

14th International Symposium on the Biology and Management of Coregonid Fishes

WebCoregonid2020

0



Oral presentation
Session: **Biology, ecology & population dynamics**

Organised by University of Jyväskylä, Finland

Sponsored by:



Federation of Finnish
Learned Societies



The fate of the yolk syncytial layer during postembryonic development of *Stenodus leucichthys nelma*

E. Kondakova^{1,2}, V. Bogdanova¹



¹Federal State Scientific Establishment “Berg State Research Institute on Lake and River Fisheries” (GosNIORH), St. Petersburg branch of VNIRO, Russian federal Research Institute of Fisheries and Oceanography



²Saint-Petersburg State University



The yolk syncytial layer of Teleostei

- Formation finishes at the blastula stage
- Functions:
 1. Morphogenetic
 - a) The YSL region at prospective dorsal side is a functional equivalent of the Nieuwkoop center
 - b) Participation in epiboly
 - c) Induction and patterning of endoderm and ventrolateral mesoderm
 - d) The YSL serves as a scaffold for cell migration and synthesizes the products necessary for this process.
 2. Nutritional
 3. Immune
- As a temporary structure the YSL becomes a component of yolk sac.



Our goal was the description of postembryonic development of inconnu and fate of the YSL from hatching to the fully active feeding



Methods

The material was obtained from a fish farm located on Sukhodolskoye lake in Leningrad region. Embryos and larvae were fixed with Bouin liquid. The material was dehydrated and embedded into Paraplast according to the standard schemes. The serial paraffin cuts 6 μm thick were stained with Carazzi's hematoxylin and eosin. We also used the collection of slides made for our previous study (Kondakova et al., 2017)

The yolk complex of inconnu at hatching

6

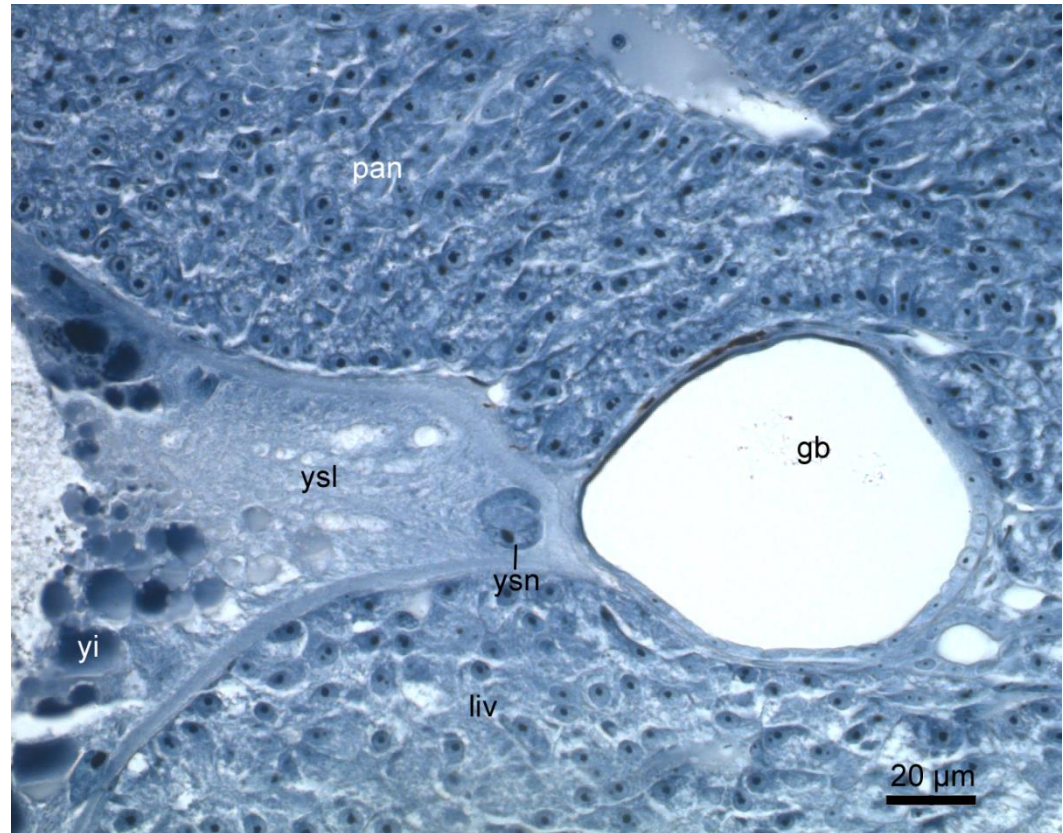


Parasagittal section. Carazzi's hematoxylin and eosin. By hatching, large oil globule occupied the anterior region of yolk complex. Additional OG can be present within yolk mass. The YSL cytoplasm around the OG looked striated. The YSL partially separated the OG from the yolk. The YSL region surrounding yolk was regionalized in apico-basal direction

es – esophagus, h – heart, g – gut, liv – liver, og – oil globule, pan – pancreas, y – yolk, ysl – yolk syncytial layer, ysn – yolk syncytial nucleus



The YSL of inconnu. The posterior region



11 dph. Parasagittal sections. Heidenhain's iron hematoxylin stain. Apicobasal regionalization is evident.

gb – gall bladder, liv – liver, pan – pancreas, yi – yolk inclusion, ysl – yolk syncytial layer, ysn – yolk syncytial nucleus



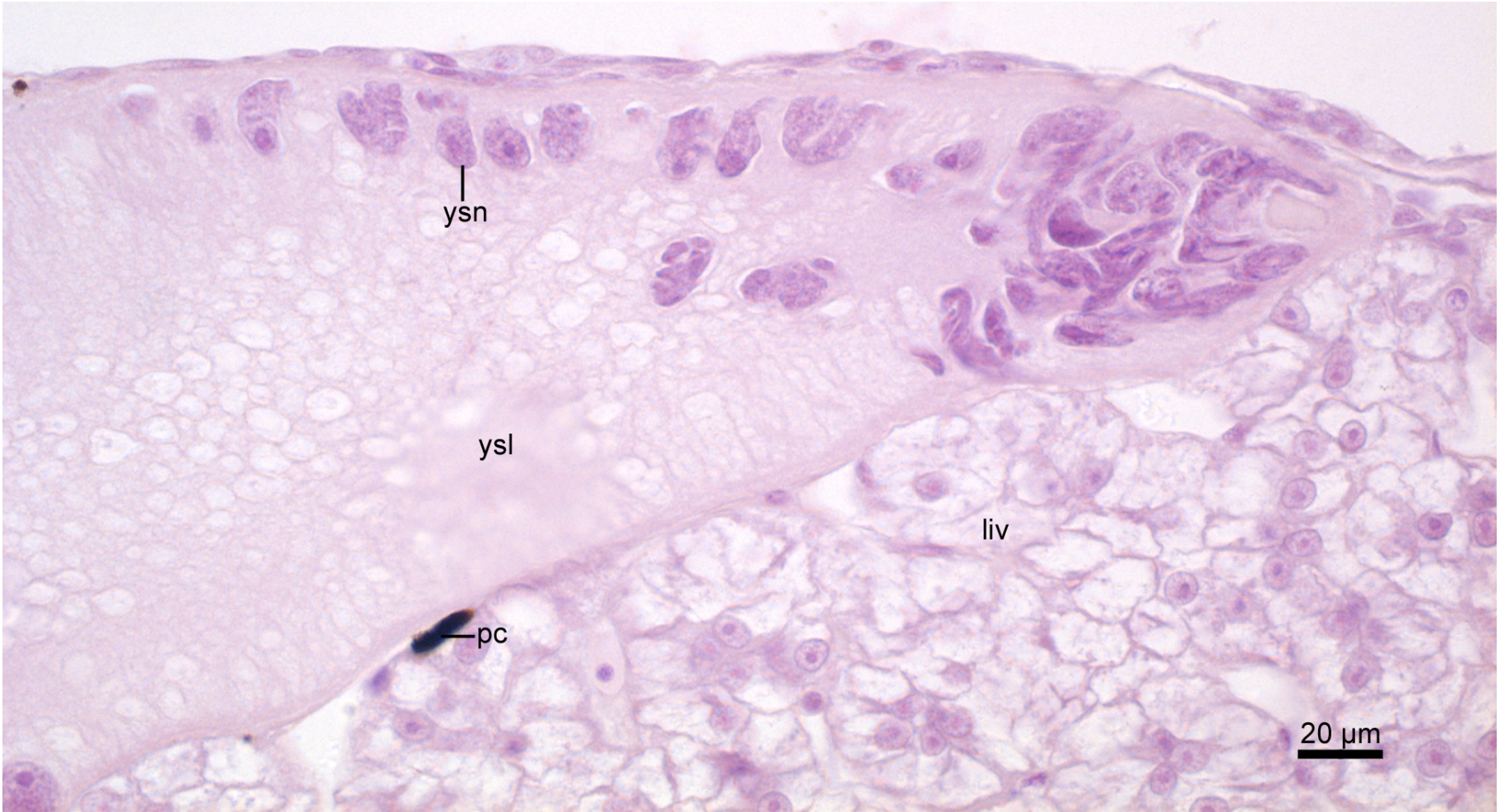
Anterior YSL region of inconnu during mixed feeding



6 dph. Parasagittal section. Carazzi's hematoxylin and eosin. Striated YSL cytoplasm around the OG and the large YSN of diverse sizes and shapes compared to blood cells.

og – oil globule, ysl – yolk syncytial layer, ysn – yolk syncytial nucleus, pc – pigment cell

The YSL of inconnu after yolk depletion

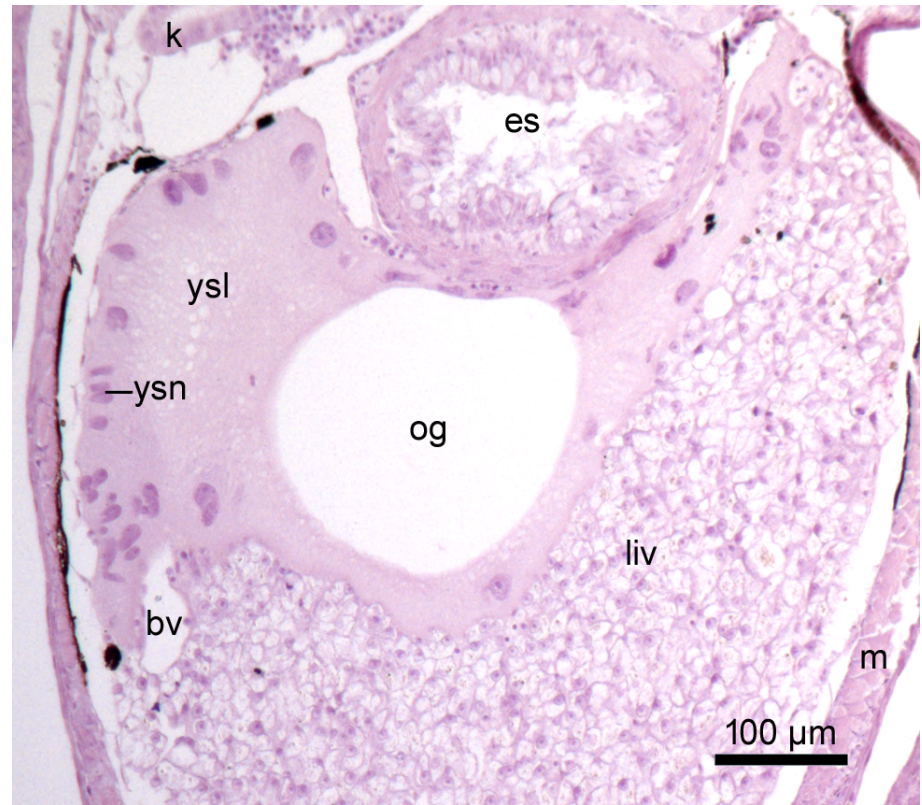


24 dph. Parasagittal section. Carazzi's hematoxylin and erythrosine. YSN of diverse sizes and shapes in the posterior tip of the YSL.

liv – liver, ysl – yolk syncytial layer, ysn – yolk syncytial nucleus, pc – pigment cell



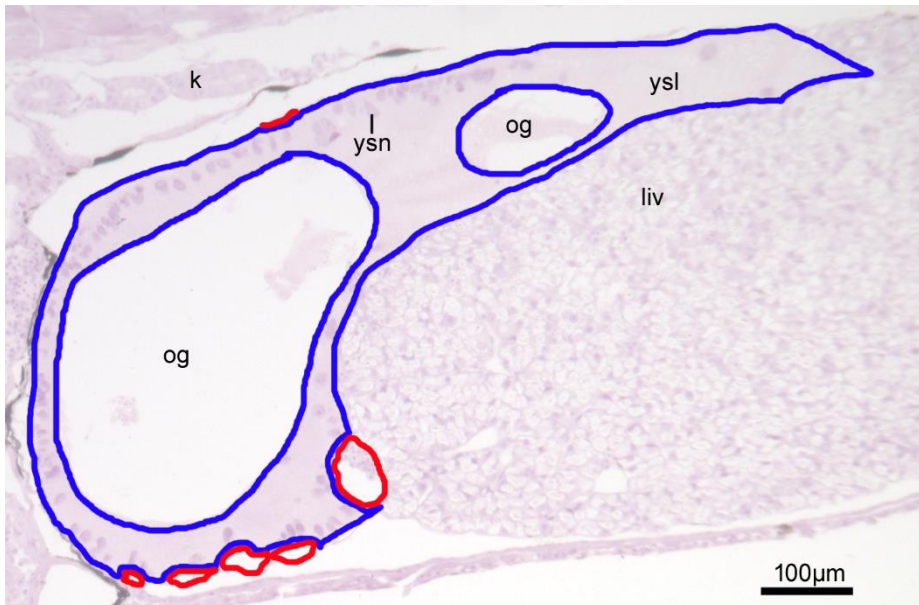
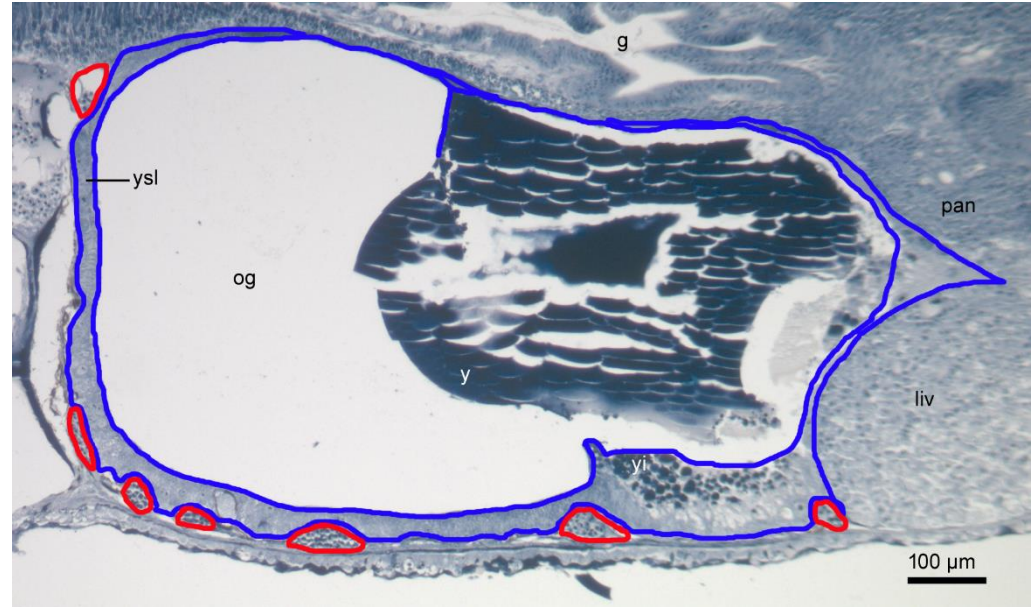
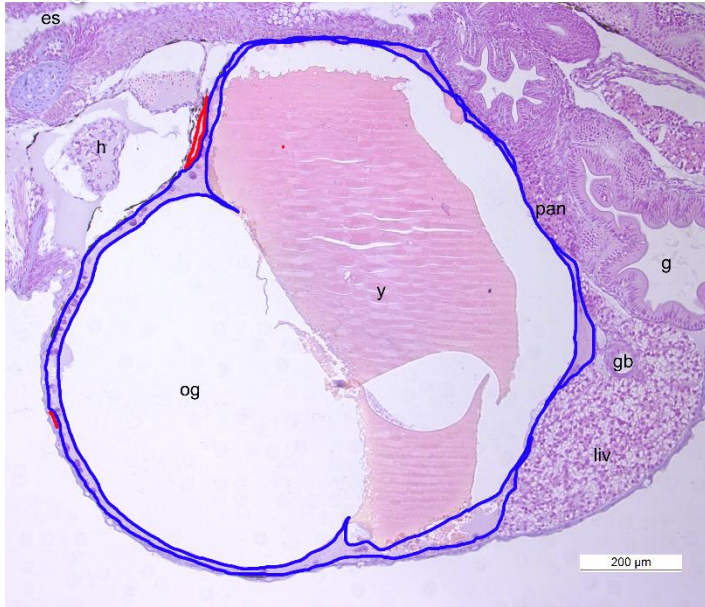
The YSL of inconnu after yolk depletion



24 dph. Transverse sections. Carazzi's hematoxylin and erythrosine. bv – blood vessel; es – esophagus, k – kidney, liv – liver, m – muscles, og – oil globule, ysn – yolk syncytial nucleus, ysl – yolk syncytial layer; pc – pigment cells (melanophores)



The yolk complex of inconnu at sequential developmental stages 11



At hatching the yolk complex is pear-shaped. Its anterior region becomes rectangular. As the yolk becomes depleted, the posterior region locates above the liver.

es – esophagus, h – heart, g – gut, liv – liver, og – oil globule, pan – pancreas, y – yolk, ysl – yolk syncytial layer, ysn – yolk syncytial nucleus. The contour of the YSL is shown with blue lines. The contours of blood vessels are shown with red lines.



Summary

1. The YSL of postembryonic inconnu had complex differentiated structure typical for Coregonidae. Structural and functional regionalization is a common feature of the teleost YSL.
2. The specific feature of the YSL of inconnu was abundance of comet-shaped YSN.
3. The yolk mass disappeared by approximately 17th dph.
4. The OG remained until the programmed death of the YSL at 32 dph.
5. At hatching the digestive tract of inconnu was differentiated, however, the larvae became independent from maternal nutritional resources approximately at 30 dph.

Acknowledgments

We thank the resource research centers “Centre for Molecular and Cell technologies” and “ Chromas ” of Saint Petersburg State University

This work was supported by Project KS 4058 cross-border innovations in arctic aquaculture – ARCTAQUA



Thank you for your attention!

