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HISTOLOGICAL DIFFERENTIATION IN THE DIGESTIVE SYSTEM AND BRANCHIAL ARCHES OF THE LIVE-BEARING TELEOST , POECILIA SPHENOPS

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Abstract and Figures

The development of digestive and branchial systems have been studied in viviparous black molly ,Poecilia sphenops, during embryonic stages and at newly born youngs .The pharynx originates as incomplete circle , or tongue likewise structure , with some mucous cells line its mucous , and some taste buds. The liver started as two segment s ,whereas the spleen bud was triangular structure The liver started as two segment s ,whereas the spleen bud was triangular structure in midst of them .The intestine started as closed tube ,where the pancreatic islets beside. Gradually, there were intestine folds and looping , with pancreatic-livery duct flows in small intestine .Then the pharynx connected with intestine by developed esophagus .It is apparent that the morphogenesis of the rostral digestive tract starts before hind gut formation. Three primordial gill arches shown at early stages of developing embryo, before the operculum opening. The gill filaments start to form as short gill rakers .Meanwhile, the kidney tubules being more developed. With birth of youngs, there was completely open lumen for intestine and more differentiated digestive organs. The fourth gill arch still as bud structure, but the gills seem to perform their functions in respiration or water / ion balance, as they continue their development.

Start of pharynx, with mucus cell... The pharynx (P) approaches to... Liver (L), pancreatic islets... Differentiated hepatocytes wit... Folds lack in some portions... +1

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HISTOLOGICAL DIFFERENTIATION IN THE DIGESTIVE SYSTEM AND BRANCHIAL ARCHES OF THE LIVE- BEARING TELEOST , *POECILIA SPHENOPS*

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Abstract

The development of digestive and branchial systems have been studied in viviparous black molly ,Poeci sphenops, during embryonic stages and at newly born youngs .The pharynx originates as incomplete circle , or tong likewise structure , with some mucous cells line its mucous , and some taste buds. The liver started as two segmen ,whereas the spleen bud was triangular structure The liver started as two segment s ,whereas the spleen bud v triangular structure in midst of them .The intestine started as closed tube ,where the pancreatic islets beside. Gradual there were intestine folds and looping , with pancreatic-livery duct flows in small intestine .Then the pharynx connect with intestine by developed esophagus .It is apparent that the morphogenesis of the rostral digestive tract starts bef hind gut formation. Three primordial gill arches shown at early stages of developing embryo, before the operculu opening. The gill filaments start to form as short gill rakers .Meanwhile, the kidney tubules being more developed. W birth of youngs, there was completely open lumen for intestine and more differentiated digestive organs. The fourth g arch still as bud structure, but the gills seem to perform their functions in respiration or water / ion balance, as th continue their development.

Key words: P.sphenops, embryo, digestive system, branchial system.

Introduction

Black molly Poecilia sphenops is one of live bearer fishes which hold the developing embryo within a bo structure until the post larval or really juvenile stage is attained.

In viviparous fish Gambusia affinis , where there is mother- to- embryo transfer of nutrients , the individu provisioning of embryos was not related to developmental stage but was related to embryo mass (Marsh-Matthews al . ,2005). It was observed that the reproductive mode in scorpaenid fish Sebastes mlanops involved longer retention embryos until after organogenesis and functional differentiation of the gut , facilitating this rather primitive form embryonic nutrition (Boehlert and Yoklavish , 1984) .The embryos of blenny Zoarces viviparus are able to assimil analine from ambient micromolar solutions (Korsgaard , 1992) .It was demonstrated that a large endogenous supply nutrients enables the definite adult phenotype to develop directly (Balon , 1986). The fish –specific apolipoprotein Ap 14 is required for digestive system organogenesis during fish embryogenesis and larval development (Xia et al., 200 On the other hand, Wang et al. (2011) observed similar morphology between the liver progenitor cells and the gre fluorescent protein(GFP) nuclei on the yolk syncytial layer (YSL) , suggesting that they might originate from the sa progenitor cells in early embryos ,and as that in human (Zaret ,2008). The endoderm gives rise to the hepatoblast, and early gastrula stage, the endoderm cells located in the ventral part tend to differentiate to liver bud while those on dorsal side are apt to give rise to pancreas (Tao and Peng, 2009). The hepatogenesis in zebrafish started as specificati in endoderm, then differentiated before hepatic growth (Chu and Sadler, 2009). In zebrafish itself, the primitive g tube is formed later from the endoderm between 32 and 40 hours post fertilization (Makkey et al., 2007).

It was suggested that the earliest bones to appear are those dermal elements of the branchial skeleton involved wi feeding (Morris and Gaudin, 1982). Falk-Petersen (2005) noted that main organs and organ systems become functio by first feeding and differentiate during larval stage and metamorphosis of marine fishes.

The main objective of the present study was to demonstrate the early developmental stages of digestive syste along with branchial system of black molly to detect the complementarity between the two systems and to recogn their role in nutrition of larvae and new-born individuals.

Material and Methods

stages of development) inside. The samples were fixed in Bouin's solution, embedded in paraffin and cut into 5-6 µ thickness, in cross or longitudinal sections that were stained with haematoxylin –eosin stain (Bancroft and Steve 1982).

The sections were viewed under x 25 -1000 magnification and photographed with aid of a digital camera (So DSC -77). Cell measurements were made under resolving power of 0.2 µm.

Results and Discussion

In gross morphology, the growing embryos lie in a groove in the surface of the yolk and enclosed by ovari follicle, as they live in a fluid medium, inside some eggs in different stages.

The abundant yolk supply in the egg maybe sufficient to provide the nutrient material required by the embry Scove et al. (2010) observed that during the last months of gestation in Zoarces viviparous , yolk reserves depleted a the embryos depend on an external source of nutrient . Korsgaard (1992), in turn, referred to an evidence for uptake a metabolism of amino acids by the embryo of the same species in vitro and in vivo.

Digestive System:

The Pharynx originates as incomplete circle, or tongue likewise structure in the first place, composed of cuboidal stratified epithelium rests on collagenous connective tissue, with some chromatophores and mucous cells among or abo the epithelium. The pharynx wall attains 25-37 µm in height, whereas the epithelium height 12-20 µm. There were som capillary blood vessels among the tongue wall, as there was large artery filled by RBC at a boundary to its wall. There were mucous cells line the mucosa of pharynx, in addition to other cells over the epithelium that attains 12-13 µm in height, and so, there is mucous gland. Some taste buds were shown on epithelial surface or among it, as there were chromatophores among submucosa, along with vascular ducts filled with blood corpuscles (Fig.1). However, no clear folds yet could be observed.

Fig.1: Start of pharynx, with mucus cells (→), connective epithelium (→), spleen tissue (►), blood vessel(c) and taste bud (t)

Fig.2: Liver bud (L) covered by bud (s) and pancreas (►)

The liver started as tow segments as elliptical structures measured 310 x 230 µm and 400 x 150 µm, and cover with stratified squamous epithelium. Between the two buds there was triangular, dark stained structure, which represe the spleen bud (Fig.2), and gall bladder with its duct. Besides, undifferentiated closed intestine and undifferentiated isl of pancreas, along with large vascular ducts filled by blood corpuscles. The genesis of such structures seems as curr phenomena in digestive system morphogenesis. That is the process observed in another fishes as zebrafish where t liver and pancreas arise from endoderm independent of a primitive gut tube (Wallace and Pack, 2003). However, morphogenesis of rostral digestive tract (pharynx and esophagus) in P.sphenops was before completion of the hind g formation, and not just as in zebrafish. Tao and Peng (2009) hypothesized that liver progenitors in zebrafish might differentiated before the initiation of alimentary canal morphogenesis and the liver bud was formed later by migration these progenitor cells, as shown in pancreas. On the other hand, the strong decrease in the mass and size of liv considered as hatching control (Huynh-Delerme et al., 2005). It was noted that different stages of hepatogenesis could seen during same time. Makkey et al. (2007) stated that organ development requires coordination between multi cellular processes to yield an organ of proper size and tissue architecture.

The structure represents tongue was shown holding 2-5 taste buds, in addition to some ones observed on the o wrap of the embryo.

Cross sections illustrated the looping of hind gut which showed distinct folds and possessed 37-62 µm he stratified epithelium.

In following, the esophagus connected to the pharynx which lined by stratified cuboidal epithelium that attaining 50 µm in height and embraced some sizable chromatophores towards the lumen. The esophagus showed 120 µm in le

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Fig.3: The pharynx (P) approaches to connect the esophagus pharynx (P) (E) and some chromatophores (→) are shown

Fig.4: The brush boarder (►) lining and esophagus(→)

In subsequent stage, the pancreatic islets being more differentiated beside the liver that has incomplete hepatoc as there was initiation of pancreatic-livery duct towards the intestine (Fig.5).

The medial intestine still has no differentiated wall, although there is central lumen inside most of its ler meanwhile, the mouth and anus still not open.

With advanced development, there were deeper intestine folds that attaining 30-50 µm thickness, with 20-30 µı which simple columnar epithelium characterized by basal nuclei, and rests on 7-10 µm thick connective tissue . intestine appeared with more distinct looping, as it contained amorphous diet, along with some RBC (Fig.6). The exist of such materials within intestine before mouth opening indicates maternal nutrition. The liver in being more devel attaining 700x330 µm in dimensions with more differentiated hepatocytes and blood vessels permeates its mass in add to scarcity of chromatophores (Fig. 7), as there were flourished pancreas scattered among small intestine looping. spleen shown as oval mass between the intestine and liver, its length 100 µm, stained darkly that indicates an assemb immature blood cells. It is being mature organ before birth or mouth opening, whereas it was observed as immature o with mouth opening in oviparous fish common dentex Dentex dentex (Stantamaria et al., 2004).

Fig.5: Liver (L), pancreatic islets (P) and livery -pancreatic duct (►)

Fig.6: Intestine folds (→), pancreas (►) ar amorphous diet (D)

At this stage, there were kidney tubules with blood vessels and blood corpuscles diffuse among them (Fig.8), ir meanwhile the operculum still with partial aperture.

At subsequent stage, the intestine seems with less mucous cells around lumen, where the spleen is larger in mas flows into the intestine through slender duct.

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