

# **Histological and Histochemical study of the liver of Iraqi local ducks**

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Abstract :

The aim of this study is provide basic data about the histological features of the liver of local Iraqi ducks or Mallard(*Anas platyrhyncha*) and to study the glycogen content in the cytoplasm of the hepatocyte in histochemical study.the liver of Mallard generally is closely similar to the liver of another avian birds and vertebrates in (histological and histochemical study).it lies in the cranial part of the abdominal cavity caudally and ventrally to the heart and associated to the proventriculus . the liver of Mallard is divided into two undivided lobes right and left lobes(the right lobe is larger than left lobe ).Histologically the liver of local ducks consist of sevsral lobules separated from each other by thin trabeculae of connective tissue extend from delicate capsule that enclosed the liver.the basic unit of the parenchyma of liver is hepatocyte which arranged in plates or cords like that radiated around the central vien and between these cords there is sinusoids lined by alayer of fenestrated endothelial cells and Kupffer's cells . in the boundary of each lobules showed portal area which consist of hepatic artery;hepatic vein and bile duct lining by cuboidl cells .in the cytoplasm of hepatocyte we showed different size of glycogen granules and in some specimet the glycogen granules arranged around the central vein becues the animal in starvation period .

Key words:local ducks, liver, sinusoids,central vein,glycogen

Introduction:

The Iraqi local ducks (Mallard) is important birds in economical and environmental fields ,because the production of egg and meat . the are nine species of ducks classified according to the body weight and type of production(1).

The liver is largest gland of body it form 3% to5% of body weight in carnivores,2% to3% and littile as1% to1.5% in herbivores is dark brown or red brown in colour and lies in the upper abdominal cavity immediately beneath diaphragmatic on the right side.is both endocrine and exocrine gland.releasing several substances directaly into blood stream and secreting bile into duct system(2,3).embryologically it drived from endoderm (hepatocyte and biliary epithelium)and mesoderm(stroma cells,stellate cells,kupffer's cells and blood vessels(4,5,6)the liver is

bilobed right and left lobe lies ventrally and posteriorly to heart associated with proven trculus and spleen .the adult liver intervences between the diaphragm cranially and the stomach and intestinal mass caudally,although extended across median plane the bulk lies to the right in all species (3). In some domestic birds the caudal part of the left lobe subdivided into dorsal and ventral parts(7)and the right lobe is larger than left lobe(2).

In the domestic birds,at least,there are one or more intermediate processes which project from the visceral surface immediately ventral to the hilus and gallbladder occurs in most species and lies on the visceral surface to the right lobe . it's cranioventrally portion surrounding in the apex of the heart (6).

The liver invested by delicate connective tissue capsule (Glisson's capsule) that becomes thicker at the hilum where the portal vein and hepatic artery enter the liver(3,7). liver composed of epitheliale cells (hepatocyte) arranged in branching and anastomosing plates (7,8)the hepatocyte storage the glycogen (2,9) the hepatocyte plate has radial pattern aboute central vein .portal area

containe abranch of hepatic artery.portal vein , bile duct and lymphatic channel (3,10) the function of liver is bile formation,metabolism of carbohydrate,lipid,protein,production and distruction of blood cells,storage of glycogen,fat soluble vitamin,detoxification of certain substance (2,11,12,13).

### **Matertals and methods :**

Fifth specimens of liver from healthy adult Iraqi local duck were collected

Immediately after animal slaughter and washed with (0,9%)normal

Saline solution and it kept in (10%)formaline approximately (48)hours at room temperture we take specimens from right and left lobes of liver to study the histological specification after that the tissue was processed by routine processing methods the slids staining with H&E stain(hematoxline and eosine)and PAS stain(periodic acid sciff reagent to study the histochemical features (glycogen content)of the liverof Mallard(14,15)

### **Result and discussions:**

The prevenions studies showed the liver of Mallard is located in cranial part of abdominal cavity behind the diaphragm, it lies caudally and

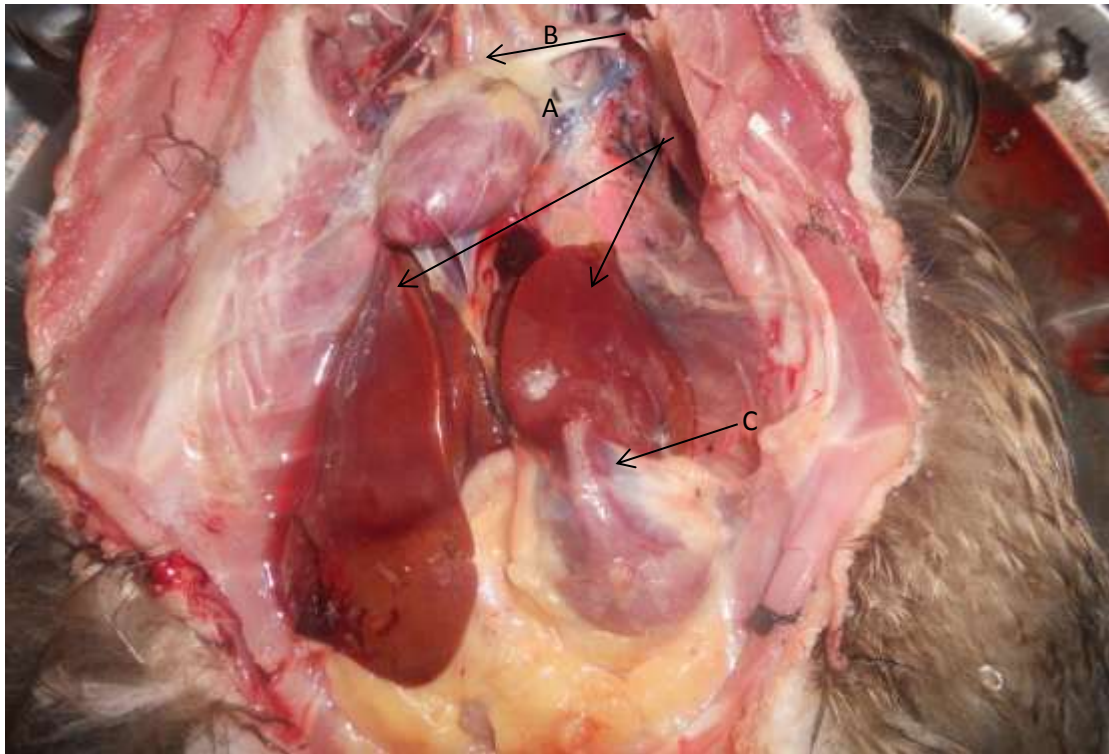
ventrally to the heart and is associated with proventriculus and the spleen fig(2) and this agree with (2,7),but the relation between the caudal end of the liver and the end of the sternum differ according to the age of the birds(16) .the liver of mallard is divided into two undivided lobes right and left lobe the right lobe is larger than the the left lobe about twice fig(2) and this result is agree with(16) in his comparative study of the liver of ducks,chicken and pigeon (only the left lobe of chicken liver is divided ) ,but inagreement with (17)he ensure that the left lobe of the liver of the ostrich is divided into three parts while the right lobe is undivided.the present study revealed that no histological difference between right and left lobes of mallard and this observed agreed with(18,19) .in the histological study saw the liver of mallard is consist of numerous lobules separated from each other by thin layer of connective tissue which is continuous from thin liver tissue capsule (fig3) and this observed agreed with (18,19,20) the parenchyma of the liver lobule is composed of epithelial cells called hepatocyte arranged in branching plates (cords-like) and this plates are separated by blood sinusoids and arranged in radiation form around central vein fig(4,)that was agreed with(7,8).the hepatocyte cells in each plate of liver of mallard are (1-2)the hepatocyte cell is polyhydral in shape with central one and this result is similar to these observed in duck, turkey and pintail duck in number of hepatocyte(21) .in the present study revealed that all hepatocyte are polyhydral in shape that all hepatocytes have large one or two nucleus .

the sinusoids are large and irregular in shape and it lining with two type of cells stellate cells called (Kupffer's or hepatic macrophage cells and flattened endothelial cells fig(5)(17,18,20)also we noticed the portal area consist of branch of portal vein and branch of hepatic artery and bile duct the blood passes from small branches of hepatic artery and portal vein into sinusoid that lie between plates of hepatocytes toward the central vein (22) .in our study we noticed between the adjacent hepatocyte are tiny channels which is called bile canaliculi this canaliculi between hepatocyte cells and terminate in the bile ducts of the portal area fig(6)and the wall of bile canaliculi lining with one layer of cuboidal layer resting on basal lamina and the lumen of canalicule increase in the size toward the external of the liver and the epithelial lining become columinar epithelial and this noticed agree with the result of (7,23) and the wall of hepatic duct consist of tunica mucosa,muscularis tunica and the tunica serosa and this agree with(24)in the common quail(*Conturinx conturinx*).

in the histochemical observation of this study by using(PAS)stain obsererved numerous granules of glycogen in the cytoplasm differ in their size fig(7)and this observation agreement with the result of(9,11)the

result of(9)showed the glycogen of the avian liver is synthesis from glucose,mannose,fructose and galactose and this synthesis induced during starvation . in the study of(25) on the liver of Muscovy duck liver find that the level of glycogen in liver increase in the birds receving energy a (glucose)and the glycogen content in liver releated with the level of keton body in blood .but,the concentration of the glycogen of chicken liver reduced in higher vibration frequency(11).

In the present study we observed in (some slids) the granules of glycogen arranged near the to the central vein fig(8) which lead to the animal in starvation period,becous the granules of the glycogen when the animal need energy was taken from the border of liver lobules firstly and then it take it from the area near to the central vein(7).also the level of glycogen releated with the age of the Turkey and Poult embryo(26).



Fig(1) Explain the position of liver in abdominal cavity :liver(A) heart (B) proventriculus (C).

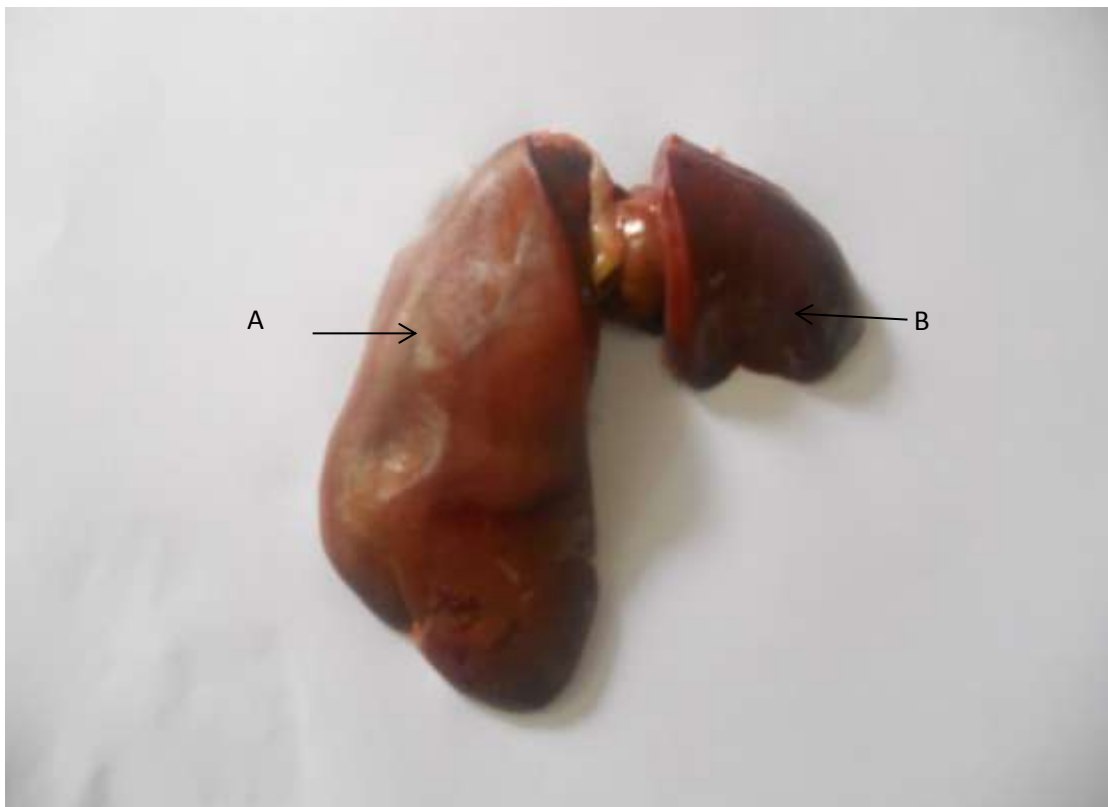


Fig.(2) Explain the lobes of the liver :right lobe (A),left lobe(B).

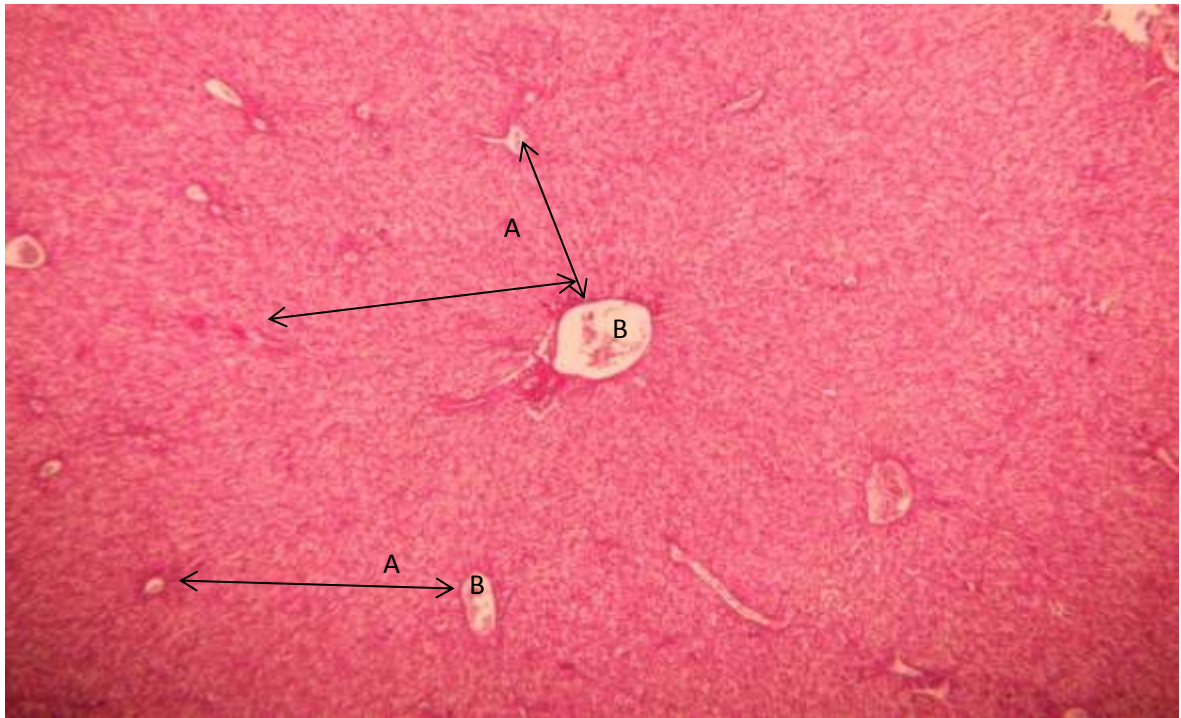
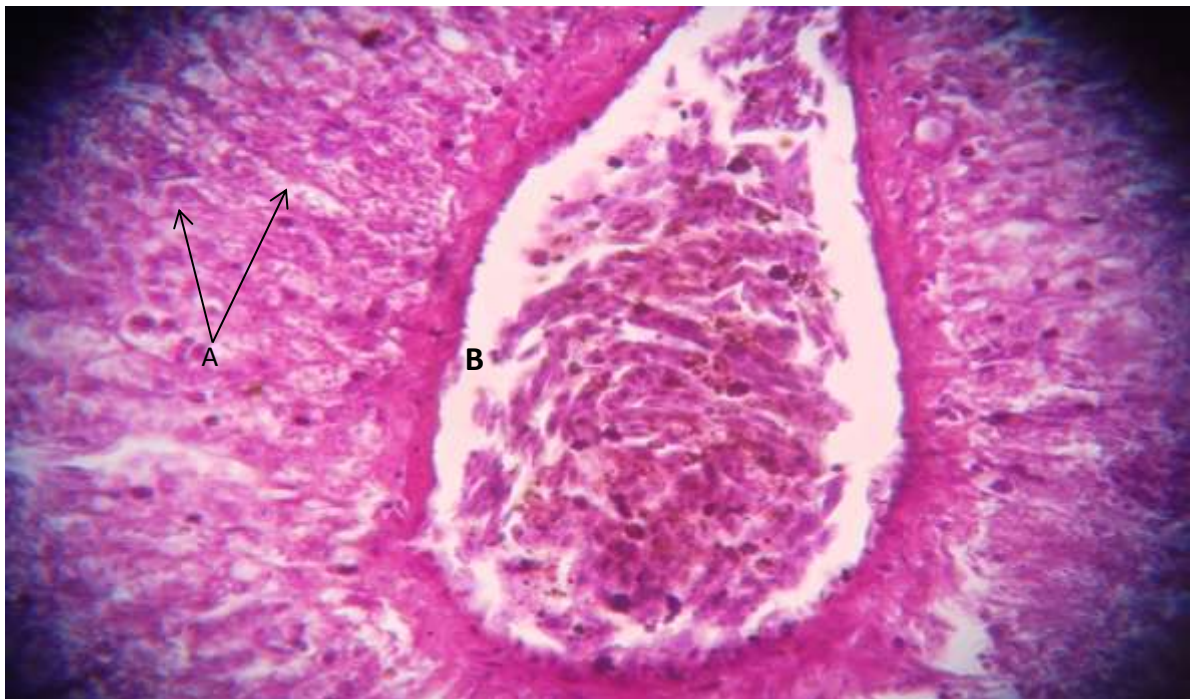


Fig.(3) Explain the histological structure of liver: A-liver lobule B-central vein .H&E(100x).



Fig(4) Explain hepatocyte plates (A) and central vein (B).H&E stain(400x).

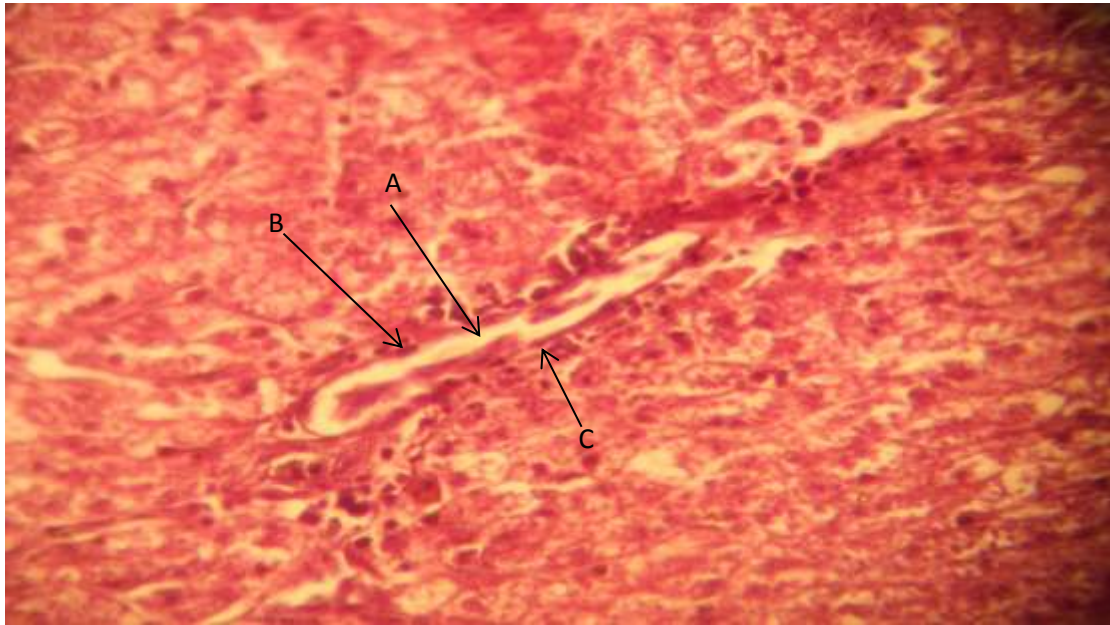


Fig.(5) Explain the histological structure of sinusoid (A) Kupffer's cell (C) endothelial cell H&Est (400x).

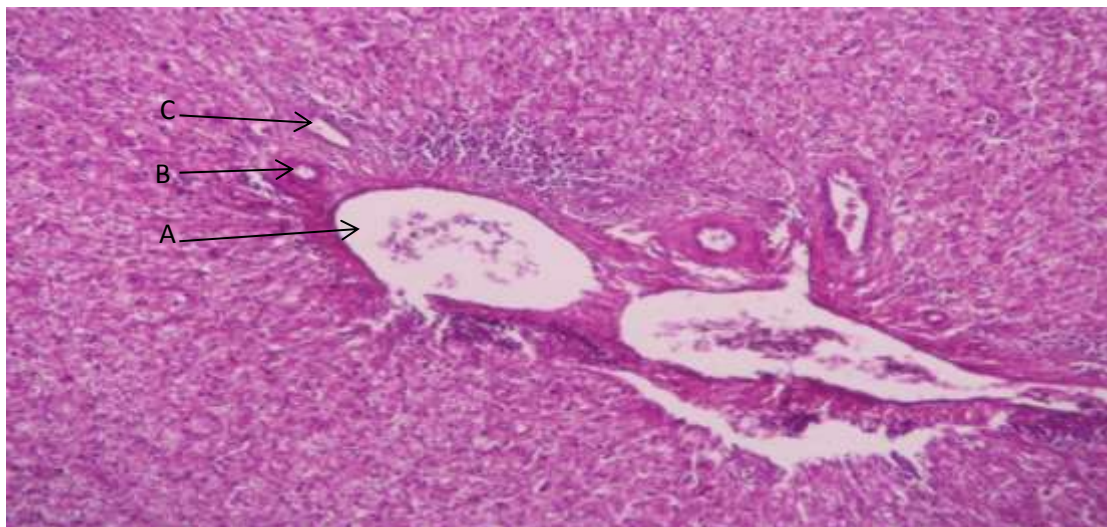


Fig.(6) Explain the portal area (A) hepatic portal vein (B) hepatic portal artery C- bile duct H&E stain (100x).

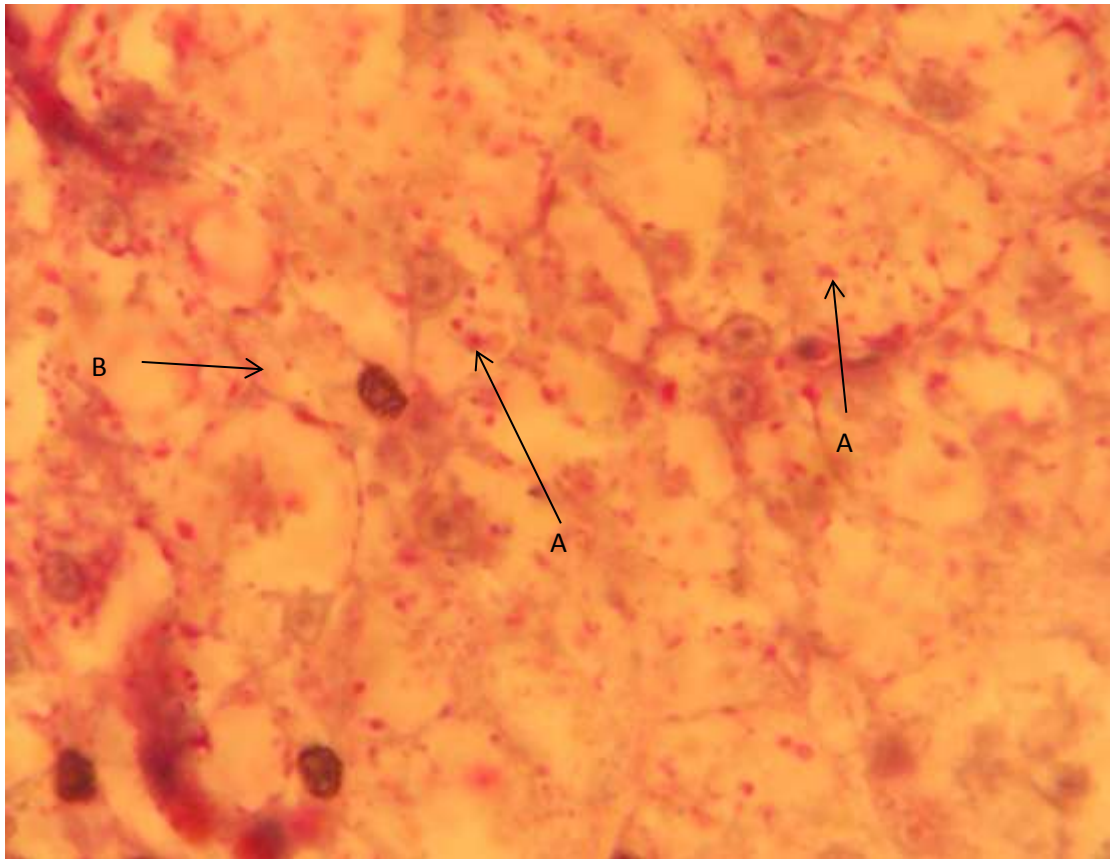


Fig.(7) Explain glycogen granules in the cytoplasm(A) hepatocyte cell (B) PAS stain(400x).



Fig.(8) Explain glycogen granules (A)around the central vein(B) PAS stain (100x).



## References:

References: References:١

1-الحياي حارث محمد ابراهيم(٢٠٠٤). تربية وامراض البط\كلية الطب البيطري\جامعة بغداد الصفحة ٢-٥.

2-Krause W J and cuts j h (1986).Concise text of Histology.second edition pp:330-334.

3-Dyce K M Sack W O and wensing C J G (2010).Text book of vetenary

4-Zhao R and Duncan S A (2005).Embryonic Development of The Liver Hepatology J.41:956-967.

5-Strick-Marchand H Weiss M C (2003).Embryonic liver cells and permanent lines as models for hepatocyte and bile duct cell differentiation.Mech .Dev.120:89-98.

6-Mclelland J (1990).acolour atlas of the avian anatomy:pp58-59.

7-Junqueira,L C Carneiro J and Kelley R O (1992).Basic Histology seventh edition pp:320-331.

8-Safer A M Meakins R Akbar L and Abou-Salem K (1998).Cytotoxicity of Kuwait Weathered lake crude oil on rat hepatocytes:Histological and ultrastructural study.Histol Histopathol 13:599-610.

9-Nigam V N and Fridland A (1967).Studies on glycogen synthesis in pigeon liver homogenates incorporation of hexose into glycogen.The Biochemical J. 105:2,505-13 .

10-Yamamoto K Sherman Philips M J et al.(1985).tr76y78u8Three dimensional observation of the

hepatic arterial termination in rat, hamster and human liver by scanning electron microscopy of micro vascular casts. *Hepatology J.* 5:452-456.

11-Warriss P D Brown S N Knowles T G et al.(1997).Potential effect of vibration during transport on glycogen in broiler chickens. *Vet. J.* 153(2):215-9.

12-Theron L Culleres M Boillier-Oudot M et al (2012).Modeling the

Relationships between quality and biochemical composition of fatty liver in mule ducks. *Anim. Sci. J.* 90(9) :3312-3317.

13-Brunn H Schmidt E Reinacher M et al.(1987).Histology and histochemistry of the liver of chicken after induced hepatocarcinogenesis and ingestion of low chlorinated biphenyls. *Arch.Toxicol J.* 60(5):337-42.

14-Luna L G (1968).Manul of histological staining methods of armed forces institute of pathology.three edition .New York, U.S.A. pp:39-110.

15-Kiernan A J (2003).Theory and practice in histology and histochemical methods.Oxford :Pergamon Press.35-6.

16-Shafey A F M (2006).Some comparative anatomical studies on the stomach,intestine and liver in ducks,chicken and pigeon .Ph.D.thesis.Benha university.

17-Stornelli M R Ricciardi M p Giannessi E and Coli A (2006).Morphological and histological study of the ostrich(*Struthio Camelus L.*) liver and biliary system. *J.Anat.Embryol .* 111(1):1-7.

18-Aughey E and Frye L (2010).Comparative veterinary histology with clinical correlates .Manson publishing\The veterinary Press.

19-Eroschenko p h D (2008).Diflore's atlas of histology with funictional coddelations. Eleventh edition pp:313-321.

20-Esfahani R T Vicker K and Cossart Y (2009). The early host immune response to duck hepatitis Bvirus infection.General virology J. 91(2):509-520 .

21-Beresford W A and Henninger J M (1986).A tabular comparative histology of the liver.Arch.hisrol.jap. J.49(3).

22-Soyer P Bluemke D A Choit M A et al.(1995). Variations in the intrahepatic portions of the hepatic and portal veins finding on helical c.t. scane during arterial portography.Am.J.Roetgenol.103-108.

23- Okihiro M S Hinton D E (2000).Partial hepatoectomy and bile duct ligation in rainbow trout (Oncorhynch mykiss):histologic,immuno-histochemistry and biliary hyperplasia. Toxicol Pathol 28:342-356.

24-Mobini B (2013)Hisyological study of hepatic bile ducts in the common quail( Coturnix coturnix).International Research of Applied and Basic Sciences 4(5):1067-1070.

25-Penkov D Bazalov P and Hristev H (2005).Content of glycogen in liver and keton bodies in blood of muscovey ducks during starving envisaged in the methods for balanced experiments.Central European Agriculture J. 6(3):235-240.

26-Rosebrough R W Henderson E G K and Frobish L T (1978).Glycogen metabolism in turkey embryo and poult .Poult.Sci. J. 57(3):747-751.

## الخلاصة:

الهدف من هذه الدراسة هو توفير قاعدة معلومات حول التركيب النسيجي لكبد البط المحلي *Anas platyrhynchos* او *Mallard* ودراسة المحتوى الكلايكوني في سايتوبلازم الخلية الكبدية وبشكل عام كبد البط المحلي مشابه لكبد باقي الطيور الداجنة والفقرات في التركيب النسيجي. يقع الكبد في الجزء الامامي للتجويف البطني، خلفيا وبطنيا للقلب وله علاقة بالمعدة الغدية. ويتكون كبد البط المحلي (*Mallard*) من فصين ايمن وفص ايسر (الفص الايمن اكبر من الايسر بمرتين).

نسيجيا يتكون الكبد من عدة فصوص مفصولة عن بعضها البعض بحواجز نحيفة من النسيج الضام تمتد من المحفظة الرقيقة التي تغلف الكبد. الوحدة الاساسية للنسيج الكبدي هي الخلية الكبدية والتي تترتب على شكل حبال حول الوريد المركزي وتوجد ما بين الحبال الكبدية جيبانيات دموية تبطن بنوعين من الخلايا الخلية البطانية المثقبة وخلايا كوفر وفي حدود الفص الكبدي توجد الباحة البوابية والتي تتالف من الشريان الكبدى والوريد الكبدى و قناة الصفراء والتي تبطنها طبقة من الخلايا المكعبة.

في سايتوبلازم الخلية الكبدية نلاحظ حبيبات الكلايكونين باحجام مختلفة وقد لاحظنا في بعض العينات المدروسة تجمع الكلايكونين حول الوريد المركزي وذلك لان الطائر كان في فترة الجوع.