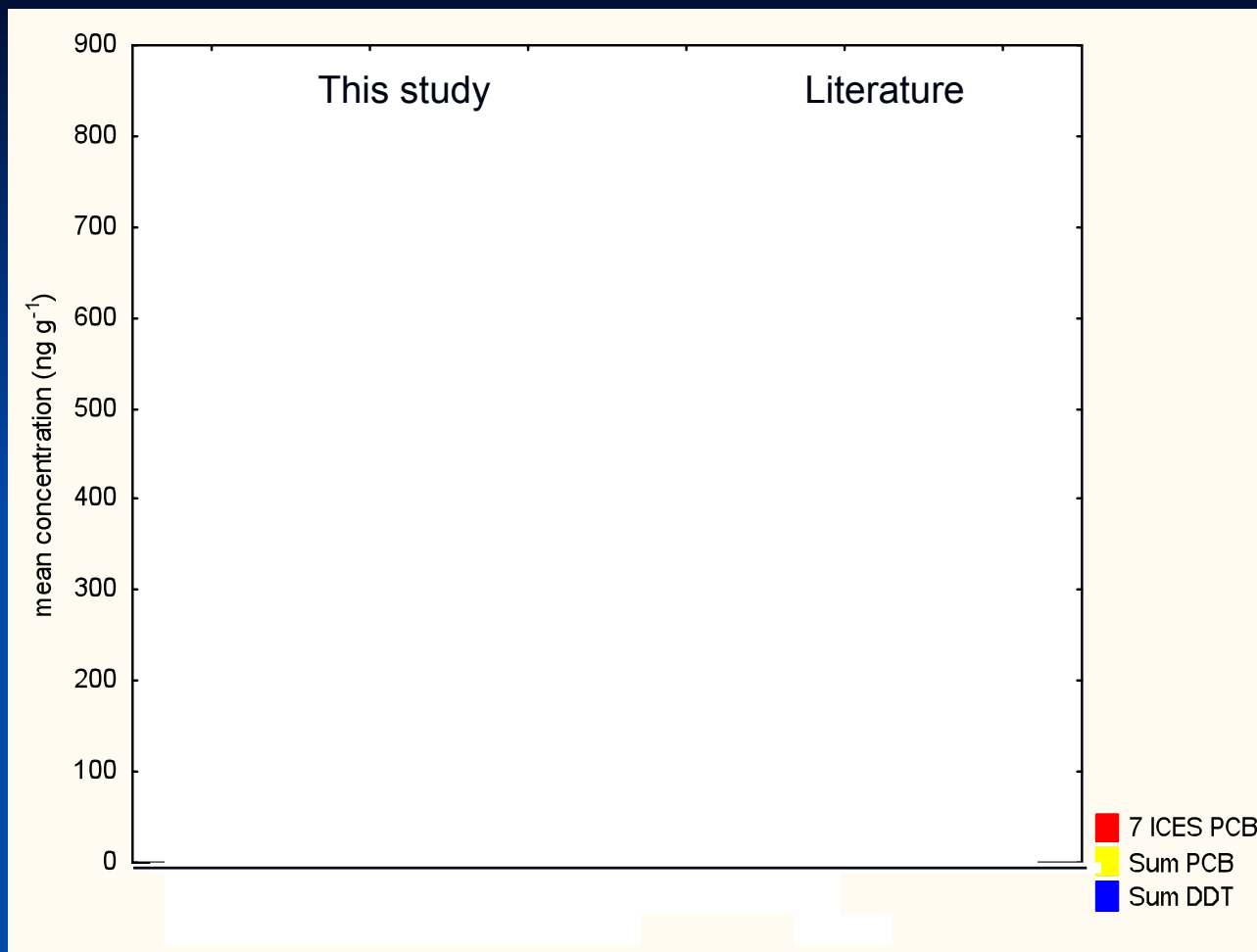
Muscular thyroxin (T_4) concentration

Results and discussion

A. Toxicological analysis

B. Relation with the thyroid parameters

Results & discussion : Toxicological analysis



We observe:

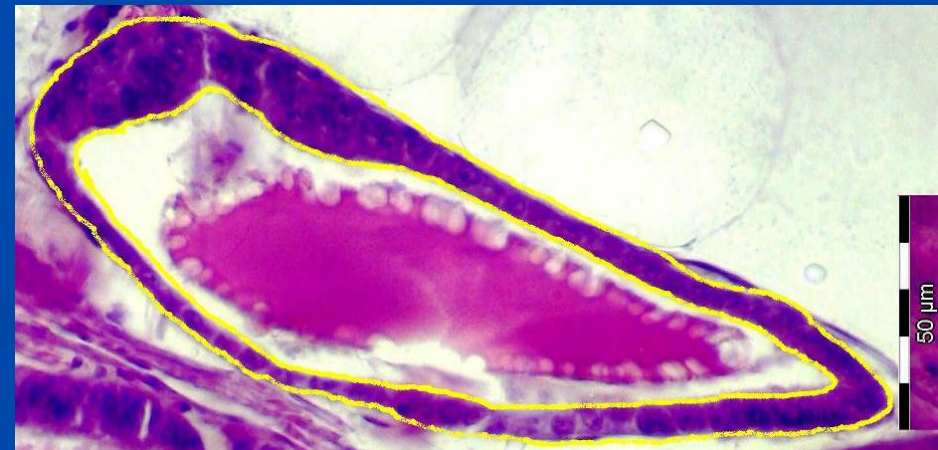
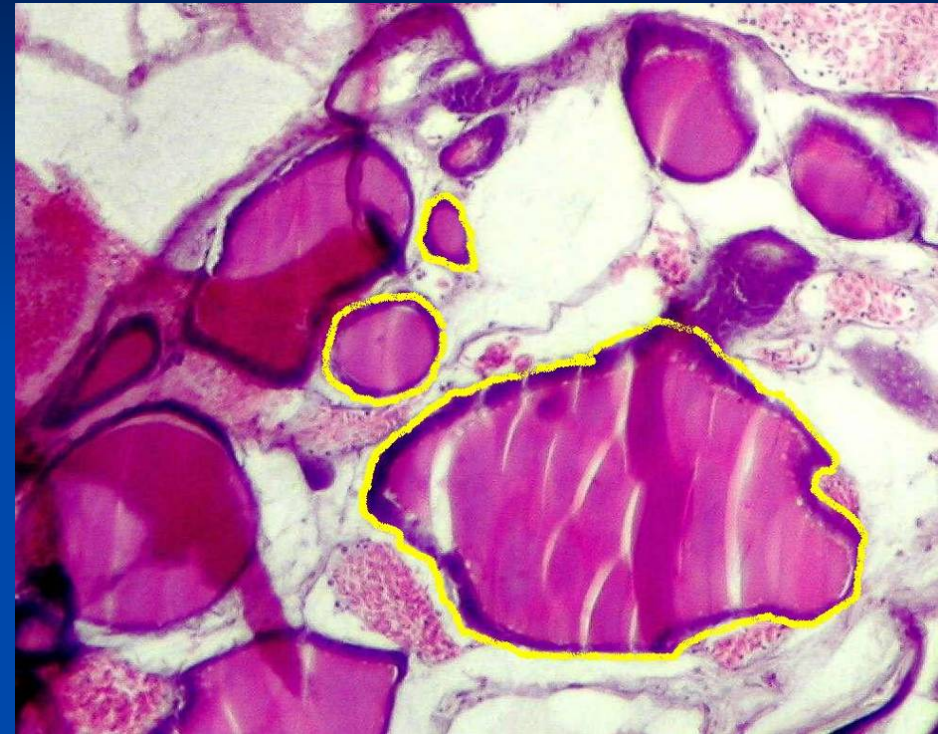
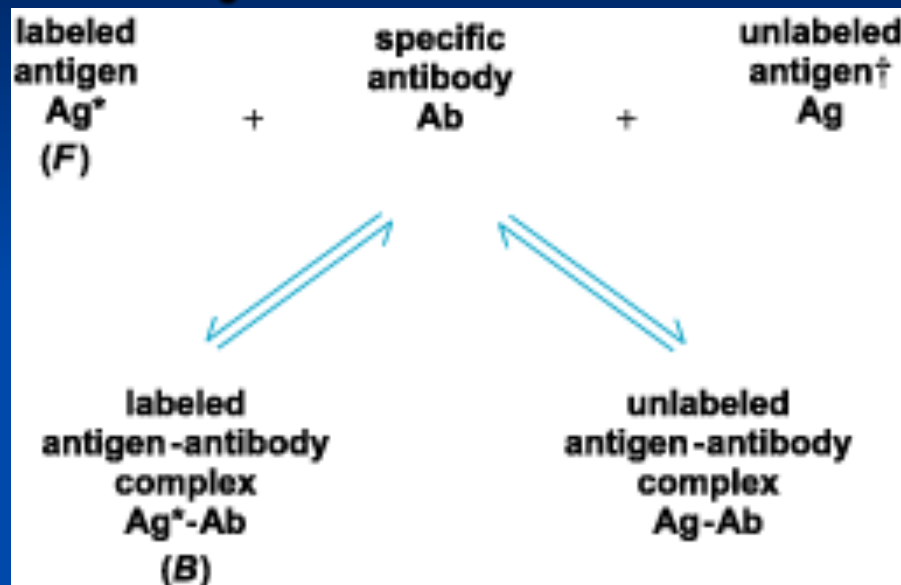
- No contamination for the 7 ICES PCBs,
- a general higher PCB and DDT contamination in wild seabass,
- No reduction compared to measurements in the Mediterranean 10 years ago,
- higher concentrations in the Mediterranean compared to the Atlantic.

Results and discussion

A. Toxicological analysis

B. Relation with the thyroid parameters

Thyroid function



- Thyroxin concentration by RIA
- Histomorphometry: Follicle diameter and epithelial cell height

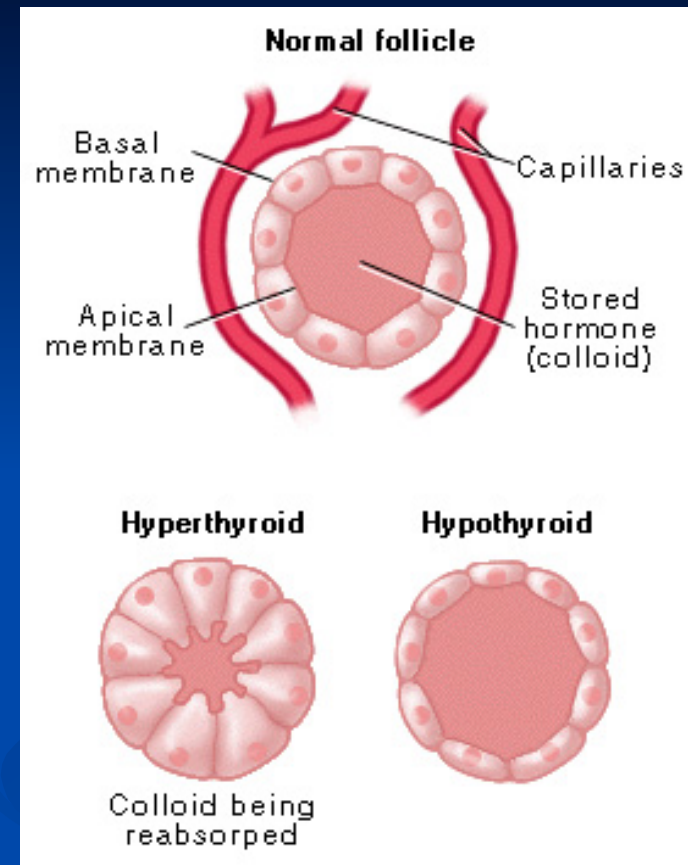
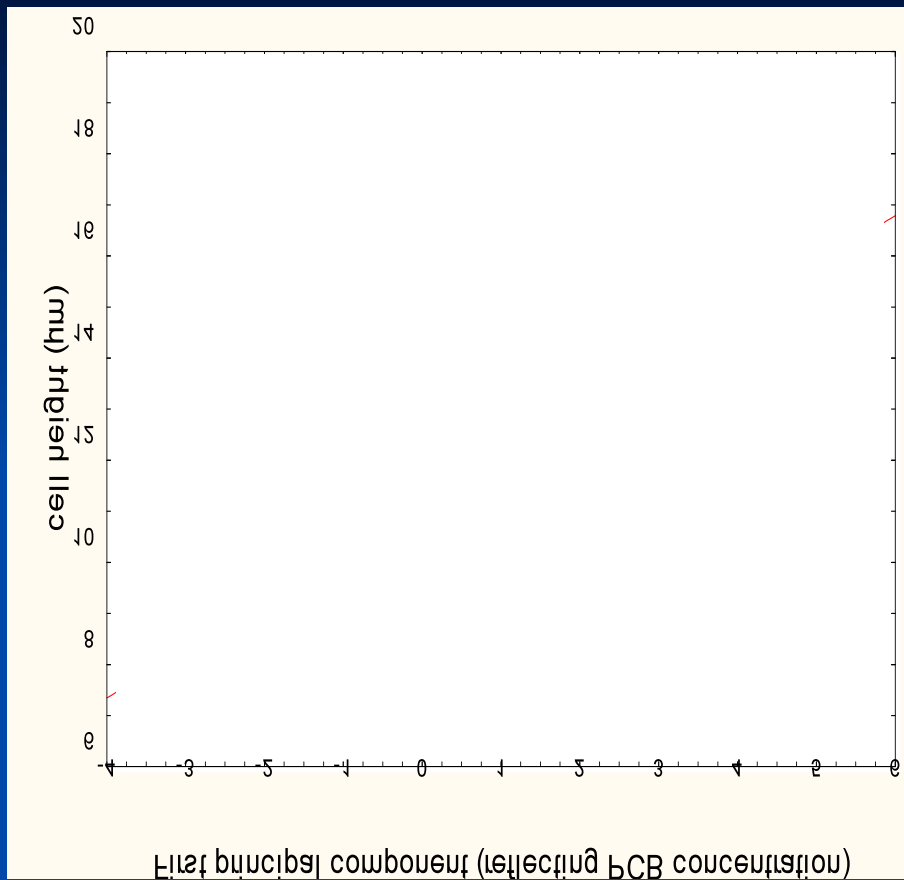
● **Multivariate statistical analysis:**

- The « pollutant » variables were reduced to 3 principal components through an PCA



- Results = 3 new data sets
- Takes account of the inherent variation of the sources data

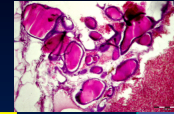
Results and discussion: Relation with the thyroid parameters



➤ The epithelial cell height increases with the organochlorine pollutant concentration

➔ Thyroid hyperactivity

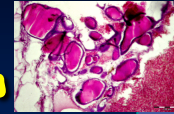
Conclusions



- Seabass fit as sentinel species for endocrine disruption
- Higher concentrations of organochlorine compounds were found in the Mediterranean and the level have apparently not sunken the last 10 years
- Wild seabass showed higher contamination levels than aquaculture seabass
- The observed differences in thyroid histomorphometry could be related to the organochlorine pollutants as indicates the significant correlation between the pollutant concentration and the thyroid parameters

Endocrine disruption ?

Acknowledgements



I wish to thank all persons who contributed to this work:

- Dr. K. Das (ULg)
- Dr. E. Koutrakis (Fisheries Research Institute, Kavalla, Grece)
- Dr. Ursula Siebert (FTZ, Germany)
- Prof. J-P. Thomé (ULg)
- Dr. J. Sulon (ULg)
- The Team of the FTZ Büsum and the Laboratoire d'Océanologie (ULg)
- My friends and my family