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HISTOMORPHOLOGICAL STUDIES DURING VITELLOGENESIS IN AQUATIC BEETLE CYBISTER TRIPUNCTATUS OL. (COLEOPTERA: DYTISCIDAE)

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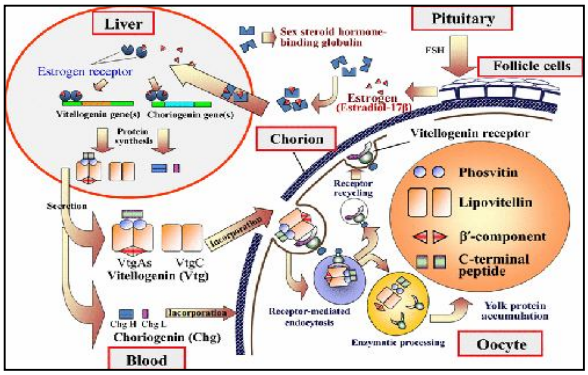
ABSTRACT:
In the newly immerged females. The ovaries are small threadLike structures measuring about 20.00± 2.00 mg in weight. TheFollicle is filled with cytocysts and the oocytes are undifferentiated. In twoDay-old females, differentiation of nurse cells and oocyte become distinct. MosOf the region of follicle is oocupied by the nurse cells, and the oocyte is verySmall, lying ventrally. The oocyte bears centrally placed large germinal vesical.The cytoplasm of oocyte is granular.

KEYWORDS :
Vitellogenesis,Nurse cells.

INTRODUCTION:
The nurse cells are large and their nuclei,Are lobulated. The nurse cells measure about 96.10 ± 0.48 цm in diameter. They discharge secreroty material into the oocyte through the redial canals.The follicular



epithelium of the previtellogenic oocyte is composed of squamous Ephithelial cells. They possess large spherical nuclei at the centre measuring about 8.10± 0.5 цm in diameter. The pre-vitellogenic oocyte grows upto 201 ± цmIn length.Thetransport of secretary material from the nurse cells to the Previtelloginic oocytes is well evident. The pre-vitellogenic oocytes are filledWith the granular cytoplasmic inclusion. In 3 day-old females the pre-vitellogenicOocytes further grow up to about 255.0 ± 25 цm in length and 20± 2 цm inDiameter respectively. Along with the oocyte, the follicular epithelial cells along With their nuclei increase in size.The nucleoli in the cuclei of follicular cells are very prominent. TheChromatin material of the nuclei of the nurse cells is dispersed and granulated.The pre-vitellogenic oocytes are devoid of yolk bodies.

1. MATERIAL AND METHODS

1.MATERIAL

The present work is carried out on the aquatic beetle, Cybistertripunctatus OL.

1.1 CLASSIFICATION (Richards and Davis 1977)

1.2 Systematic position of the aquatic beetle, Cybistertripunctatus OL is given below.

Class –Insecta
Subclass – Pterygota
Division – Endopterygota
Order – Coleoptera
Suborder –Adephaga
Family – Dytiscidae
Genus – Cybister
Species – tripunctatus (OL)

CHARECTERS1.2.1] In aquatic beetles Cybistertripunctatus. Ol.,sexes are separateAnd sexual dimorphism is well marked as the forelegs of maleBeetles show presence of adhesive pads, while such structuresAre absent in the females.

1.2.2] It possesses filliform antennae.

1.2.3] Hind legs are notatorial, functioning as swimming organs,Flattened and fringed with large hairs.

1.2.4] Larvae are with long sickleshaped mandibles.

1.2.5] Last two abdominal segments along with abdominal lobes areFringed with hairs.
1.2.6] Elytra store air beneath them.It is the source of oxygen which isSupplied to tracheal system by last two pairs of abdominalSpiracles, during diving in deep water.

1.3 SELECTION

1.4 Aquatic beetle, Cybistertripunctatus. OL, is selected for the present Work because of the following reasons-1.3.1] It is easily available, and commonly found in local ponds in all Seasons.
1.3.2] It can easily be collected by fishing nets or hand nets in ample Quantity.
1.3.3] It can be acclimatized under the laboratory conditions for a long Duration due to their sturdy nature and their quick adaptability to New environment.
1.3.4] It can be maintained by feeding small fishes and crustaceans.
1.3.5] It is of convenient size to handle and easy for experimentation.SOURCE The aquatic carnivorous beetles were collected from the ponds Located Pavani, Disti.Bhandara (MS). The beetles were reared in laboratory Throughout the year to carry out the present studies.

1.5 REARING

The larvae and adult beetles were kept in well aerated aquarium inThe laboratory. The mudy water and small stones having crevices wereKept in aquarium to maintain natural condition. The small fishes were kept as aFood of the beetles. The stones were kept to provide place for egg laying. Some

Times, they lay the eggs on the inner side of the wall of aquarium also.The Aquarium was covered to prevent escaping of beetles from the aquarium. TheFresh water was added for sufficient supply of oxygen.The larvae and beetles were acclimatized and reared in laboratoryUnder normal condition of photoperiod 12L : 12 D and 24ñC temperature. TheMating occurred mostly during daytime. The mated female laid eggs in a capsulLike case which hatched within 3-4 days depending upon environmentalConditions. The food was supplied once every day. The first instar larvaeUnderwent two moults. The well developed third instar larvae were trasferedInto another aquarium.The larvae lastly constructed the pupal chambers in a soil. NewlyEmerged adults of bothe sexes were separated and kept into individual glass jars.The date and time of emergence of the adult beetles were recorded.

2. METHODS

2.1 DISSECTON, FIXATION AND SECTIONING

The female reproductive organs dissected in insect Ringer'sSolution under stereoscopic binocular microscope. The organs were fixed in

OBSERVATION:

1. Oocyte Development and Vitellogenesis

The terminal oocyted undergo development periodically.Repeated cycles of oocyte development and subsequent cycles of ovipositionOccur in the adult female Cybistertripunctatus. Development of the terminalOocyte shows consective stages of vitellogensis.During development the terminal follicles show remarkable changesIn the oocyte shape, size, cytological structure, deposition of yolk material andFormation of egg-membranes along with the cytomorphological

change in theTrophocytes and foolicular epithelium. The entire process of vitellogenesis can beDivided into following five stages:

1) Pre-vitellogenic;
2) Early-vitellogenic;
3) Mid-vitellogenic;
4) Late-vitellogenic and
5) Maturation stage.

1.1.1 The-Early vitellogenic stage

In the 4 day old beetles, the ovaries are gradually increased in Size and measure about 97.00 ± 9.50 mg in weight. The terminal oocytes areEncircled by a double layered follicular epithelium. The terminal oocytesBecome large and occupy almost half the portion of fo follicles. Rest of the portionOf the follicle is occupied by a group of the nurse cells. The nurse cells are foundTo the large in size with well defferntiated ring canals. The nucei are lobulatedEnormously containing granular chromatin material. The transport of secretoryMaterial from nurse cells to oocyte occurs predominantly. Accumulation of fineGranules is well-evident in the intrafollicular spaces formed within the follicularcells. The follicular cells are fully-packed with granular material. The follicularcell are tall and columnar in shape in the 5 day old beetles.The early vitellogenic oocytes measure about 290 ± 16 цm in lengthAnd 60.0 ± 4 цm in diameter while the nurse cells measure about 90.7 ± 6 цminDeameter. The muclei of follicular cells measure about 7 ± 1 цm in deamete.

1.2.3 Mid-vitellogenic stage

In the 6 day old beetles, the ovaries become large andMeasure about 227.00 ± 13.00 mg in weight. It is foung that the volume of oocyteincreases greatly and subsequently, the nurse cells also attain the maximum size.At this stage, the nurse cells become active and the cytoplasmic material flowsInto the respective oocyte through the intercellular bridges. The terminal oocytesAre filled with initially small dense spherical yolk bodies at the periphery.

They measure about 400± 23цm in length and 295.5 ± 29 цminDiameter while the nurse cells are 97.0 ± 11 цm in diameter. The follicularCells are spherical in shape. The nucei of follicular cells are measured about11.0 ± 0.69 цm in diameter. In the 7th day old beetle, the terminal oocytes attainthe maximum size i.e. 445 ± 22 цm in length and 342 ± 21 цm in deameterandare fully filled with yolk bodies. The nurse cells increase to 103 ± 9 цmindiameter and the nuclei of follicular cells to about 14 ± standard error цmindiameter . At this stage the foolicular epithelial cellas are full of RNA contents.

1.1.2 The late- vitellogenic stage

In the 8 day old beetles, the ovaries increase in size and measureAbout 340.00 ± 20.00 mg in weight. The nurse cells undergo degeneration andAre reduced in size greately . The follicular epithelial cells become squamous andFilled with large quantity of cytoplasmic inclusions. The yolk bodies occupy whole Substance of the terminal oocytes. The follicular epithelial cells secrete globularChorion bodies in the form of fine membranous vesicals. The size of the lateVitellogenic oocyte increases i.e. 663.5 ± 14.5 цm in diameter.The nurse cells decreases in size . The follicular nuclei measureAbout 15.2 ± 1.25 цm in diameter. The formation of vitelline membrane and the Chorion is initiated.

1.1.3 The maturation stage

In the 10 day old beetles, the ovaries measure about 273 ± 22 mg in Weight. The terminal oocytes represent the maturation stage. The terminal oocytesBecome large and surrounded by two membranes, the internal vitelline anThe external thick chorion. The trophocytes are completely disappeared. TheColumnar follicular cells are greatly regressed and wide spaces are formedInitially in between the vitelline and chorion membranes and later on between The chorion and follicular epithelium. The matured oocytes are fully packed withYolk bodies and measure about 657 ± 27 цm in diameter, and nuclei of follicularCells measure about 12.4 ± 1.80 цm in diameter.The changes occurring in oocytes, trophocytes and follicular cells are Summarized in Table.1

Table 1 : Developmental changes in wight of an ovary, size of oocyte, Nuclei of trophocyte and follicular cells in Cybistertripunctatus

Age of Beetles (Days)	Vit. state	Weight Of ovary (mg)	Histological Changes		
			Oocyte Length (цm)	TC (цm)	FC (цm)
0	*NE*	*20.42 ± 2.80*	*20 ± 20*	--	--
2	*PV*	*20.42 ± 2.80*	*62 ± 4*	*96.10 ± 0.48*	*8.10 ± 0.5*
4	*EV*	*97.68 ±6.71*	*295.5 ± 29*	*90.7 ± 6*	*7± 1*
6	*MV*	*227.24 ± 7.11*	*400 ± 23*	*97 ± 11*	*11.00 ± 0.69*
8	*LV*	*240 ± 8.08*	*663.5 ± 14.5*	*78 ± 2.18*	*15.2 ± 1.25*
10	*MS*	*273.25 ± 7.95*	*657 ± 27*	--	*12.4 ± 1.80*

Abb. : PV - pre-vitellgenic stage
EV -early – vitellogenic state
MV - mid- vitellogenic stage
LV - late- vitellogenic stage
MS - maturation stage
TC - trophocyte
NE - Newly - emerged
± - standard error.

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