BIOTECHNOLOGY OF THE FISH AQUACULTURE

L. P. Buchatsky

Institute for Fisheries of Ukrainian Academy of Agrarian Sciences, Kyiv, Ukraine
The latest progress in biotechnology on fish aquaculture and different modern methods of investigations for increasing of fish productivity in aquaculture are analyzed. Except for the applied aspect, the use of modern biotechnological methods of investigations opens new possibilities for fundamental researches of sex-determining mechanisms, polyploidy, distant hybridization, and developmental biology of bony fishes. Review contains examples of utilizing modern biotechnology methods to obtain transgenic fishes with accelerated growth and for designing surrogate fishes. Methods for receiving unisexual shoals of salmon and sturgeon female fishes with the view of obtaining a large quantity of caviar, as well as receiving sterile (triploid) fishes are analyzed. Great attention is given to androgenesis, particularly to disperm one, in connection with the problem of conserving rare and vanishing fish species using only sperm genetic material. Examples how distant hybrids may be obtained with the use of disperm androgenesis and alkylated DNA are given. Methods of obtaining fish primordium germ cells, recent developments in cultivation of fish stem cells and their use in biotechnology, as well as ones of transplantation of oogonium and spermatogonium to obtain surrogate fishes. The examples of successful experiments on spermatogonial xenotransplantation and characteristic of antifreezing fish proteins and also the prospect of their practical usage are given.

**Key words**: fishes, grows acceleration, reproduction, sterilization, androgenesis, stem cells, transplantation, antifreeze proteins.

© Palladin Institute of Biochemistry of National Academy of Sciences of Ukraine, 2008

{spoiler title=References}

[http://dx.doi.org/10.1038/nbt0598-399](http://dx.doi.org/10.1038/nbt0598-399)  
PMid:9592375

[http://dx.doi.org/10.1016/S0044-8486(01)00587-7](http://dx.doi.org/10.1016/S0044-8486(01)00587-7)
   [http://dx.doi.org/10.1126/science.1072104](http://dx.doi.org/10.1126/science.1072104)
   PMid:12142439


   [http://dx.doi.org/10.1038/300611a0](http://dx.doi.org/10.1038/300611a0)
   PMid:6958982

   [http://dx.doi.org/10.1038/nbt0292-176](http://dx.doi.org/10.1038/nbt0292-176)

   [http://dx.doi.org/10.1111/j.1541-4337.2007.00013.x](http://dx.doi.org/10.1111/j.1541-4337.2007.00013.x)

   [http://dx.doi.org/10.1007/s10126-001-0085-3](http://dx.doi.org/10.1007/s10126-001-0085-3)
   PMid:14961274
http://dx.doi.org/10.1095/biolreprod67.4.1087 PMid:12297522

http://dx.doi.org/10.1095/biolreprod.104.034249 PMid:15744027

http://dx.doi.org/10.1016/j.seares.2007.02.003

http://dx.doi.org/10.1002/mrd.20771 PMid:18022822

http://dx.doi.org/10.1007/s10126-006-6034-4 PMid:17089084


15. Devlin R. H., Nagahama Y. Sex determination in fish: an overview of genetic, physiological,
http://dx.doi.org/10.1016/S0044-8486(02)00057-1

http://dx.doi.org/10.1139/f05-048

http://dx.doi.org/10.1139/G08-060

http://dx.doi.org/10.1016/j.theriogenology.2008.08.019


   http://dx.doi.org/10.2331/suisan.46.1317


   http://dx.doi.org/10.1016/j.cbd.2010.05.003

   http://dx.doi.org/10.1016/S0960-9822(02)00723-6


http://dx.doi.org/10.1126/science.1145626


54. Nagasawa K., Shikina S., Takeuchi Y. Lymphocyte antigen 75 (Ly75/CD205) is a surface marker on mitotic germ cells in rainbow trout. *Biol.*
   http://dx.doi.org/10.1073/pnas.0308668101

   http://dx.doi.org/10.1530/jrf.0.1130197

   http://dx.doi.org/10.1073/pnas.89.10.4519

   http://dx.doi.org/10.1126/science.1185473

   http://dx.doi.org/10.1007/s10695-008-9252-z

60. Collares T., Campos V. F., Seixas F. K. Transgene transmission in south american catfish (
Rhamdia quelen larvae by sperm-mediated gene transfer. 
[http://dx.doi.org/10.1007/s12038-010-0006-6](http://dx.doi.org/10.1007/s12038-010-0006-6)

[http://dx.doi.org/10.1007/BF00119294](http://dx.doi.org/10.1007/BF00119294)

[http://dx.doi.org/10.1126/science.1175151](http://dx.doi.org/10.1126/science.1175151)


[http://dx.doi.org/10.1016/S0091-679X(04)76009-4](http://dx.doi.org/10.1016/S0091-679X(04)76009-4)

[http://dx.doi.org/10.1073/pnas.041449398](http://dx.doi.org/10.1073/pnas.041449398)

[http://dx.doi.org/10.1007/s10126-006-6034-4](http://dx.doi.org/10.1007/s10126-006-6034-4)


86. Buchatsky L. P., Starodub N. F. Immune sensor based on surface plasmon resonance for express control of fish retroviral infection. *Proc. of the 2-nd bilateral conf. «Aquatic and marine animal health»*. Shepherdstown
http://dx.doi.org/10.1016/S0006-291X(05)81102-7

http://dx.doi.org/10.1002/(SICI)1097-4652(199608)168:2<305::AID-JCP9>3.0.CO;2-T

http://dx.doi.org/10.1074/jbc.273.36.23098

http://dx.doi.org/10.1073/pnas.93.13.6835

{/spoiler}