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Histochemical study of the Jujenum in two types of bird's Guinea fowl *(Numidia meleagris)* and Falcon *(F. tinnunculus)*

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Abstract:

Twenty birds were used to conduct the current study, aged 1-2 years, the Jejunum samples were collection from September 2024 to February 2025, the birds collected at Al-Samawa abattoir and the study was conducted in department of anatomy, histology in college of veterinary medicine university of Al-Muthanna.

The Jejunum wall consists from the four common known layers of a tube organ: tunica mucosa, tunica submucosa, muscularis Externia and tunica serosa and adventitia.

Histochemical by applying three stains: PAS, AB(PH-2.5) PAS-AB [pH 1] stain. These staining techniques were conducted to view the presence or absence of neutral mucins, acidic mucins and neutral mucins with acidic mucins respectively. Both two types of cells of villi, which were the simple columnar cells that reacted negatively with PAS technique and the goblet cells which reacted strongly with this technique.

By using the alcian-Blue(PH-2.5) stain the goblet cells were revealed the strong reaction in both villi and the crypt of lieberkühn . These reactions of AB stain indicate presence of acidic mucins in the villi and crypts.

On using the combined PAS-AB (PH-1) for staining the tissues of Jejunum wall in guinea fowl, the columnar epithelial cells reacted negatively, whereas the goblet cells reacted moderate with this stain, indicating the presence of neutral and acidic muccopolysaccharide, the connective tissue of both lamina propria, submucosa and serosa sustain negative reaction. The smooth muscle fibers of muscularis mucosa and tunica muscularis afforded negative reaction with the PAS stain, AB and PAS + AB.

Keyword: falcon, Guinea, Histology and Histochmistry.

Introduction

There are about 8600 kinds of birds distributed throughout the world, out of them the order Passeriformes found the largest. Whereas, the smallest one was the order Struthioniformes . During previous century, different kind of birds were studied in Iraq by several investigators such (AL-Samawy, E.R; Fayak, J.t. (2015).

Generally, birds need many researches to investigate the structure and function of their variable organs (Hussien and Rezk,2016), and the domestic birds are considered as an important animalist fortune used for different purposes and they are very important in bio-protection from both harmful insects and rodents (M Hamodi, h *et al* ., 2013).

Guinea fowls (Numida meleagris) could be potentially an alternative to chickens as a protein source represented by egg and meat (Zvakare *et al.*, 2017)

Guinea fowls were produced in Africa, and were first domesticated by earliest Egyptians (Oakland, 2001). They are presently distributed in many parts of the world (Dondofema, 2000; Ligomela, 2000; Robinson, 2000; Smith, 2000; Embury, 2001; Saina, 2001).

Kestrel is a characterized member of the falcon family , and one of the most popular birds of prey , it is numerous and wide spread of the world , have much or varied colors , feed on different insects types or tiny mammals such as mice , young ground squirrels and sometime feeds even small birds (AL-kafagy, S. M. 2016).

The avian digestive system consist of the mouth cavity, phyranx ,esophagus, crop, and stomach (proventriculus and ventriculus),small intestine , large intestine and cloaca. It is short compared to those of mammals (Gelis, S. (2012).

The small intestine of the birds made up of three portions: duodenum, jejunum and ileum respectively. The first one begins from the gizzard constitute a loop encompass large part of the pancreas. The second part between the duodenum and the ileum when is jointed by the Mackle's diverticulum, the last part in the small intestine is ileum which extends from the diverticulum to the ileocaecal junction (Yamauchi *et al* ., 2010). The aim of this study to identified the acidic mucins, neutral mucins and Mixtures in jejunum of studies birds.

Methods

Birds collection

Twenty birds were used to conduct the current study. The samples were examined by me and made sure that they were in good health and didn’t contain any diseases. The study was based on the differences in their food types, ten of each type of birds were collected, each male Falcon and Guinea fowl were dissected by fixing it on a suitable dissecting plate to expose the abdominal viscera including the small intestine , then mid-line incision was made in the abdominal wall, then the small intestinal segment (jejunum).

After dissected of the birds, the organs immediately removed from the abdominal cavity and washed with saline solution to remove blood and any other adhering debris, half of the specimens (jejunum) from each birds were collected and fixed in Bouin’s solution and the other half were fixed in 10% neutral buffered formalin for 48 hours (Luna, 1968). The fixed tissues (jejunum) were cut into blocks and identified. They were then dehydrated through a series of graded alcohols (70%, 80%, 90%, 95% and 100%). The blocks were cleared in xylene and then infiltrated with molten paraffin wax. Sections (6 µm) microns thick were cut from embedded tissue using (Jung Rotary Microtome (model 42339). (Luna,

I. G. 1968).

The tissues were then mounted on grease free clean glass slides. The slides were prepared at room temperature stained alternatively with PAS (glycoprotein) , Alcian blue (pH2.5) (Acid mucins) and Combined of PAS-AB stain (neutral mucins). The prepared slides were studied using light microscope (Olympus binocular microscope). Photomicrographs of the prepared slides mounted on the binocular microscope were taken using a digital microscopic objective. These pictures were then transferred to a computer and detailed studies were carried out. (Bancroft, J. D. and Stevens, A. 2010).

Results and Discussion:

In studies birds the epithelial cells that include simple columnar cells, which covered these projection and lined the intestinal glands, reacted negatively toward the PAS stain, while the goblet cells showed a positive reaction, indicating to secret of neutral mucopolysaccharides. Similar findings were recorded by Dang (2009) in grower Aseel poultry.

The histochemical findings when subjected this stain on the jejunal wall connective tissue, which structured the lamina propria, submucosa, serosa and the smooth muscle fibers, revealed a weak reaction with PAS technique. Similar findings were observed by Osho *et al.,* (2016) in the jejunum of turkey poults.

On using AB (PH-1) stain in guinea fowl, the goblet cells reacted strongly with this stain in both villi and crypts, but in falcon showed moderate reaction toward Alcian blue. such finding was similar to Hamdi *et al.,* (2013) in Elanus caeruleus, Khaleel and Atiea (2017) on Indigenous ducks with guinea fowl but different with falcon.

The histochemical findings when subjected this stain on the jejunal wall connective tissue, which structured the lamina propria, submucosa, serosa and the smooth muscle fibers, revealed a weak reaction with AB (PH-1) stain. Similar findings were observed by Osho *et al.,* (2016) in the jejunum of turkey poults.

The histological section results in guinea fowl, which were stained with combined PAS-AB (PH-1), showed that the goblet cells in the villi and intestinal glands displayed a positive reaction, while the simple columnar cells reacted negatively with the same stain.

The connective tissue gave negative reaction, whereas the smooth muscle fibers of the tunica muscularis revealed a mild reaction with this technique. This observations were comparable with those recently reported by AL-Samawy (2015) in owl and pigeon.

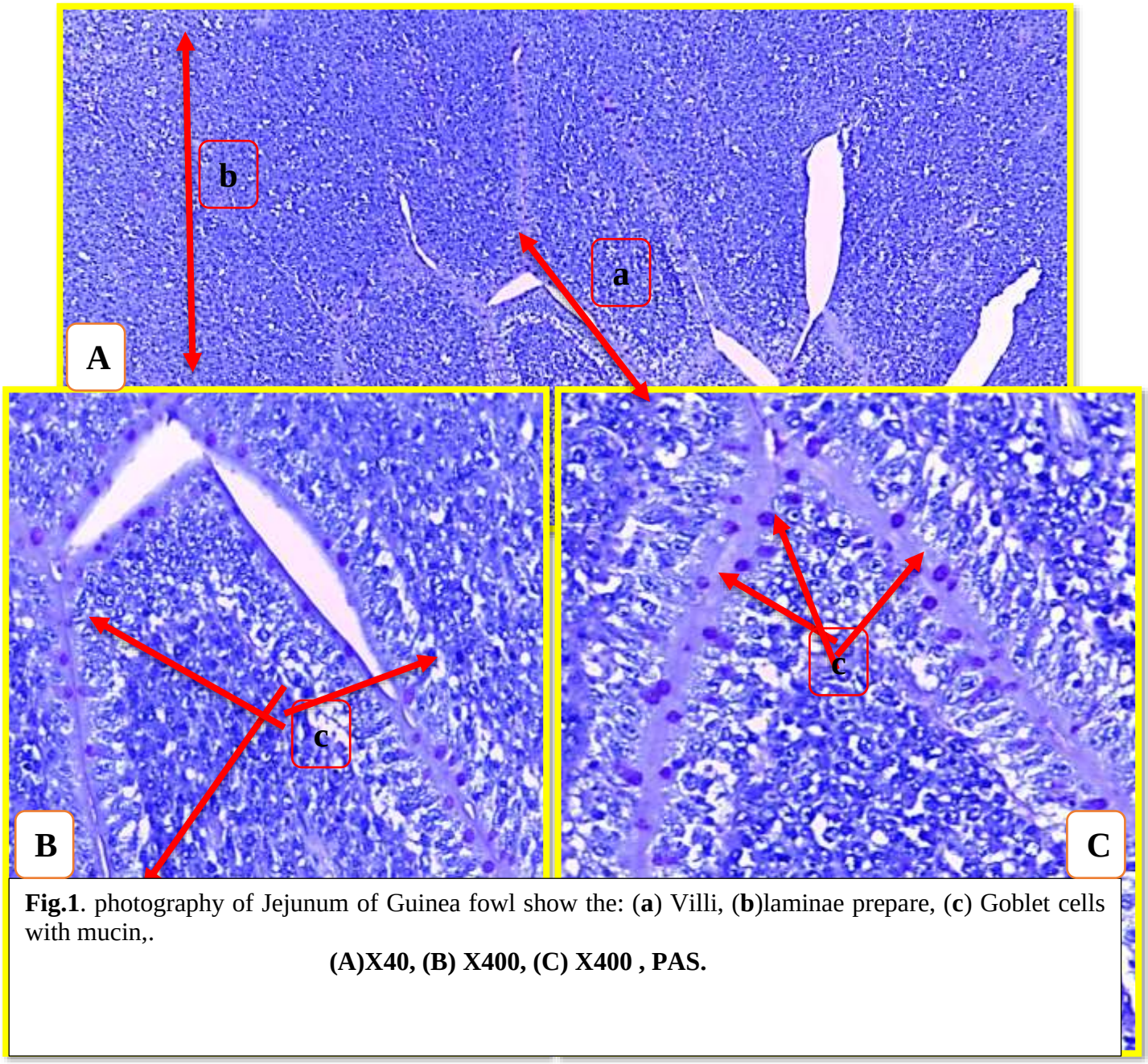

Fig.1. photography of Jejunum of Guinea fowl show the: (**a**) Villi, (**b**)laminae prepare, (**c**) Goblet cells with mucin,.

(A)X40, (B) X400, (C) X400 , PAS.

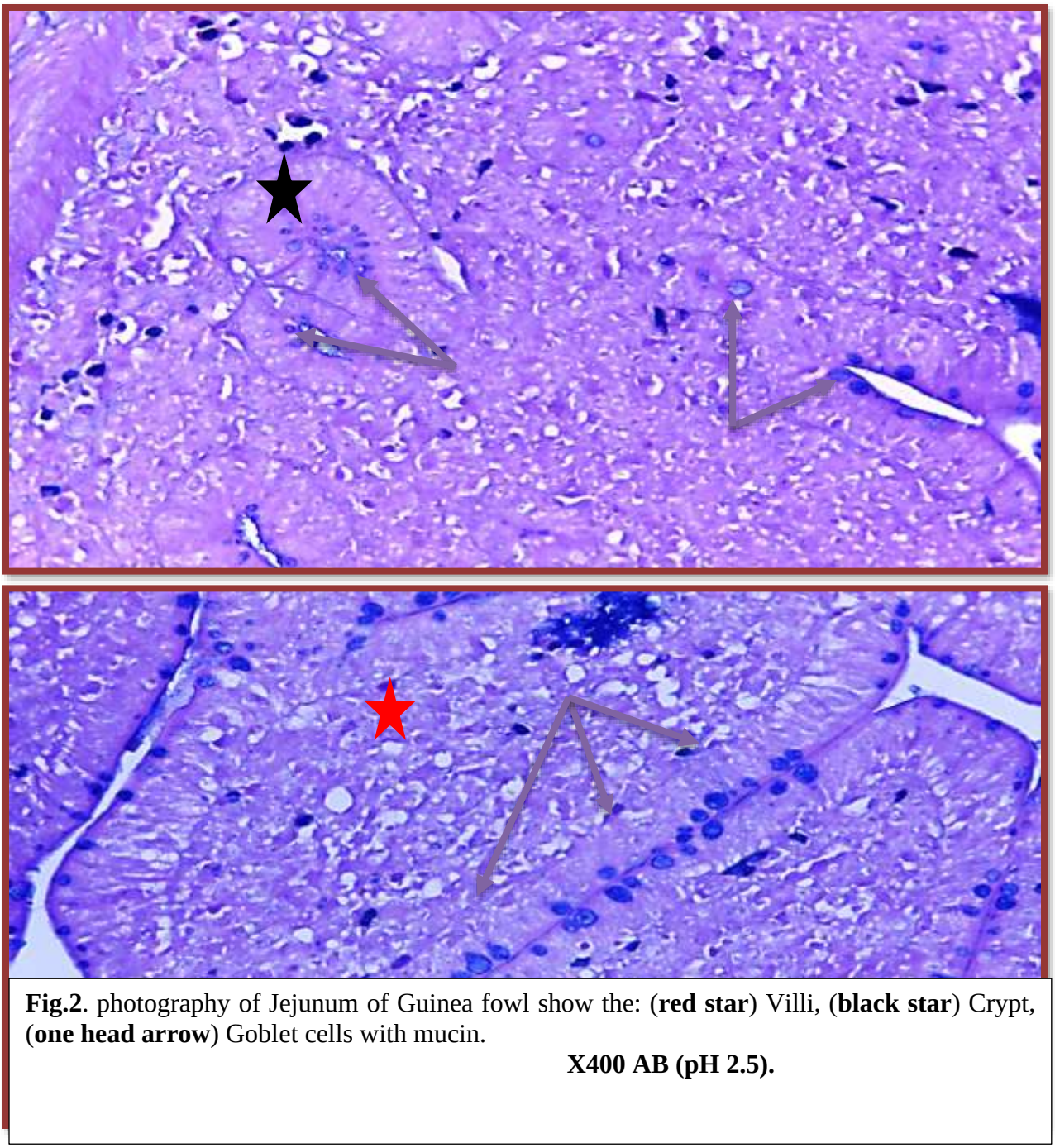

Fig.2. photography of Jejunum of Guinea fowl show the: (**red star**) Villi, (**black star**) Crypt, (**one head arrow**) Goblet cells with mucin.

X400 AB (pH 2.5).

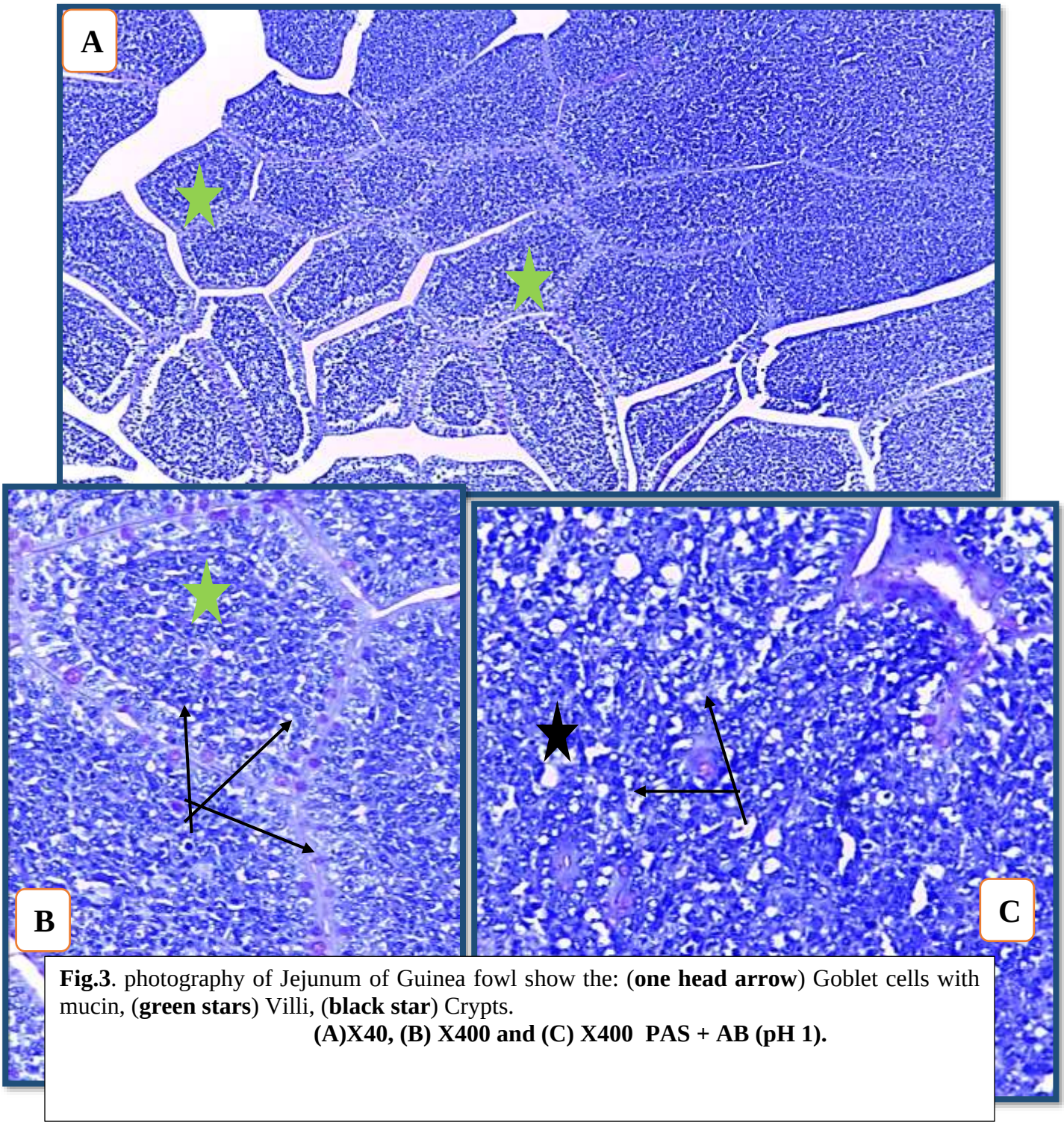

Fig.3. photography of Jejunum of Guinea fowl show the: (**one head arrow**) Goblet cells with mucin, (**green stars**) Villi, (**black star**) Crypts.
(A)X40, (B) X400 and (C) X400 PAS + AB (pH 1).

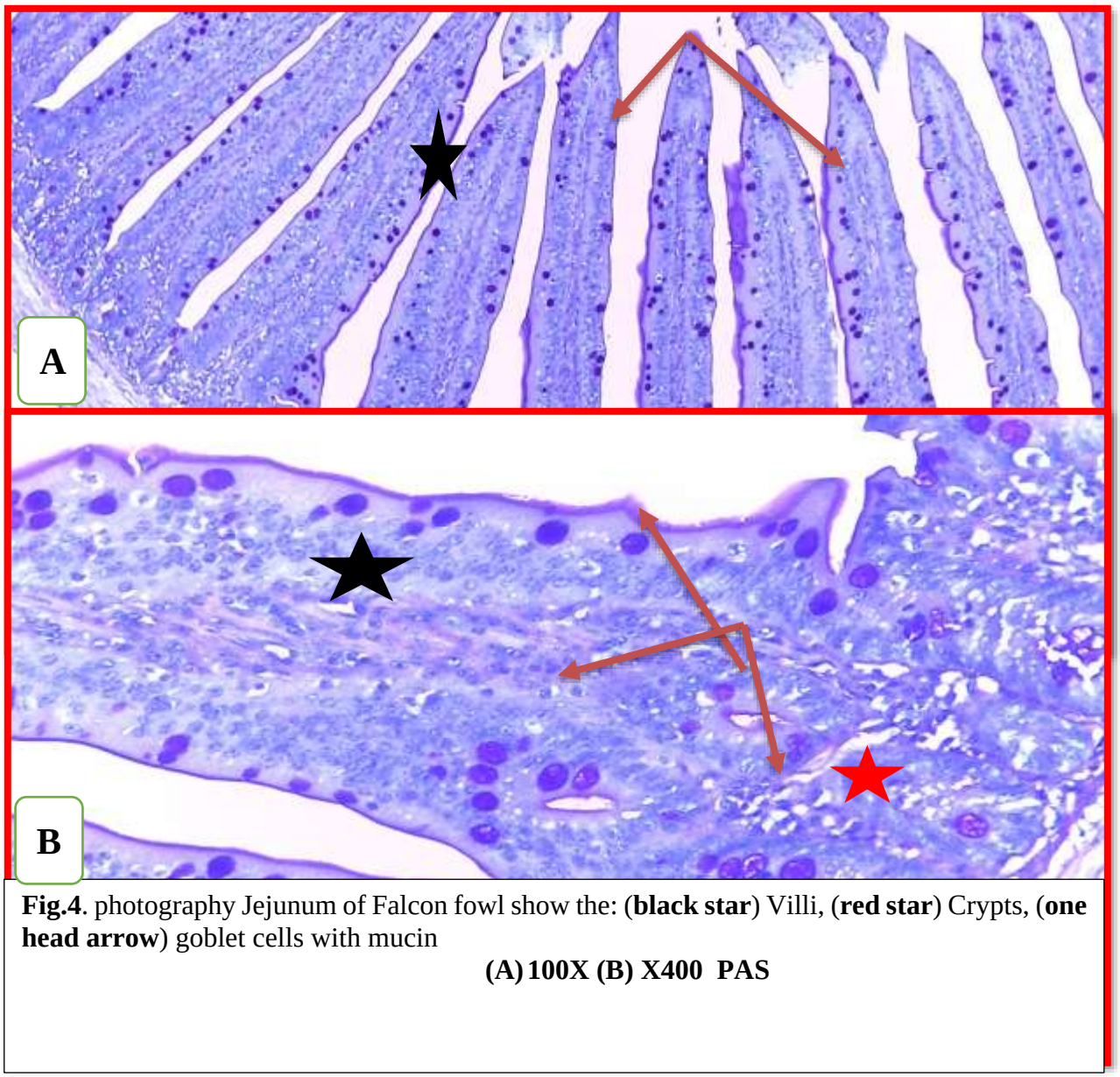

Fig.4. photography Jejunum of Falcon fowl show the: (**black star**) Villi, (**red star**) Crypts, (**one head arrow**) goblet cells with mucin

(A) 100X (B) X400 PAS

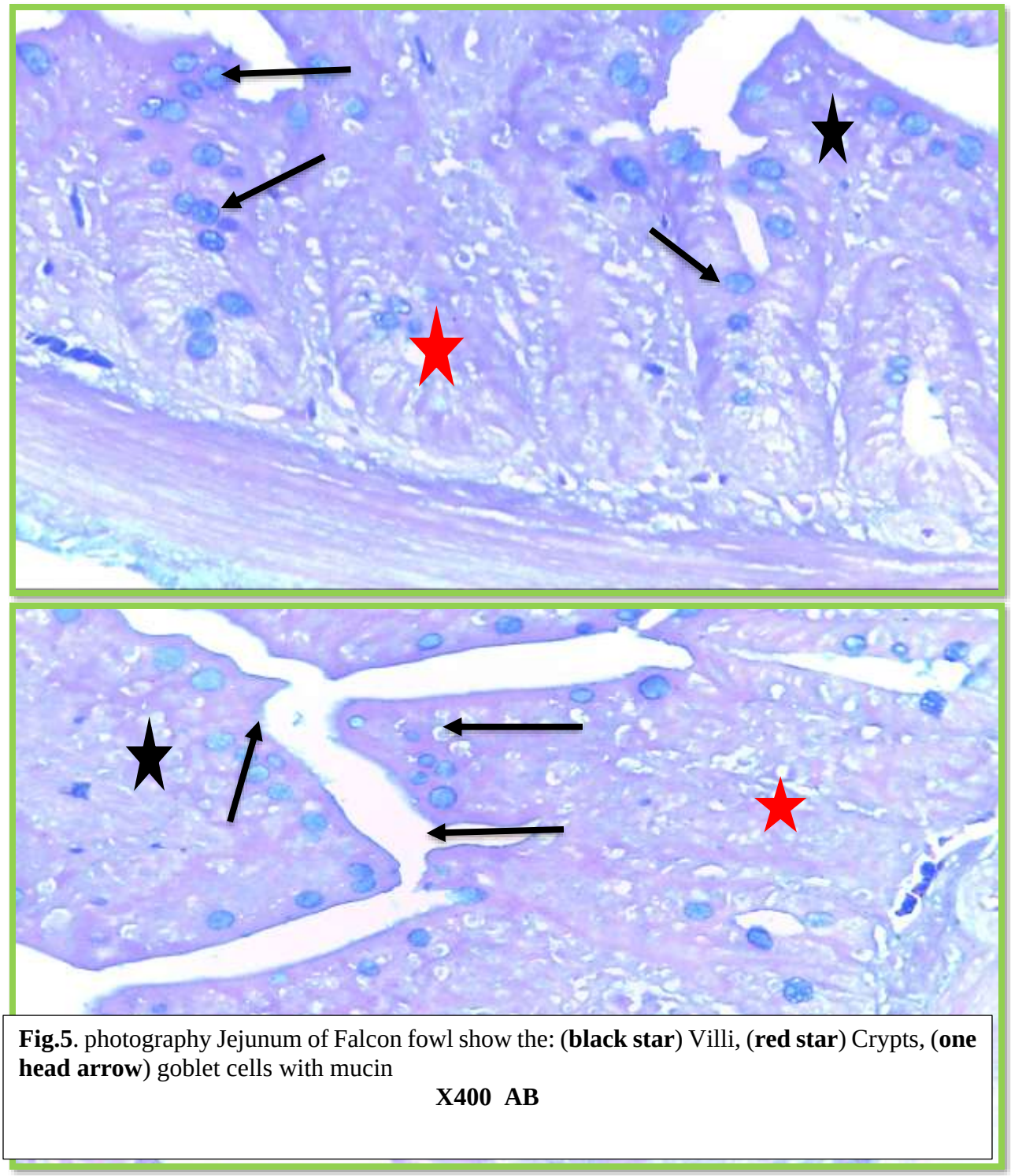

Fig.5. photography Jejunum of Falcon fowl show the: (**black star**) Villi, (**red star**) Crypts, (**one head arrow**) goblet cells with mucin

X400 AB

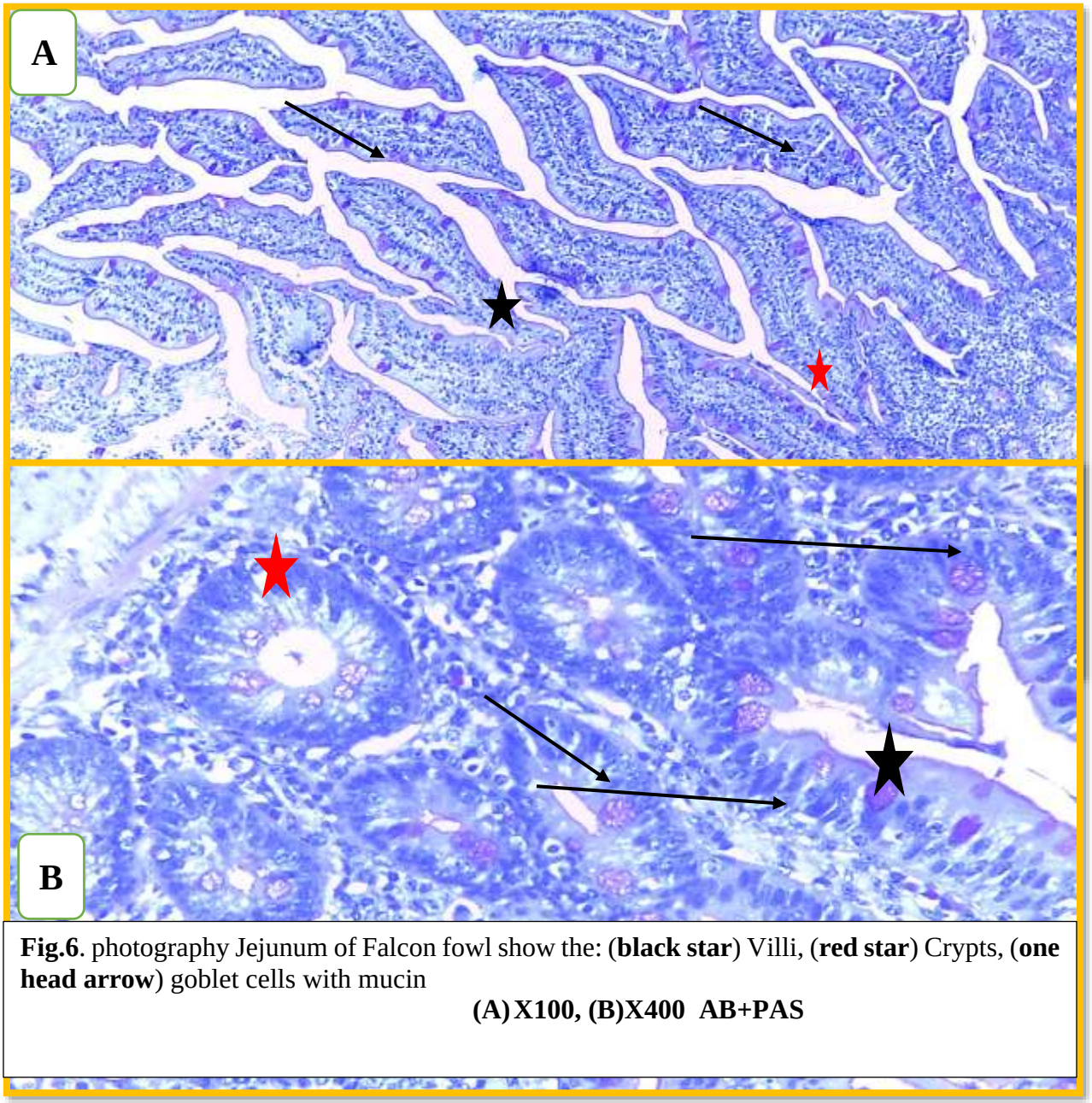

Fig.6. photography Jejunum of Falcon fowl show the: (**black star**) Villi, (**red star**) Crypts, (**one head arrow**) goblet cells with mucin

(A) X100, (B)X400 AB+PAS

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