IMPACT OF ATRAZINE ON SOMATIC ANEUPLOIDY IN CUPPED OYSTERS, *Crassostrea gigas*

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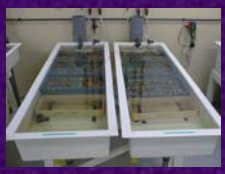
INTRODUCTION

In the Pacific oyster, *Crassostrea gigas*, hypodiploid aneuploid cells with 2n=19, 18 or 17 chromosomes have regularly been reported. There is a negative correlation between somatic aneuploidy and growth rate in oysters (Leitão *et al*., 2001a) as well as evidence for a genetic basis (Leitão *et al*., 2001b). Furthermore, non-random chromosome loss has been demonstrated in aneuploid karyotypes of *C. gigas* using the G-banding technique (Leitão *et al*., 2001c).

This poster summarises different studies used to investigate the effects of the herbicide atrazine on the level of aneuploidy in this species.

MATERIALS & METHODS



Firstly, *C. gigas* adults and juveniles were subjected to different atrazine doses for two months and three and a half months respectively. Three treatments and their replicates were applied: (1) with no atrazine, (2) with 10 µg/l of atrazine representing a peak value found in a polluted environment and (3) with 100 µg/l of atrazine, a value ten times higher.

We also compared the results obtained with the juveniles exposed to atrazine with a sample from the same cohort which were subsequently transferred to non polluted conditions for an additional two and a half months after the atrazine treatment.

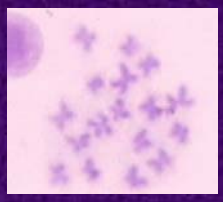
Then, we examined the progeny of adult oysters previously treated with atrazine.

Additionally, restriction enzyme digestion chromosome banding was used on the progeny to identify which chromosomes were missing.

20 chromosomes

19 chromosomes

18 chromosomes



17 chromosomes

RESULTS

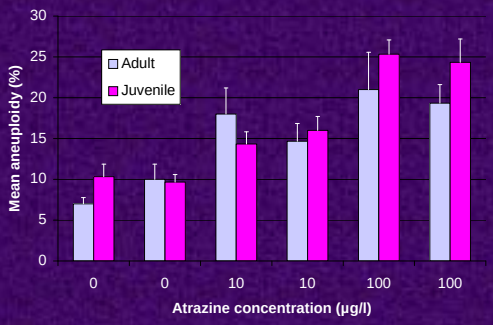


Figure 1: Comparison of mean percentage of aneuploidy between adult and juvenile Pacific oysters *Crassostrea gigas* exposed to different atrazine concentrations: 0, 10, and 100 µg/l.

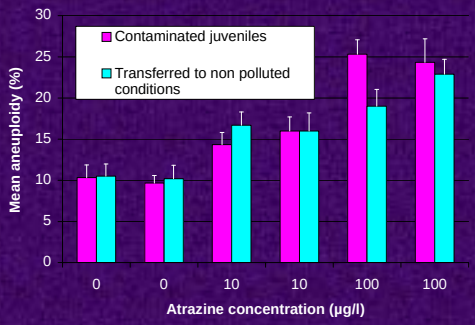


Figure 2: Comparison of mean percentage of aneuploidy between juvenile Pacific oysters *Crassostrea gigas* contaminated by different atrazine doses: 0, 10, and 100 µg/l and a sample from the same cohort transferred to non polluted conditions for an additional period.

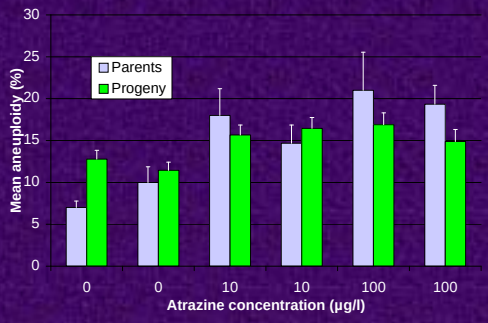


Figure 3: Comparison of mean percentage of aneuploidy between Pacific oysters *Crassostrea gigas* exposed to different atrazine concentrations: 0, 10, and 100 µg/l and their progeny.

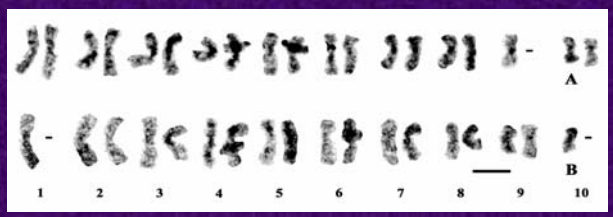


Figure 4: Example of banded aneuploid karyotypes with the restriction enzyme *Hae* III in *Crassostrea gigas* contaminated indirectly by atrazine. (A) Chromosome loss in pair 9. (B) Chromosome loss in pairs 1 and 10. Scale bar = 5 µm.

CONCLUSION & PERSPECTIVES

• Significant differences in aneuploidy level were observed among the treatments for both adult and juvenile oysters (Figure 1). Moreover, the observed impact after three and a half months of atrazine exposure on juvenile oysters persisted even after the return to non polluted conditions for two and a half months (Figure 2). Furthermore, the progeny exhibited significantly higher aneuploidy levels when their parents had been exposed to atrazine (Figure 3). Additionally, the study of 26 banded aneuploid karyotypes with *Hae* III showed that the chromosome pairs: 1, 5, 9, and 10 were affected by the loss of one chromosome (61, 15, 42, and 42%, respectively) (Figure 4).

• This study therefore demonstrates that aneuploidy level is positively correlated with atrazine concentration, and moreover, that there is a persistence of this phenomenon in time within and between generations. However, the chromosome loss itself is not influenced by atrazine as the same chromosome pairs than in "spontaneous" aneuploidy were affected by the loss of one chromosome.

•Further investigation is required to enable a better understanding of aneuploidy in oysters, especially with respect to why some chromosomes are more easily lost than others, and why cells tolerate the loss of only four out of ten chromosome pairs.

References: Leitão A, Boudry P, Thiriot-Quiévreux C. 2001a. Negative correlation between aneuploidy and growth in the Pacific oyster *Crassostrea gigas*: ten years of evidence. Aquaculture 193: 39-48.

Leitão A, Boudry P, McCombie H, Gérard A, Thiriot-Quiévreux C. 2001b. Experimental evidence for a genetic basis to differences in aneuploidy in the Pacific oyster (*Crassostrea gigas*). *Aquat Living Resour.* 14: 233-237.

Leitão A, Boudry P, Thiriot-Quiévreux C. 2001c. Evidence of differential chromosome loss in aneuploid karyotypes of the Pacific oyster *Crassostrea gigas*. *Genome* 44: 735-737.