

# **Emission of estrogens makes fish having a hard time deciding their sex identity**

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**Emission of estrogens from water treatment plants makes fish living downstream of these to change sex, become sterile or even makes them hermaphroditic. It has also been shown that the exposure of estrogens can lead to the crash of whole populations. An estrogen that has been shown to cause these effects in fish is 17 $\alpha$ -ethinyl estradiol (EE<sub>2</sub>), a man made estrogen that is commonly used in contraceptives.**

## **Studies provide pieces to understand the bigger picture**

That estrogens affect fish has been known for quite a while and studies regarding this subject have been performed for at least the past two decades. By studying fish in their natural ecosystems it is hard to tell whether it is only the emitted estrogens that are affecting the fish or if it is a combination of several different substances and/or environmental causes. Therefore laboratory studies can provide useful information about how different substances alone affect fish and their reproductive ability. One of the estrogens that have been widely investigated is EE<sub>2</sub> due to its persistence in nature and that it is commonly used in contraceptives. When zebra fish are exposed to EE<sub>2</sub> in laboratory environments it has been shown that males develop both male and female gonads and thereby reproduction is inhibited. It has also been shown that male fathead minnows become less aggressive against other males in competition for spawning places and females when exposed to EE<sub>2</sub>.

## **Populations of fish crashed due to exposure of EE<sub>2</sub>**

Field studies have also shown that exposure of EE<sub>2</sub> made males of fathead minnows develop both male and female gonads. Females of the same species were affected by having a changed production of egg cells. The most interesting, and perhaps frightening result is that a whole population of fathead minnows crashed two years after the exposure of EE<sub>2</sub> began. Other field studies have shown that males of both gudgeon and common roach develop hermaphrodite genitals when living downstream of water treatment plants where emissions of estrogens occur.

## **Future perspectives**

These findings clearly show that emissions of estrogens, like EE<sub>2</sub>, affect the reproduction of fish populations. Fish today are not just important as food source and for leisure fishing; they also play an important role in aquatic ecosystems. Therefore a reduced fish reproduction can have far-reaching consequences and there is an urgent need to reduce the effects. Even though it is most unlikely that the solution would be to prohibit EE<sub>2</sub> and other estrogens in contraceptives, one possible solution could be to improve the water treatment plants so that they will be able to remove the emissions of estrogens before reaching the fish.

## **More information**

Valén Fransson A. 2016. Hur påverkar utsläpp av det syntetiska hormonet 17 $\alpha$ -etinylostradiol (EE<sub>2</sub>) reproduktionen hos fiskar? Independent Project in Biology, 1BG210, Uppsala University.