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Morphology and endocrinology of interstitial cells of bat ovary *Hipposiderous speoris*

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Bats are among the most diverse and successful of all mammals. Taxonomically bats comprise the order Chiroptera, which means 'hand-winged'. Chiroptera includes two extant clads, Megachiroptera (old world fruit bats) 167 species and Microchiroptera (echolocating bats) 834 species included in 17 families. Bats are unique among mammals as they are the only group to have evolved true powered flight. The bat, *Hipposideros speoris* (Schneider, 1800) belongs to the suborder Microchiroptera and the family Rhinolophidae. There are over nine hundred extant species of bats (Koopman, 1994).

The mammalian ovary is a complex dynamic structure depicting conspicuous morphological, histochemical, biochemical and molecular changes. The ovary has two basic complementary tasks to perform: to produce fertilizable eggs and to secrete a variety of steroid hormones such as androgen, estrogen and progestrone. Mature mammalian ovary consist of four major compartments. Steroidogenically important component of the mammalian ovary *viz.,*-developing follicles, atretic follicles, corpora lutea and interstitial gland (Guraya, 1985 and 1997 and Hirshfield, 1991). Interstitial glands are complex population of steroid producing cells of dual origin, which proliferate during the growth and differentiation of the ovaries. In the ovary of *Hipposideros speoris* three different types of interstitial glands have been observed.

Interstitial:

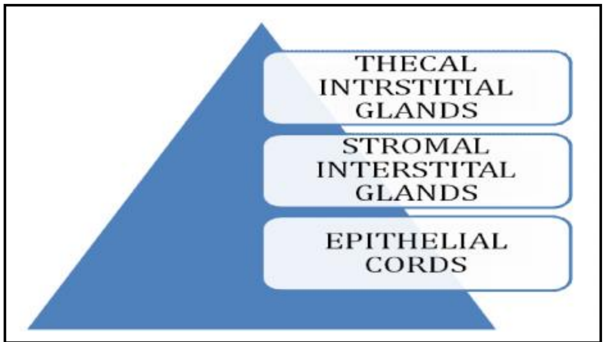
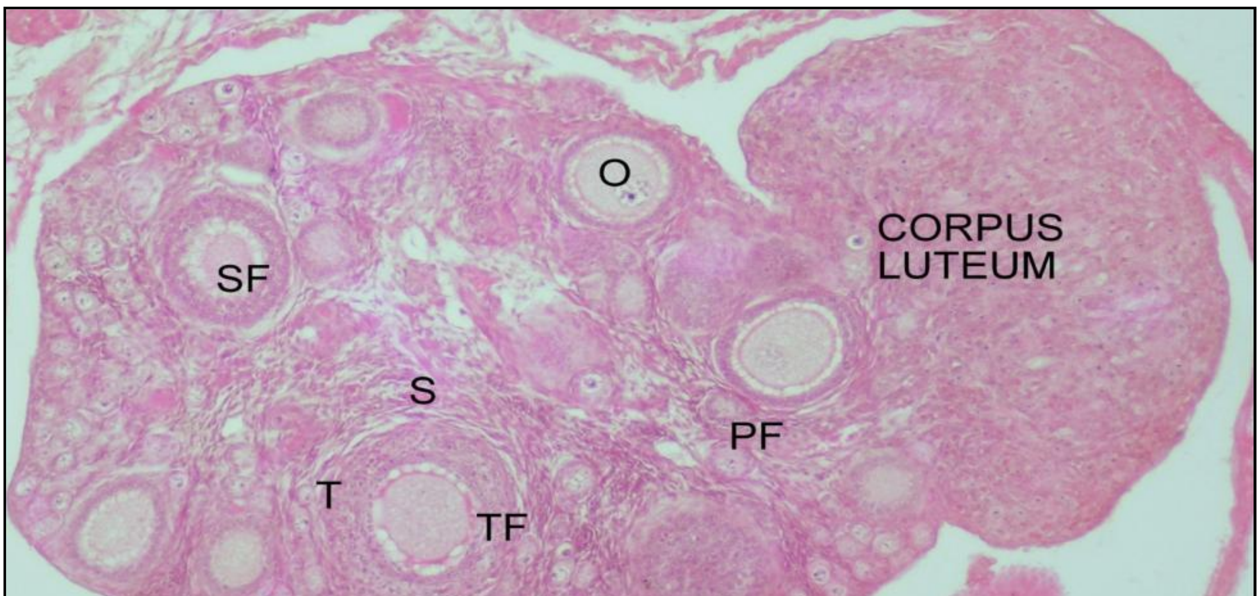


Fig. 1: Glands

In *Hipposideros speoris* interstitial cells are of three types:- thecal type interstitial cells (formed either from the hypertrophied theca interna and surrounding stroma of degenerating large follicles), stromal type interstitial cells (formed by the hypertrophy of stromal cells) or epithelial cords either from the germinal epithelium by its ingrowth and from the persisting granulosa of atretic primordial follicles and small preantral follicles (Jabara *et al.*, 2003 and Singh *et al.*, 2005). Histochemical localization of SDH, G-6-PDH, 17β-HSDH, 3β-HSDH and lipids to examine the site and changing pattern of its activity in ovaries of Hipposideros speoris during non-pregnant and pregnant states. The purpose of the present study provides a brief account on interstitial gland cells and its role in steroidogenesis during different stages of reproduction (Singh and Krishna,1994 and Singh *et al.*, 2005).

Both morphological and histochemical studies reveal that Igc in *H. speoris* are better equipped for steroidogenesis. The histological changes seem to be associated with the histochemical activities of the stromal interstitial cells. The intensity of the enzymes 17β HSD, G-6-PDH, SDH and lipid accumulation in stromal interstitial cells in the ovary – of *Hipposideros speoris* showed variations during the breeding, pregnant and lactational phases. Increased lipid accumulation during non-breeding season could be due to the sharp decline in androgen production (Guraya, 2000).

All these observations also strongly support the suggestion that the lipid droplets in the Igc are the stores of potential precursor materials which are converted into steroid hormones when the proper gonadotrophic stimulation becomes available. The present study also emphasizes that cyclic changes in the interstitial epithelial cords (EC) are related to the reproductive cycle of Hipposiders speoris. During mid-pregnancy, they were observed to be highly hypertrophied, closely clustered in the cortical portion of the ovary, each with 20-30 hypertrophied cells in each cord and there was a sudden burst in SDH, 17β HSD and G-6-PD staining profile. However G-6-PDH activity was at more elevated levels during advanced pregnancy as evident from the occurrence of density populated, highly hypertrophied zones in the cortex (Trivedi and Lall, 2004 and 2007 and Gil *et al.*, 2007). These structures during mid and advanced pregnancy seem to be equivalent to structures like accessory corpora lutea, supporting the chorio-allantoic placenta to sustain the development of the embryo. Also during lactation, the cords were observed to be abundant and histochemically functional might be for the synthesis of hormones, progesterone and estrogen necessary for the synthesis and secretion of milk (Singh



O : Oocyte, SF: Secondary follicle, PF: Primary follicle, TF: Tertary follicle, EC: Epithelial cords, T: Thecal glands, S : Stromal gland

Fig. 2: Complete ovarian section with corpus luteum

et al., 2005 and Sastry and Tembhare, 2008 and Sastry *et al.*, 2010).

Hence, forth the development of different types of interstitial glands at different phases have significant role in the production of different types of steroids, such as androgen production by the stromal Igc for the recruitment of follicles, estrogen production by the thecal type interstitial glands for the selection of dominant follicle or differentiation and development of interstitial EC for the synthesis of progesterone to help in the maintenance of pregnancy (Gill *et al.*, 2007; Sastry and Pillai 2005 and 2013 and Sastry and Tembhare 2008 and 2009).

Thus, we suggest that this compartment may be a storage precursors for the steroidogenesis and then, the precursors are principally used during pregnancy by other ovarian compartments (e.g. corpus luteum) when the endocrine requirements are higher. The observed histological and histochemical feature of Igc suggest steroidogenic activity, thus, these cells may contribute to the total endocrine production synthesized by the ovary. Then the Igc of H.speoris may play a role as a source of steroid precursors during pregnancy and probable further in its maintenance. However, further studies are necessary to conform there roles.

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