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*Case Report*

# The Foetal Anatomy and Allantoic Placenta of an African Fruit Bat (*Epomops franqueti*)

**Olude M.A. [1], Aina O.A.[1], Obasa A.A.[1], Adeyanju T.E.[2], Olopade J.O.[1]**

[1]*Department of Veterinary Anatomy, University of Ibadan, Ibadan, Nigeria*
[2]*Department of Wildlife and Ecotourism, University of Ibadan, Ibadan, Nigeria*

**Summary:** Bats and human biological structures are believed to be similar in terms of phylogeny, reproductive biology, and early development. Adequate knowledge of placental morphology will have important implications for research and in comparative anatomy. This report is a part of on-going studies on the African fruit bat species and is a case report from an incidental discovery of the foetus and placenta in an African fruit bat (*Epomops franqueti*) captured for research.

**Keywords***: Placenta, African Fruit Bat, Foetus, Epomops*



**Address for correspondence: jkayodeolopade@yahoo.com; Tel: +234-8108587128*

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## INTRODUCTION

Bats are often suspected culprits in zoonotic outbreaks. For instance, the *Epomops franqueti* fruit bat was one of the fruit bat species fingered previously as potential reservoirs in recent outbreak of the human filoviruses and the transmission of the Ebola and Marburg viruses (Groseth *et al* ., 2007). Several species of bats have however been reported to show wide intra-species variations in physiological baselines in response to change in geographical and environmental conditions, such as gestation lengths (Barclay *et al* .,2004; Roche *et al* ., 2020). The placental structure is one of the versatile structures capable of exhibiting extensive adaptive measures for the propagation of the bat species. Interestingly, bats and human biological structures are believed to be hosts to a wide range of similar pathogens; a relationship which may be vital for disease transmission (Annan *et al*., 2013).

Sparse studies have highlighted the allantoic placenta of several bat species but none is currently available with respect to *Epomops franqueti* (Carter and Mess, 2008; Enders *et al.*, 2009; Carter and Enders, 2016; Rodrigues *et al.*, 2019). The morphological study of the foetus and allantoic placenta will aid research understanding on the Epomops fruit bats and highlight the comparative anatomy of this species (Carters and Mess, 2008).

This histomorphological report is therefore made from an incidental collection on the foetus and placenta of the African fruit bat (*Epomops franqueti*) when in an attempt to study uterine histological architecture, one of the bats was found to be pregnant.

## CASE PRESENTATION

Animal capture approval, techniques and sampling were approved by the University of Ibadan Ethical Approval Committee (UI-ACUREC/App/2016/015). Bats were obtained using mist nets in the wild and were thereafter sedated (using Ketamine (80mg/kg) and Xylazine (20mg/kg)) and transcardially perfused (with saline followed by 4% buffered paraformaldehyde) for organ histology. Incidentally, one of the bats was pregnant upon dissection. The foetal and maternal tissues were then routinely processed, using paraffin-wax embedding method, and stained with Haematoxylin and Eosin.

## FINDINGS

The allantoic sac was harvested and revealed a single foetus pregnancy. Foetus appeared fully formed with limbs, external ocular and auditory features well defined. Histological features of the region reported are presented in Figure 1a-i. The foetus presented a well pronounced cervical flexure. Well-developed ventricular zones were seen at the head/brain region (1a,b), showing epithelial development that were consistent with those found lining the nasal and oral cavity (1c,e). Features that make the visceral organs readily identifiable at light microscopy but prominent forms of the tongue, heart, lungs, liver, kidney, intestines and testis were seen on section (1f, g, h). Cartilage model features of the long bones to the digits, and vertebrae with mesenchymal concretions at the periphery and some foci within the cartilaginous masses were observed (1d, f, i).

## DISCUSSION

Bats usually carry a single fetus with a few are exceptions, mostly among the Vespertilionids e.g. *Pipistrellus nanus*, with two or more offspring per birth (Kurta and Kunz, 1987). From the scarce placental descriptions in bats, the African Fruit Bat (AFB) is notably absent. The features in this fruit bat are however similar to those in other Pteropodidae (Carter and Mess, 2008).

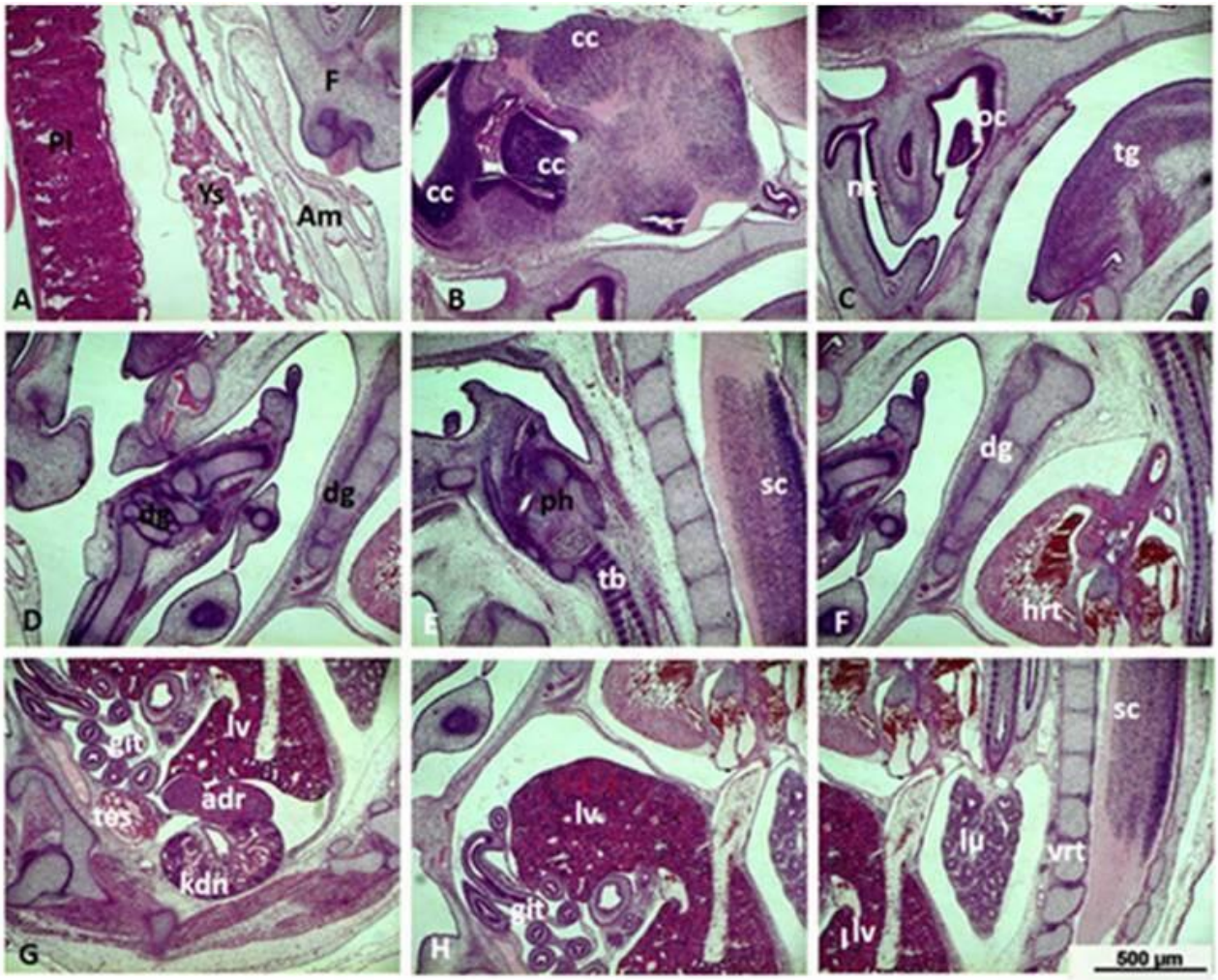


**Figure 1:**
**Anatomical landmarks depicting structure and organ formations in the foetus of *Epomops franqueti*.** (Mag x25 H&E) **A:** Showing placental and other membranes; Discoid and hemochorial placentation (Pl), Yolk sac (YS), Amnion (Am), F: Mouth part of the foetus. **B**: Showing cellular concretions at ventricular zones were seen at the head/brain region, showing epithelial development (cc) that was consistent with those found lining **C:** the nasal**. D, F** and **I:** Cartilage model features of the long bones to the digits (dg), and vertebrae with mesenchymal concretions at the periphery I: (vrt)and some foci within the cartilaginous masses were observed. (nc)and oral cavity (oc)and tongue (tg) **E:** cellular aggregations highlighting the pharynx (ph), tracheobronchi (tb) and spinal cord (sc).There were prominent forms of several viscera, **F:** heart (hrt),**G :** kidney(kdn) and testis(tes) **H:** showing liver(lv), intestinal sections (git) **I:** additionally presented liver (lv), lungs(lu) and spinal cord (sc).

The foetus can be adjudged to be in the last trimester; all the features that make the visceral organs readily identifiable at light microscopy were present, thus suggesting that organogenesis was completed. Within the limit of light microscopy, sections of the placenta can be described as chorionic villi forming interdigitations with the endometrial epithelia, consistent with epitheliochorial placentation. Endotheliochorial placentation is the ancestral condition within placental mammals where the uterine epithelium is lost but the endothelium of maternal capillaries remains intact. This is reported also in several bats e.g. the *Rhinopoma hardwickei* (Carter and Mess, 2008).

It has been suggested that the disease transmission via AFBs have been initiated by the consumption of fruits contaminated with blood and placentas during parturition of infected fruit bats. Hence, a better understanding of the placental morphology in AFBs will be useful in biomedical research for transmission and possible development of antibody sera/cultures in the AFB (Hasannin *et al* ., 2016)

In conclusion, this case report details the obvious limitation of a lone specimen and authors hereby recommend domestication, mating and gestational age studies in order to fully elucidate the AFB foetus and placental morphology.

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