
(Rutilus frisii kutum)

*

(/ / : / / :)

Rutilus frisii kutum

- C° () () ()

...

(Depêche; and Billard, 1994;
Iwamatsu, 2004)

()

(Razavi)
.sayad, 1994

(Razavi sayad, 1994; Nikoo, 2004;
.Rasouli, 2004)

()
.(%)

—
(Musavi, 2005)

—
(Razavi sayad, 1994)

(Razavi sayad, 1994)

Orizias

(Iwamatsu,T., 2004)

latipes

.()
)

.((-)
(X) %

.()

% - %)
(% - %)

.()
/ -

.(Posti, 1990)

(C°)

-
)
(X

/ -
% -

.()()
/ -

:

) (% -)

.(()

:

().

...

)
Kageyama (1987)

(
()).

:

:

()

()

()

:

()

-

()

)

(

()

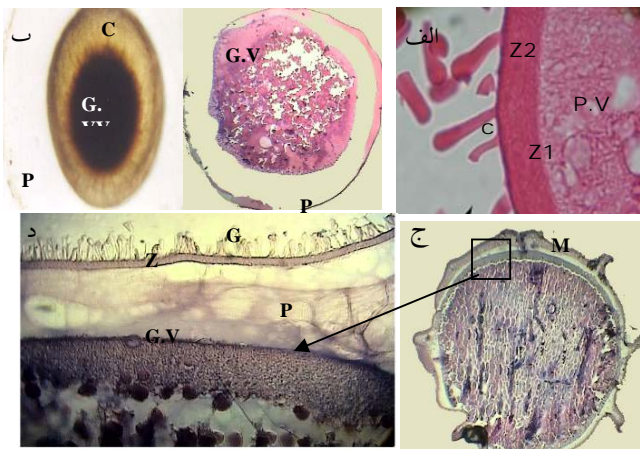
-

()

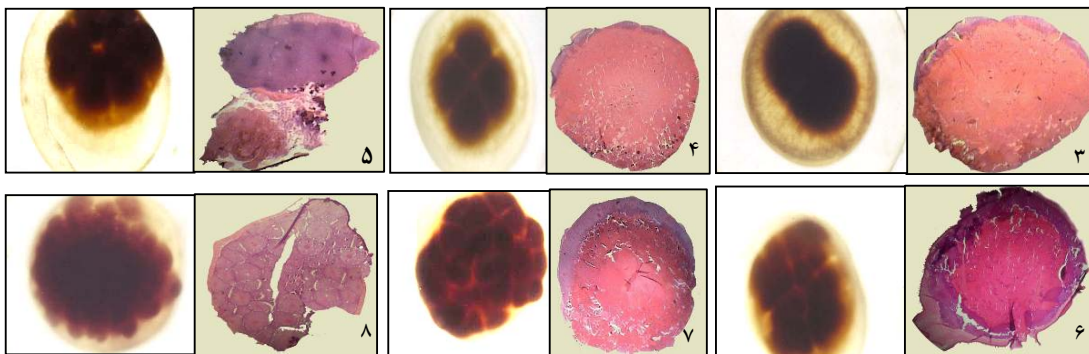
- :



O2 : . . :T :G :O1 *Rutilus frissi kutum* :O5 :O4 (X)



Rutilus frissi kutum
:G :Z2 :Z1 :P.V : (X)
: (x) :G (X) :Z :P :M :G.V



تصویر ۳- مراحل ۳ تا ۸ به ترتیب تصاویر بافت شناسی و شفاف سازی تقسیمات اول تا ششم تا مرحله مرولای اولیه را در جنین ماهی سفید نشان می دهد (۱۰X)

...



()

()

)

(

)

()

(

()

()

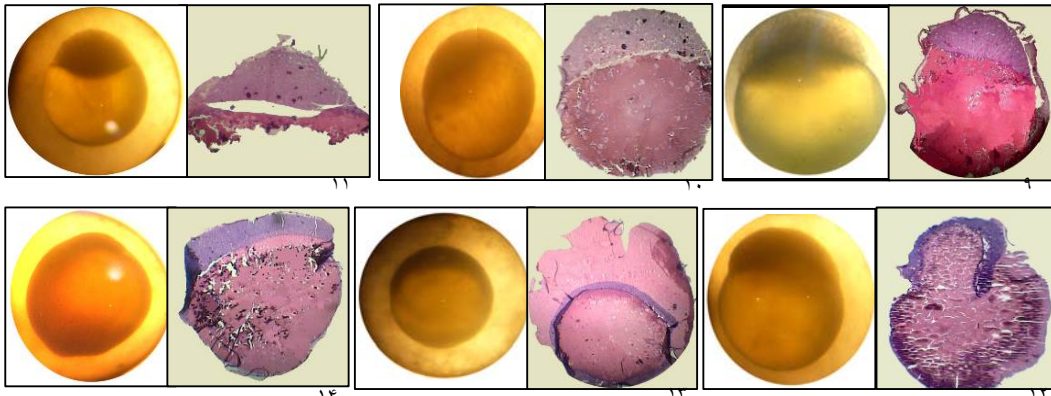
()

()

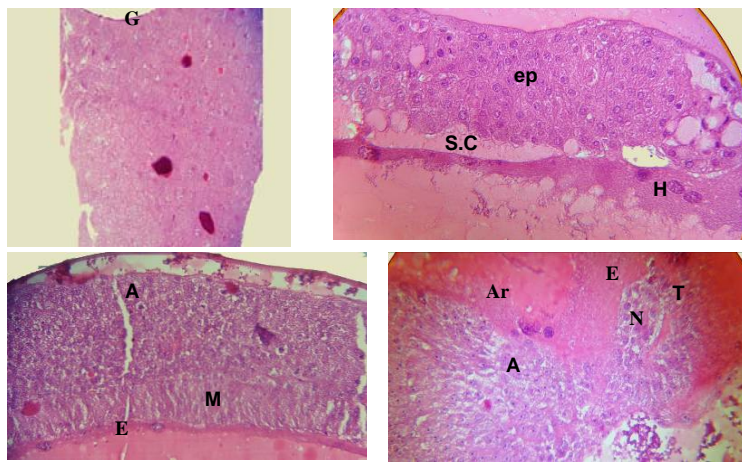
i

()

()

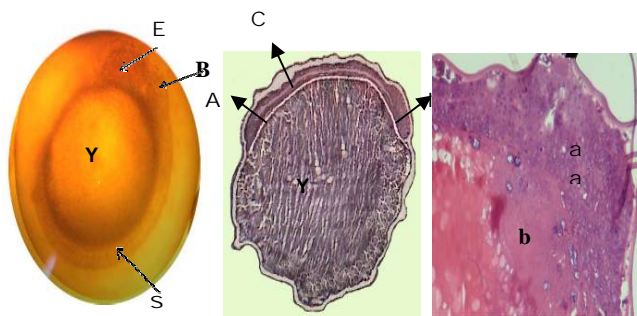


(x) *Rutilus frissi kutum*



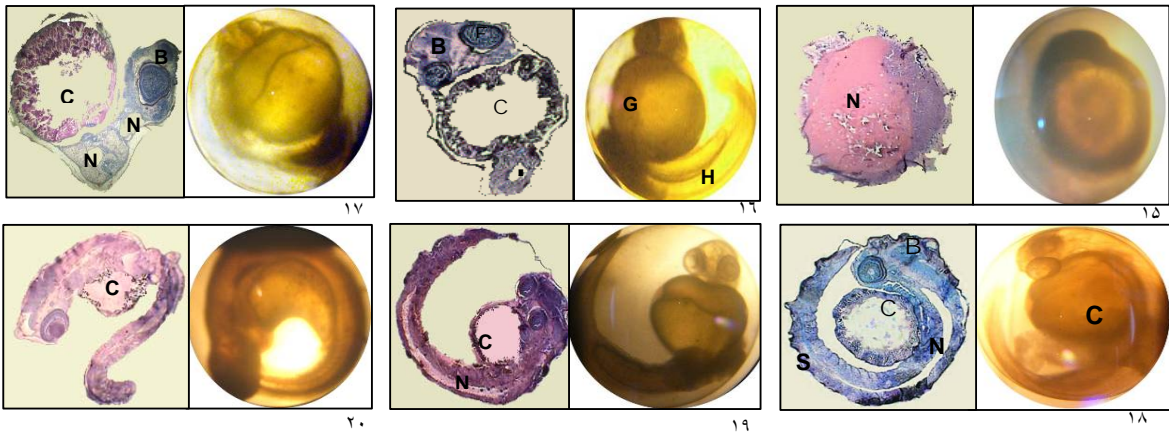
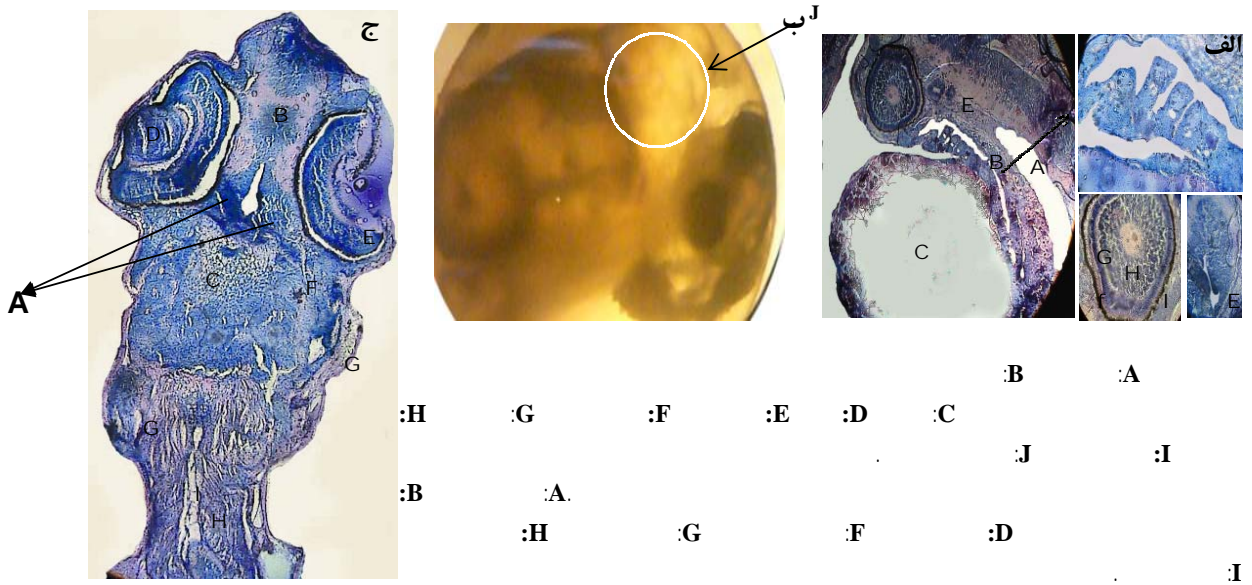
:e :H :M :E () :B :Ar :A :S.C :N :T

Rutilus frissi kutum



:H :E :C :B :b a (X) S

Rutilus frissi kutum



: *Rutilus frissi kutum*

)

)

:

(

:(

()

:

()

()

(Vosoughi, 2003)

Rutilus frisii kutum

(Nicoo, 2004)

;
(Monaco and Doroshove, 1983)

(Razavi sayad, 1994)

(Moosavi,
.2005)

(Armstrong, 1965., Depêche and Billard,
.1994; Gharavi, 1997)

(Depeche
and Billard., 1994)

(1994) Billard Depêche

Razavi sayad (1994)

/ _
% _

(Razavi sayad, 1994)

Iwamatsu (2004)

:

...

(Malek nejad, 1995)

(Iwamatsu, 2004)

(Depêche and Billard, 1994)

(Iwamatsu 1976;

Iwamatsu, 2004)

(Depeche and

(_) Billard, 1994)

:

Yokoya

(1966)

Kageyama (1987)

Rutilus frisii kutum

kamensky

()

(Depêche and Billard, 1994; Yamamoto, 1975;
(Hiraki and Iwamatsu, 1979; Iwamatsu, 2004
Ginsburg Dettlaff (1953)

References

- Armstrong, P.B., Child, J.S., 1965. Stages in the normal development of *Fundulus heteroclitus*. Biological Bulletin 128, 143-168.
- Depêche, J. and Billard, R., 1994. Embryology in fish: A review. Part III and IV, 21-46. *Société Française d'Ichtyologie* press. 123 pp.
- Dettlaff, T. A. and Ginsburg, A. S., 1953. Sturgeon fishes. Schmalhause I. O (eds). Springer, verlag publishing company.
- Gharavi, B. 1997. The study on embryogenesis of *Cyprinus carpio*. Ph.D. Thesis, Faculty of Veterinary. University of Tehran (In Persian).
- Hiraki, M., Iwamatsu, T., 1979. Histological observations on developmental process of the medaka eggs. Bulletin Aichi University. Education 28(Natural science), 73-78.
- Iwamatsu, T., 1976. The medaka as a biological material. III. Observations of developmental process. Bull. Bulletin Aichi University. Education 25(Natural Science), 67-89.
- Iwamatsu, T., 2004. Stages of normal development in the medaka *Orizias latipes*. Mechanism of development 121, 605-618.
- Kageyama, T., 1987. Mitotic behavior and pseudopodial activity of cells in the embryo of *Oryzias latipes* during blastula and gastrula stages. Journal Experimental Zoology 244, 243-252.
- Malek nejad, M., 1995. Embryology of vertebrate. Jihad University Press, Gilan (In Persian).
- Monaco, G. and Doroshove, S.I., 1983. Mechanical de-adhesion and incubation of White Sturgeon eggs in jar incubators. Aquaculture 35, 117-123.
- Musavi, S. Hadi, 2005. A report on the propagation and rearing of mahi sefid (*Rutilus frisii Kutum*). Shahid Rejaee fish propagation and rearing complex publication. 11-14pp (In Persian).
- Nikoo, M., 2004. Study some physiological differences in matured and maturing Female Broodstocks of southern Caspian kutum *Rutilus frisii kutum* kamensky. MSc. Thesis. University of Tehran pp.61 (In Persian).
- Posti, I., 1990. Comparative histology and histotechnic. University Press Tehran. 265pp (in Persian).
- Rasouli, H. R., 2004. Study on differences between hour- degree ontogeny of Caspian kutum in the early, mid and end of spawning season . 49 pp (In Persian).
- Razavi sayad, B., 1994. Book of Caspian kutum *Rutilus frisii kutum* kamensky. Jihad University Press, Guilan. 167pp (in Persian).
- Vosoughi, Gh and Mostajir, B., 2003. Freshwater fish. University Press, Tehran. Fifth edition, 376pp (in Persian).
- Yamamoto, T., 1975. Stages in development. In Yamamoto T. T., (Ed.), Medaka (killifish): Biology and strains, Keigakua publication company., Tokyo, pp. 30-58.
- Yokoya, S., 1966. Cell dissociation and segregation in early stage embryo of the teleost, *Oryzias latipes*. Science Reproduction Tohoku University 32, 229-236.

Histological and Morphological study of Caspian kutum eggs and embryo developmental stages (*Rutilus frissi kutum kamensky, 1901*)

M. Mardaneh Khatooni¹, B. Mojazi Amiri¹, M. Ghelichpour² and S. H. Moosavi³

¹Department of Fisheries and Environmental Sciences, Faculty of Natural Resources, University of Tehran, I.R. Iran

²Department of Fisheries, Faculty of Natural Resources, Golestan University, I.R. Iran

³Shahid Rajaei Fish Propagation and Culture Center, Sari, I.R. Iran

(Received: 03/07/2010 , Accepted: 07/03/2011)

Abstract

In fish propagation and aquaculture industry, egg incubation period up to hatching is the most critical time. There is scarce information about events happening during this period for Caspian Kutum, which is a very economically important endemic fish in the Caspian Sea. Morphological and histological developmental changes of Caspian kutum eggs and embryo up to hatching were investigated. Developing eggs from incubator was cleared through the exposure of Acetic acid (1-2%) to study the morphological and histological observation for tissue changes. Early results have shown the cells divisions, archenteron formation and Gaustrolation in second day which result in formation of 3 germinal layers including ectoderm, mesoderm and endoderm. Histological and morphological studies followed blastoderm extending or epibolic expansions which result in notochord and neural plate formation. After that organization started along with neural formation stage and continued till hatching time.

Consequently, according to our results, two stages before fertilization and 19 stages after that has been distinguished. Eggs were eyed in fifth day after fertilization and larvae hatched finally as usual in seventh days in 18C.

Keywords: Caspian Kutum (*Rutilus frissi kutum*), Embryology, Development, Fertilized eggs.