

# Anatomical and Histological Study of Thyroid Gland in Weasel (*Herpestes javanicus*) (E.Geoffroy saint.Hilaire,1818)

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## Abstract

The present study aimed to investigate the morphological description and histological structure of thyroid gland in *Herpestes javanicus*. The results revealed that thyroid gland in adult *Herpestes javanicus* is located in the neck region just below the larynx and attached to the trachea. Histological study revealed that thyroid gland in *H. javanicus* surrounded by a capsule of loose connective tissue and the thyroid gland mainly formed from follicles within different sizes. The results showed that the follicle consists of three components represented by follicular lining cells, basal parafollicular cells and the colloid. Microscopical examination revealed that the follicular lining tissue is either to be simple squamous or simple cuboidal epithelial tissue. The results also showed that the parafollicular cells (C-cells) are spherical, oval and even polygonal, and are located either interfollicular or intrafollicular.

**Key words:** Thyroid gland, Weasel, Thyroid histology, anatomy, C-cell

## Introduction

The thyroid is a bilobed endocrine gland located in the neck region, anterolateral to the larynx and upper trachea. The two lobes are connected by a thin band of thyroid tissue, the isthmus that cross anterior to upper part of the trachea [1,2,3].

Thyroid gland is an unique among the endocrine gland in that it stores large amount of hormone in an intact form within extracellular compartments in the center of follicles, in contrast with other endocrine gland store only small quantities of hormones in intracellular site [4,5].

The main bulk of the gland develops from an epithelial down growth from the fetal tongue whereas the calcitonin-secreting cells are derived from ultimobranchial element of the fourth branchial pouch [4]. A thin connective tissue capsule surrounded the gland. It sends trabeculae divided parenchyma to several lobules [4,6,7].

The thyroid gland follicles consist of two basic cells types represented by principal or follicular cells and parafollicular or C-cell. The two cells have different embryonic origins [6]. The first type secretes the thyroxin, T<sub>4</sub> and Triiodothyronin hormones which are playing an important roles for reproduction differentiation and migration of cells during embryonic stages [3,8]. The second type of cells (parafollicular cells) are secreted calcitonin hormone which regulate the calcium level in the blood [9,6].

Review of the literature revealed that there is few investigation deals with the morphological description and histological structure of thyroid gland in Iraqi vertebrates especially the wild vertebrates [10,11]. This literature record supports the idea to study the thyroid gland in Iraqi wilde vertebrates including the animal under investigation Weasel, Small asian mangoose (*Herpestes javanicus*). This study is a part of large scale investigation deals with the anatomy and histology of thyroid glands of different Iraqi wild vertebrates, hope to increase the information in this field of the study.

## Materials and Methods

A total of [10] adult weasel (males & females) (*Herpestes javanicus*) were collected from Al-Najaf province.

The animals are classified according to the field guide of wild mammals of Iraq [12]. All animals were scarified for collecting the thyroid gland for morphological and histological study.

Methods of Bancroft & Stevens [8] were employed for histological techniques and different stains were used (Harris Haematoxylin- Eosin, PAS and Azan stains) to stain the histological sections.

## Results

The present study on the morphological description and histological structure of thyroid gland in Weasel (*Herpestes javanicus*) declares the following results:

### 1- Morphological description:

Results of the gross anatomy revealed that the thyroid gland in adult Weasel (*Herpestes javanicus*) is located in the neck region, it is attached to the trachea just below the larynx (Figure 1). It consists of two distinct lobes with no clear isthmus as in other large mammals. They are located at the tracheal incomplete rings (1<sup>st</sup>- 5<sup>th</sup>). The thyroid lobes are oval shaped with length & width for right & left lobes in males & females respectively (Table 1)

### 2- Histological structure:

Results of the present study showed that thyroid gland in *H. javanicus* surrounded by a capsule of loose connective tissue consists of two layers, an outer fibrous layer of collagen

fibers, elastic fibers and few reticular fibers in addition to the fibroblasts and the inner layer of collagenous fibers with few elastic fibers and smooth muscle fibers in addition to the blood vessels and nerves. The capsules extend to the gland tissue by the trabeculae which divided the gland paranchyma to several lobules (Figure 2).

The thyroid gland is mainly formed from follicles of different sizes. The follicles consists of three components which are represented by follicular lining cells, basal parafollicular cells which located inbetween the basement membrane and follicular cells and the colloid which filled the follicle cavity (Figure 4). The follicles appear with different shapes either to be oval or round and even irregular shapes and have different sizes, small, medium and large (Figure 3) (Table 1).

Microscopical examination declares that the follicular lining tissue is either to be simple squamous or simple cuboidal epithelial tissue, the later is the dominant type. The cavity of the follicles is filled with colloid in different quantities [Figure 3,4]. Blood vessels are appeared inbetween the follicles and they are clearly appear in males in contrast with females (Figure 3).

The parafollicular cells (C- cells) are spherical, oval and even polygonal with spherical nucleus and clear cytoplasm (Figure 5). These cells are located either interfollicular or intrafollicular and they appeared either single cells or in clusters [5], their numbers in males are less than in females.

## Discussion

Anatomical examination revealed that thyroid gland in adult *H. javanicus* is bilobed located in front of neck region at tracheal ring (1<sup>st</sup>- 5<sup>th</sup>), such result agrees with the results of several previous works [11,13,14 and 15] dealt with anatomy of the thyroid gland in buffalo, camel, donkey and rat respectively. This agreement probably related to the fact that all vertebrates have the same body plan.

Previous studies showed that there is a cylindrical structure called isthmus connected the two thyroid glands on both sides of trachea [10,11,14]. These results disagree with present study results that the disagreement is probably related with the size and physiological structure of the animal under investigation [15].

Review of the literature revealed that there are clear differences in the thyroid gland capsule structure. Kausar & Shahid [14] and Igbokwe [15] observed that in camel & wild african grasscutter that the capsule consists of a thin layer of loose connective tissue, while Adhikary *et al.*, [16] found that the capsule is formed from three layers, an outer, middle and inner layers. The present study disagrees with the above finding as the capsule formed of a two layers loose connective tissue represented by an outer and inner layers, which agree with the results of [13] in Iraqi buffalo, white fulani (*Zebu*) cattle [17] and giant rat [18]. Smooth muscles fiber in inner layer of capsule probably plays an important role in contraction of the capsule and motility of colloid.

Results of the present study revealed that the histological structure of the thyroid gland in *H. javanicus* has the same structure that recorded in previous studies [13,15,16,17,18].

The present study results revealed that the tissue lining the follicles represented by simple squamous or simple cuboidal epithelial tissue. These results agree with several previous results [11,14,15,18 and 19] and disagree with [9,10 and 20]. Igbokwe and Ezeasor [17] revealed that the cells lining the follicles are columnar and form simple columnar epithelium. The disagreement probably is related with the function of gland due to the fact that the columnar cells are more active cells in different organ lining [25].

The follicle of gland contains a colloid material with different quantities [13,16,17,20 and 25], these results agree with the present study and it is related with body plan & the functional need .

The histological examination of thyroid gland revealed that the parafollicular cells [C-cell] appeared as single cells or in cluster, and these cells appear spherical or oval shape with dark nucleous and light cytoplasm [1,13,16,17,20,22,23,24].

Results of the present study that declare C-cells either to be interfollicular or intrafollicular in their location which agree with [16,17] foundation and this is related with the functional construction .

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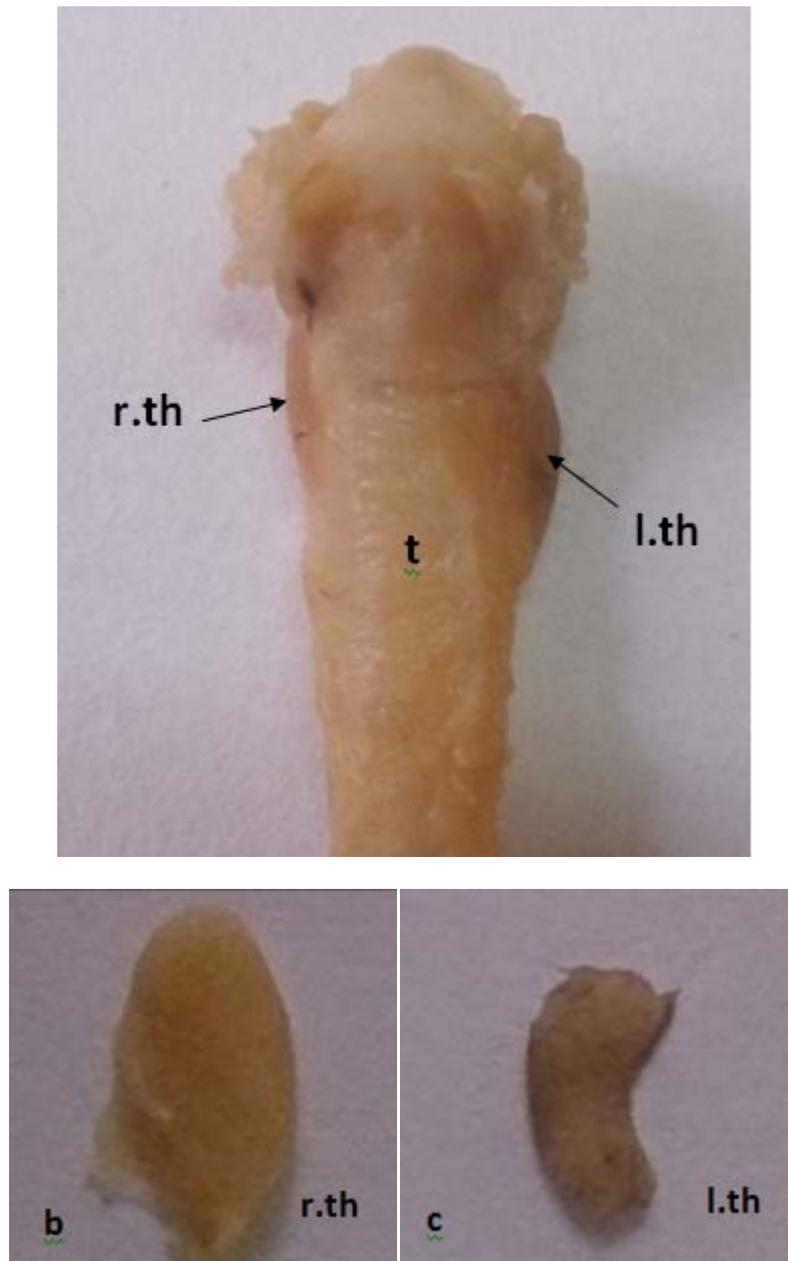
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**Table (1): Length, width and the diameter of the thyroid lobes in *H. juvanicus***

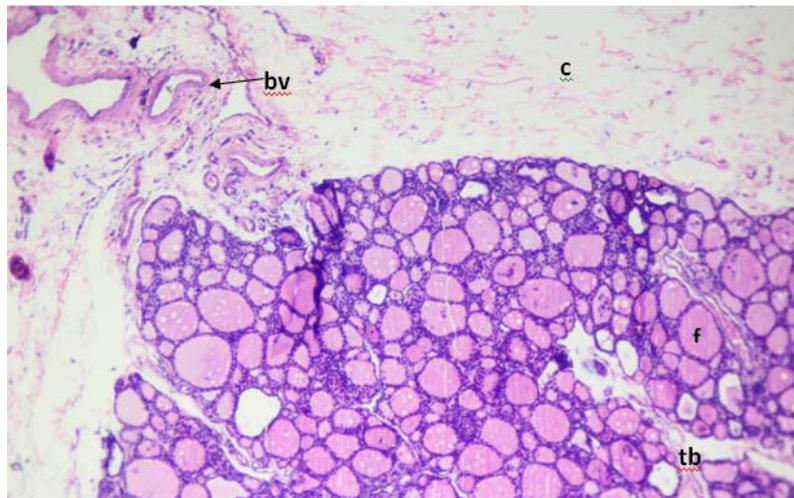
Sex	Dimension (cm)	Right lobes	Left lobes
		Mean ± S.E	
Male	Length	0.770 ± 0.0517	0.850 ± 0.0453
	Width	0.380 ± 0.0389	0.340 ± 0.0371
Female	Length	0.860 ± 0.0427	0.680 ± 0.0611
	Width	0.350 ± 0.0342	0.720 ± 0.0153

**Table (2): The diameter of the thyroid follicles in *H. juvanicus***

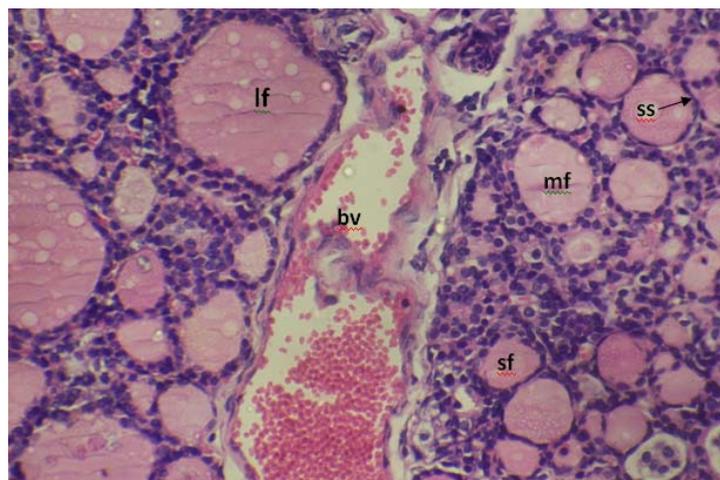
Sex	Small follicles (µm)	Middle follicles	Large follicles
	Mean ± S.E	Mean ± S.E	Mean ± S.E
Male	0.2205 ± 0.1323	0.180 ± 0.00824	1.1465 ± 0.06313
Female	0.2110 ± 0.01183	0.1985 ± 0.00693	0.9758 ± 0.06971



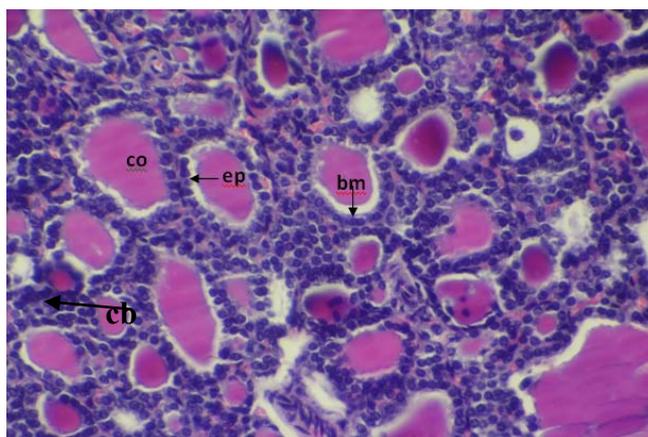
**Figure (1) :a. Positon of thyroid gland in *Herpestes javanicue*,. ( t ) trachea, b.(r.th ) right thyroid lobe, c. (l.th ) left thyroid lobe**



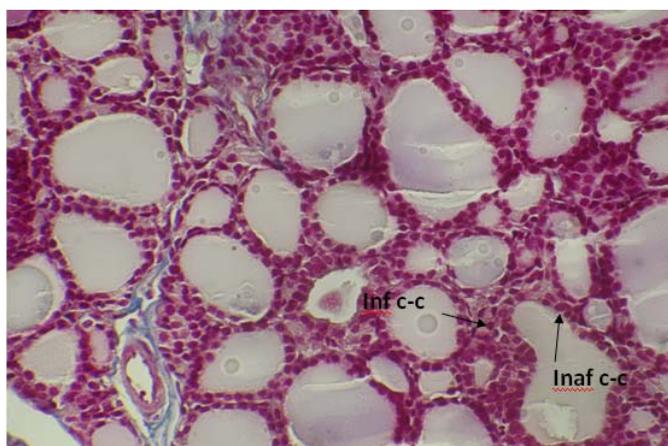
**Figure (2):** Cross section in thyroid gland showing ( f ) follicle ,( c ) capsule ,(tb) trabeculae (bv) blood Vessle H&E 100X



**Figure (3):** Cross section in thyroid gland showing (lf) large follicle, (mf) medium follicle, (sf) small Follicle,( ss ) simple squamous epithelial tissue , (bv) blood Vessle H&E 400X



**Figure (4):**Cross section in thyroid gland showing (co) colloid, (ep) epithelial tissue cell (bm) basment membrane PAS 400X



**Figure (5):** Cross section in thyroid gland showing ( inf) interfollicular cell, (inaf) intrafollicular cell Azan 400X

## دراسة تشريحية ونسجية للغدة الدرقية في حيوان بيز ابن عرس Weasel (*Herpestes javanicus*) (E.Geoffroy saint.Hilaire,1818)

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### الخلاصة

هدفت الدراسة الحالية التعرف على الوصف الشكليائي والتركيب النسجي للغدة الدرقية في بيز ابن عرس *Herpestes javanicus*. اظهرت نتائج الدراسة ان الغدة الدرقية في الحيوان البالغ تتموضع في المنطقة العنقية تماما تحت الحنجرة وتكون ملتصقة بالرغامى. اوضحت الدراسة النسجية ان الغدة الدرقية في الحيوان موضوع الدراسة *H. javanicus* تكون محاطة بمحفظة من نسيج ضام، وان الغدة تتكون بشكل رئيس من جريبات مختلفة الحجم. اوضحت نتائج الدراسة الحالية اوضحت بأن الحويصلات تتكون من ثلاثة مكونات تتمثل بالخلايا الظهارية للحويصلات وخلايا قاعدية جنب جريبية اضافة الى الغروان (Colloid). اظهر الفحص المجهرى ان النسيج المبطن للجريبات اما ان يكون نسيجا ظهاريا حرشفيا بسيطا او مكعبيا بسيطا. كذلك اوضحت نتائج الدراسة الحالية ان الخلايا جنب الجريبة تكون اما بيضوية او مضلعة وقد تكون متعددة الوجة وهي تتموضع بموقعين بين جريبي و داخل جريبي.

**الكلمات المفتاحية:** الغدة الدرقية، بيز ابن عرس ، ، دراسة نسجية للغدة الدرقية , دراسة تشريحية للغدة الدرقية , خلايا C-cell