

Chromosome Manipulation & **POLYPLOIDIZATION**

CONTENT

- Introduction
- Natural polyploidy
- Types of polyploidy
- Induce polyploidy
- Detection of polyploid individuals
- Evaluation of polyploid fishes
- Application of polyploid in aquaculture

INTRODUCTION

Polyploidy refers to the enhancement of genome by the addition of one or more set of chromosomes to the normal diploid genome.

The phenomenon of polyploidy has been observed to take place in nature as in the case of gynogenesis and androgenesis and also can be artificially brought about.

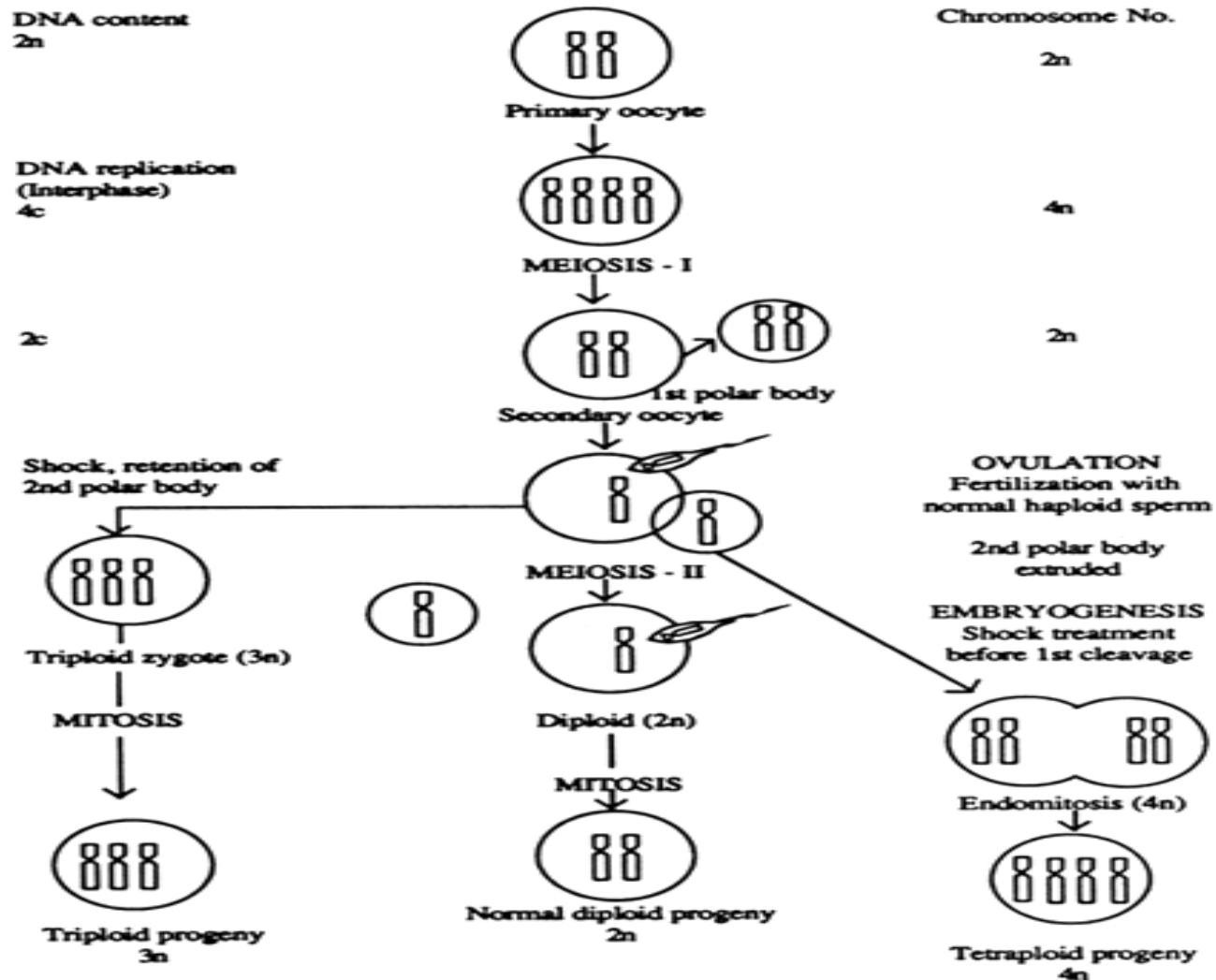
NATURAL POLYPLOIDIZATION

Polyploidy has been observed to occur in some fish species like the – common carp and trout mainly due to chromosomal traslocation.

It also occurs when very distantly related fish species are cross bred.

The cross between grass carp and bighead carp have produced tripod hybrids.

ARTIFICIAL INDUCTION OF POLYPOIDY IN INDIAN MAJOR CARPS



TWO MAIN TYPES OF POLYPLOIDS

Autopolyploidy - embryo from parents of the same species

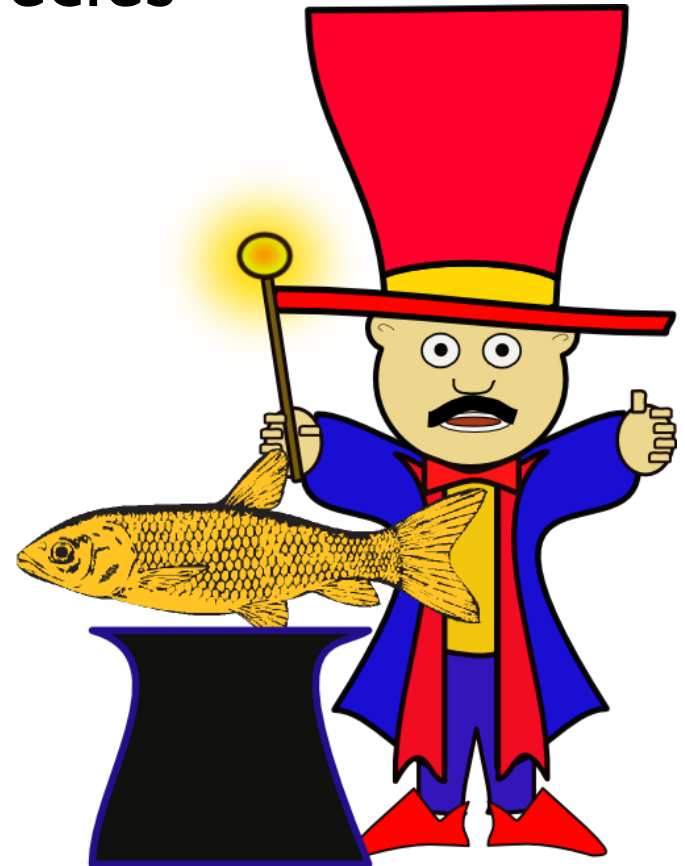


Allopolyploidy - embryo from parents of different species




INDUCE POLYPLOIDY

- Can use various process to induce polyploidy in some species-
- Heat shock
- Cold shock
- Pressure shock
- Some chemical

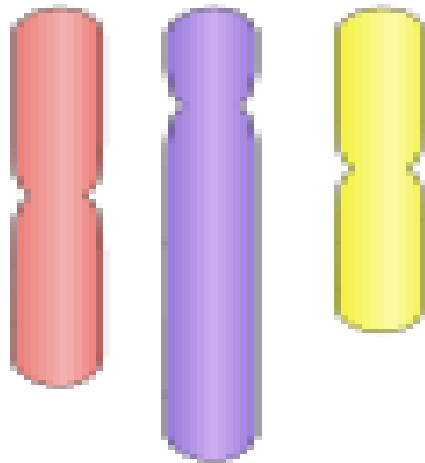


DETECTION OF POLYPLOID INDIVIDUALS

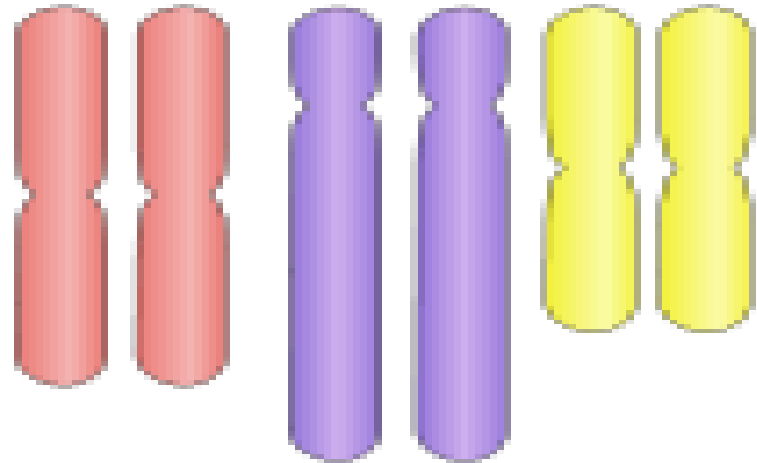
- The production frequency of polyploid individuals varies if the shock treatment is not given in proper dosage at appropriate time.
- It may so happen that a mixture of diploid , triploid , tetraploid and polyploid fishes are difficult to differentiate on the basis of external morphology.

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- Diploid – cells have two homologous copies of each chromosome.
 - Triploid – 3 sets,
 - Tetraploid – 4 sets
 - Polypoidy is the state where all cells have multiple sets of chromosomes.

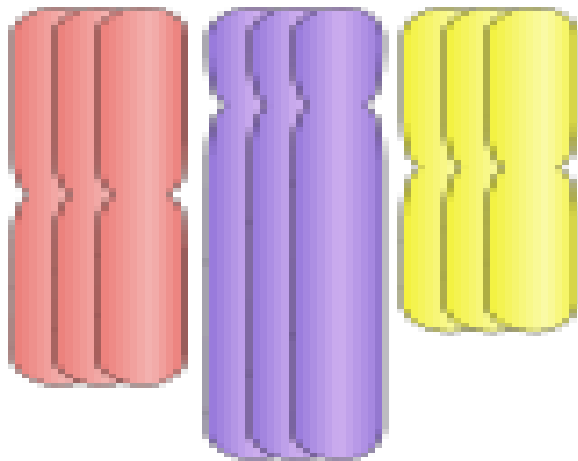
Haploid (N)



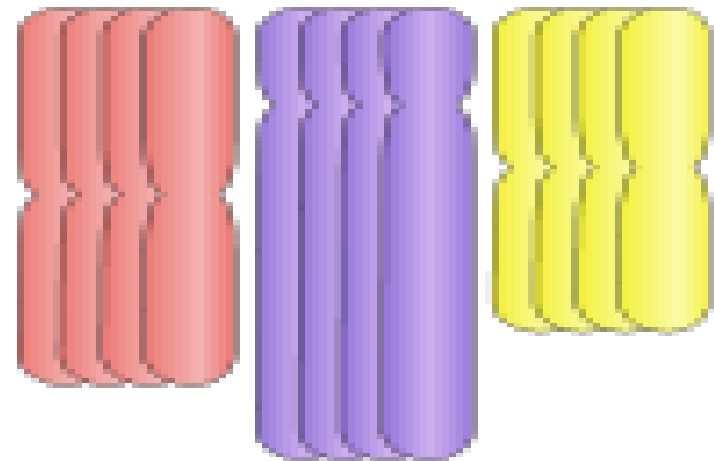
Diploid (2N)



Triploid (3N)



Tetraploid (4N)



EVALUATION OF POLYPLOID FISHES

A). Survival : Triploid fishes survived better than the tetraploid ones.

The survival of autotriploid was lower than the allotriploids.

B). Growth : the effects of triploidy on growth rate differ in different species.

C) . Reproduction : Induced polyploidy affects fertility in females more than in male.

APPLICATION OF POLYPLOIDY IN AQUACULTURE

Polyploidization may enable an animal to adapt to varying environmental conditions.

Common carp and the catostomid fishes are naturally polyploid species.

Diploid spermatozoa of tetraploid males are useful for producing androgenetic offspring



THANK YOU