

## Captive shark had 'virgin birth'

BBC News



Dr Mahmood Shivji explains this strange but true case

Published: May 23, 2007

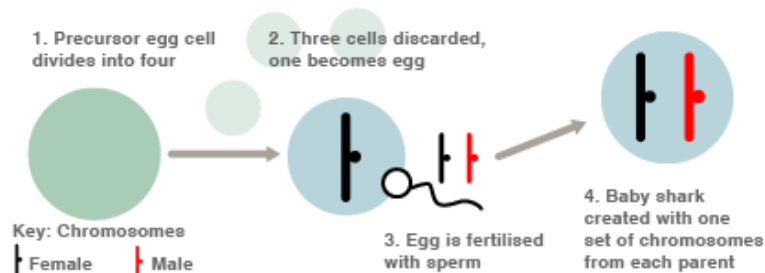
**Female hammerhead sharks can reproduce without having sex, scientists confirm.** The evidence comes from a shark at Henry Doorly Zoo in Nebraska which gave birth to a pup in 2001 despite having had no contact with a male.

Genetic tests by a team from Belfast, Nebraska and Florida prove conclusively the young animal possessed no paternal DNA, Biology Letters journal reports.

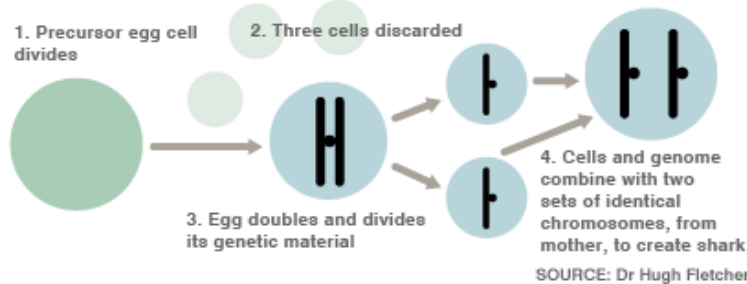
The type of reproduction exhibited had been seen before in bony fish but never in cartilaginous fish such as sharks.

### HOW NORMAL FERTILISATION AND PARTHENOGENESIS DIFFER

#### Normal Fertilisation



#### 'Virgin birth' - Parthenogenesis



reproduce because females have difficulty finding mates, this is likely to weaken populations still further, the researchers warn.

The reason is that asexual reproduction reduces genetic diversity and this makes it harder for organisms to adapt - to changed environmental conditions or the emergence of a new disease, for example.

With normal sex, the mixing of maternal and paternal DNA introduces genetic novelty which can give animals new traits that might be advantageous in their new circumstances.

### Sex marks

Dr Paulo Prodohl, a co-author on the Biology Letters paper from Queen's School of Biological Sciences, said: "Vertebrates in general have evolved away from parthenogenesis to boost genetic diversity and enhance evolutionary potential.

"The concern for sharks is that not only could we be reducing their numbers but we could be making them less fit as well."

"Our findings will now have to be taken into consideration for any conservation management strategy, especially for overexploited species."



The bonnethead is a species in the hammerhead group.

Parthenogenesis, as this type of reproduction is known, occurs when an egg cell is triggered to develop as an embryo without the addition of any genetic material from a male sperm cell.

The puzzle over the hammerhead birth was reported widely in 2001, but it is only with the emergence of new DNA profiling techniques that scientists have now been able to show irrefutably what happened.

The investigation of the birth was conducted by the research team from Queen's University Belfast, Nova Southeastern University in Florida, and Henry Doorly Zoo itself.

The scientists say the discovery raises important issues about shark conservation.

In the wild, these animals have come under extreme pressure through overfishing and many species have experienced sharp declines.

If dwindling shark groups resort to parthenogenesis to

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### Captive shark had 'virgin birth'

The birth of the hammerhead (of the bonnethead species, *Sphyrna tiburo*) at Henry Doorly was as tragic as it was puzzling.

The new pup was soon killed by a stingray before keepers could remove it from its tank.

At the time, some theorised that a male tiger shark kept at the zoo could have been the father - but the institution's three bonnethead females had none of the bite marks that are usually inflicted on their gender during shark sex.

Some even suggested that one of the females could have had sex in the wild and stored the sperm in her body - but the three-year period in captivity made this explanation highly unlikely.

The new tests on the dead pup's tissues now show the newborn's DNA only matched up with one of the females - and there was none of any male origin.

Although extremely rare in vertebrates, parthenogenesis (out of the Greek for "virgin birth") occurs in a number of lower animals. Insects such as bees and ants use it to produce their drones, for example.

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