

Histological Studies of Interstitial Cells in the Ovaries of Bats *Hipposideros Speoris* and *Megaderma Lyra Lyra*

Nitin P. Meshram and Kishor S. Janbandhu

S.K.Porwal College, kamptee,Nagpur[India] Govt. Institute of Science, Nagpur[India]

Abstract: Bats are the most diverse and successful group of mammals exhibiting many adaptive specializations. Chiroptera shows great variations in the reproductive stage, even the closely allied species exhibit different breeding habits. It is important to study the reproductive organ that is ovary in respect with the interstitial cells. Because the interstitial cells with the help of LH of pituitary produce a hormone androgen. That means interstitial tissues are developed as a gland having steroidogenic activities. In the immature ovary of *Hipposideros speoris*, interstitial cells are not distinguished from the stromal cells while It is clearly distinguished from stromal cells. In the inactive *Hipposideros speoris* ovary, bundles of interstitial cells observed 60 ± 5 . The immature ovary of *Megaderma lyra lyra* showed the small bundles of few interstitial cells in stromal region. In inactive ovary of *Megaderma lyra lyra*, interstitial cell bundles observed 48 ± 5 . Number of interstitial cells in each bundle observed in inactive ovary of *Hipposideros speoris* are 5 to 10 and in *Megaderma lyra lyra* it is observed 5 to 7. In the active ovary of *Hipposideros speoris*, the bundles of interstitial cells observed 80 ± 5 and in *Megaderma lyra lyra* observed 56 ± 5 . Number of interstitial cells in each bundle observed in *Hipposideros speoris* is 20 to 30. while in *Megaderma lyra lyra* observed 10 to 20. Pregnant ovary of *Megaderma lyra lyra* showed extrovert corpus luteum, atretic follicles and destructed interstitial cells. So it is concluded that the interstitial cells in the active ovary is more steroidogenic than inactive ovary

Keywords: *Hipposideros speoris*, *Megaderma lyra lyra*, interstitial cells

I Introduction

India has a rich chiropteran fauna. 17 families 174 genera and 913 species of bats reported by Koopman (1994). At present 1116 recognized species of bats worldwide Simmons SB (2005) out of the 17 families, 7 families incorporating over of 100 species are reported in India.

A literature survey reveals that meager information is available on the interstitial cells in the ovary of Indian Bats. Guraya (1901), Singh and Krishna (1994), Abhilasha and Krishna (1996) *Megaderma Lyra Lyra* breeds end week of November and delivering in 1st to 3rd week of April. *Hipposideros* breeds last week of December to 2nd week of March, deliveries in May to mid June.

The present work includes observation on the interstitial cells in ovary of two species of Indian bats *Megaderma lyra lyra* and *Hipposideros speoris*.

II Material And Methods

Female specimens of *Megaderma lyra lyra* and *Hipposideros speoris* used for present study collected from the Ballarshah and Kandri mines, near Nagpur in India. The bats were collected from delapidated dark rooms and mines with the help of mist nets and butterfly net, the collection made as per requirement. The animals killed by chloroform and their body weight taken and fixed in 10% formalin for 24 hours.

III Histology

The female reproductive system was dissected out, their ovaries were separated and fixed in 10% formalin for 24 hours. Tissue washed overnight in running water. The tissue was dehydrated by passing through a graded series of ethyle alcohol, cleared in xylol and embeded in paraffin wax (58° - 60° C).

The sections were cut for the thickness of 4 to 5 μ with the help of rotary microtome for routine histological study. The sections were stained with haematoxyline eosin stain.

The photographs were taken with the help of 35mm leica camera attached to the microscope and enlarged to the required size. All microscopic observations, measurements were taken with the help of an eyepiece micrometer calibrated to stage micrometer scale.

IV Historical Review

May J. Guthrie, Katnarine R. Jeffer (1938a) have been studied the ovaries of bats *Myotis lucifugus* *Myotis lucifugus* and *M. grisescens* and informed that Interstitial cells very numerous in Newborn bats and they arose from hypertrophied theca interna of retrogressing follicles of granulosa cells. Mossaman et, al (1964) have

recently designated that these Interstitial cells of thecal origin in the mammalian ovary are of first type of Interstitial cells. The second type of interstitial cells in the ovary of bat are in the form of epithelial cells are irregularly distributed among the first type of interstitial cells.

Brambell FWR (1906) described that there are several type of glandular tissues in the mammalian ovaries which are severally described as Interstitial cells. The different view regarding their origin have been produced by Brambell to two comprehensive thesis namely epithelial origin and the connective tissue origin of the interstitial cells. In many species of mammals the ovarian interstitial tissue consists of cellular clusters and nests Guraya (1967) which are scattered in the cortical stroma. Investigated that ovaries of non pregnant and pregnant grey bat *Myotis grisescens* show two types of Interstitial cells. The first type of cells were considerably developed and occupy all the ovary except the periphery which contain small follicles they originated by the thecal hypertrophy of atretic large Preantral and antral follicles and they are apparently developed to the some extent in the ovaries of pregnant and non pregnant bats. The second type of interstitial cell was in the form of epithelial cells which were irregularly distributed among the first type of interstitial cell.

Sardul S Guraya, Gilbert, S Greenwald (1964) studied various mammalian ovarian interstitial tissues and described that in Rat ovary, the interstitial cells occur as scattered patches of various sizes that are derived from the theca of atretic preantral follicles and antral follicles. Most of Bat ovary, The interstitial cells occupied the total ovarian area except the cortex and the interstitial cells distributed and scattered in between the follicles and connective tissue area.

V Observations

The observations in immature ovary of *Hipposideros speoris* shown that the Interstitial cells cannot be distinguished from the stromal cells. The number of developing primordial follicles seen. Amongst the developing follicles small clusters of cells seen with lightly staining vesicular nuclei in some places, these are forerunner of the interstitial cells. The interstitial cells does not become well differentiated in *Hipposideros speoris* in the immature animals (fig.1a and 1b)

In mature ovary of *Hipposideros speoris* shows, the larger area of stroma composed of connective tissue cells with elongated nuclei. follicular composition of the ovary shows various different stages of the reproductive cycle development. In inactive ovary only primordial, unilaminar, bilaminar, preovulatory, graafian follicles, antral follicles are found.

The inactive ovary of *Hipposideros speoris* showed the polyhedral and polygonal shaped scattered interstitial cells found in between various follicles. The interstitial cells are found in small bunches, In the stromal as well as peripheral epithelial area. The connective tissue also seen in the stromal area. The polyhedral interstitial cells having vesicular nuclei. In this stage very few bunches of interstitial cell found distributed in small stromal area because the unilaminar follicles contain large in number and stromal area becomes narrow. In inactive ovary interstitial cells are small about 5 to 7 μ . About 5 to 10 cells are consisted in each bunch. There are 5 to 6 such bunches are found in all over the ovarian stroma. (fig 2)

The active ovary of *Hipposideros speoris* noticed that multilaminar follicles, single preovulatory follicle, follicles undergoes atresia. The stroma is compound of polyhedral interstitial cells with rounded nuclei. A few blood capillaries also supplied with interstitial cells. As the primordial follicles are few in number, stromal area becomes larger and number of clusters of interstitial cells are increases. about 5 to 10 bunches of interstitial cells with rounded nuclei are seen distributed among the follicles in the stromal region. Each bunch consisted of about 7 to 20 interstitial cell. Interstitial cells in active ovary is more hypertrophied than inactive ovary are measured about 7 to 10 μ . (fig. 3)

The immature ovary of *Megaderma lyra lyra* consisted of large number of primordial follicles and few unilaminar follicles throughout the ovary except in the central part and in the region of the hilus. The ovarian stroma sparsely distributed between the follicles. It is made up of a connective tissue with fusiform cells. There are clusters of polygonal interstitial cells with spherical nuclei are seen in the stromal region between the follicles. (fig.4a and 4b)

The mature ovary of *Megaderma lyra lyra* showed various follicles such as unilaminar, bilaminar, multilaminar, vesicular, graafian pre ovulatory follicles. The theca follicles in some vesicular follicles becomes differentiated into a theca externa and theca interna, made up of fusiform cells.

In inactive ovary of *Megaderma lyra lyra* shows polyhedral or polygonal interstitial cells with spherical nuclei distributed in clusters between the primordial follicles in the stromal area of peripheral region. There are about 3 to 5 smaller and at some places larger cluster of interstitial cells noticed. In each cluster about 7 to 15 interstitial cells present. These cells are somewhat larger in size than that of stromal cells. Each interstitial cells measure about a diameter of 5 to 9 μ . (fig 5a and 5b)

In active ovary of *Megaderma lyra lyra* presence of follicles of various stages of development in which vesicular follicles with small antra are developed and progresively increases. The interstitial cells shows in the deeper area of cortex into the stroma and in between the follicles. Number of interstitial cells and their bunches

increases than that of the Inactive ovary. The cluster remain distributed through out the ovary in between the follicles in stromal region. About 5 to 10 cluster of interstitial cells with polygonal in shape and spherical nuclei are observed. About 3 to 20 interstitial cells in each bundle are observed. These cells are more hypertrophied than that of inactive ovary. interstitial cells are also found distributed in the region and in between the theca interna and theca externa of atretic follicles. These cells are more hypertrophied and measured about a diameter of 10 to 12 μ . (fig.6)

In pregnant ovary of *Megaderma lyra lyra* showing disintegrated interstitial cells and different types of follicles(fig.7)

VI Discussion

As per the above observation it is found that the interstitial cells are found in the ovary of immature and mature animals both. In inactive and active stages of ovaries of *Hipposideros speoris* and *megaderma lyra lyra* bats showed some what structural differences. Some observations resulted that the interstitial cells or Epithelial cords are seen throughout the reproductive cycle in the species *Hipposideros speoris*. The epithelial cords or interstitial cells originated either by the invagination of the germinal epithelium and from the hypertrophy of persistent granulosa cells of atretic primordial and preantral follicles (M.S. sasty and S.B. Pillai (2013)

In my observations it is seen that the interstitial cells found in *Hipposideros speoris* in inactive as well as active ovary, but it is not differentiated from the stromal cells in case of immature ovary. In *Megaderma lyra lyra*, interstitial cells observed in inactive as well as active ovary and it is also differentiated from the stromal cells, in case of immature ovary. interstitial cells in ovary numerous in new born bats in *myotis lucifugus lucifugus* and they are arose from hypertrophied theca interna of retrogressing follicles of granulosa cells. (Guthrie and Jeffer, 1938a). Interstitial cells of thecal origin are in the mammalian ovary (Mossaman et al, 1964). Several type of glandular tissue in the mamalian ovary which are severally described as interstitial cells. Watzka (1957) stated that the primary function of the interstitial cells tissue was nourishment and destruction of follicles and made no distinction between the thecal gland cells and the interstitial cells.

M.S. Sastry and S.B. Pillai (2013) observed the *Hipposiderous speoris* ovary and resulted that, the epithelian cords i.e. interstitial cells were observed throughout the reproductive cycle. The epithelial cords have originated either by the invagination of the germinal epithelium and from the hypertrophied of persistant granulosa of atretic primordial and preantral follicles. Further study shows that varying numbers of cords and number of interstitial cells in various developmental stages.

Antonin Bukvsky et al (2002) studied rat ovarian interstitial cells and described the 5 stages of interstitial cells development.

Immature – small (5 to 7 μ), Young- large (8 to 10 μ), Mature – large (12 to 16 μ), Aged – large (12 to 16 μ), Regressing –Shrink (5 to 7 μ)

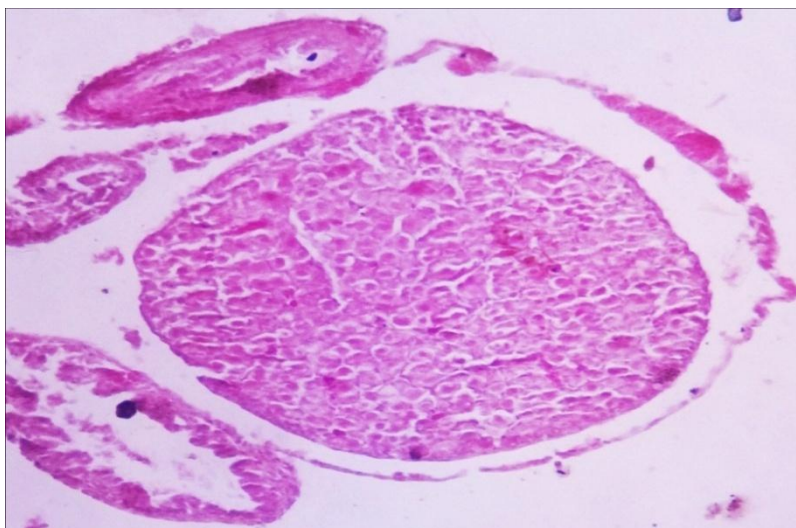


Fig.-1a Immature Ovary Of *Hipposiderous Speoris* Showing Various Developing Primordial Follicles. Intetitial Cells Not Identified From Stromal Cells X100.

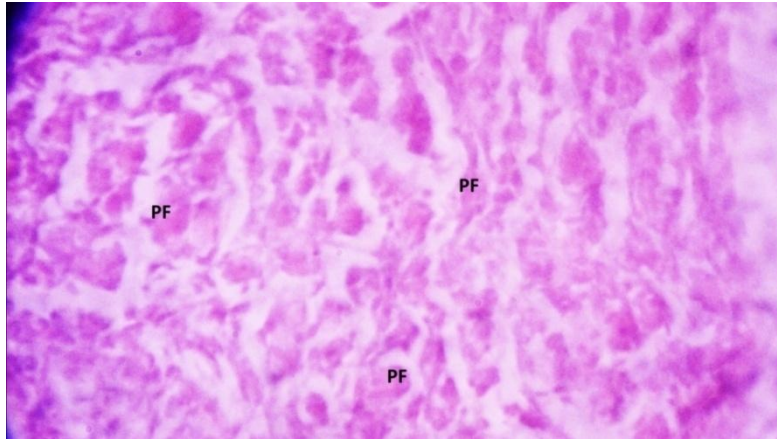


Fig. 1b Immature Ovary Of Hipposiderous Speoris Showing Various Developing Primordial Follicles. Interstitial Cells Not Identified From Stromal Cells. X400 Pf- Primordial Follicles

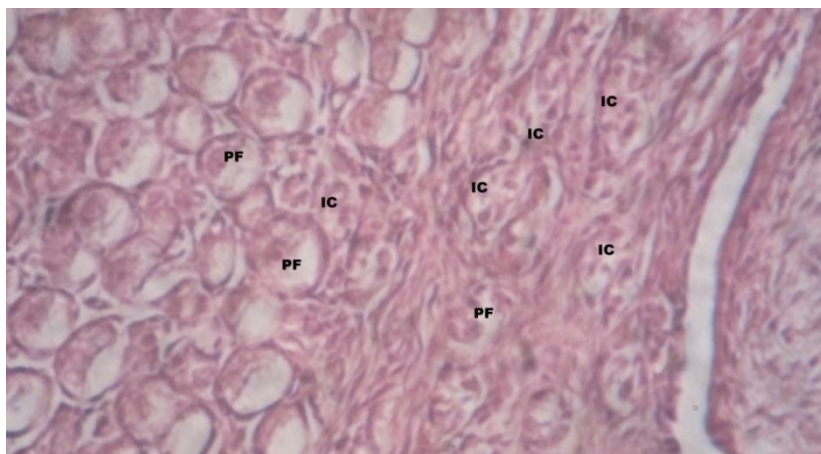


Fig-2 Inactive Ovary Of Hipposiderous Speoris Showing Large Number Of Primordial Follicles And Clearly Seen Intesttial Cell Bunches Distributed All Over The Stromal Area. X400 Pf- Primordial Follicles, Ic- Interstitial Cells

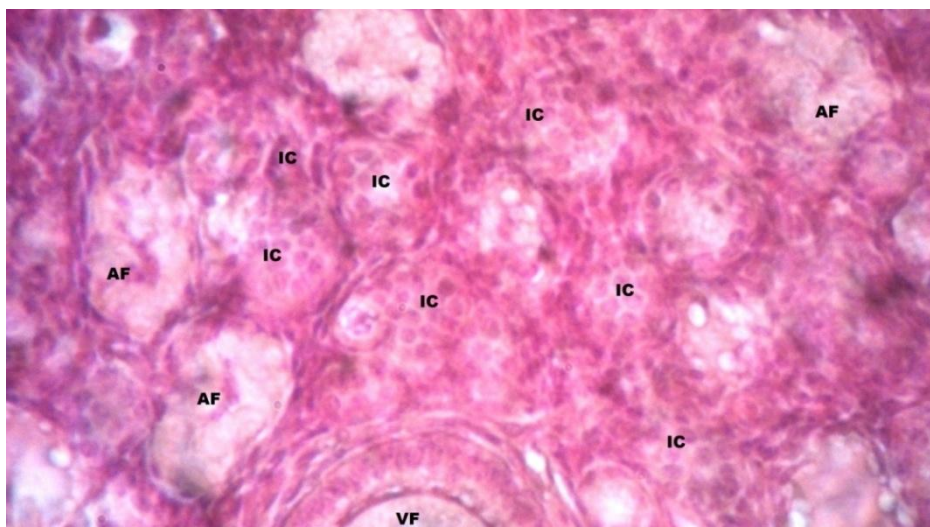


Fig-3 Active Ovary Of Hipposiderous Speoris Showing Follicle And Atretic Folliclesalongwith Numerous Bunches Of Intesttial Cells Distributed All Over The Stromal Area.X600 Ic- Interstitial Cells, Af- Atretic Follicle, Vf- Vesicular Follicle

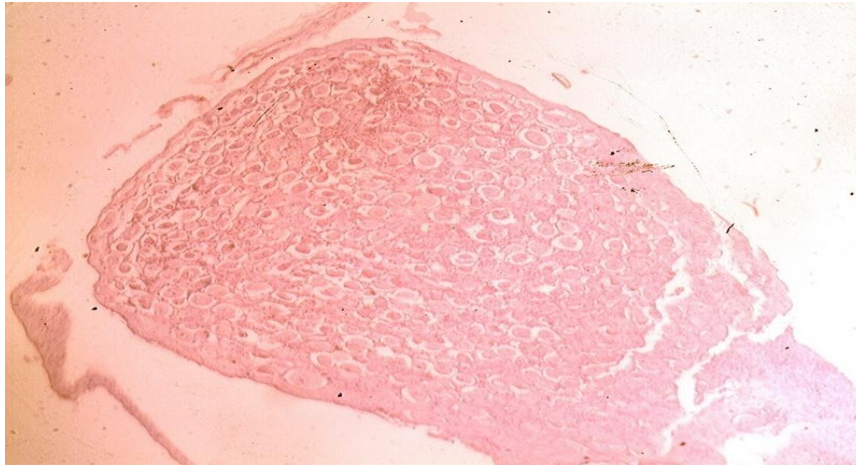


Fig-4a Immature Ovary Of Megadema Lyra Lyra Showing Numerous Developing Primordial Follicles Occupying Stromal Area. X100.

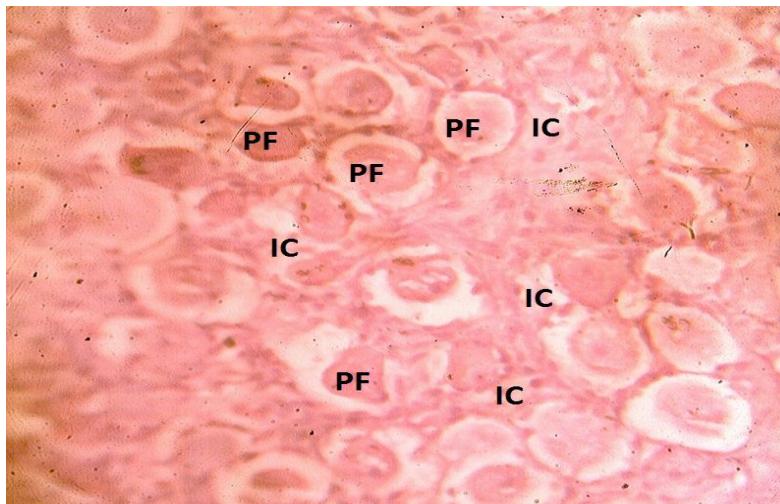


FIG.4b Immature Ovary Of Megadema Lyra Lyra Showing Numerous Developing Primordial Follicles And Some Intestinal Cells In Stromal Area. Due To Numerous Developing Primordial Follicles Stromal Area Is Less.(X400) Pf- Primordial Follicles, Ic- Interstitial Cells

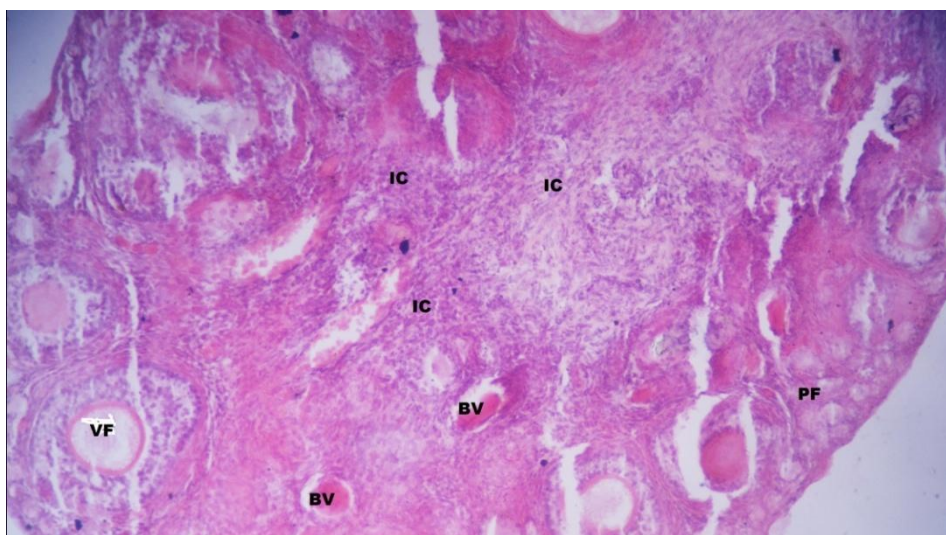


Fig-5a Inactive Ovary Of Megadema Lyra Lyra Showing Various Stages Of Follicles And Scattered Interstitial Cells X100. Gf- Graafian Follicles, Bv-Blood Vesicle, Pf- Primordial Follicles, Ic- Interstitial Cells.

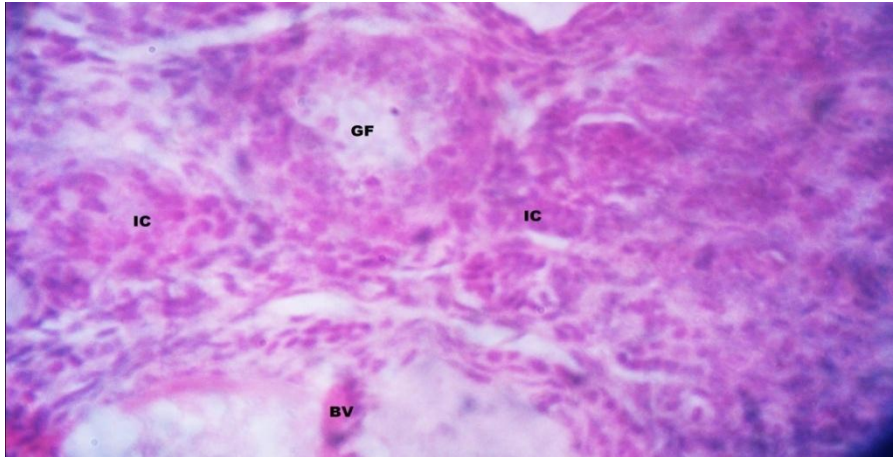


Fig-5b Inactive Ovary Of Megaderma Lyra Lyra Showing Scattered Bunches Of Interstitial Cells,X400. Gf- Graffian Follicles, Bv-Blood Vesicle, Ic- Interstitial Cells.

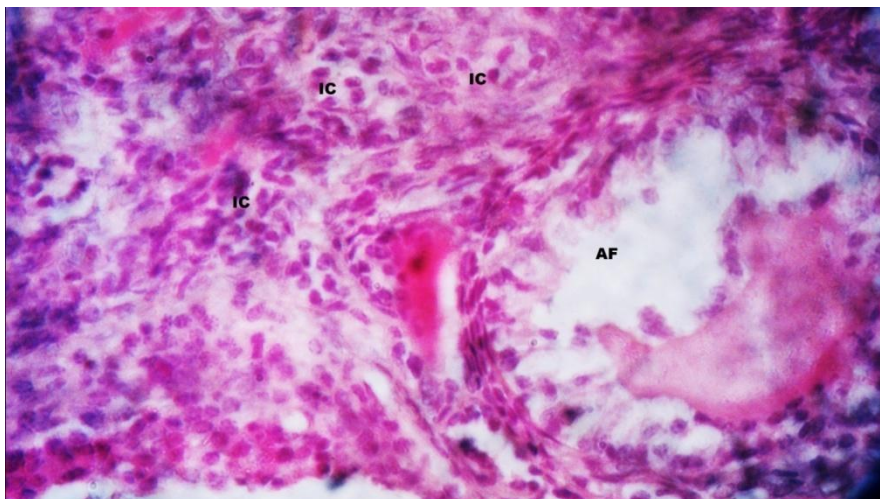


Fig-6 Active Mature Ovary Of Megaderma Lyra Lyra Showing Various Bundles Of Interstitial Cells Distributed Throughout The Ovary. X600. Ic- Interstitial Cells, Af- Atretic Follicle

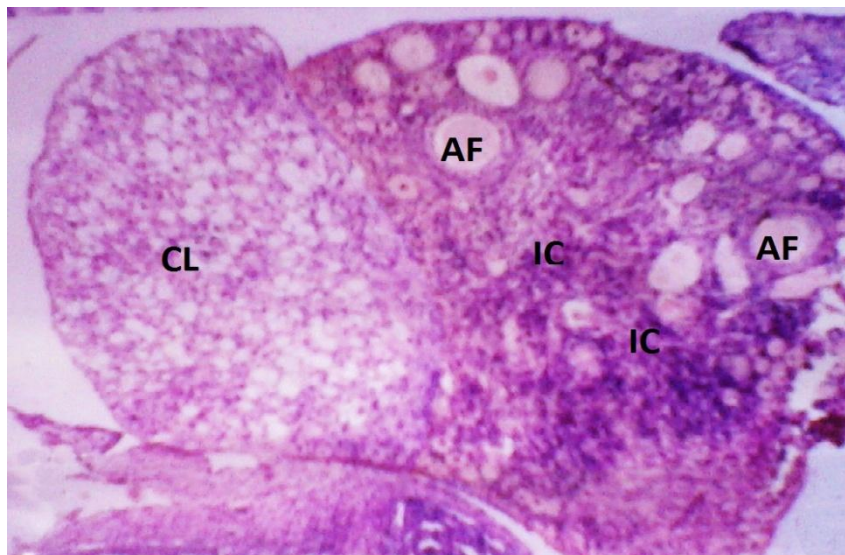


Fig-7 Pregnant Ovary Of Megaderma Lyra Lyra Showing Extrovert Corpus Luteum And Disintegrating Interstitial Cells Along With Follicles.X100. Af- Atretic Follicle, Ic- Interstitial Cells, Cl- Corpus Leuteum

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