Fate and transport of steroids in the environment: What goes in, must come out?

Institute of Agriculture and Natural Resources
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East Campus Union.

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Steroids and the U.S. beef cattle industry

More than 90% of US beef cattle are given growth promoting implants.

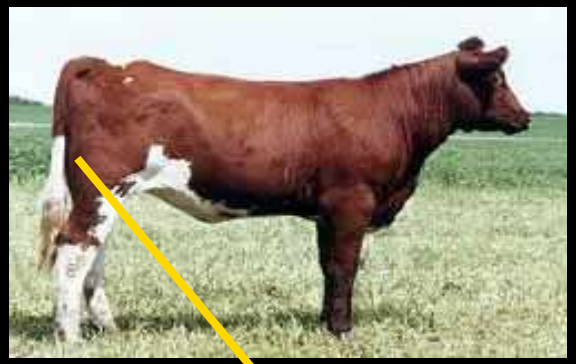
The most common implant contains trenbolone acetate and estradiol.

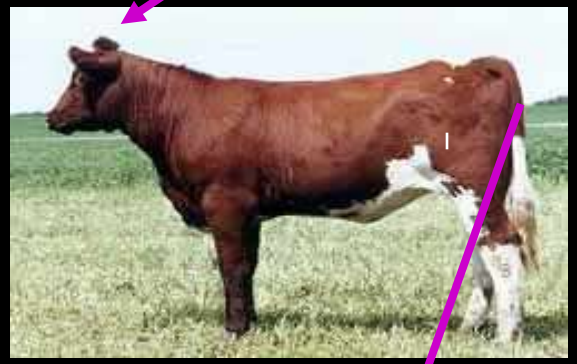
Brand Name	Trenbolone Acetate	Estradiol
Synovex Plus	200 mg	28 mg

Implanted

Trenbolone acetate
Estradiol benzoate

Unimplanted

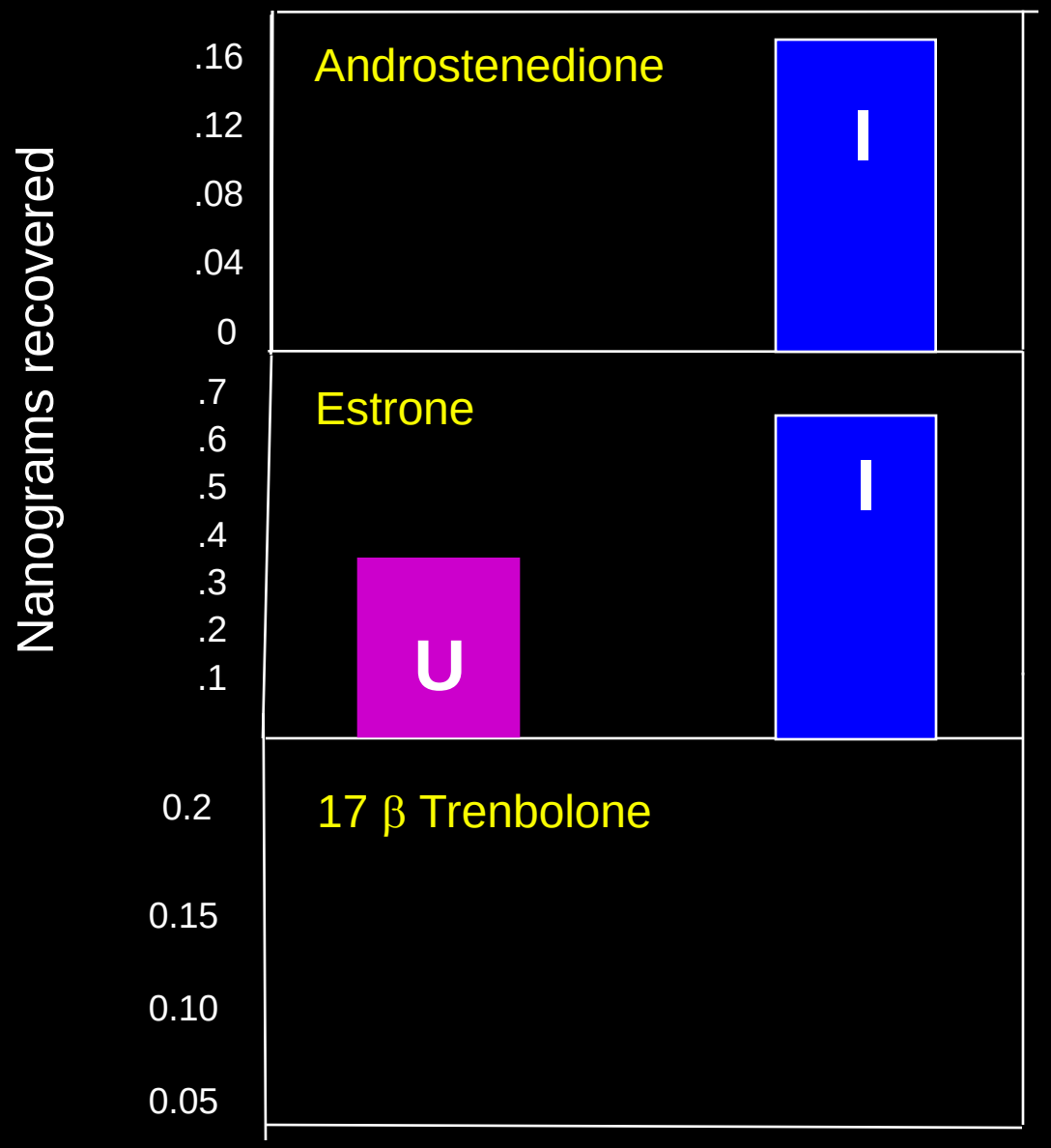




Endogenous steroid metabolites

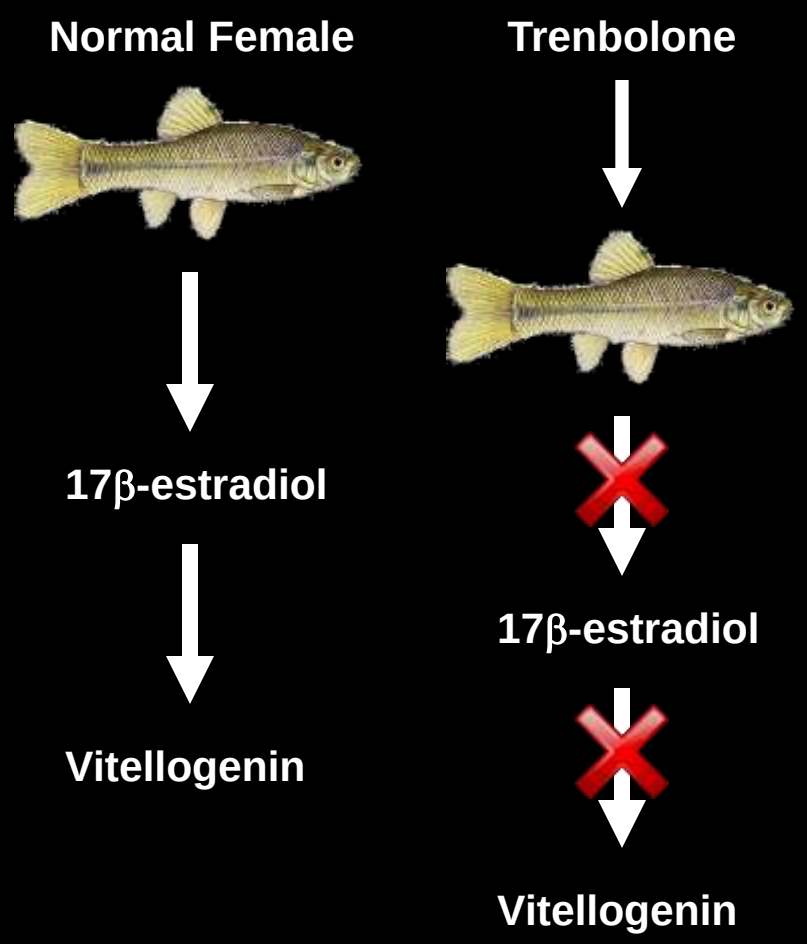
(but not Testosterone)

17 α-Trenbolone, 17 β-Trenbolone
17 α-estradiol, estrone

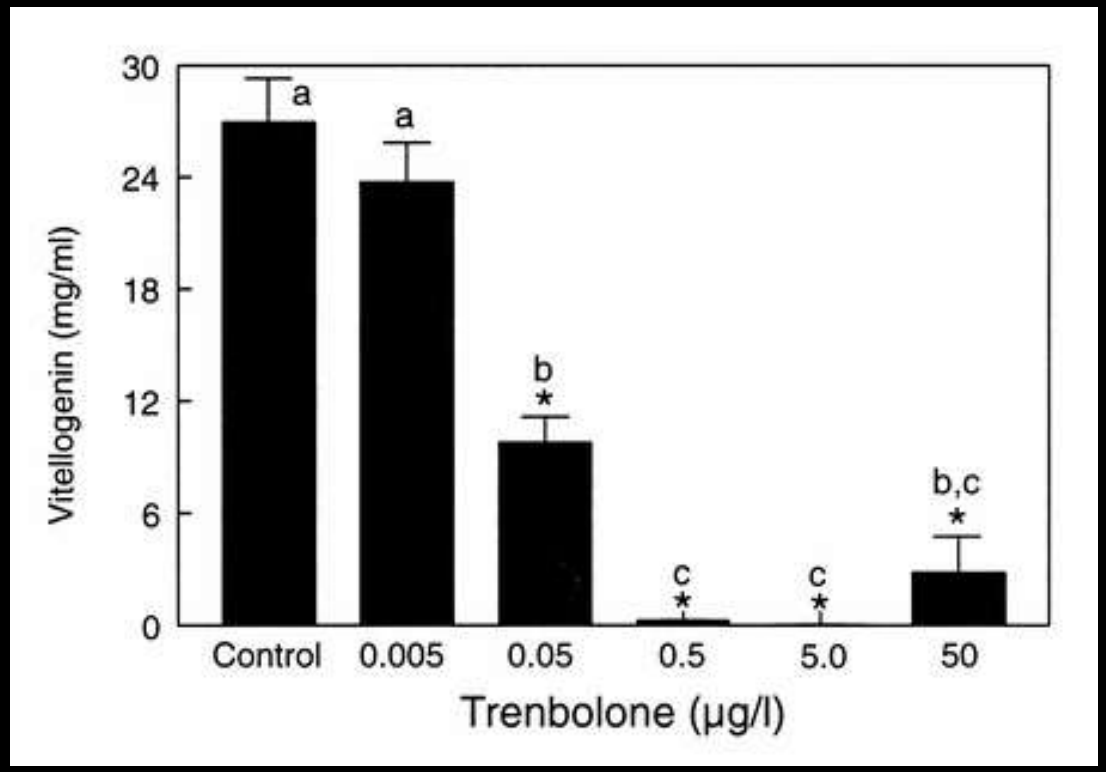


Sellin et al. 2009. Aq. Toxicol.

Exposures to exogenous steroids and steroid mimics disrupt the endocrine function of fish.

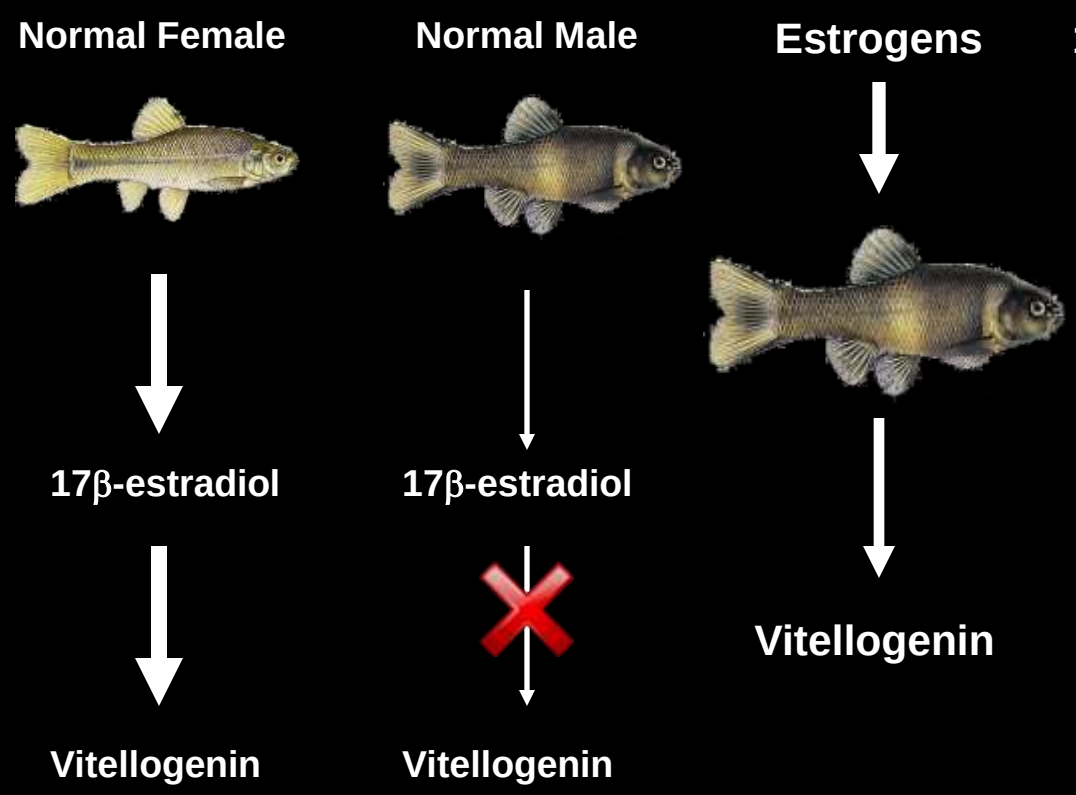


17β-TB reduces female plasma vitellogenin levels

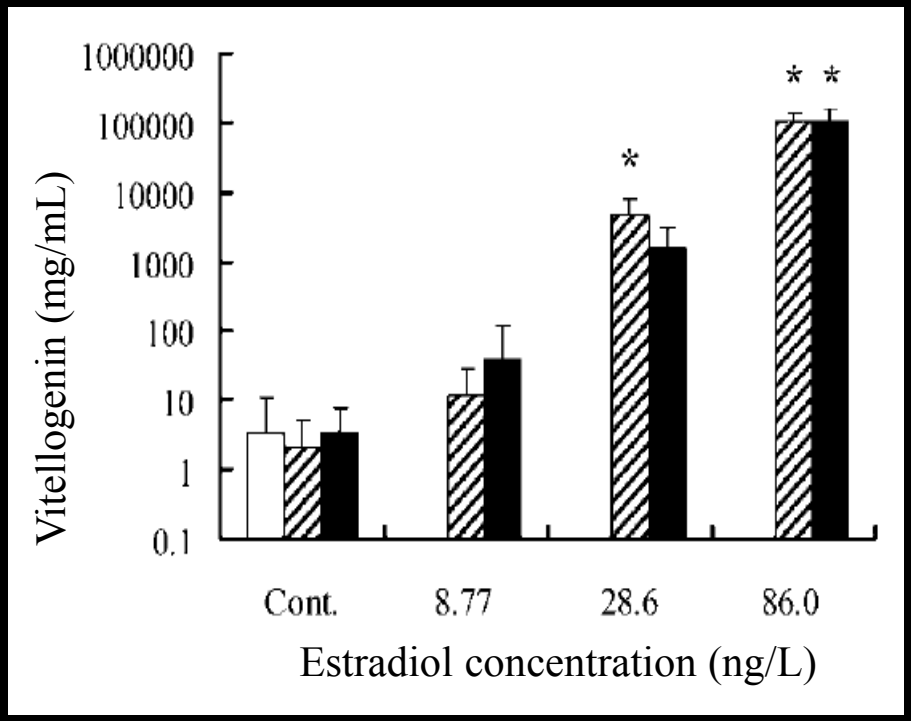


Ankley et al. 2003. *Environ Toxicol Chem* 22:1350-1360.

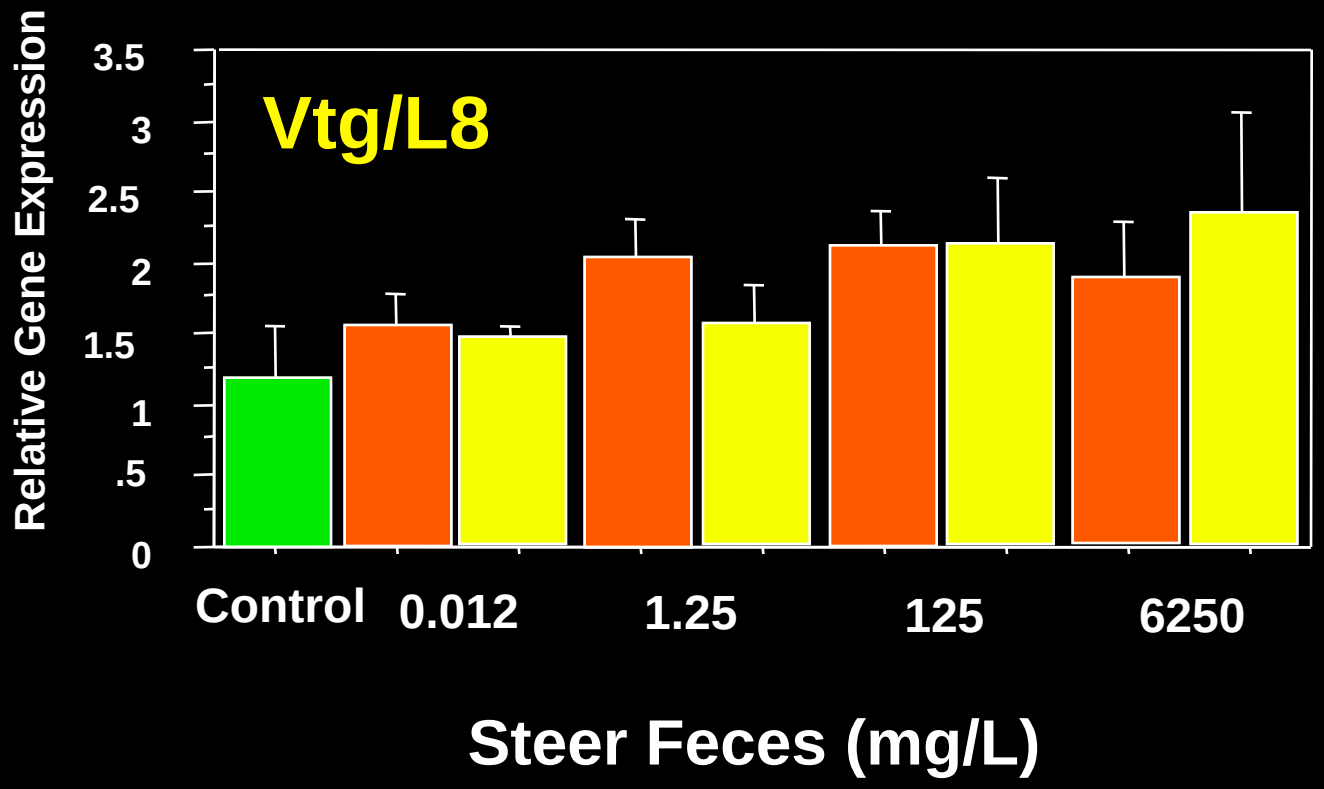
Exposures to steroids and steroid mimics disrupt the endocrine function of fish.



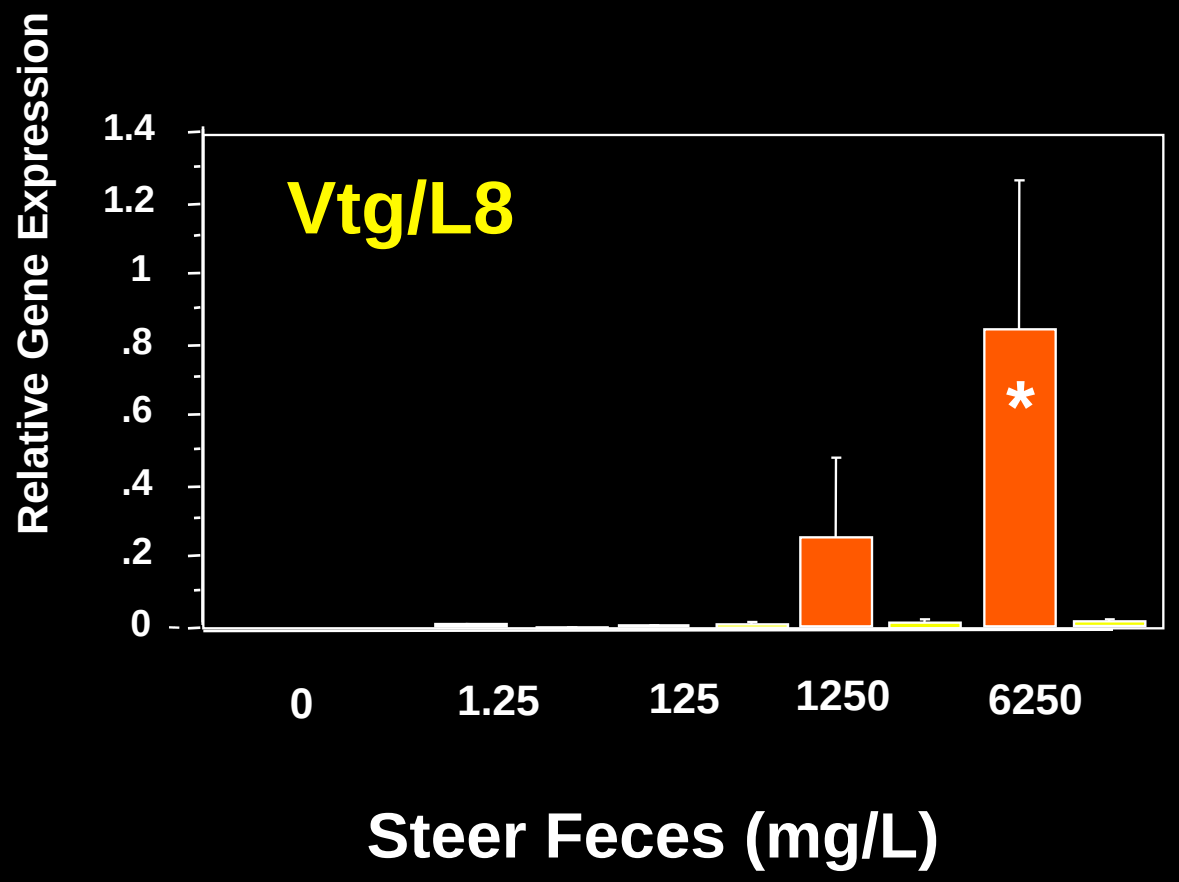
17β-E_2 increases male plasma vitellogenin levels



Seki et al. 2006. *Environ Toxicol Chem.* 25:2742-2752.



Sellin et al. 2009. Aq.Tox. 92:221-227.



Implanted

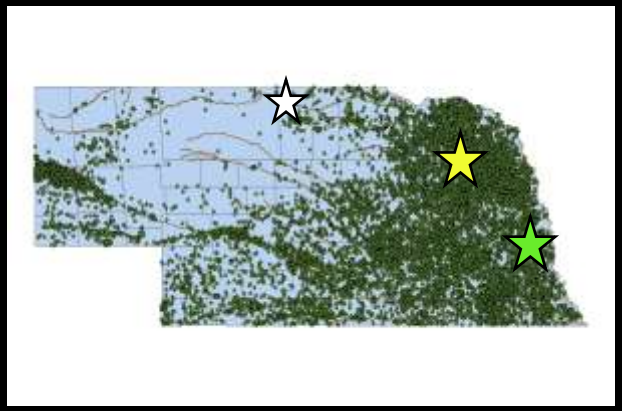
Unimplanted

Sellin et al. 2009. Aq.Tox. 92:221-227.

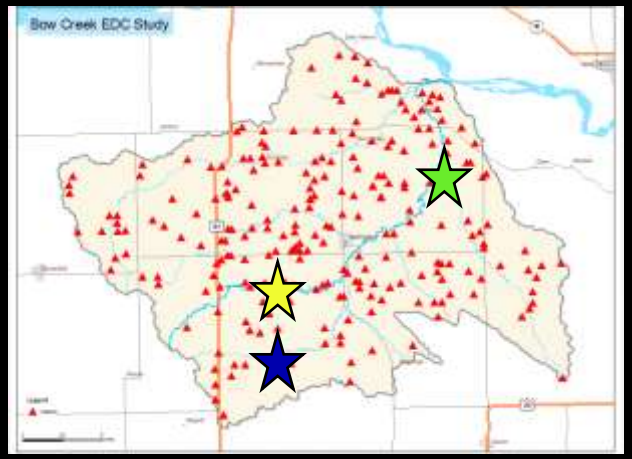
Laboratory

Field

No TBA, Estrogenic effect

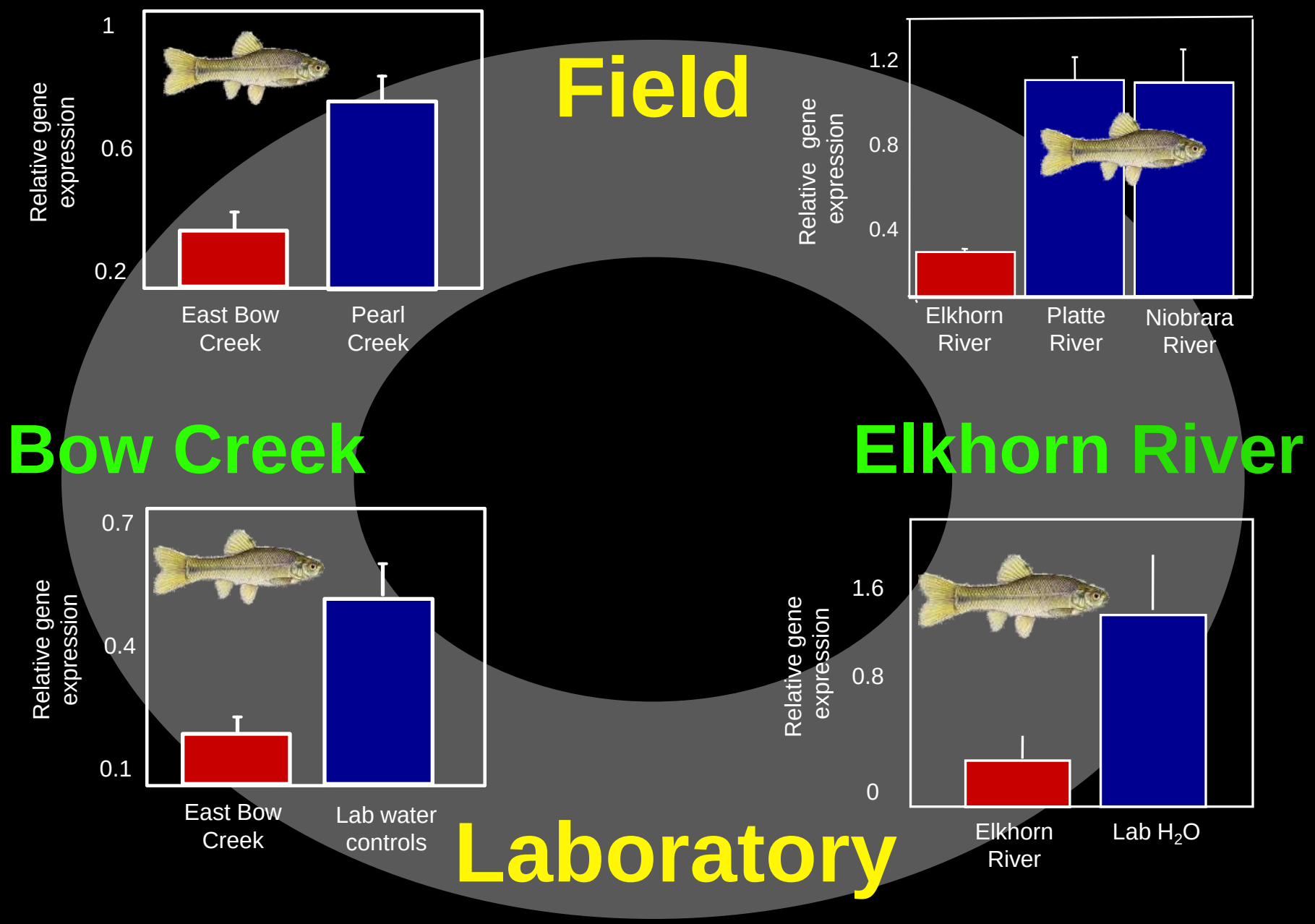


Compound	Niobrara	Platte	Elkhorn
17β-estradiol	ND	ND	ND
Estrone	ND	ND	ND
Estriol	ND	ND	ND
17α-trenbolone	ND	ND	ND
17β-trenbolone	ND	ND	ND



Compound	Pearl Cr.	Bow Cr.	E. Bow Cr.
17β-estradiol	ND	ND	ND
Estrone	ND	ND	ND
Estriol	ND	ND	ND
17α-trenbolone	ND	ND	ND
17β-trenbolone	ND	ND	ND

* detection limit = 1 ng



Sellin et al. 2009. *ET&C. 28:2443-2448*.

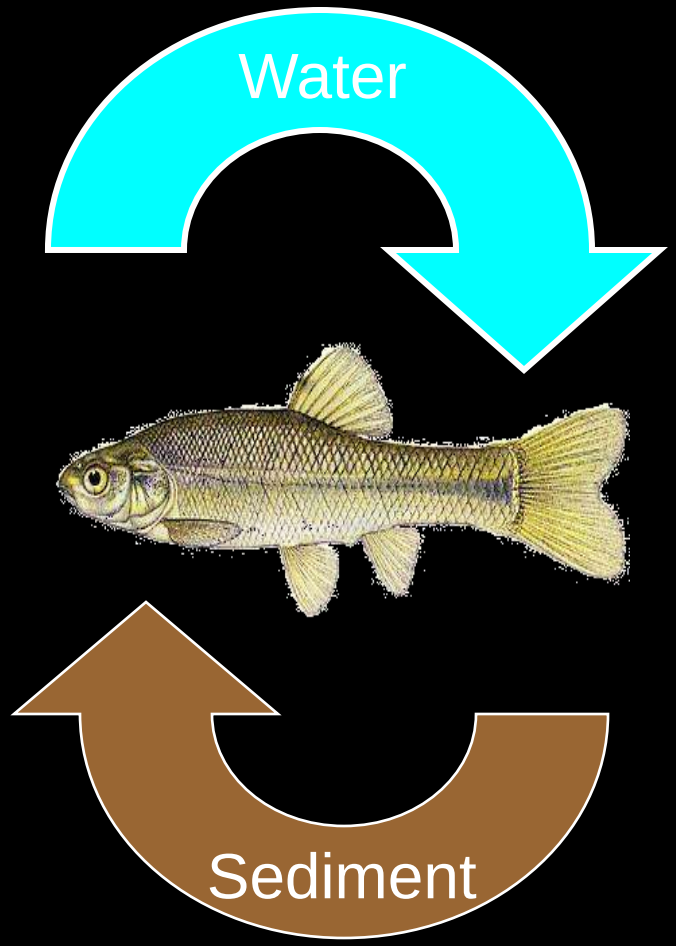
Sellin et al. 2010. Aq Tox 96:103-108.

Laboratory

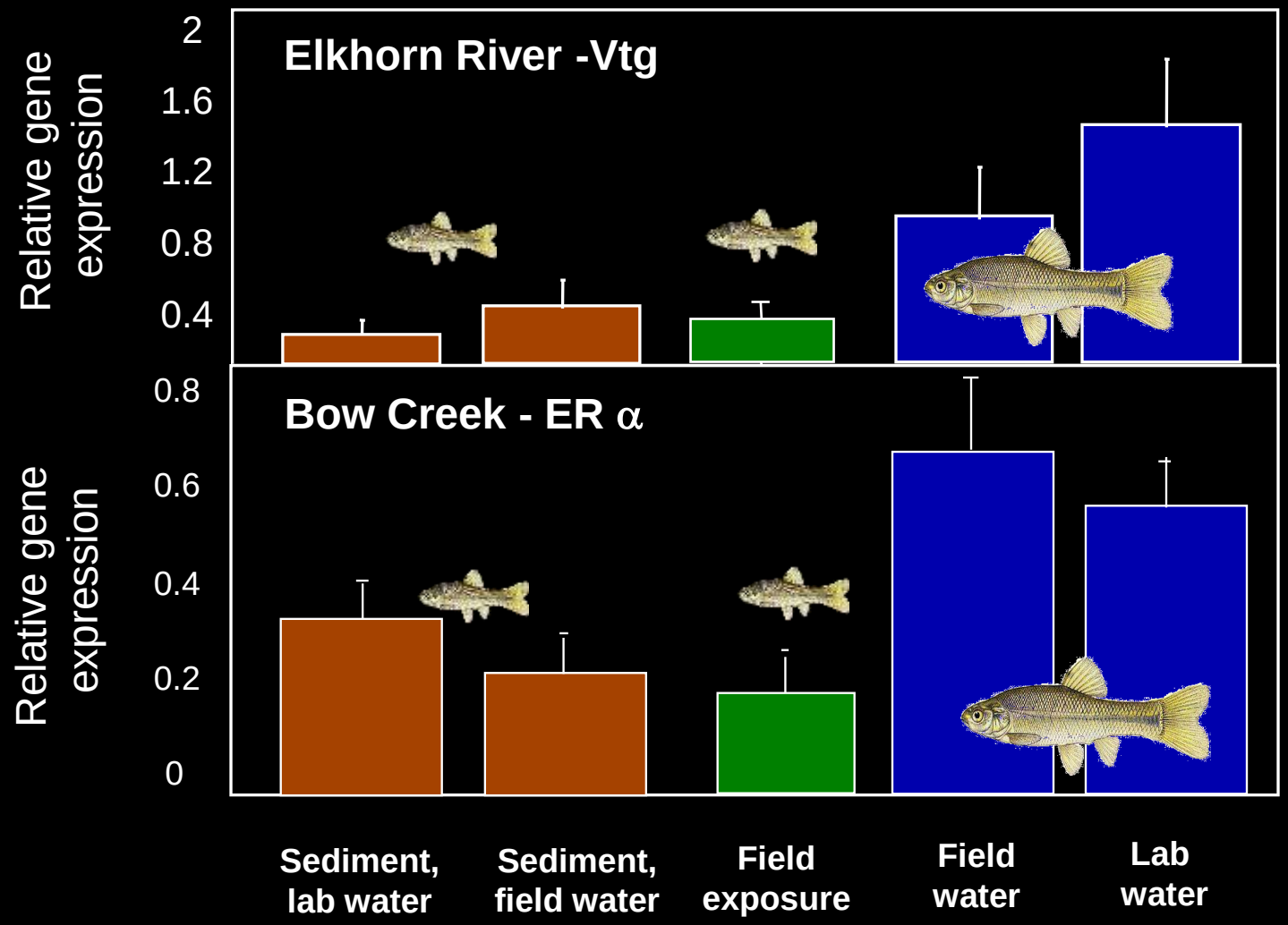
Field

No TBA, Anti-estrogenic effect

No TBA, Estrogenic effect

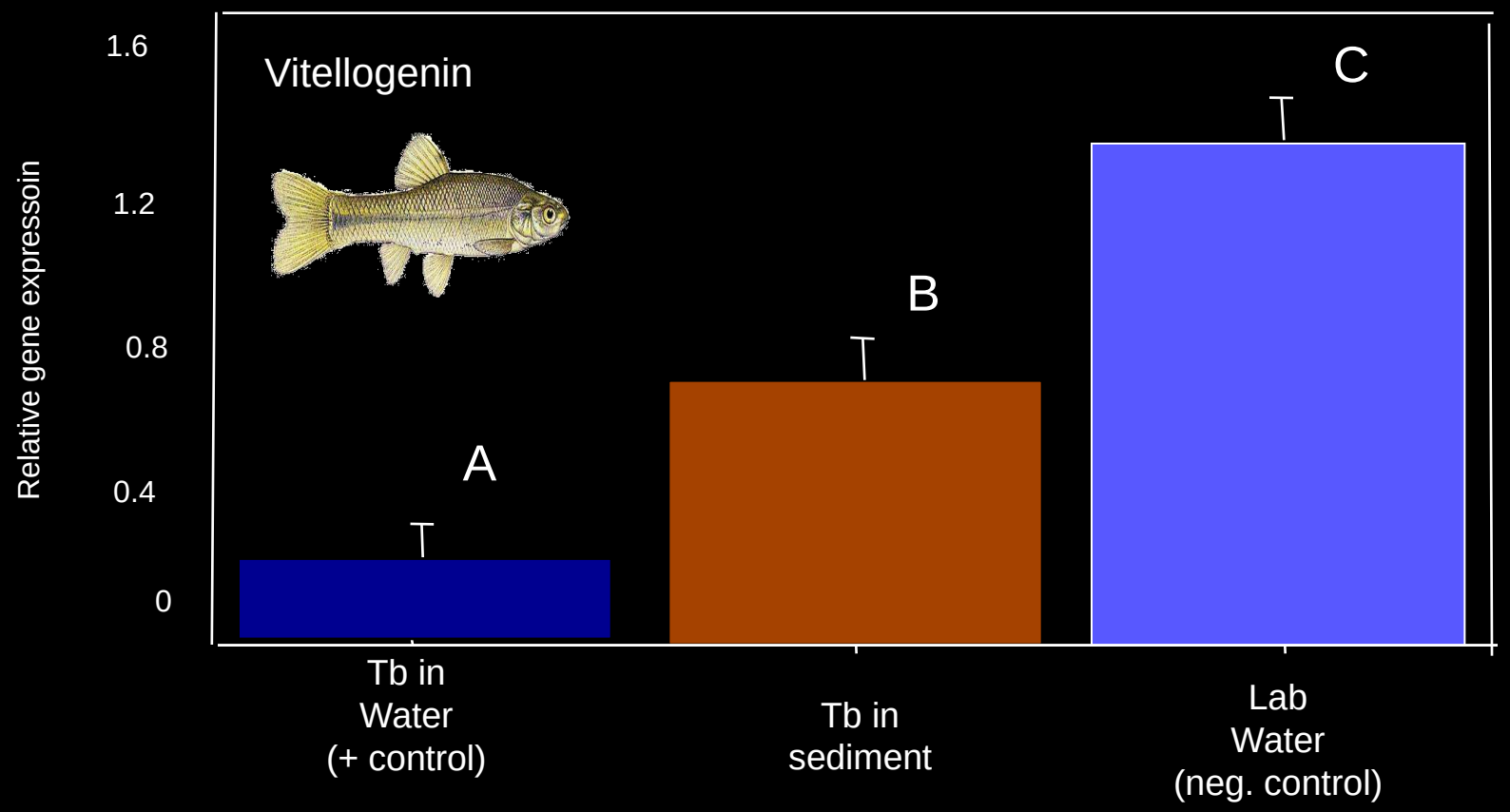

Water
Sediment

Defeminization of female fathead minnows and sediment exposure.



Sellin et al. 2010. Aq Tox 96:103-108.

Is the trenbolone in the sediment ?



Kolok et al. In prep. Env Biol Fish