

## OBSERVATIONS ON THE MORPHOLOGY OF REPRODUCTIVE SYSTEM IN PIKES (ESOX LUCIUS) DURING A SEXUAL CYCLE

Ioan GROZA, Mihai CENARIU, Simona CIUPE, Al. Raul POP, Eموke PALL,  
Laura PARLAPAN, Lucica GERU

University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca,  
3-5 Calea Manastur, 400372 Cluj-Napoca, Romania, tel. +40264596384, fax +40264593792

Corresponding author email: isgroza@yahoo.com

### Abstract

*In order to check weather Danube river water provides adequate conditions for proper gametogenesis in pike, a full cycle of ovogenesis and spermatogenesis were followed. Pike capture was performed at the beginning of May, end of August, November and April for ovogenesis assessment, as well as in November and April for spermatogenesis study. For external macroscopic investigation fish were examined by inspection, while the internal aspects were studied by dissection. Histological sections of reproductive tract components were performed for microscopic evaluation. Research proved that the external examination of females can somewhat show the stage of the sexual cycle in pike, as their abdomen is slightly dilated in stage III, visibly dilated in stage IV and very dilated in stage V. Microscopically, the presence of two categories of oocytes during an ovogenic cycle proved that pike ovary is of grouped synchronous type, as the large oocytes mature and are eliminated during egg shedding, while the small ones remain for the next cycle. The spermatogenesis process was slow until stage III when it became rapid, spermatocytes being grouped, as zonal cell clusters. Both ovogenesis and spermatogenesis were normal under specific conditions provided by the Danube River.*

**Key words:** gametogenesis, morphology, pike, reproductive system.

### INTRODUCTION

Gametogenesis in pike is a cyclic process, and the interval between the shedding of two egg series represents a sexual cycle (Jalabert, 2005; Symes, 2005; Geru et al., 2012a). The duration of a gametogenic cycle in pike is of almost one year and presents specific features in males as well as in females (Oprea et al., 2011; Geru et al., 2012b). In order to check weather Danube river water provides adequate conditions for proper gametogenesis in pike, a full cycle of ovogenesis and spermatogenesis were followed.

### MATERIALS AND METHOD

Pike capture was performed at the beginning of May, end of August, November and April for ovogenesis assessment as well as November and April for spermatogenesis study. External macroscopic investigation was made by inspection, while the internal aspects were assessed by dissection. Histological sections of reproductive tract components were performed for microscopic evaluation and stained using the Tricrom Goldner

technique and examined using optic microscopy.

### RESULTS AND DISCUSSIONS

The study of ovogenesis in pikes revealed the following aspects: the female individuals captured in May presented stage I and II of ovogenesis, as the reduced diameter of the ovaries was observed macroscopically (Figure 1); microscopically they contained only small sized oocytes (Figure 2).



Figure 1. Small sized ovaries in pike, ovogenesis stage I and II

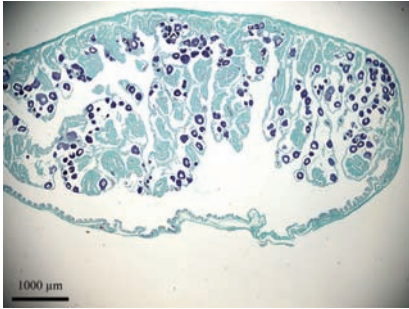


Figure 2. Microscopic view of pike ovary, ovogenesis stage I and II

The female individuals captured in August presented stage III of ovogenesis, when the ovaries occupied the whole abdominal cavity (Figure 3).

The oocytes arranged in nests which contained both small sized oocytes and oocytes which had visibly increased in diameter, therefore, the pike ovary is said to be the group synchronous type (Figure 4). At the end of stage III, the female pikes had a slightly dilated abdomen.



Figure 3. Ovaries in pike, ovogenesis stage III

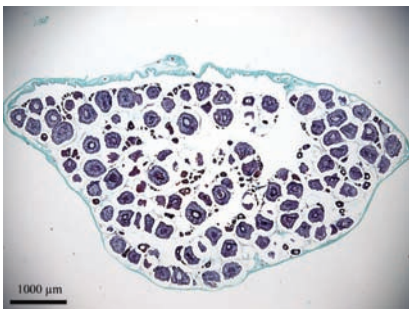


Figure 4. Microscopic view of pike ovary, ovogenesis stage III

The female individuals captured in November presented stage IV of ovogenesis, when the abdomen was visibly dilated (Figure 5 and 6), and the oocytes tended to reach their final dimensions (Figure 7).



Figure 5. Female pike captured in November, dilated abdomen

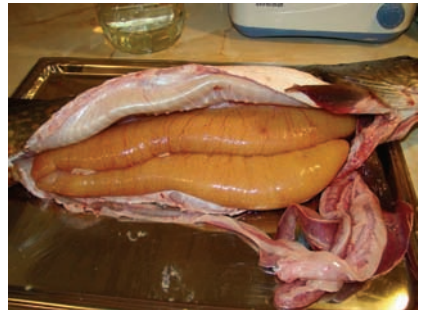


Figure 6. Ovaries in pike, ovogenesis stage IV

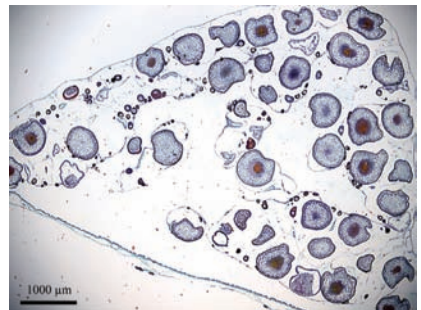


Figure 7. Microscopic view of pike ovary, ovogenesis stage IV

The female individuals captured in April presented stage V of ovogenesis when the abdomen was much dilated (Figure 8), because the ovary had reached its maximum dimensions and was ready for spawning (Figure 9).

Histological sections showed an advanced stage of development and maturation of yolk granules (Figure 10).



Figure 8. Female pike captured in April, much dilated abdomen



Figure 9. Ovaries in pike, ovogenesis stage V

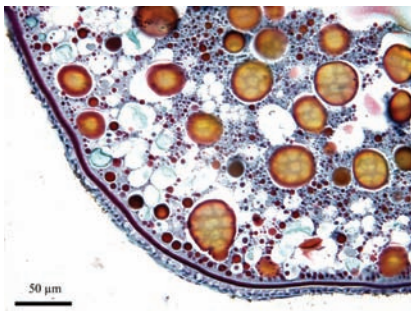


Figure 10. Microscopic view of pike ovary, ovogenesis stage V

Immediately after spawning, the ovaries decrease significantly in weight and change their colour to pinkish-grey or yellowish (Figure 11). Few roe remain in the ovary (Figure 12).



Figure 11. Ovaries in pike, after spawning

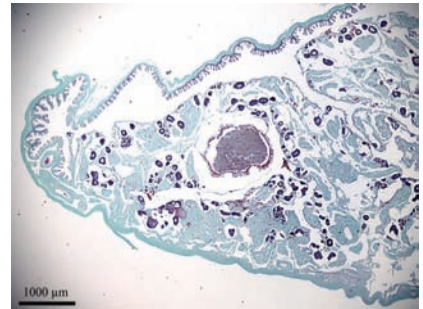


Figure 12. Microscopic view of pike ovary after spawning

The male individuals captured in November presented stage IV of spermatogenesis. Macroscopically, the gonads were well developed, having a whitish-grey or pinkish-grey colour (Figure 13).

Microscopically, an intense spermatogenic activity was observed on the whole surface of the testicle section, spermatocytes being grouped, as zonal cell clusters (Figure 14).



Figure 13. Male gonads in pike, spermatogenesis stage IV

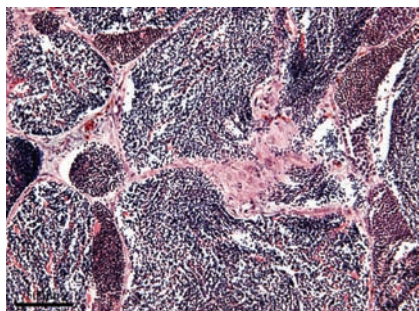


Figure 14. Microscopic view of male gonads in pike, spermatogenesis stage IV

In the male individuals captured in April, the gonads presented a significant reduction in dimension after spawning. Microscopically, the lacunae appeared very polymorph, containing small, medium or large amounts of cells (spermatogonia) (Figure 15).

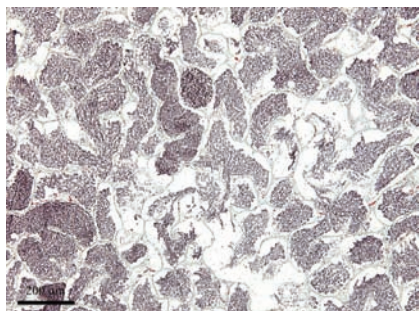


Figure 15. Microscopic view of male gonads in pike, after spawning

## CONCLUSIONS

Research proved that the external examination of females can somewhat show the stage of the sexual cycle in pike, as their abdomen is slightly dilated in stage III, visibly dilated in stage IV and very dilated in stage V.

Microscopically, the presence of two categories of oocytes during an ovogenic cycle proved that pike ovary is of grouped synchronous type, as the large oocytes mature and are eliminated during egg shedding, while the small ones remain for the next cycle.

The spermatogenesis process was slow until stage III when it became rapid, spermatocytes being grouped, as zonal cell clusters.

Both ovogenesis and spermatogenesis were normal under specific conditions provided by the Danube River.

## REFERENCES

- Geru L., Trofimov A., Ruxanda F., Rus V., Radu I., Pop R., Miclăuș V., 2012a. Ovarian morphology of pike (*Esox lucius*) from the Danube river, during the oogenesis cycle. *Annals of RSCB*, XVII, Issue 1, 307-311.
- Geru L., Cocan D., Mireșan V., Miclăuș V., Radu I., Rus V., 2012b. Macroscopic Assessment of Ovogenesis Stages in Pike (*Esox lucius*, Linnaeus 1758) from Romanian Sector of Danube. *Bulletin UASVM Animal Science and Biotechnologies*, 69(1-2), 322-324.
- Jalabert B., 2005. Particularities of reproduction and oogenesis in teleost fish compared to mammals. *Reproduction Nutrition Development*, 45, 261 – 279.
- Oprea D., Marica N., Costache M., 2011. Contributions to Knowledge of Embryonic Development of Pike (*Esox lucius*) under Artificial Conditions. *Bulletin of UASVM, Animal Science and Biotechnologies*, 68 (1-2), 238-244.
- Symes D., 2005. *Altering Course: Future Directions for Europe's Fisheries Policy*. *Fisheries Research*, 71, 259-265.