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OBSERVATIONS REGARDING THE EMBRYONARY AND LARVAL DEVELOPMENT OF STERLET (ACIPENSER RUTHENUS)

OBSERVAŢII PRIVIND DEZVOLTAREA EMBRIONARĂ ŞI LARVARĂ A CEGĂI (ACIPENSER RUTHENUS)

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Studying and presenting the embryo stages of sterlet has the main purpose of widening the knowledge horizon in this direction. Although all sterlet embryos originated from one female and from the same incubator (15°C, 9.6 mg/l of dissolved oxygen and a water flow of 2.7 l/min), they are in different stages of development at a certain time. Because the asynchronous development of embryos from one incubator is maintained throughout the incubation period, it is explained why not all embryos hatch at the same time. The first hatchings appear at the age of 145 hours from fecundation, the larvae have a very large yolk sack and are moving very fast, especially in obliquely upward direction. At one hour from hatching, the larvae presents clear opercularly movements. The last hatching occurs 193 hours from fecundation. The larval stage for Acipenser ruthenus lasts for 7-8 days, probably the larvae that hatched sooner have also a quicker absorption of yolk sack.

Keywords: sterlet, embryo, larvae, development

Introduction

In the speciality literature, there are references regarding the embryo and larval development of the Russian sturgeon (*Acipenser guldenstaedti*) (Dettlaff et al., 1993), where it is mentioned that these developmental stages are similar among all sturgeons (Patriche, 2001).

Materials and Methods

Our observations were made in the aquaculture laboratory from Wollershof fish institute from Germany in the moment of sterlet reproduction in March 2005 and again in April 2006 in the same conditions.

From one incubation jar containing embryonated eggs from a single female, sampling was made at regular time intervals, and the eggs were examined at the microscope.

These sampling were photographed with an Olympus digital camera. For a better observation, some eggs were dechorionated using small tweezers and needles.

The developmental embryo and larval stages of sterlet were recorded comparing the data with those of Dettlaff et al. (1993), made on the russian sturgeon.

The eggs were incubated at constant conditions throughout the essay at a temperature of 15°C, 9.6 mg/l D.O. and a water flow-rate of 2.7l/min.

Results and Discussion

First observations on sterlet embryonated eggs were made at the age of 34 hours post fecundation. At this stage was noticed that although all embryos originated from the same female and same incubation jar, they are at a certain time in different developmental stages. (**photo 1**). We recorded this characteristic throughout our observations, explaining why there is not a mass hatching in sterlets at a certain time.

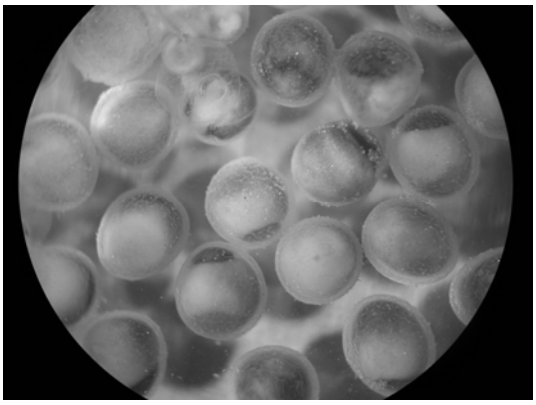
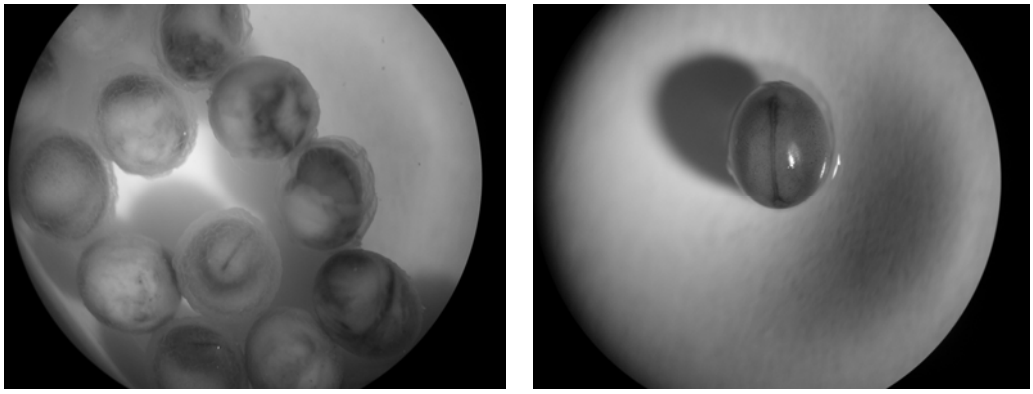


Photo 1. *Acipenser ruthenus* embryos at the age of 34 hours post fecundation. Different development stages

Therefore, at the age of 34 hours post fecundation, there are embryos in the stage of gastrulation initiation, when at equatorial level it is observed a pigmentation stripe of the embryo. Other embryos are in a more advanced gastrula stage (early gastrula), when some cells evaginate above the dorsal blastopor's "lip". Other embryos that has reached the middle gastrula stage, the embryo cells (animal material) cover 2/3 of the whole embryo. At the same age are observed embryos (the majority) in the stage where the cork of vegetal cells is emphasised in the shape of a dark disk, large or small (more advanced).

The next records were made at the age of 51 hours post fecundation, when again different developmental stages were noticed. (**photo 2,a**). Most of the

embryos are in an early stage of neurulation, when neural folds begin to appear around the head area. Also, the large neural plates are clearly visible. At this age, at a dechorionated embryo, the appearance of neural tube is noticeable (**photo 2,b**).



a) b)

Foto 2. *Acipenser ruthenus* embryos at the age of 51 hours post fecundation. a)Different development stages; b) Dechorionated embryo with clear neural tube

A little later, after 55 hours since fecundation, the neural cells are very close (**photo 3**) and rudiments of excretory system appear (Dettlaff et al., 1993). At this age at most of the sterlets embryos is the final stage of neurulation, stage which is followed by the development of excretory system.

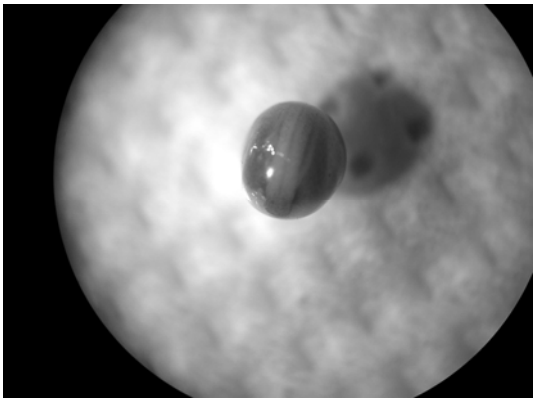


Photo 3. *Acipenser ruthenus*. Dechorionated embryo at the age of 55 hours post fecundation.

76 hours after fecundation is the moment when we identified the appearance of eye protuberances (**photo 4**). Also at this stage we noticed the swelling of anterior end of excretory apparatus, as described by Patriche (2001).

This is the stage when the cardiac muscle is starting to be formed as a long muscle. The embryo starts to have a distinctive shape. The tale has a rounded shape, being separated of the vitellus that has a yellow colour.

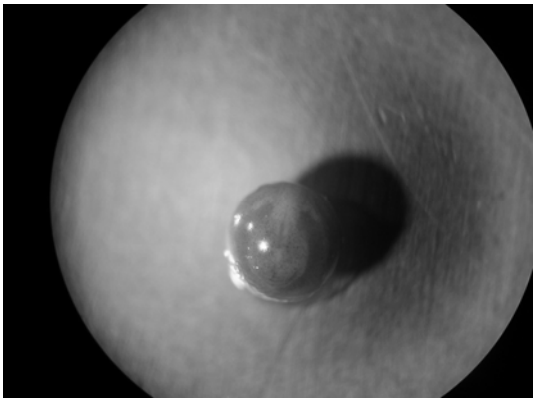


Photo 4. *Acipenser ruthenus* dechorionated embryo, at the age of 76 hours post fecundation

At 107 hours post fecundation, the embryo has an elongated shape, grey coloured that contrasts with the yolk yellowish colour (**photo 5**). The heart is presented as a elongated tube, which is beating to some embryos of this age. At the embryos that already have a heart activity, the whole body is responding to stimuli by moving in serpent way.

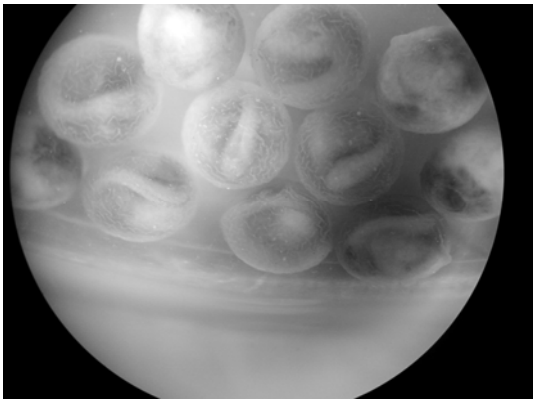
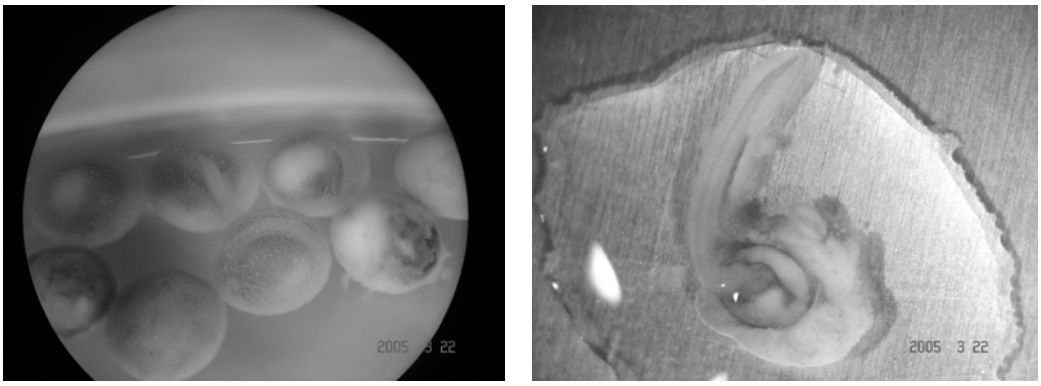


Photo 5. *Acipenser ruthenus* embryos at the age of 107 hours

The age of 126 hours after fecundation is when most of the studied sterlet embryos are moving inside the chorion without being mechanically stimulated. They present rhythmic uncontrolled movements.

The movement frequency is increasing by the age. The tip of the tale is reaching the heart level and the embryo is more robust.



a) b)

Photo 6. *Acipenser ruthenus* embryos at the age of 126 hours post fecundation. a)Most of embryos are moving without external stimulation; b) Dechorionated embryo with digestive tube

At this age, on an dechorionated embryo (**photo 6,b**) the formation of digestive tract is visible as a chord on the ventral side of the abdomen. The yolk sack is still large, and the tip of the embryo's head is not passing it. The embryo's movements are accentuated, and the dechorionated embryo is capable of moving in circle in the observation dish's liquid.

After 145 hours since fecundation, (**photo 6**), the larvae start to hatch, swimming very fast. The swimming movements are mostly oblique upward, crowding in the illuminated corners of the tanks.

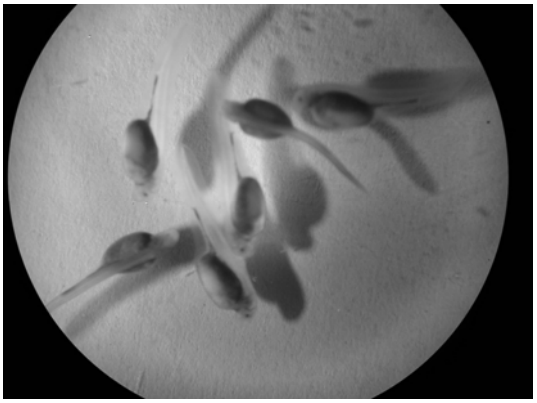


Photo 7. *Acipenser ruthenus* larvae at the age of 145 hours from fecundation and immediately after hatching

At the age of 1 hour post hatch, or 146 hours post fecundation, the hatched larvae have a well defined head, slightly opened opercula and some of them have opercular movements. The heart is beating rhythmically, in harmony. The last larvae hatch at 193 hours after fecundation, thus the hatching is a long process in the sterlet population.

The larvae stage at sterlet, *Acipenser ruthenus*, is lasting until the moment of full yolk sack resorbtion and the sterlet is staring to feed actively, exogenous. The duration of full yolk sack resorbtion is between 7 and 8 days. Probably, the larvae that have hatched early have an earlier resorbtion of the yolk sack.

Conclusions

Although, all studied embryos originated from the same female per lot (different females in the 2 years of observations), and the embryos were incubated at the exactly the same conditions, they are developing different.

Because asynchronous embryo population development from one incubation jar is maintained throughout the incubation process, it is explained why the hatching is not occurring in mass in the same time.

At 34 hours post fecundation, the embryos are already in different developmental stages.

At the age of 51 and 55 hours, the neurula stage is installed.

The eye protuberances appear at the age of 76 hours, together with a heart rudiment and excretory organs. The tip of the tale is round-shaped.

At the age of 107 hours, most of the embryos, have a specific fish shape, and some move at external stimuli.

At the age of 126 hours, all embryos are moving inside the chorion, without external stimulation and the heart is beating with regularity.

First hatching occurs at 145 hours post fecundation.

The hatching is a long process in the population, between the age of 145 and 193 hours since fecundation.

The larvae stage is 7 to 8 days long, probably the larvae that has hatched the first are passing the first from the larvae stage.

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