

Study Anatomy of Testis and Epididymis of Timorese Fruit Bats (*Pteropus vampyrus*)

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INTRODUCTION

Fruit bats (*Pteropus vampyrus*) is one of the bats in Timor Island, East Nusa Tenggara (NTT). Fruit bats have unique behaviour when mating which is hanging upside down (Corbet and Hill, 1992). The ability of male bat in maintaining the position when mating is according to the characteristics of male fruit bat reproduction system morphology. Testes are male genital organs which synthesis androgen hormone (especially testosterone) and the site where spermatogenesis takes place and eventually producing sperm. Epididymis plays role in transporting, storing and maturing the sperm (Syahrurn et al., 1994).

MATERIAL AND METHODS

This study used 3 Timorese fruit bat's (*Pteropus vampyrus*) which were obtained from South Central Timor (Timor Tengah Selatan; TTS). The bats were anesthsied, perfused with formalin 10%, and necropsied. Testis and epididymis were taken and observed macroscopically, and subsequently processed following histological procedures included H&E staining to produce histology slides. The slides were examined under the microscope.

RESULTS AND DISCUSSION

Anatomy of Testes and Epididymis of Fruit Bats

Results showed, macroscopically, testes and epididymis of all fruit bats samples signified normal shape. The testis was oval and covered by white thin layer, with firm consistency (Fig. 1).

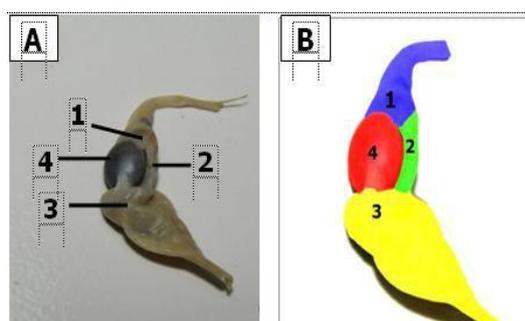


Figure 1. (A) The anatomy of testes and epididymis of fruit bats (*Pteropus vampyrus*). (B) Schematic figure of testes and epididymis; (1) Caput, (2) Corpus (3) Cauda, (4) Testis

It was found that sample KJ2 showed different location between both testes. The sinister testes was inside abdominal cavity, while the dexter was outside abdominal cavity and but also was not inside of the scrotum (Fig. 2A). Samples KJ1 and KJ3 testes were not present in the scrotum, instead located outside of the abdominal cavity, which were between the skin and muscles layer near the lateral pubic peak of the penis (Fig. 2B). Fried et al. (2006) states that testes in rodents and bats move down to the scrotum merely during copulation. Therefore, this suggests that fruit bats testes (*Pteropus vampyrus*) also move into the scrotum only during copulation. This is related to the timing of sampling of fruit bats (*Pteropus vampyrus*) which was not done during mating season. According to McGuckin et al. (1991), bats mating season occurs between November to December, meanwhile the sampling of this research was done in (*Pteropus vampyrus*) in March.

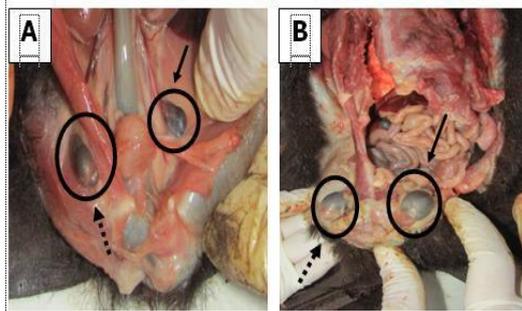


Figure 2. Topography of testis dan Epididymis of fruit bats (*Pteropus vampyrus*). (A) Sample KJ2; the sinister testis was in abdominal cavity, the dexter was outside abdominal cavity, (B) Sample KJ1, KJ3; testes were outside of abdominal cavity. →: sinister testis •••→ : dexter testis

Epididymis of all samples were found attached to testes. Epididymis consisted of *caput*, *corpus* dan *cauda* (Fig. 1). *Cauda* epididymis of fruit bats (*Pteropus vampyrus*) showed circled shaped with larger size on their *caput* compare to *corpus*. This is related to the function of *cauda* epididymis as greatest storage site of spermatozoa.

Histology of Testis and Epididymis of Fruit Bats

Microscopic examination upon testis of all fruit bats (*Pteropus vampyrus*) samples did not show any differences. The tunica vaginalis comprised of lamina parietalis which covered epididymis duct and deferens duct, whereas the inner part of tunica vaginalis, lamina parietalis, laid tunica albuginea (Fig 3). The histological observation of testes also showed smooth muscle layer with seminiferous tubulus which filled by germinal cells which consisted of myoid cells, spermatogonia, spermatid, and spermatozoa, meanwhile on interstitial tissue was found interstitial cells (Leydig cells) (Fig. 4).

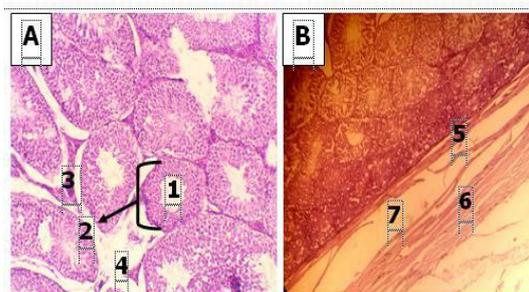


Figure 3. Histology of fruits bats (*Pteropus vampyrus*) testes; (A): (1) Lumen, (2) Seminiferous tubules, (3) Leydig cells (4) Interstitial tissue; (B): (5) Tunica albuginea, (6) Tunica vaginalis lamina parietalis, (7) Tunica vaginalis space (HE, 10x)

Fruit bats (*Pteropus vampyrus*) epididymis wall consisted of tunica mucosa which comprised of lamina epithelial, lamina propria, and lamina muscularis, tunica sub mucosa which filled by loose connective tissue, tunica muscularis which

comprised of circular and longitudinal smooth muscle layers, also tunica adventitia. The histology of caput, corpus, and cauda epididymis showed difference on their stereocilia length, also the thickness of epithelial and smooth muscle layers (Fig. 5).

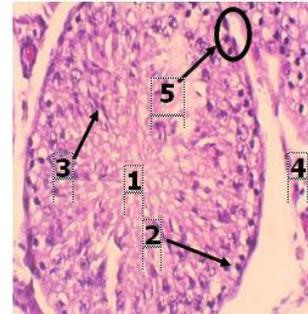


Figure 4. Histology of Seminiferous tubules. (1) Spermatozoa, (2) Spermatogonium, (3) Spermatid, (4) Interstitial cells (Leydig cells), (5) Basal cells (Myoid cells) (HE, 40X).



Figure 5. Histology of fruit bats (*Pteropus vampyrus*) epididymis. (1) Tunica mucosa, (2) Tunica sub mucosa, (3) Tunica muscularis (circular), (4) Tunika muscularis (longitudinal) (5) Tunica adventitia (HE, 10x)

Tunica mucosa of epididymis consisted of tersusun dari pseudostratified kolumner epithel with broad stereocilia, connective tissue, and smooth muscle adanya jaringan ikat dan otot polos. Comparison of stereocilia of epididymis indicated decrease of its length from caput towards cauda epididymis. The similar feature was also found on the thickness of the epithelial layer, which showed reduction towards cauda epididymis (Fig. 6). In regards to cellular components of the tunica mucosa, three types of cells were found, they were apical cells which located near the seminiferous tubules lumen, main cells, and basal cells (Fig. 7).

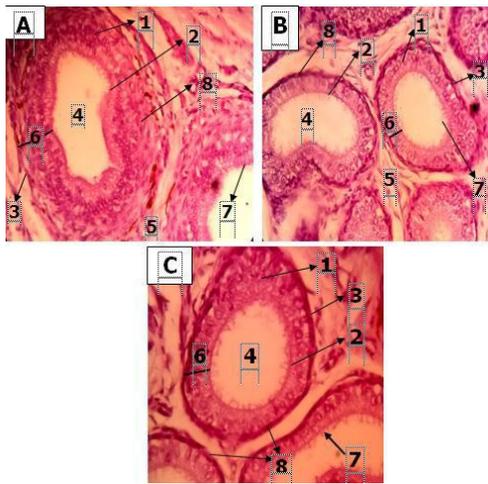


Figure 6. Histology of fruit bats (*Pteropus vampyrus*) epididymis. (A) *Caput*, (B) *Corpus*, (C) *Cauda*; (1) Main cells, (2) Apical cells, (3) Basal cells, (4) Epididymis duct lumen, (5) Loose connective tissue, (6) Pseudostratified columnar epithel, (7) Stereocilia, (8) Smooth muscle (HE, 40X)

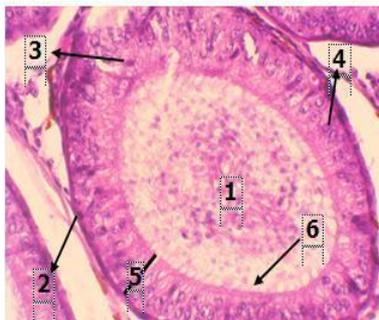


Figure 7. Cellular components of fruit bats (*Pteropus vampyrus*) epididymis. (1) Spermatozoa, (2) Basal cells, (3) Apical cells, (4) Main cells, (5) Pseudostratified columnar epithel, (6) Stereocilia (HE, 40x)

Microscopically, tunica sub mucosa filled with loose connective tissue. External tunica muscularis comprised of circular and longitudinal smooth muscle (Fig. 5), where the thickness of the muscular layer was increased towards cauda epididymis (Fig. 8).

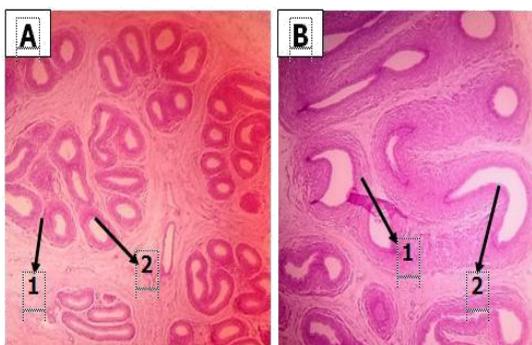


Figure 8. Histology of fruit bats (*Pteropus vampyrus*) epididymis. (A) *Caput*, (B) *Cauda*; (1) Smooth muscle, (2) Pseudostratified columnar epithel (HE, 10x)

epithel (HE, 10x)

The histology of tunica adventitia of epididymis was thin and did not attach to abdominal cavity wall (Fig. 5). According to Gartner and Hiatt (2012), tunica adventitia is the outer layer which consists of loose connective tissue, blood vessels, adipose tissue, and nerve which serves as covers of nerves and blood vessels and also prevents organ from attachment to other parts of abdominal cavity.

CONCLUSION

Testis of Timorese fruit bats (*Pteropus vampyrus*) were black oval shaped with firm consistency. Two testis samples were located outside of the abdominal cavity and did not present in the scrotum, the other sample was located inside the abdominal cavity (*sinister testis*) and outside abdominal cavity between skin and muscle (*dexter testis*).

Overall, the histology of testis and epididymis of Timorese fruit bats were similar to the histology of the same organs in other mammals, such as rats and weasel. Testis consisted of tunica vaginalis lamina parietalis and tunica albuginea, whereas epididymis comprised of tunica mucosa, sub mucosa, muscularis dan adventitia.

In order to obtain the data, it is necessary to study the thickness of epithel layer, smooth muscle, stereocilia, seminiferous tubules diameter, and the diameter of *caput*, *corpus* dan *cauda* epididymis, also the movement of testis to scrotum each month on the adult fruit bats (*Pteropus vampyrus*) during breeding season.

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