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HISTOLOGICAL AND HISTOCHEMICAL FINDING OF MAJOR SALIVARY GLANDS IN DOMESTIC GUINEA PIG

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Abstract

The current study aimed to determined the histological and histochemical structure of major salivary glands taken from six mature female and male guinea pig captured locally in Al-Samawa city (Province of Al-Muthanna, Iraq) after euthanized of animals, the major salivary glands fixed in 10 % NBF, dehydrated in series of graded concentrations of ethanol, clearing in xylol, embedded in paraffin. Sections of (5 µm) thick then stained with Mayer's haematoxylin and eosin, PAS, combind PAS-AB (pH 2.5) and the Masson's Trichrome. The results showed that the parotid gland was enveloped by thick dense fibrous connective tissue capsule and lumina of the acini are narrow.

Around the acinar cells, myoepithelial cells may be seen, and the intercal ated ducts are lined by simple cuboid epithelial cells. Submandibular glands were coated by a capsule of dense fibrous connective tissue from which septa of connective tissue extended and divide the gland into several lobules and sublingual glands which is compound tubuloacinar gland the paranchyma are lobules, enclosed by layer of irregular connective tissue capsule, from it, the septa are raised and dividing it into various lobules in conclusion the salivary gland's of guinea pig capture in Al-Samawa showed some differences of histological structures.

Key word: guinea pig, histological study, Harris haematoxylin, parotid gland, submandibular glands and sublingual glands.

Introduction:

The domestic guinea pigs *(Cavia porcellus),* considered a rodent species belongs to genus; Cavia in the Caviidae family. Breeders frequently use

the term cavy to describe the animal, although in scientific and laboratory settings, the term is used (Weir,1974).This species of guinea pig is a rodent from South American that Similar to other cavies, it has a muscular physique with short limbs, a large head and eyes, and small ears. The claws are short and sharp, and the soles of the feet are hairless. The local guinea pigs are huge rodents, weighing 500 to1,500 g and measuring 20 to 40 cm in length. From the outside,

the tail is invisible. At the neck, a crest of longer hairs can be seen, but the fur's tallness and texture range from smooth (short or long) to coarse and sh ort or long and silky.Coat color might bewhite, cream, reddish to chocolate brown, black, or combination of these colors (De Vries, 2001).

The wild cavy is a common rodent in South America, and the domestic guinea p

ig is a descendant of it(Kunzl and Sachser, 1999).

It's a herbivorous, crepuscular, nonburrowing hystricomorph (porcupinelike) rodent with stocky body,with small neck and limbs, and either no tail or a rudimentary one. More closely associated with chinchillas and porcupines than to and rat mice, this rodent is thought to

be(North,1999). Except during pregnancy, the mature male weighs between 900- 1200 gram, while the smaller female weighs between 700–900 g.(Quesenberry *et al.*,2004).
Their lifespan varies between 2 and 8 years, with the breeding female having the shorter longevity(North,1999).The ducts of the glands drain around the molars(Quesenberry *et al.*,2004). The digestive system starts from the mouth and ends at the anus, it contains accessory organs that aid in digestion which including; teeth, salivary glands, pancreas, liver, and gall bladder (Cooper and Schiller, 1975). There are four pairs of major salivary glands: parotid, submandibular, sublingual and molar. Three pairs of main salivary glands: parotid, submandibular, and sublingual were were determined. They are exocrine tubuloacinar type glands. They are structured into many lobules which, divided into multiple lobules each contains blood arteries, nerves, and large excretory ducts (Silviaetal.,2005).The salivary glands of rodents play a vital function in the digestive system dueto it secrete a fluid cal led saliva that moistens the oral cavity mucosa and lubricates dry foods before s wallowing(Vissink,2010).It has a high bicarbonate level, which acts as a buffer i n the mouth. It serves as a platform for food elements to trigger taste buds. It use s the digestive enzme amylase to start carbohydrate digestion and secretes lysoz yme to regulate thebacterial flora (Genkins, 1978). Experiments have also reveal ed that it secretes IgA, potassium, and resorbs the salts (Ferraris *et al.,* 1999; Pijpe *et al.*, 2009 ; Ikpegbu, 2013).

Materials and Methods

Salivary glands of six mature (male and female) *Guinea pig* catch in AlSsamawa city (Province of Al-Muthanna, Iraq) were used. They were fixed in 10 % NBF, dehydrated in ethanol that has been graded,cleared in xylene. Embedded in the paraffin wax. Sections of (5 µm) thickness, stained with "Mayer's hematoxylin and eosin" as a routine stain used for general features identification, Masson's trichrome stain for collagenous and smooth muscle fibers staining and identification (Luna, 1968). For histochemical study, the specimens were fixed in Bouin's solution. Stained with different stains including PAS, combind PAS-AB (pH 2.5) and Masson's Trichrome after which it was examined and photographed After that, an Olympus BH2 microscope was used to analy ze and photograph the samples. Olympus BH2 microscope was used to cr eate this image, using dino-eye camera (Bancroft and Stevens, 2012).

Results and discussions:

1-Parotid glands:

The parotid gland was envelops by thick dense fibrous connective tissue capsule includes the collagen fibers, this result was approve by (Rosa *et al.,* 2014), but differ with (Al-Saffar and AL- Simawy (2014) who mentioned the capsule which surrounded the glands was thin connective tissue and the paranchyma was arranged into lobules which are widely separated by fibrous stroma (Fig.1). This gland was compound tubuloacinar exocrine glands made up of acini which were purel serous type in relation to the intercalated and striated ducts, as reported by (Yazadni Moghaddam *et al.,* 2009). Each lobule was structured with an interlobular duct system and also associated blood vessels (Fig.2). The acini lead to intercalated ducts, which in turn lead to the striated ducts, and these to the excretory ducts, these ducts merge to form larger and more larger ones till excretory ducts were formed that was lined by a stratified epithelial cells. The acinar cells possess spherical nuclei basally located of the cells and the cytoplasm full of granules (Yasear *et al*., 2004; Kahdem, 2018). The lumina of the acini were narrow, Myoepithelial cells were detected around the acinar cells, and the intercalated ducts were lined by simple cuboid epithlium. The acini of parotid gland showed negative reaction for PAS and AB- PAS stains, while its ducts gives positive reaction for PAS stain and PAS part of AB-PAS stain (Fig.3, 4).This result was disagree with (AL-Saffar and Simawy, 2014) on rabbit in which the acini in this gland showed positive reaction for PAS stain, but similar result for AB-PAS stain to the same researcher.

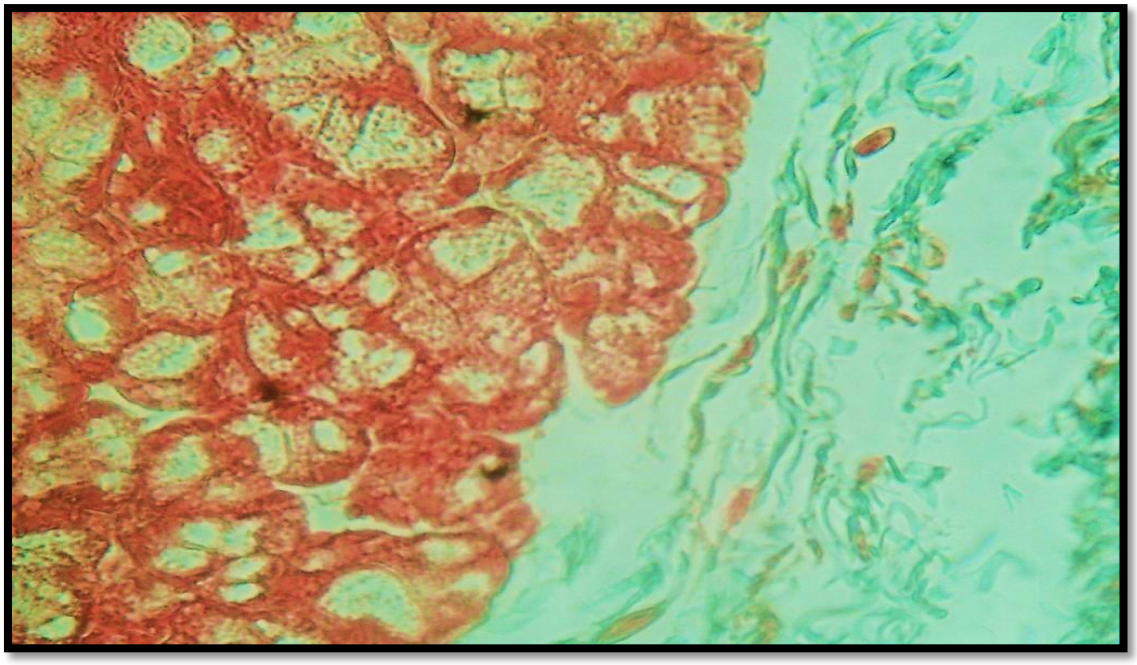
2- Submandibular glands:

The submandibular glands were envelops by the dense fibrous connective tissue capsule. The septa of connective tissue extend from capsule and divided the gland into several lobules, similar to that reported by (Khojasteh and Delashoub, 2012 and Ikpegbu *et al.,* 2013) who mentioned the gland was lobulated and surround by fibrous dense connective tissue capsule (collagenous, elastic and few reticular fibers). This gland is mixed gland, it composed of two types of secretory cells in their lobules, that are mucous acinar cells, serous and seromucous demilunar cells (Fig.5). This results agree with (Hiba *et al.,* 2021) who mentioned the gland the secretory system of the gland was involved acini (serous, mucous and serous demilune) and the ducts. The mucous cells are more abundant than those of serous cells which are characterized by flattened nuclei located in the base of the cells, the acini were surrounded by flattened myoepithelial cells. This gland with intercalated, striated and excretory ducts. Both intercalated and striated ducts lined by a simple columnar epithelium, but the excretory ducts lined subsequently by stratified columnar epithelium and finally by a stratified squamous epithelium at the junction with the oral mucosal epithelium. The acini of Submandibular gland showed positive reaction for PAS and PAS part of AB-PAS stains except the ducts which gives negative reaction for this stain (Fig. 6,7).

3- Sublingual glands:

The gland is compound tubuloacinar gland the paranchyme are lobules with surrounded by a thin layer of irregular connective tissue capsule, from which the septa are raised and dividing it into various lobules (Fig.8) agree by (Nagato *et al*, 1997). In each lobule, the acini are either acidophilic mucous or basophilic, in addition to that basophilic cells, as crescent shape demilunes. both mixed acini, mucous, serous and demilunes, glands this similar by (Kahdem, 2018) who mentioned the with both mucous cells (predominant cells type).The mucous acini, serous demilunes, intercalated ducts, striated ducts, and excretory ducts were lined by cuboidal cells with small flattened basally located nuclei.

Intralobular duct are present which are intercalated and striated ducts which are striated ducts lined with simple cuboidal cells are seen in the mucoserous acini together with not frequently intercalated ducts covered with flattened epithelium. The excretory ducts are very large (Fig.8). As recorded in the other rodents by (Amano *et al.,* 2012).



(Fig. 1) Photomicrograph of parotid gland of guinea pig of shows the thickened capsule surrounding the gland. **Masson's Trichrome stain 40X**

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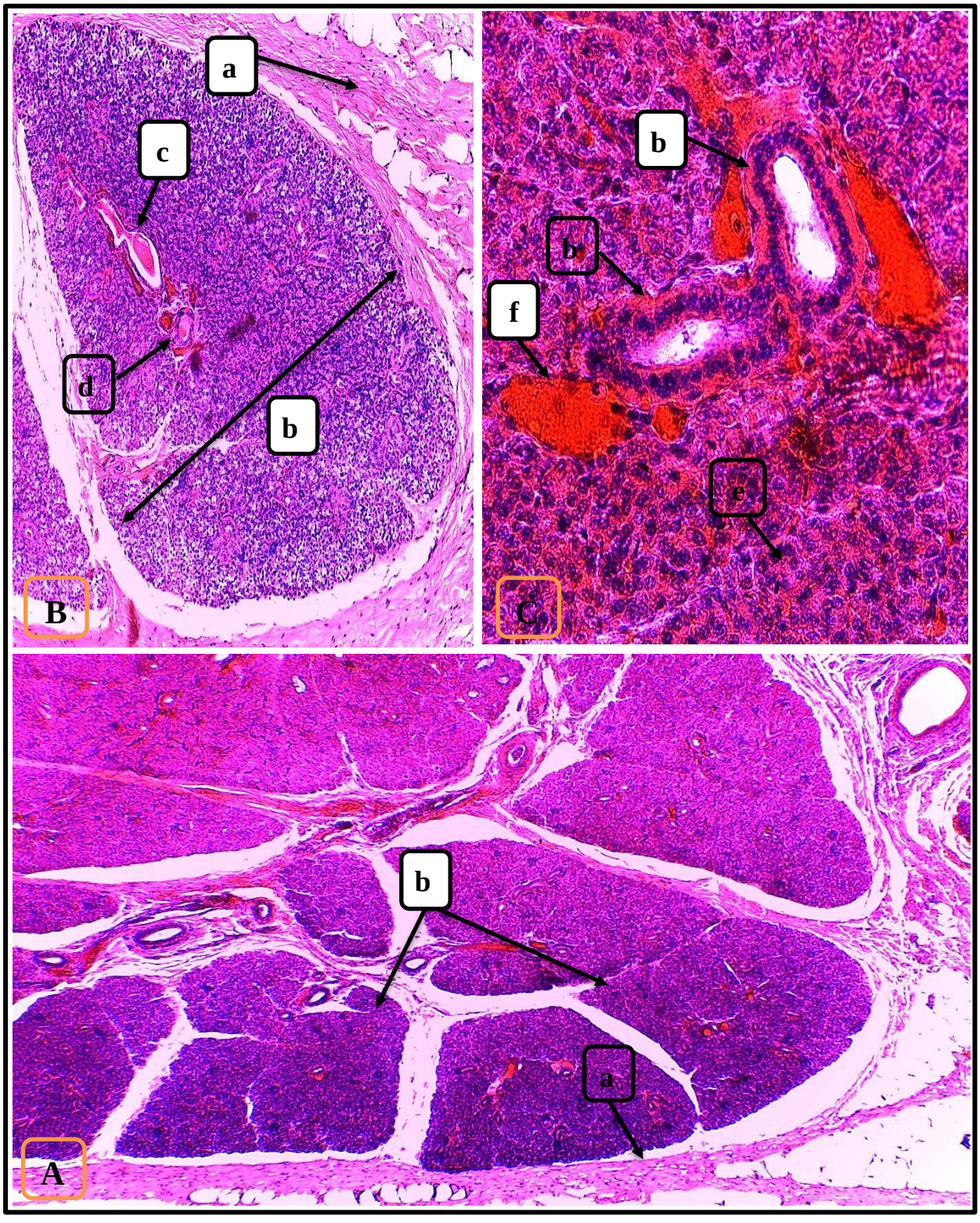

(Fig. 2). Photomicrpgraph of parotid gland of guinea pig shows many lobules contains serous acini
(**A**), surrounded by connective tissue capsule (**B**) and section of part of lobule showed the ducts and
acini. (**a**) capsule, (**b**) lobules, (**c**) interlobular duct, (**d**) intralobular duct, (**e**) serous acini

, (**f**) blood vessels. **(A) X40 , (B) X 100 and (C) X 400 (H & E)**

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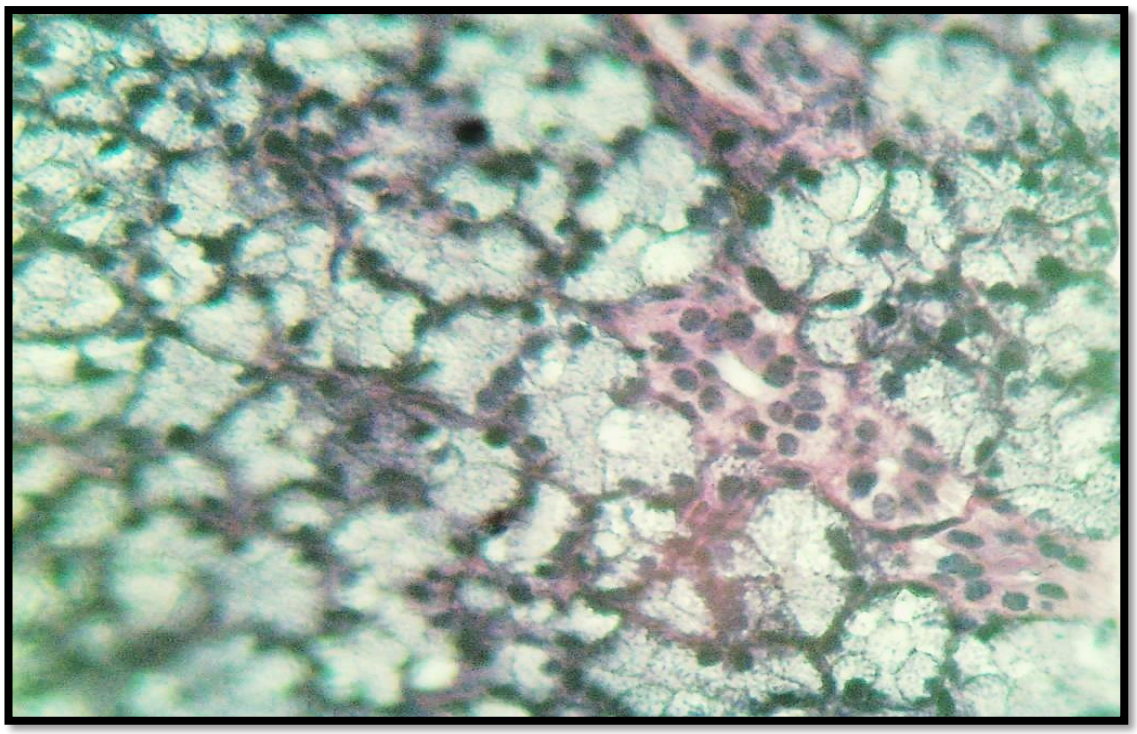
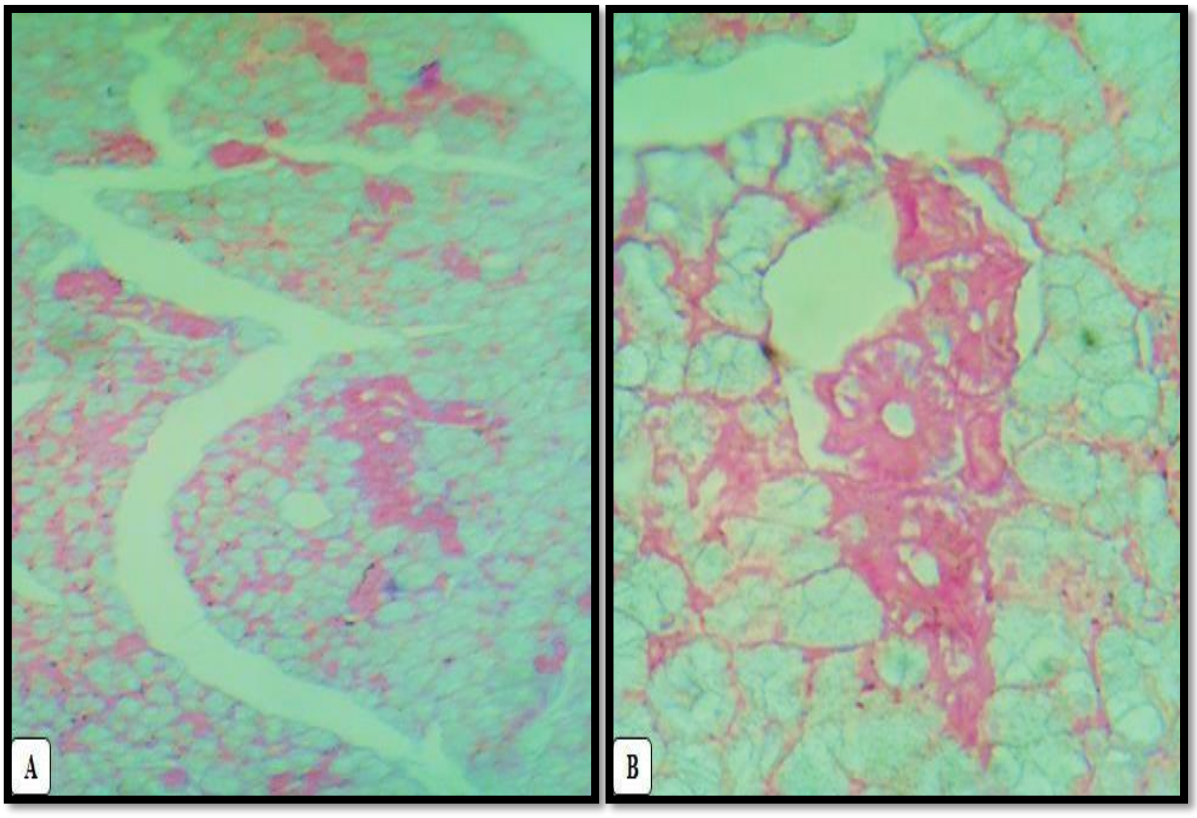


(Fig.3): Photomicrograph of Parotid gland of guinea pig shows the acini gave negative reaction while the ducts reacted positively with PAS stain PAS 400X



(Fig.4):photograph of Parotid gland of guinea pig shows the acini gave negative reaction while the ducts reacted positively with PAS part in combined AB- PAS stain 40X

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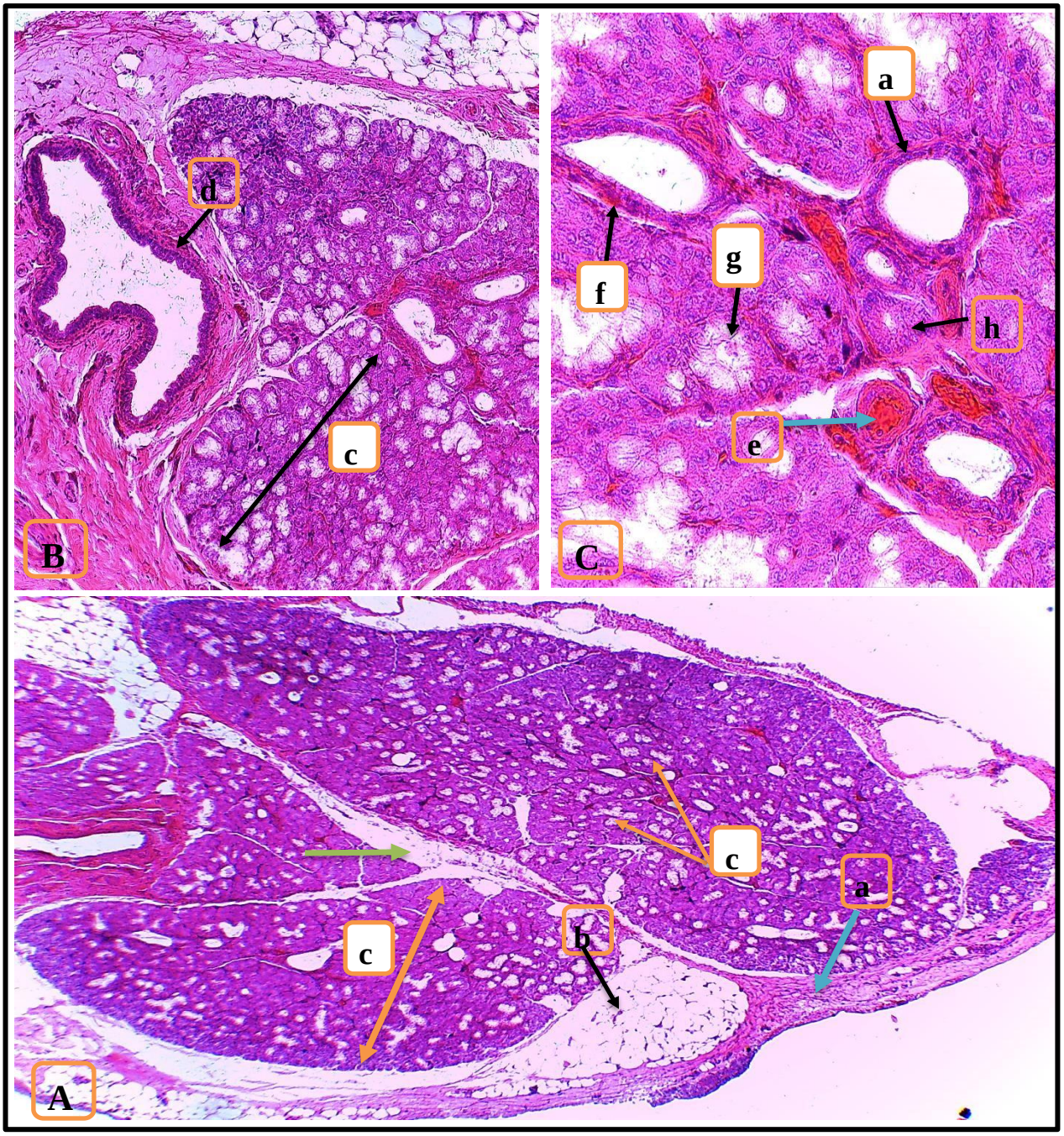

(Fig. 5) Photomicrpgraph of submandibular gland of guinea pig show many lobules with inter lobular connective tissue septa (green arrow) dividing the parenchyma into lobules which showed mixed acini (**A**), mixed lobule surrounded by C.T. capsule (**B**) and section of part of lobule

showed the ducts and acini. (**a**) capsule, (**b**) subcapsular C.T. (**c**) lobules, (**d**) interlobular duct , (**e**) blood vessels, (**f**) intralobular duct, (**g**) mix acini, (**h**) serous acini. **(A) X40 , (B) X 100 and (C) X 400 (H & E)**

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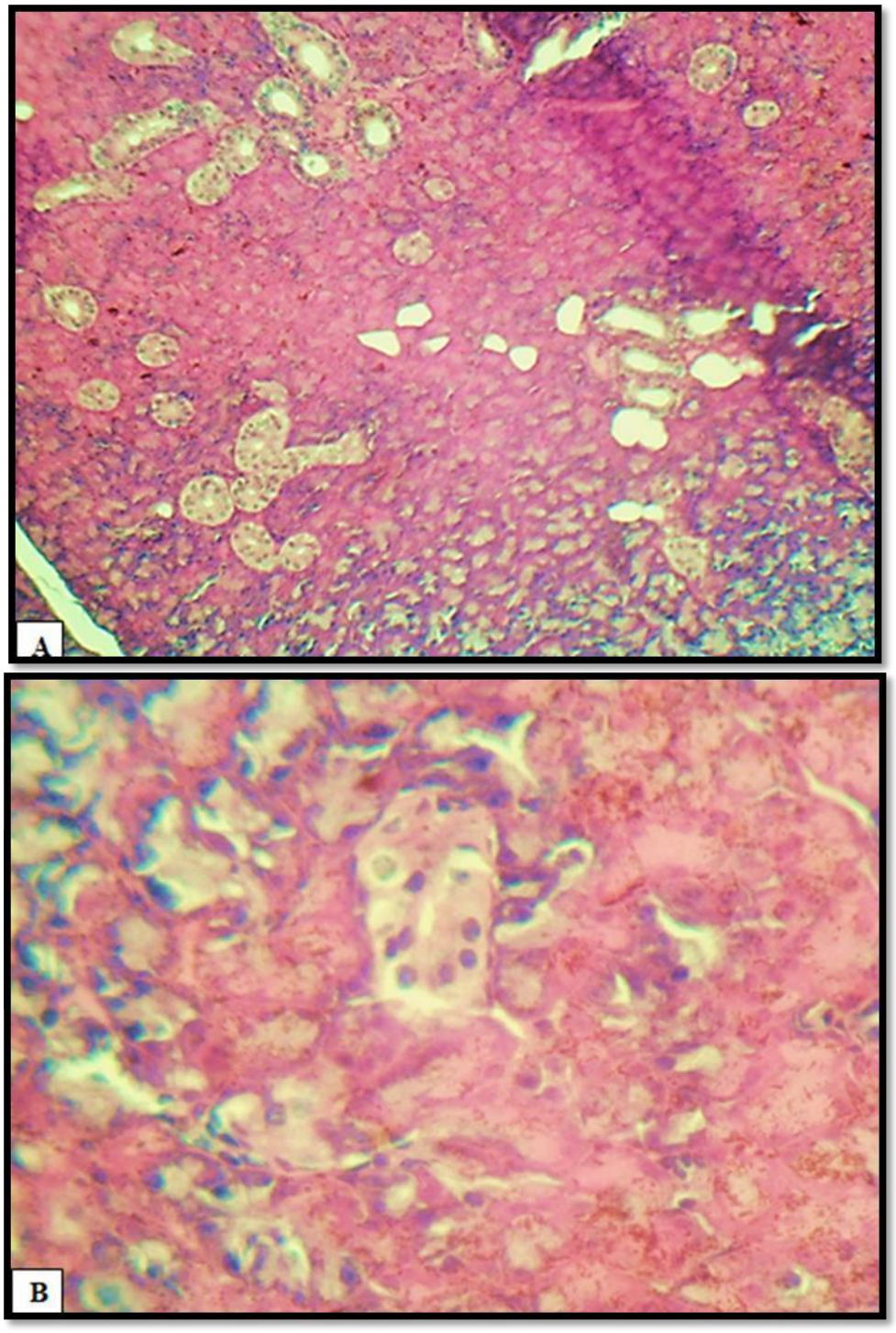

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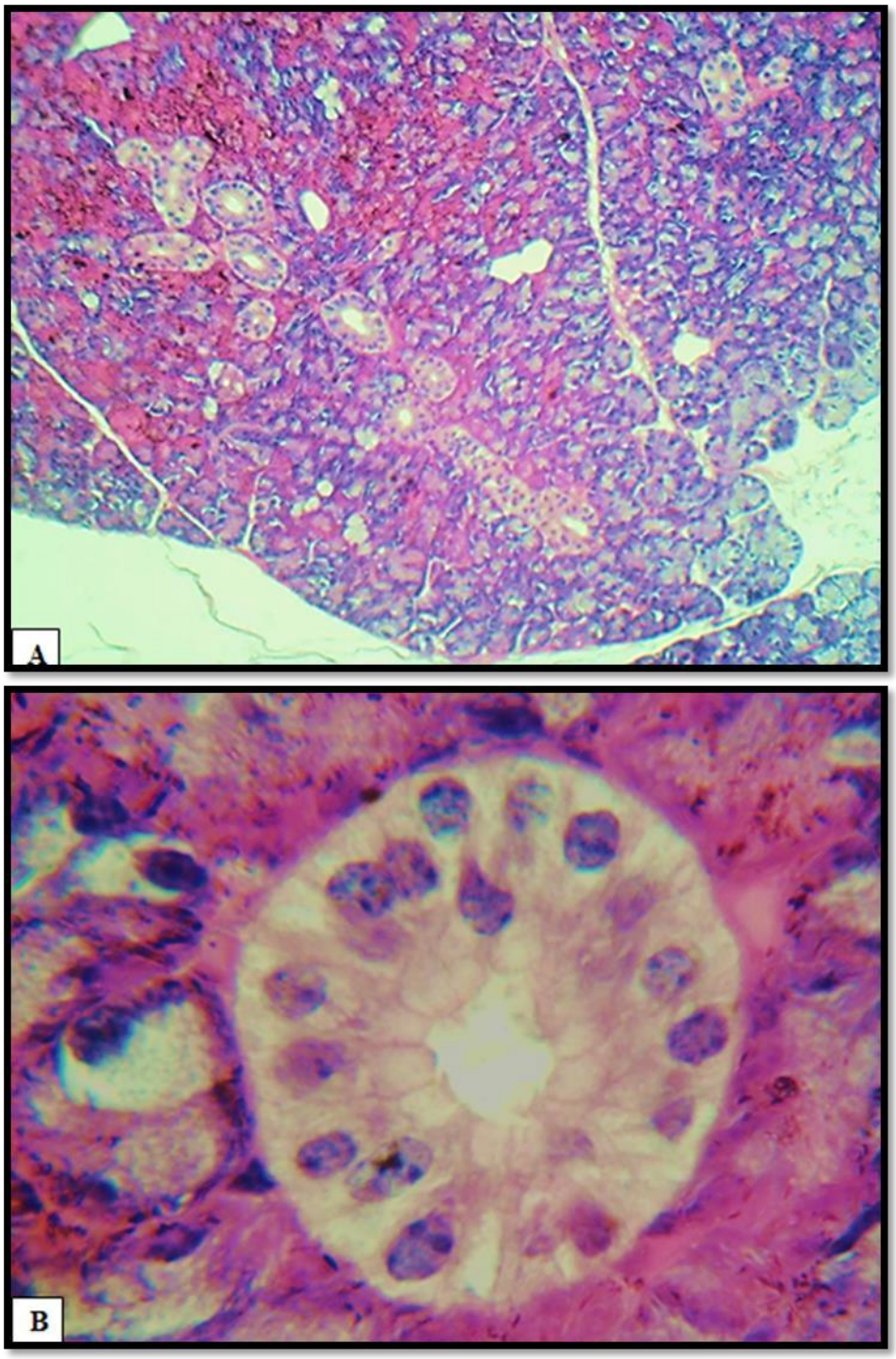

(Fig.7): photograph of **submandibular** gland of guinea pig shows the mucous acini gave positive reaction AB- PAS while the serous aceni & the ducts reacted negative with PAS part in combined AB- PAS stain 40X

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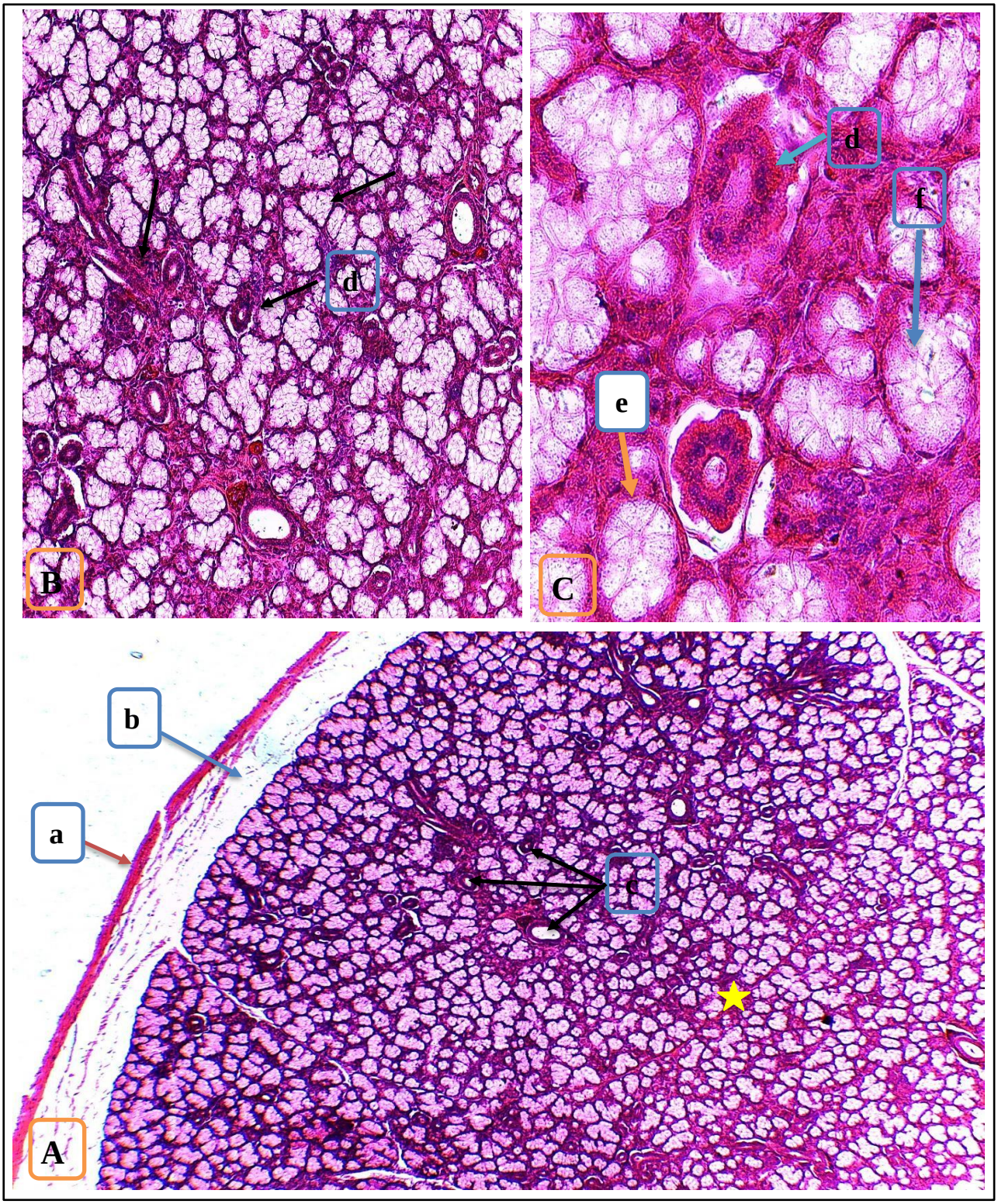

(Fig. 8) Photograph of subligual gland of guinea pig show the thin connective tissue capsule surrounded the gland and many lobules with interlobular connective tissue septa (yellow star) dividing the parenchyma into lobules which showed mixed acini (**A**), mixed lobule surrounded by C.T. capsule (**B**) and section of part of lobule showed the ducts and acini.

(**a**) capsule, (**b**) subcapsular C.T. (**c**) ducts, (**d**) striated duct, (**e**) mix acini, (**f**) mucos acini. **(A) X40 , (B) X 100 and (C) X 400 (H & E)**

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