

## MACROSCOPIC AND MICROSCOPIC STUDY OF THE THYMUS DURING MATURE AND IMMATURE IN LOCAL GEESE (*ANSER CYGENOIDES*)

Rabab Abd Alameer Nasser

Department of Anatomy and Histology, College of Veterinary Medicine, University of Diyala, Iraq.  
e-mail: dr.raba72@gmail.com

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**ABSTRACT :** This paper present the crossly study of a thymus inmature and immature Iraq geese, the weight of immature geese about the  $1670 \pm 25.56$  gm in both sex, the age at 4-6 weeks the other group mature goose weighted about  $2500 \text{ g} \pm 33.6$ , the age about 15-20 week. The position of thymus geese (immature) located in middle part of the neck, which extended from half part of neck in both side the trachea parallel the jugular veinto the thoracic cavity, consist of the serieslobes, the total number about six –seven lobes, chain like on each side, which extending from the third cervical region to thoracic entrance, the three first lobes bean in shape completely separated while the last lobes consist of the fourth-six are connected each other, lies parallel to the internal jugular veins and vagus nerve Thymus is surrounding by the capsule embedded into adipose tissue the capsule send the septa separated thymus. First group of the birds (mature) noted invasion the thymus parenchyma by adipose, while the second group of the birds (immature) the thymus is good developed and observed apportion the gland into two zone area cortex and medulla. Cortex was peripheral area of the thymic lobules, dark in staining and medulla, which shows as light in discoloration and situated in the center.

**Key words :** Morphology, mature, immature, thymus, goose.

### INTRODUCTION

The Iraqi goose origin from the Asian goose characterized blue eye, orange to yellow bill knob leg and feed. It has the body weight between 4.5 kg for females and 5.5 kg for males. Each female produced about 15-87 eggs per year. Most Asian peoples used goose eggs as a source of animal protein for human consumption. It is limited produce the eggs by the goose (Yuwanta, 1990). The meat of the goose is more expensive when compared with any meat the domestic birds (Yogyakarta, 2006). As chicken, geese have a complex of nutritional needs, about 40 essential component are needed to be present in their diets. If geese are to undergo rapid rate of growth, high production of eggs, optimal reproductive performance; there essential compound should be included in adequate, amounts, balanced proportions and in readily available (Yuwanta, 1990). The bursa and thymus of fabricius in the birds are mainly lymphoid organs contributing to advance improvement of B and T lymphocyte correspondingly (Davison *et al*, 2008). It is a primary lymphatic organs, in birds responsible to postnatal antigen (Aita and Romano, 2006; Soad *et al*, 2014; Bodi *et al*, 2015). The main function of the thymus is secretion the hormone include thymulin, thymopietin and B4.

Thmosinthymus gland in the bird is remaining unclear. The theory concern this function is that worried with common sexual maturity thymus is situated in neck internal jugular vein located on parallel to the vagus (Aslan, 1999; Young and Heath, 2000; Miller, 2002; Haseeb *et al*, 2014), it is composed of the six-eight flattened pale lobe of the varying size of lymphoid tissue in the broiler and Aseel chickens (Miller, 2002; Akter *et al*, 2006; Haseeb *et al*, 2014) and in turkey (Muthukumaran, 2011; Ail, 2016; Hussein and Reshag, 2018) in duck (Sultana, 2011), in turkey goose (Aslan, 1999), in malired duck the glands are long lobulated chains (Al-Sharoot and AL-Abdula, 2019). It is Varyingin a color of depending on species of birds (Muthukumaran *et al*, 2011; Ail, 2016) histological feature include. The thymus covered by the thin capsule of the connective tissue in most bird avian (Davison, 2008; Tarek *et al*, 2012; McLelland, 1990) in duck (Sultana, 2011). Every lobule was include of the core peripheral and medulla of the central which was thickly population with lymphocyte while the cortex discolored dark (Nakamurya *et al*, 1986; Aita and Romano, 2006; Leena *et al*, 2008; Khan *et al*, 2014; Senapati *et al*, 2016). The cortex cells are basophilic than the cells in medulla (Atoji *et al*, 2000; Sultana, 2011) and some research stated the type of cell in cortex and medulla in pigeon (Masum *et al*,

2014), in broiler chicken (Masum *et al*, 2014; Khan *et al*, 2014) in chicken (Karaca *et al*, 2006; Kannan *et al*, 2015) in ostrich (El-Zoghby and Attia, 2007) in turkey goose (Aslan, 1999).

## MATERIALS AND METHODS

Fourteen Health of Iraqi breed geese of both sexes were collected from the market of poultry in Baqupa city, these bird divided to two groups, the first group consist of seven immature birds, weighted the  $1670 \pm 25.56$  in both sex and the second group consist of seven birds are mature goose weighted  $2500 \pm 33.6$ . These all groups subdivided to two groups for anatomical and histological study. The bird in all group were killed by deeply anasthesed by ketamine 30-40 mg/Kg B.W with xylazin 10mg/KgB.W injected in pectoral muscle (Paul-Murphy and Fialkwski, 2000) and immediately after killed the bird used for the :

A. The macroscopic study include

A. Weighted these goose mature and immature

B. Biometry weighted each lobes of thymus in two groups

2. **Microscopic study** : include

when open skin in ventral neck dissection and collected the specimen from different lobes of the thymus gland, keeping in 10% neutral formaldehyde solution for 24 hours and preparation the slid by series steps stated by dehydration in gradually alcohol followed, the clean used xylene than infiltrated the tissue in two jar of paraffin, late stage cutting by microtome after staining by hematoxyline and eosin (Bancroft and Stevens, 1982).

## RESULTS AND DISCUSSION

### Anatomical study

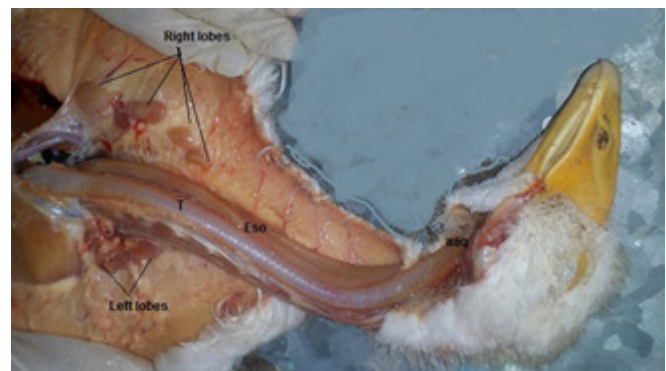
**a. Weight of bird** : The average weight of immature geese (4-6 weeks old) was  $1670 \pm 25.56$  gm in both sexes. The average weight of mature geese (15-20 week old) was  $2500 \pm 33.6$  g. (Fig. 1).

**b. Position of thymus** : The thymus in immature geese was found to be located in the middle part of the neck and extended on both side of the trachea parallel to the jugular vein (Fig. 3). This result agreed with that obtained in broiler chicken (Akter *et al*, 2006; Tarek *et al*, 2012; Haseeb *et al*, 2014). While thymus in the mature geese was found on both side of the trachea, extending from second third of the trachea to the thoracic entrance. The reported the thymus lobulation distinct in immature but the lobulation is indistinct in mature Turkey and later than become.

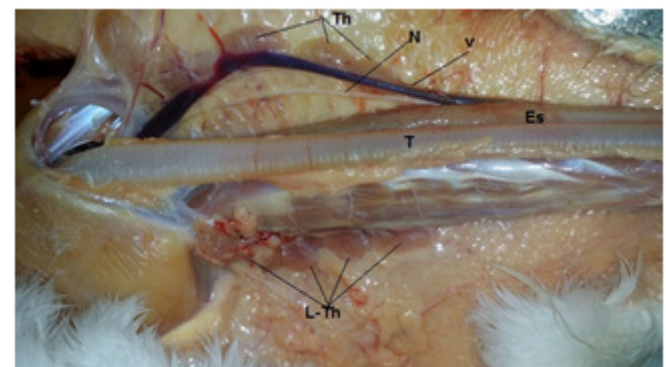
**c. Shape** : The shape of thymus in immature bird is



**Fig. 1** : The mature Iraq breed Family of the goose: *Anseridae*, Spp: goose.



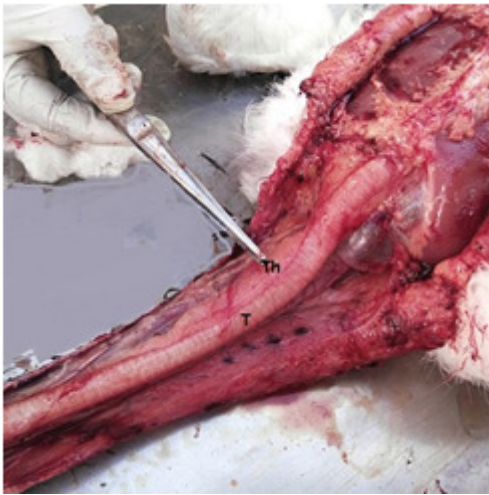
**Fig. 2** : The immature goose 6 weeks appearance the thymus gland on each side of the neck consist of 5-7 lobes, T: Trachea, Eso: esophagus.



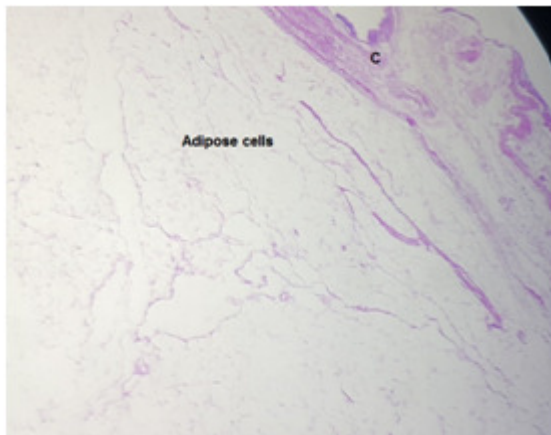
**Fig. 3** : The immature goose 6 weeks appearance TH : thymus lobes bean shape, V : jugular vein, v : vagus nerve, Es : esophagus, T : trachea.

very distinct; it consists of a series of lobes arranged in lobes with a total number of about seven on each side of the trachea. This result agreed with that obtained turkey goose (Aslan, 1999). Extending at the level second -third of cervical region to the thoracic entrance. Anterior first to three lobes are bean in shape and completely separated from each other. While the remaining lobes are connected to each other and lies parallel to the internal jugular vein

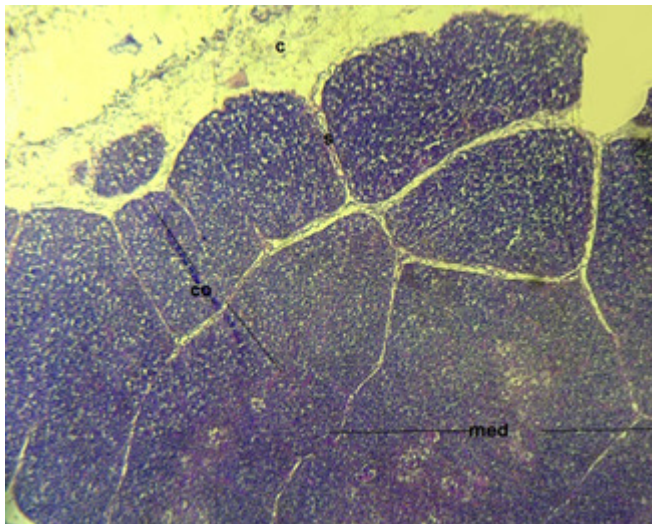




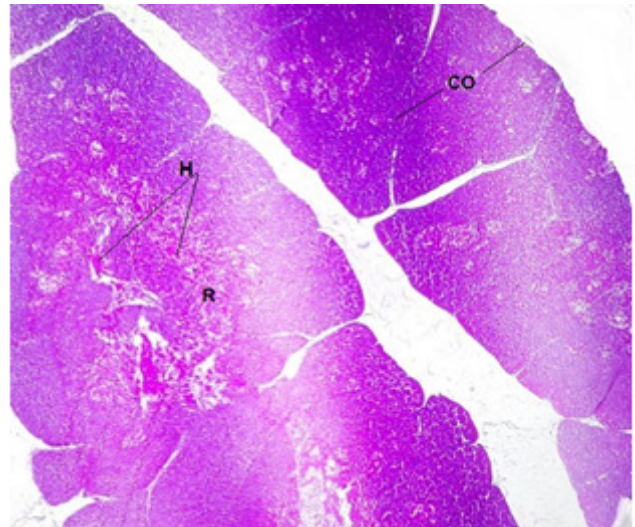
**Fig. 4 :** Neck region appearance the thymus in mature goose replace by fat, Th: thymus gland, T: Trachea.



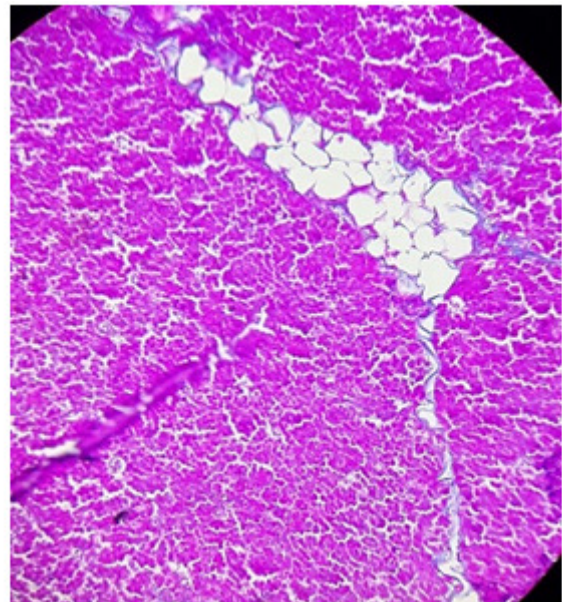
**Fig. 5 :** Photomicroscope thymus illustrates the capsule : c., adipose tissue replaced the parenchyma in mature geese (H & E stain X50).



**Fig. 6 :** Photomicroscope illustrates the capsule : c, send the septa : sto the parenchyma cortex area:co and medullamed in goose. (H & E stain X40).



**Fig. 7 :** Photomicroscope illustrates the thymus cortex and medulla, keratinized reticular cells (R) that form, Hassall's corpuscle : HMmassons trichrome stain x40.



**Fig. 8 :** Photomicroscope illustrates the thymus cortex, Fat: F Mason stain x200.

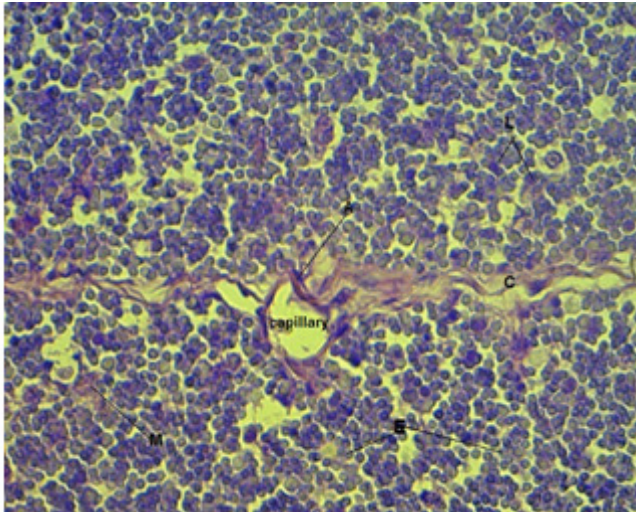
and vagus nerve (Figs. 2 & 3). In mature geese there is no distinct lobulation and the gland looks like a mass of fat (Fig. 4), this observation is similar to that observed in chicken (Akter *et al*, 2006; Aita and Romano, 2006; Haseeb *et al*, 2014). The weight of the left and right thymus is  $2.438 \pm 0.0036$  and  $2.324 \pm 0.0021$ , respectively (Fig. 3).

**d. Color of the thymus :** In immature geese the thymus was mostly pale yellowish to pink in color. In mature geese, the thymus appeared yellowish in color; which is similar to that observed in most birds, in turkey (Muthukumar *et al*, 2011)

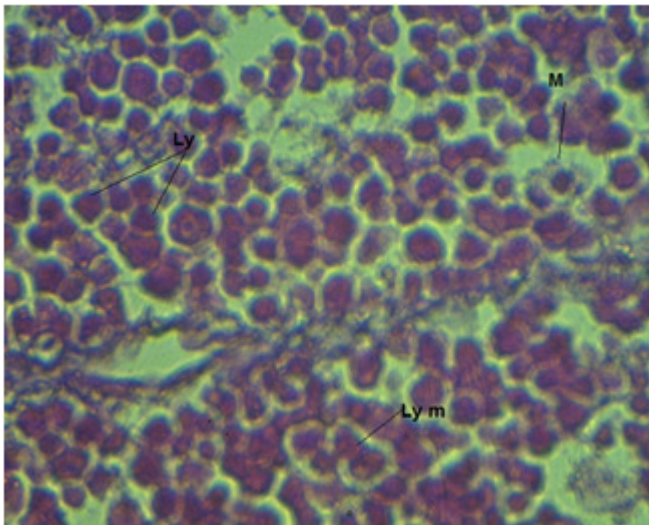
**Histological study**

**a. Capsule :** The thymus is surrounded by a capsule





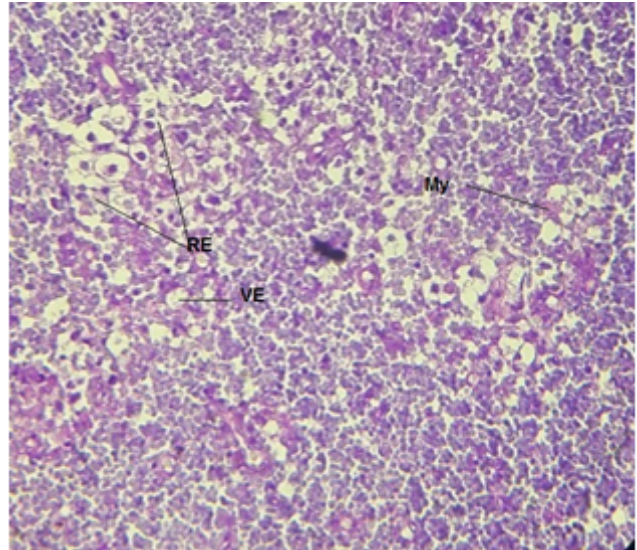
**Fig. 9 :** Photomicroscope illustrates: the cortex of the thymus in gooseshowing the capillary, obscured of lymphocyte (L) cortical epithelial cell poorly stain (E), the capsule : C.macrophage : M, H&E stain X400.



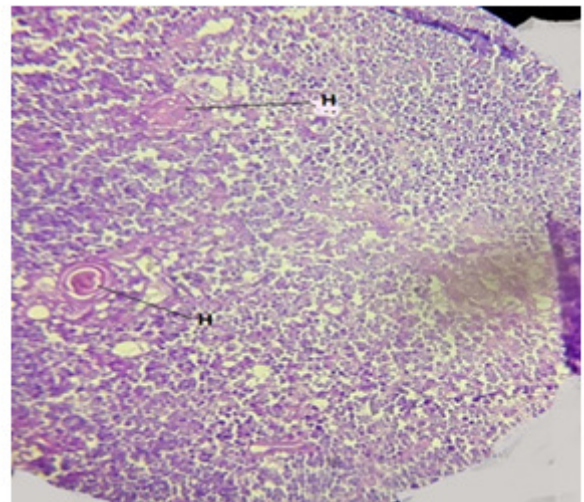
**Fig. 10 :** Photomicroscope illustrates the cortex containing the lymphocyte, lymphoblasts : Ly, mature lymphocyte divided by mitosis. Lymphoblasts were characterized by large nuclei : Ly, M: macrophage :M, mason stain x1000.

which consisted of fine fibers, connective tissue and embedded into adipose tissue (Fig. 5). The capsule sends septa separating the thymus parenchyma (Fig. 7). These results are in accordance with that obtained by others in chicken (McLelland, 1990; Davison *et al.*, 2008), in ducks (Sultan *et al.*, 2011) in turkey (Muthukumaran *et al.*, 2011; Hussein and Reshag, 2018) in ostriches (El-Zoghby and Attia, 2007)

**b. Thymus parenchyma :** First group of the birds (mature) noted invasion the thymus parenchyma by adipose tissue due to regression of lobules of thymus (Fig. 5). This result similar the result noted by in broiler chickens when used three age (Aita and Romano, 2006; Sultana *et al.*, 2011; Senapati *et al.*, 2016). In immature geese the



**Fig.11 :** Photomicroscope illustrates: the medulla of the thymus in goose reticular cells: RE, in this section contain the eosinophilic materials and vesicles : VE, myoid cells: My H & E stain X200.



**Fig.12 :** Photomicroscope illustrates: the medulla of the thymus in goose, few lymphocyte and large, medulla contain Hassall's corpuscles :H.

thymus is well-developed and distinguished into two zones, the cortex and medulla. Cortex was the tangential region of the thymic lobule, darker than the medullas which appear lighting more in colour and positioned in the center of the gland (Figs. 6, 7). These results run parallel with that obtained in broilers (Akter *et al.*, 2006; Haseeb *et al.*, 2014; Khan *et al.*, 2014) and in ostriches (El-Zoghby, 2007) in turkey geese (Aslan, 1999).

**C. hymus cortex :** The cortex is packed with mature and immature – lymphocytes. Large lymphocyte was seen undergoing mitotic division (Fig. 8). This result agreed with that observed in broilers (Tarek *et al.*, 2012; Aita and Romano, 2006) in ducks (Sultana *et al.*, 2011). Blood capillaries lined by flattened endothelial cells was

observed entering the cortex from the capsule. The cortical epithelial framework appeared pale in colour; it was not easily distinguished because of high density of lymphocyte in the area (Figs. 9, 10).

Fine cytokeratin a mesh of epithelial reticular cell (ERC) was seen densely packed with the cortex. Number of basophiles and macrophages and large to medium sized lymphocytes were also observed (Figs. 10, 11). These observations are in accordance with that observed in pigeon (Atoji *et al*, 2000) and in turkey (Muthukumar *et al*, 2011; Ail, 2016).

### Thymic medulla

Histological feature of the medulla consisted of robust epithelial cells characterized by eosinophilic cytoplasm and large poorly stained nuclei. These results agreed with that obtained by others in 28 day old chickens (Aita and Romano, 2006; Karaca *et al*, 2006; Bodi *et al*, 2015). These cells form clusters of the large number of epithelial like cell and small number of the lymphocyte in medulla less basophilic, the classical histological structure in medulla concentrically arrangement keratinized called Hassalls corpuscle an epithelial cell aggregation concentrically myloid cell are elongated see in medulla of thymus pale stain (Fig. 12). These result accordant with in ostrich (El-Zoghby and Attia, 2007) in broiler (Karaca *et al*, 2006; Tarek, 2012) in chicken (Young and Heath, 2000; Khan, 2014).

### CONCLUSION

1. Thymus gland very active in gosling and then replace by fat in mature
2. Study the thymus of the goose anatomically composed of enumerate the lobulated chains on each side of the neck pink in color flattened in shape
3. The gland surrounding by the thin capsule which send the septa separated thymus in to lobules each lobules compose from two zones cortex contain many lymphocyte and the medulla have uniform distribution of reticulum cells. Located among of lymphocytes (reticulum cells), Hassal's corpuscles dissimilar in form as well as mass.

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