

بِه نام خدا

Edwardsiella

first isolated in Georgia in 1976 :Ictaluri

first isolated in Japan by Hoshina (1962) :tarda

دو گونه مهم

❖ **Gram negative, Rod shape, Enterobacteriaceae**

Edwardsiella tarda

Atlantic salmon	<i>Salmo salar</i>
Black skirted tetra	<i>Gymnocorymbus</i> sp.
Brown bullhead	<i>Ictalurus nebulosis</i>
Channel catfish	<i>Ictalurus punctatus</i>
Chinook salmon	<i>Oncorhynchus tshawytsch</i>
Japanese eel	<i>Anguilla japonica</i>
Emerald shiner	<i>Notropis atherinoides</i>
Hirame flounder	<i>Paralichthys olivaceus</i>
Goldfish	<i>Carassius auratus</i>
Grass carp	<i>Ctenopharyngodon idella</i>
Largemouth bass	<i>Micropterus salmoides</i>
Striped mullet	<i>Mugil cephalus</i>
Striped bass	<i>Morone saxatilis</i>
Nile tilapia	<i>Tilapia nilotica</i>
Yellowtail	<i>Seriola lalandei</i>

Edwardsiella ictaluri

Brown bullhead	<i>Ictalurus nebulosis</i>
Channel catfish	<i>Ictalurus punctatus</i>
Danio	<i>Danio devario</i>
Green knifefish	<i>Eigenmannia virescens</i>
Blue tilapia	<i>Tilapia aurea</i>
White catfish	<i>Ictalurus catus</i>

Edwardsiella ictaluri: enteric septicemia of cat fish (ESC)

❖ فرم حاد:

ورود از طریق دستگاه گوارش، جریان خون روده، کلنیزه شدن در ارگان های مختلف بدن و ایجاد نکروز و واکنش التهابی.

❖ علائم ظاهری:

آسیت و اتساع محوطه شکمی، اگزوفتالمی، آبشش های رنگ پریده

ایجاد نکروز و خونریزی در پوست به رنگ قرمز قهوه ای

پتشی در سطح پشتی بدن و پهلوها

پتشی در نواحی با رنگ تیره به شکل کانون های دیپگمانته 1 تا 3 mm

❖ رفتار شنایی:

crockscrew spiral و Head up tail down

علائم کالبدگشایی:

محوطه بطنی حاوی مایع تقریبا خونی رنگ (آسیت)
خونریزی بر روی اندام های مختلف و عضلات

Behavior

Catfish affected with ESC often are seen swimming in tight circles, chasing their tails. This head-chasing-tail, whirling behavior is due to the presence of the *Edwardsiella ictaluri* in the brain. Affected fish also sometimes hang in the water column with the head up and tail down.

External Signs

ESC-affected catfish frequently have red and white ulcers (ranging from pinhead size to about half the size of a dime) covering their skin.



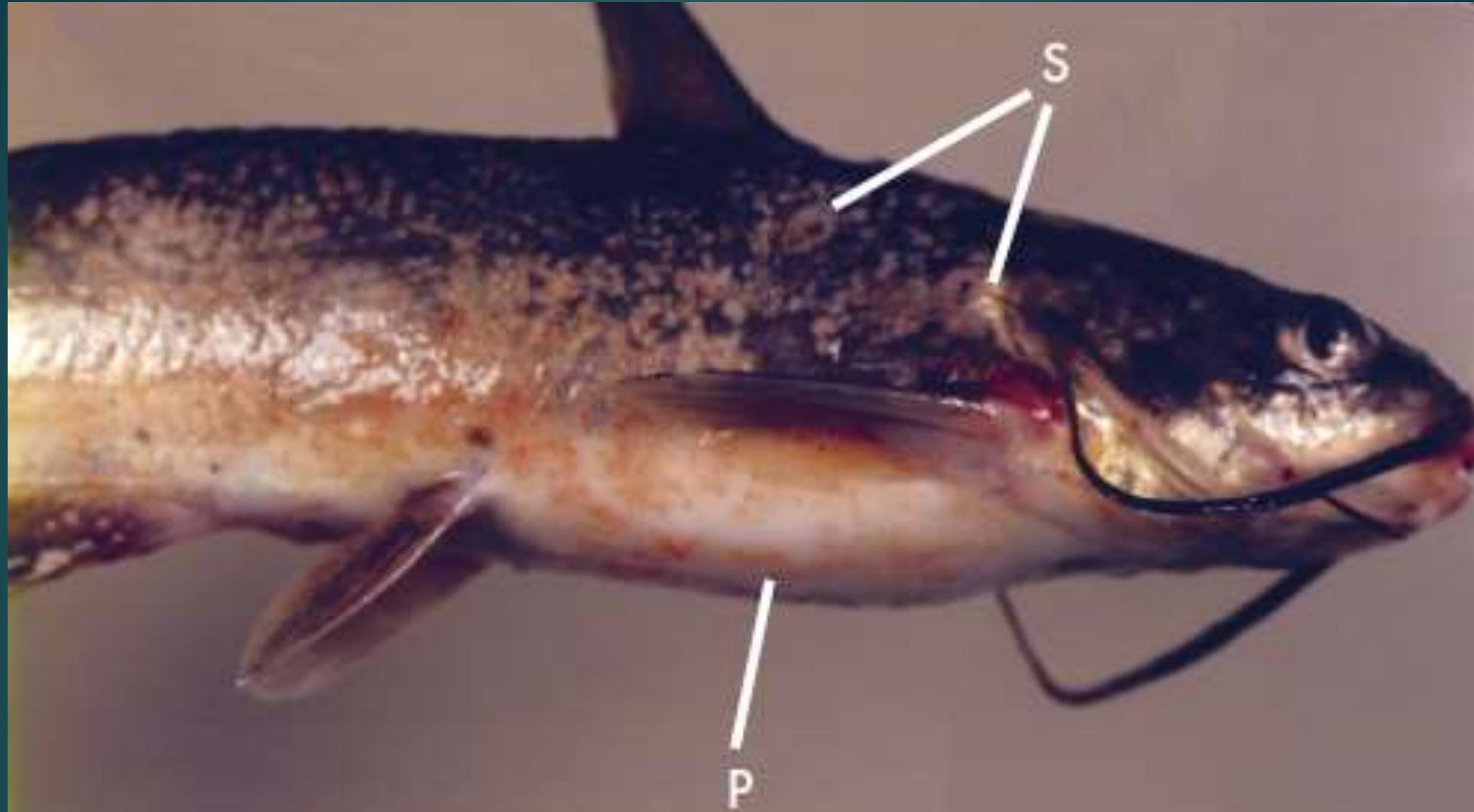
pinpoint red spots (called petechial hemorrhages) especially under their heads and in the ventral or belly region and around the mouth, on lateral and ventral portions of the body and the on the fins.







Figure 8.12 Petechial haemorrhagic ulcers over the skin surface of channel catfish infected with *Edwardsiella ictaluri* infection. (By courtesy of Dr T.E. Schwedler.)







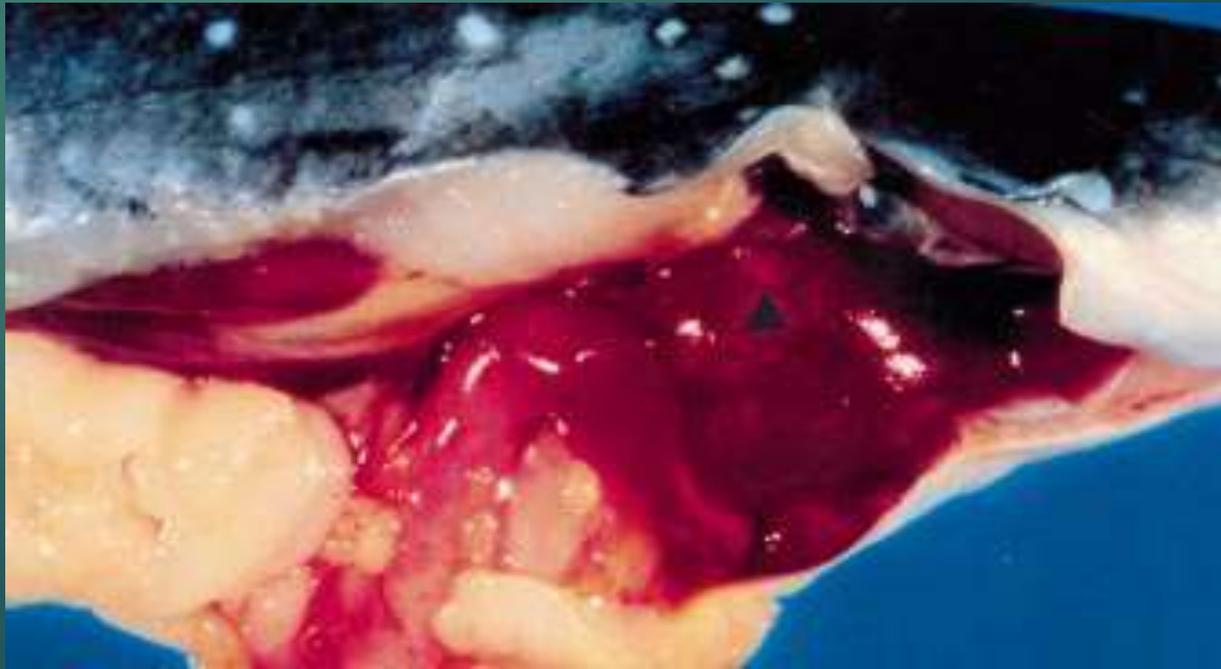
Catfish with larger red-rimmed shallow ulcers, the characteristic “buckshot” lesion

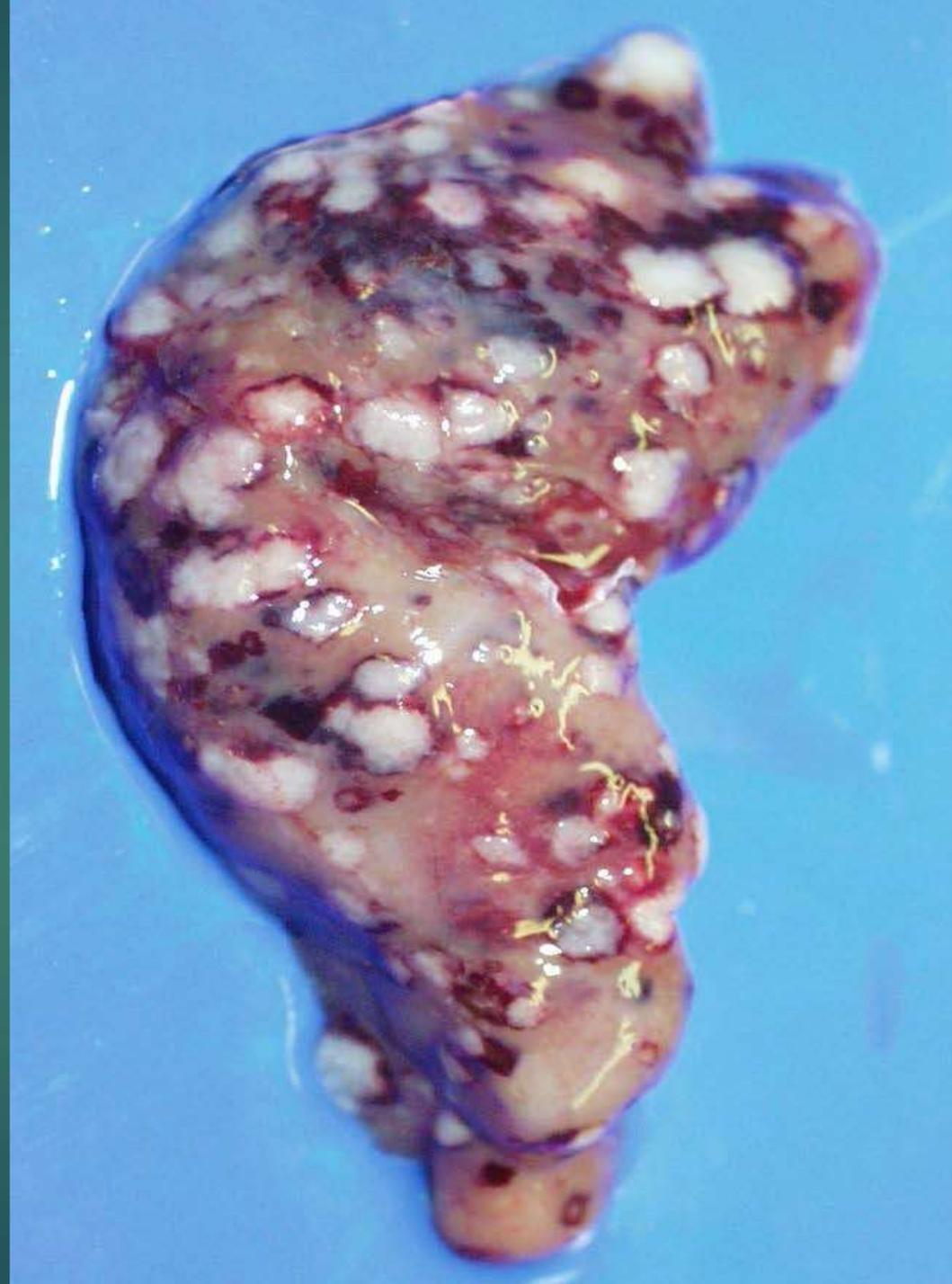
that can progress into the (hole-in-head) condition. Internal build-up of fluid can lead to a swollen abdomen and exophthalmia (popeye).



Internal Signs

Clear, straw-colored or bloody fluid is often present in the fish body cavity. The liver typically has characteristic pale areas of tissue destruction (necrosis) or a general mottled red and white appearance. Petechial hemorrhages can be found in the muscles, intestine and fat of the fish. The intestine is also often filled with a bloody fluid.



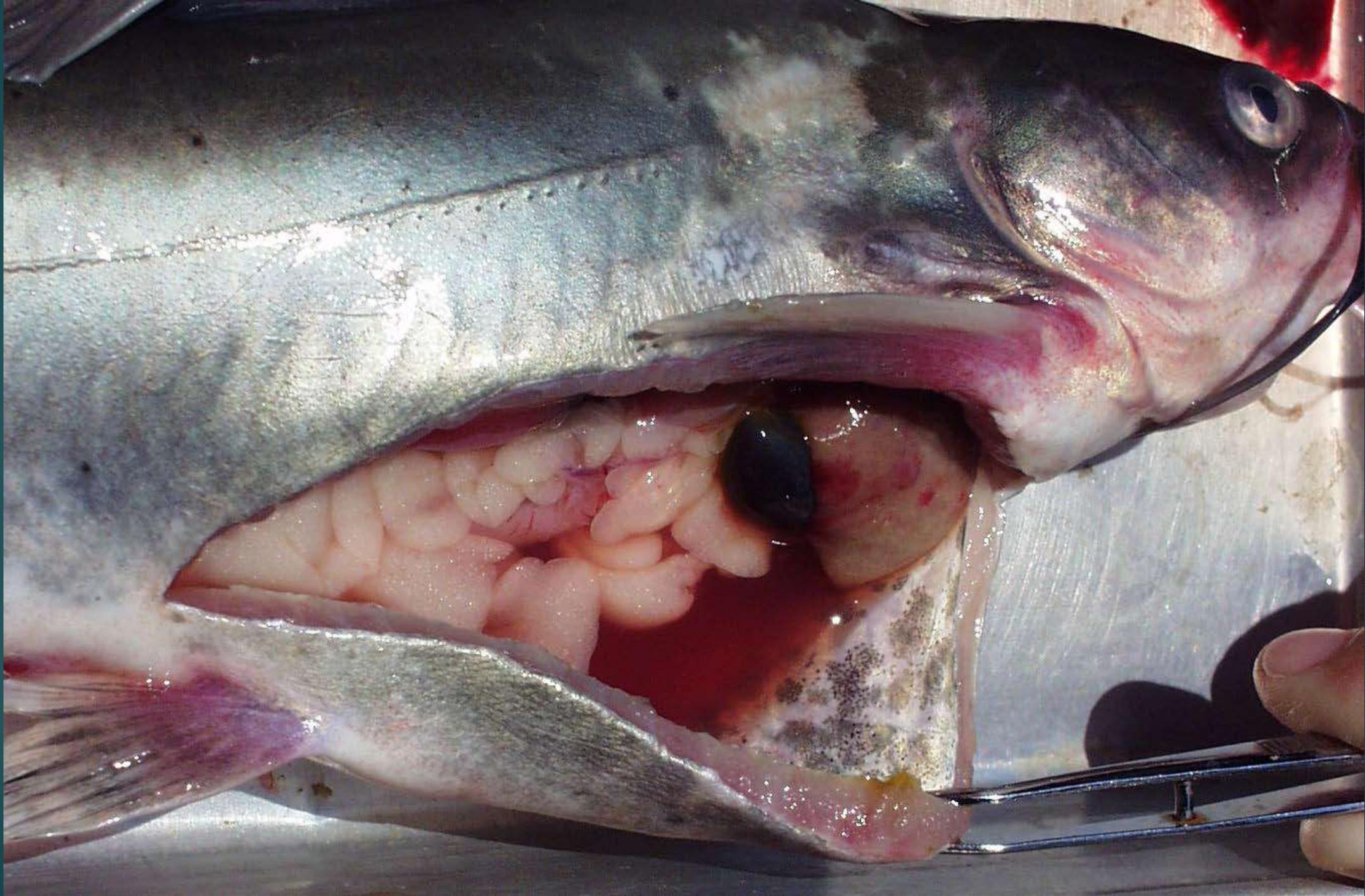


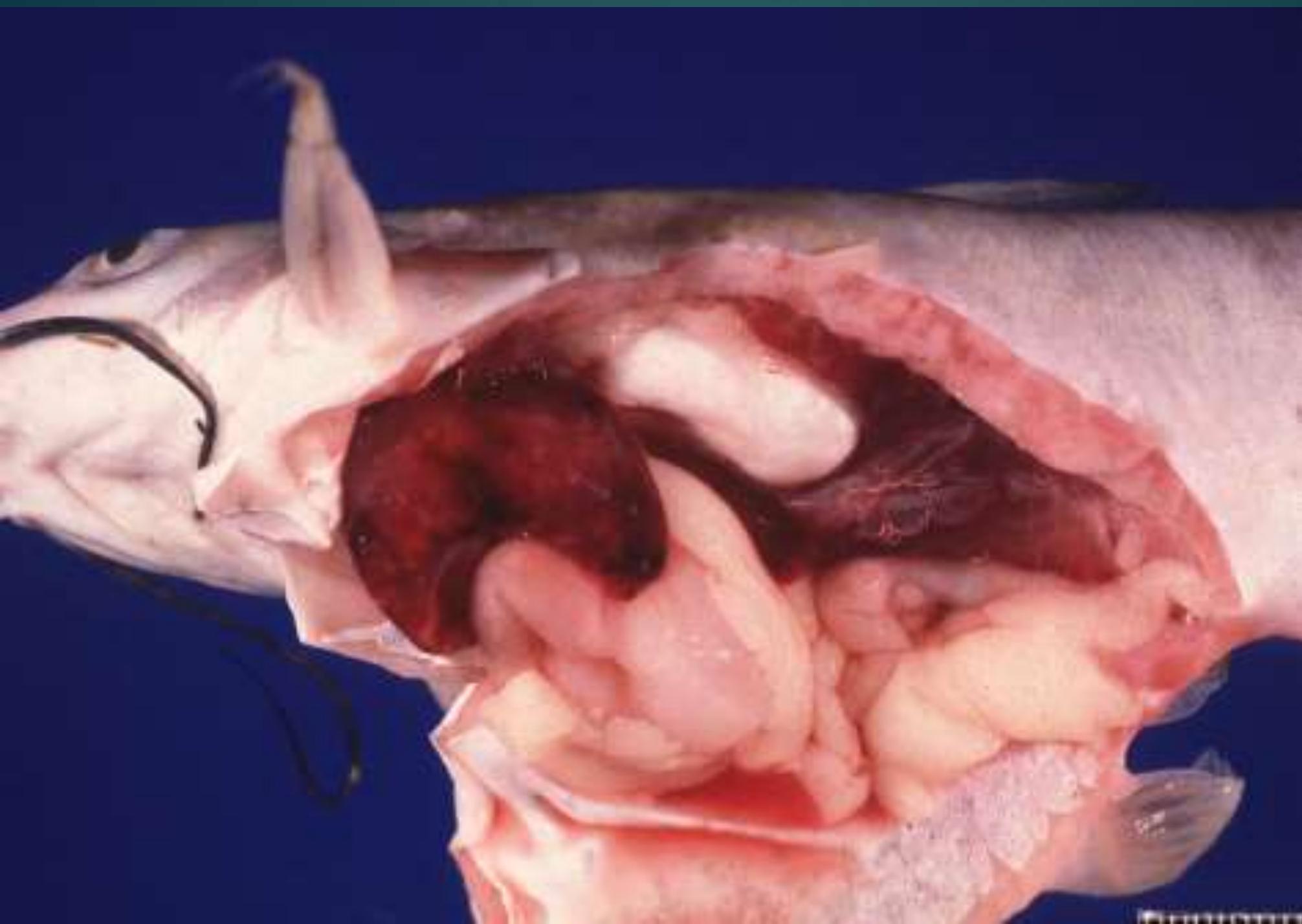
Ascites and enlargement of the liver, kidney, and spleen are sometimes observed.





Hemorrhagic
exudate
and hepatic
edema in a
channel
catfish
with ESC





هیپاتومگالی و
خونریزی و نقاط
نکروزه بر روی
کبد، بزرگ شدگی
طحال و کلیه ها

(hepatitis, enteritis, myositis, interstitial nephritis) ❖

❖ خونریزی عمومی بدن

❖ آبسه های حقیقی (از محدود بیماری هایی که ایجاد آبسه حقیقی میکند).

فرم مزمن (encephalitis)

حمله باکتری به ارگان های بویایی از طریق سوراخ بینی، رفتن به مغز از طریق عصب بویایی olfactory nerve، رفتن از مغز به پرده مننژ، جمجمه، پوست و ایجاد hole in the head، که زخمی باز بر روی استخوان frontal می باشد، که گاهی حتی خود مغز قابل رویت می باشد.

❖ این ویژگی می تواند به عنوان ویژگی تشخیصی معتبر برای این بیماری باشد.

❖ در لام پاتولوژی meningoencephalitis و التهاب پوست و استخوان

Ulceration of the frontal bones, longitudinal raised red (pimples) at the cranial foramen between the eyes.









Edwardsiella tarda (emphysematous putrefactive dis.) fish gangeren:

در گربه ماهی روگاهی کانون هایی بر روی پوست به قطر 3 تا 5 mm، که توسط فیستول هایی به عمق عضلات می رسند و در برش بوی بدی H₂S ایجاد می کنند. پتشی نیز مشاهده می شود.

در برخی موارد ماهی علامت HITH را می تواند نشان دهد که با ایکتالوری می تواند اشتباه شود.

تیره شدن رنگ پوست، اگزوفتالمی و خونریزی در چشم، زخم پوستی (لکه هایی بدون رنگدانه در ابتدا و در مراحل بعدی با برش آن ها بوی تعفن حس می شود). خونریزی در بیشتر نقاط بدن، نکروز و تجمع گاز در بین عضلات، ایجاد ضایعات شبه تاول در عضلات و بوی تعفن بعد از برش آنها

در اندام های داخلی پرخونی و خونریزی

❖ رفتار شنا standing head:

ناشی از فلج سیستم اسکلتی عضلانی و تجمع گاز در عضلات

گاهی ماهی هیچ گونه علائمی ندارد (فرم تحت بالینی)

در کارخانه با کندن پوست ماهی و برش : خروج مواد نکروتیک و بوی تعفن

❖ زئونوز

حساس ترین گونه ها گربه ماهی روگاهی و مارماهی ژاپنی

هیستوپاتولوژی:

❖ نکروز اندام های داخلی به همراه پریتونیت پیش رونده با حضور باکتری

❖ خونریزی عمومی بدن



Fig. II-49. Channel catfish with *Edwardsiella tarda* infection. Note the deep fistula on the flank (arrows). *P* = pectoral fin; *H* = hemorrhage. (Photograph courtesy of F. Meyer.)

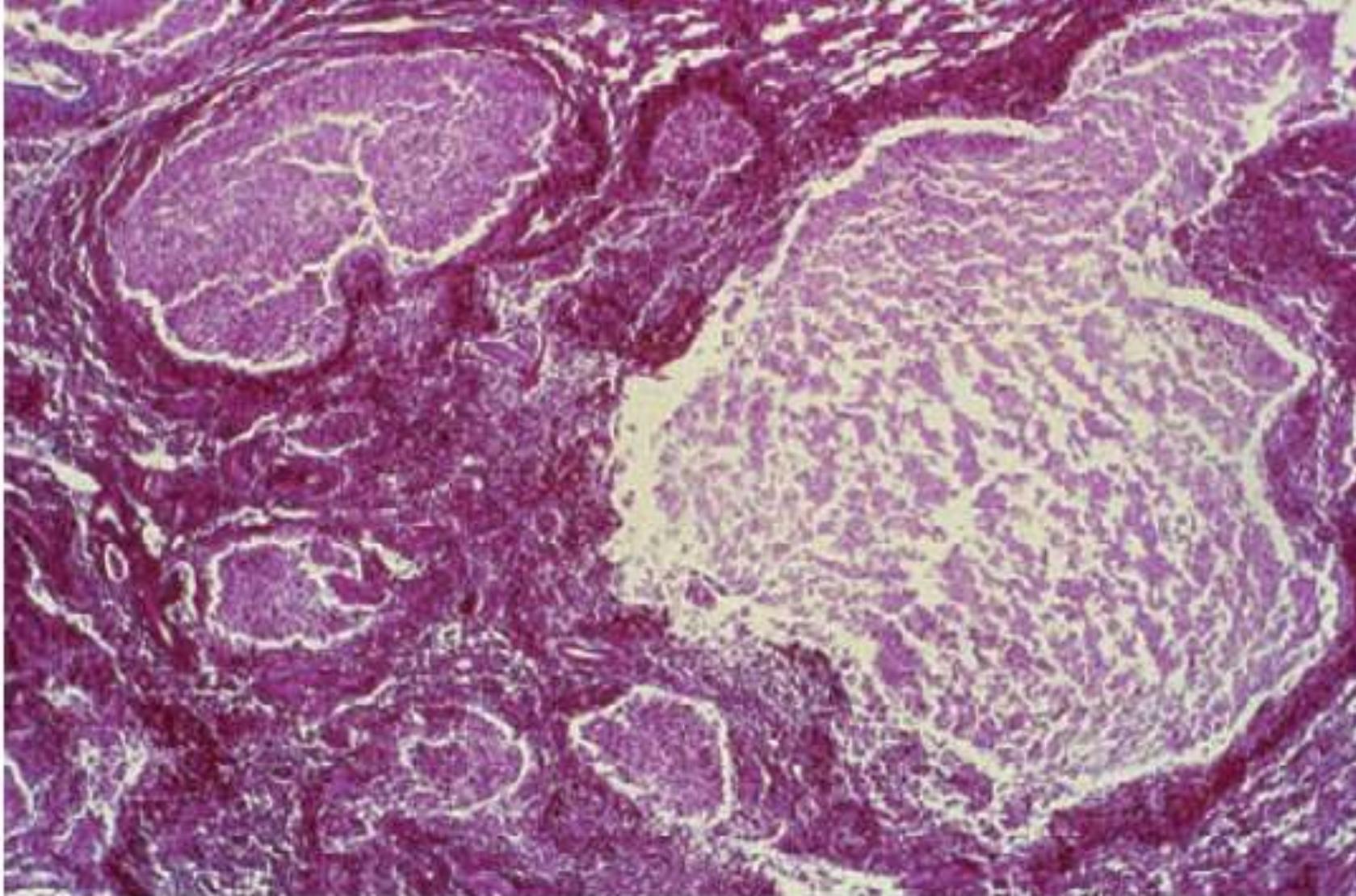
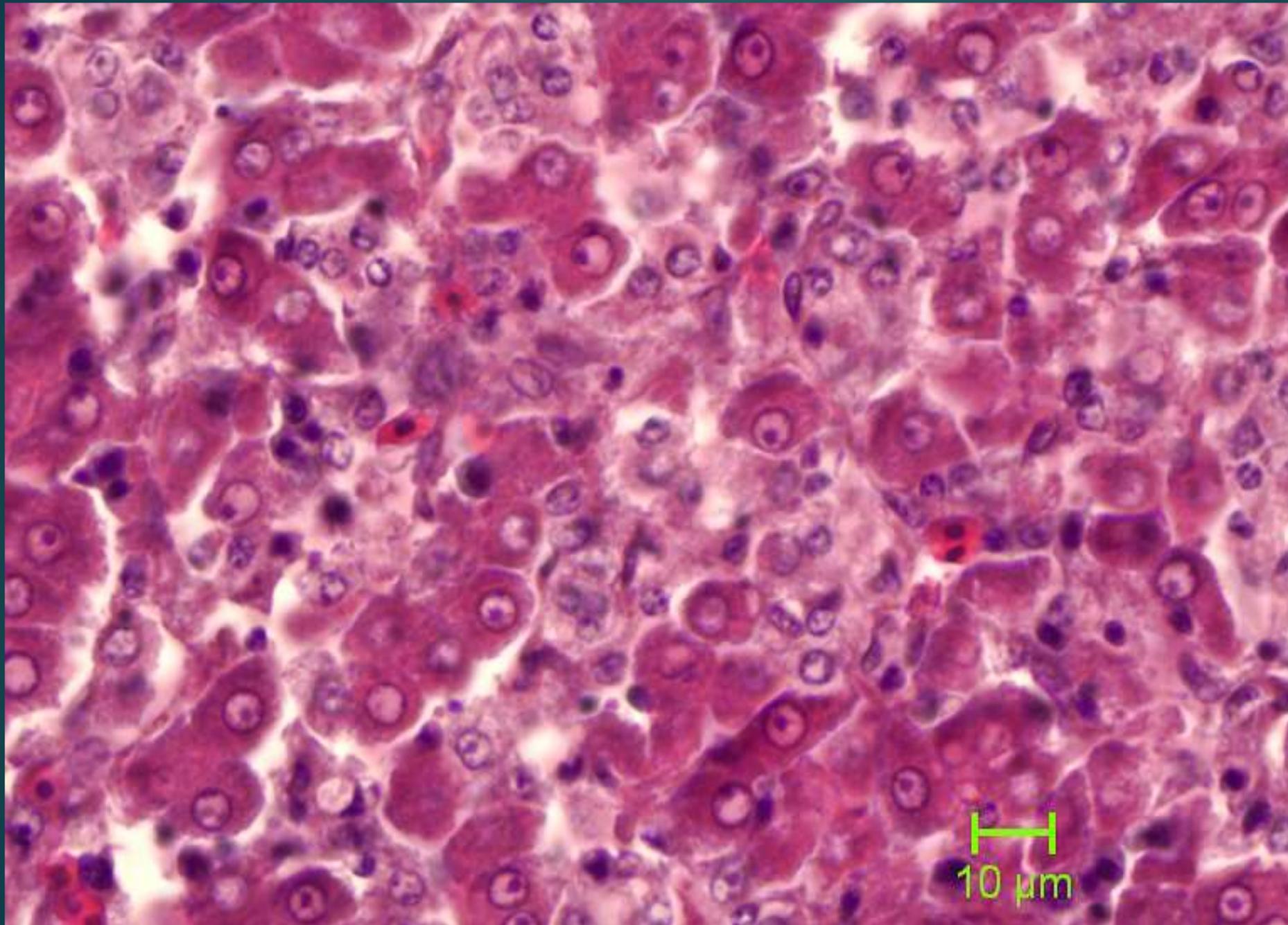


Figure 8.15 Abscess in necrotic kidney of eel surrounded by large area of haemorrhage. H + E $\times 80$. (Courtesy Dr J.A. Plumb.)



**Granulomatous
exudate (pale
pink cells) in the
liver**

Mortality and pathology of hybrid catfish, *Clarias macrocephalus* (Günther) × *Clarias gariepinus* (Burchell), associated with *Edwardsiella ictaluri* infection in southern Thailand

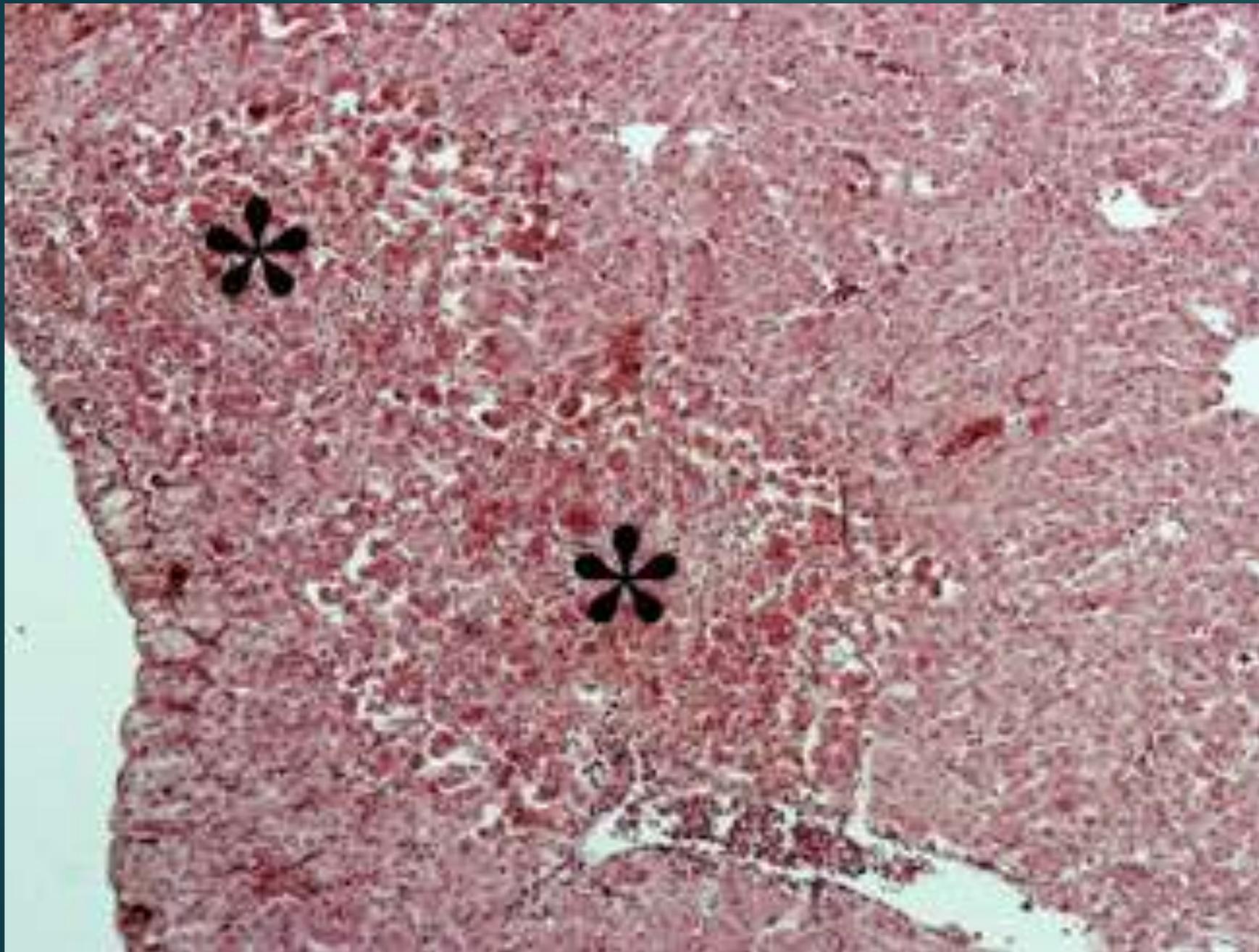
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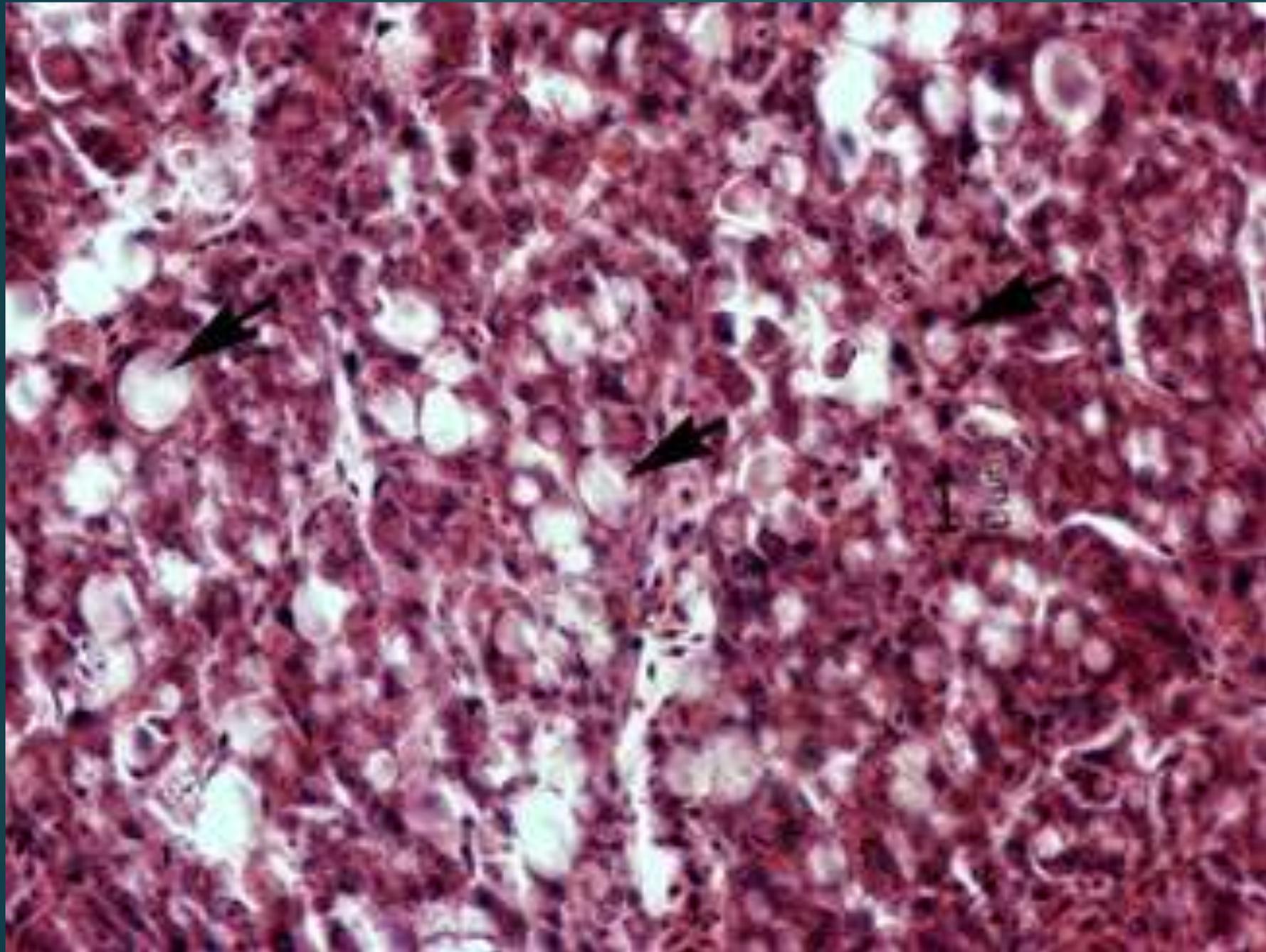
2 Department of Pathobiological Sciences, School of Veterinary Medicine, Louisiana State University, Baton Rouge, LA, USA

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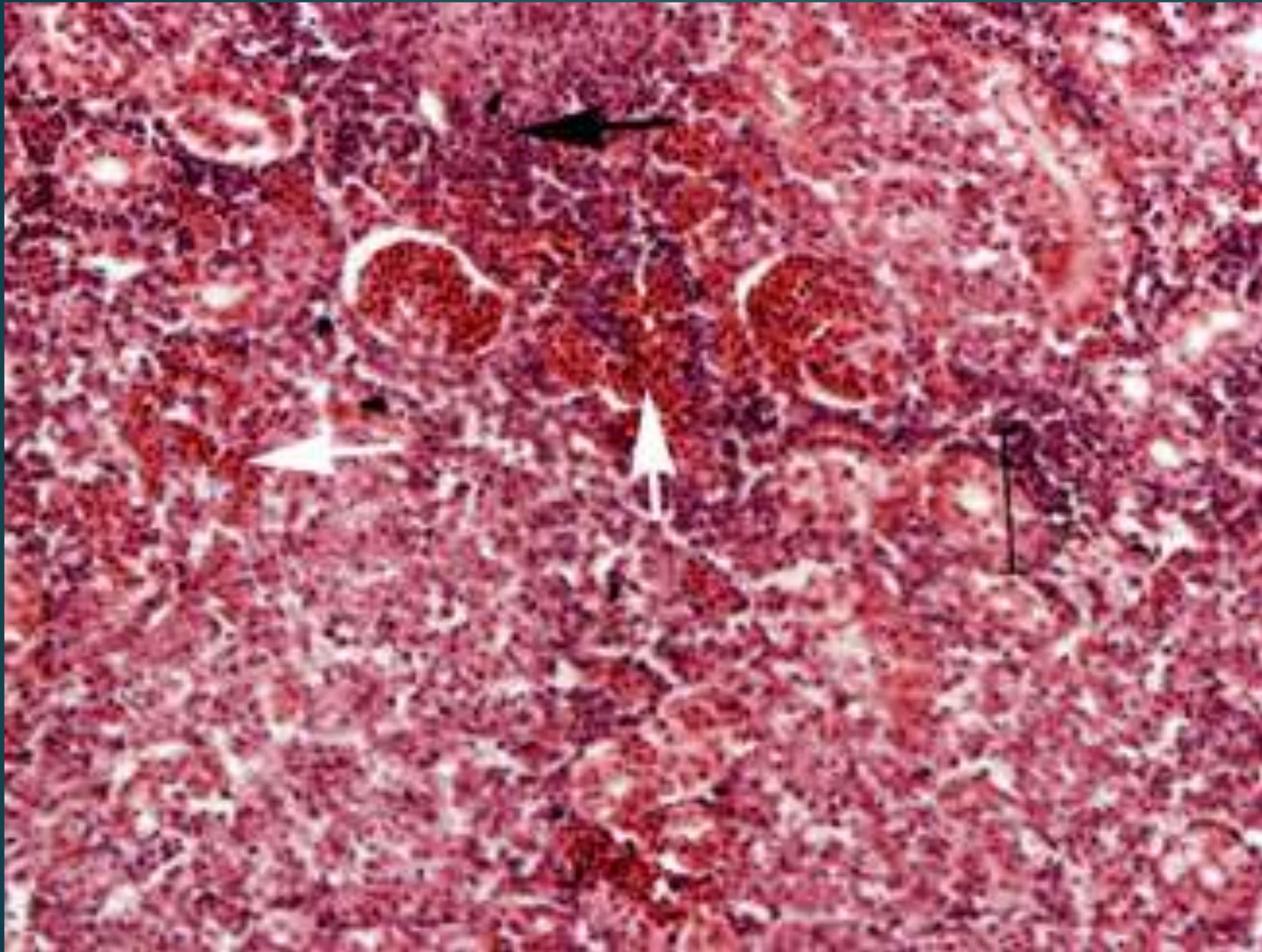




**multifocal
granulomatous
inflammation
(asterisk) and
hepatocytic necrosis**



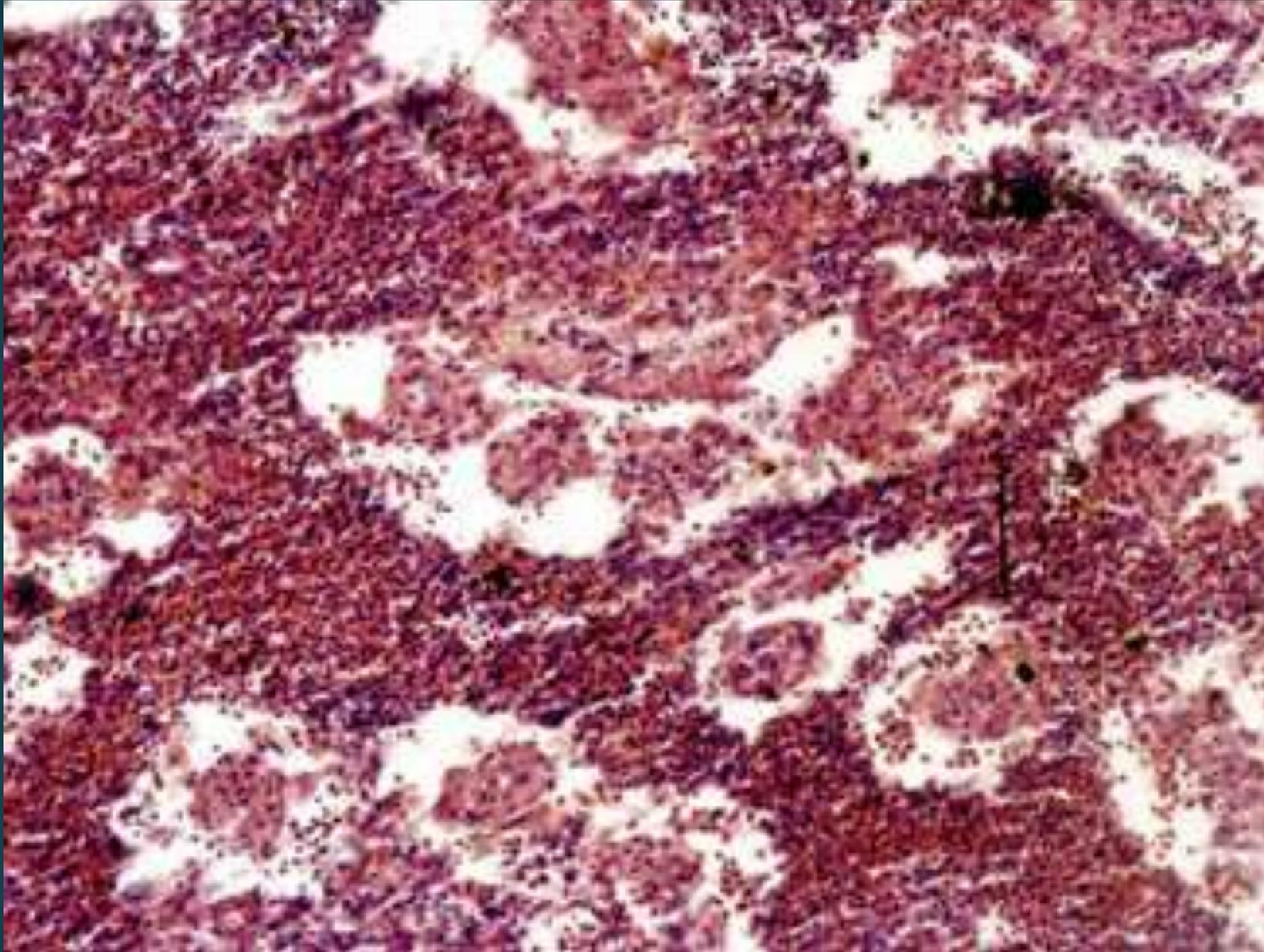
Histological section of liver showing vacuolation (arrow) with some hepatocellular necrosis



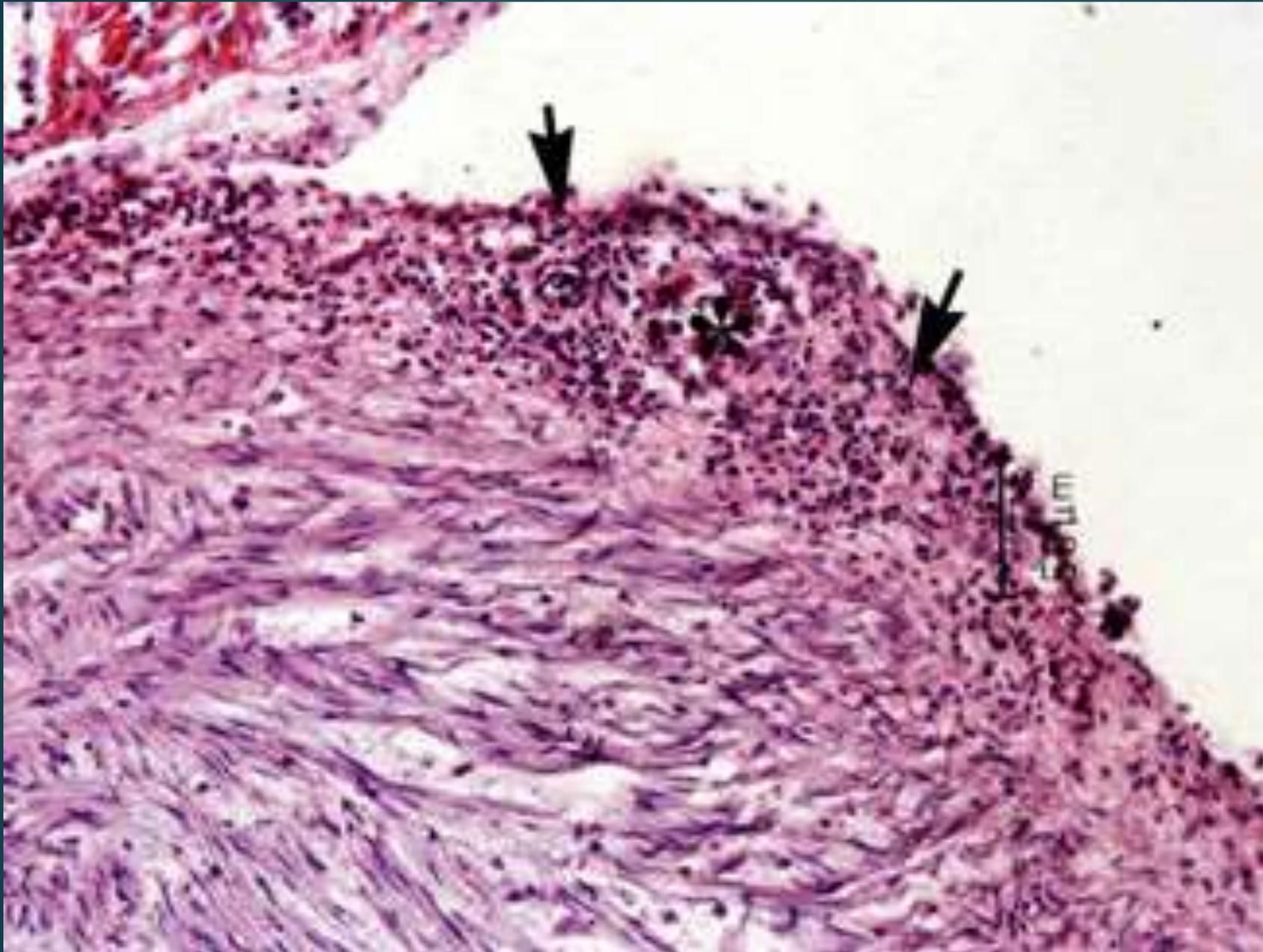
Histological section of kidney showing haemorrhage (white arrow) and lymphocytic infiltration (black arrow)



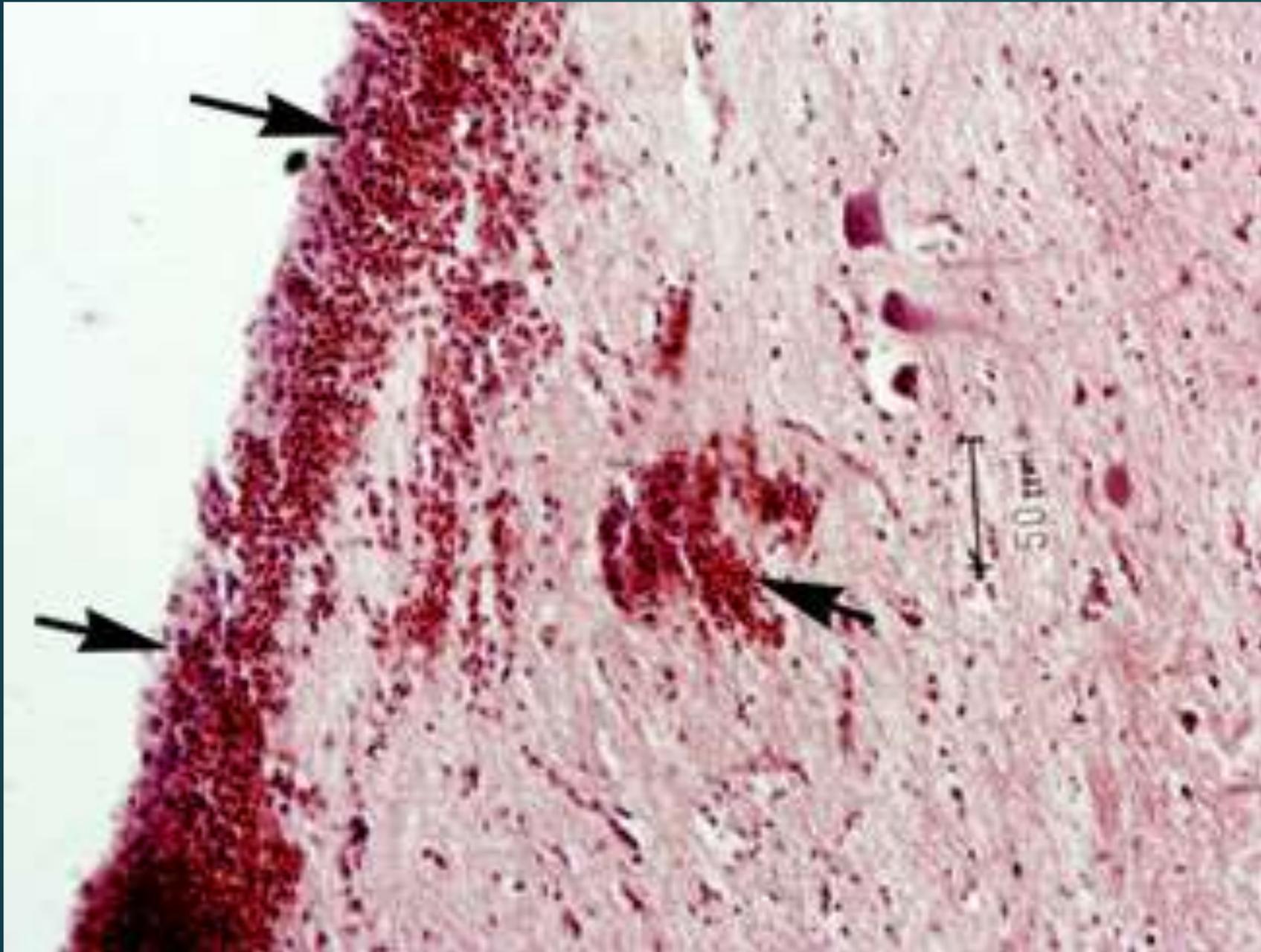
Histological section of kidney from an infected hybrid catfish showing an abscess (asterisk) is walled off by layers of fibrin (arrow) with lymphocytic infiltration associated with granulomatous inflammation



Histological section of spleen showing fibrinoid degeneration and edematous dissociation of the pulp, along with a decrease in the number of lymphoid cells



Histological section of heart tissue showing lymphocytic infiltration (arrow) associated with granulomatous inflammation (asterisk) as well as an extended epicardium apparent in the heart



Histological section of brain from an infected hybrid catfish showing diffuse haemorrhage at the outer layer of brain

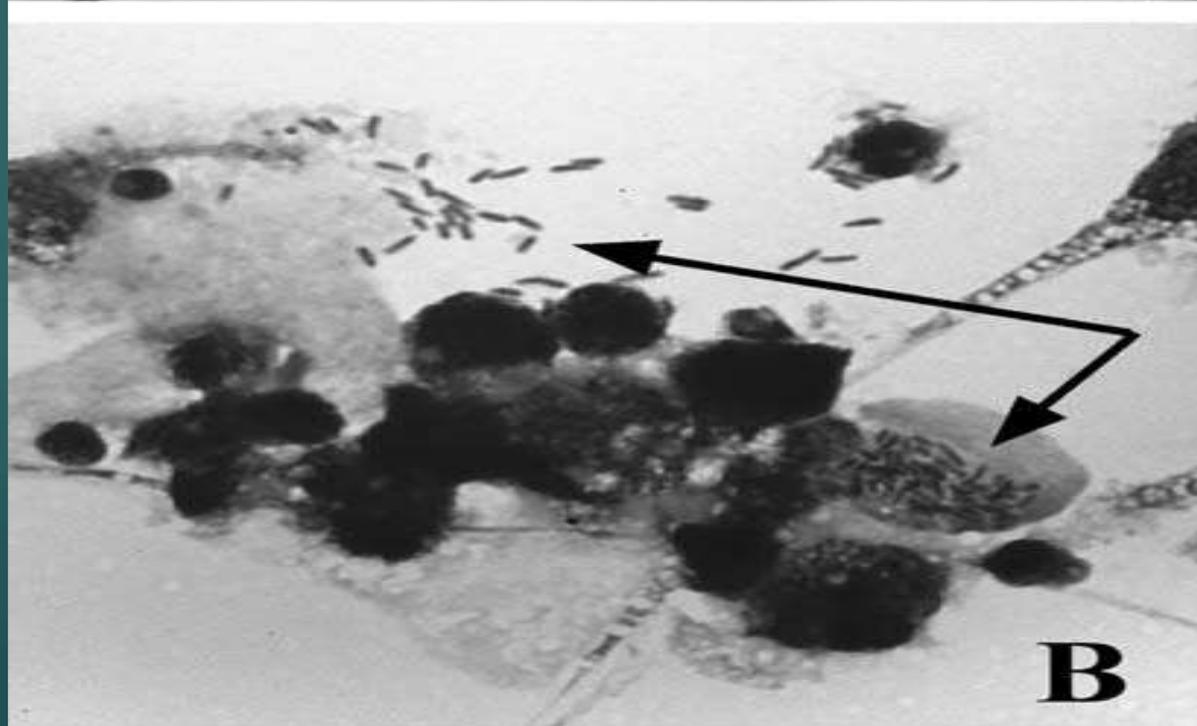
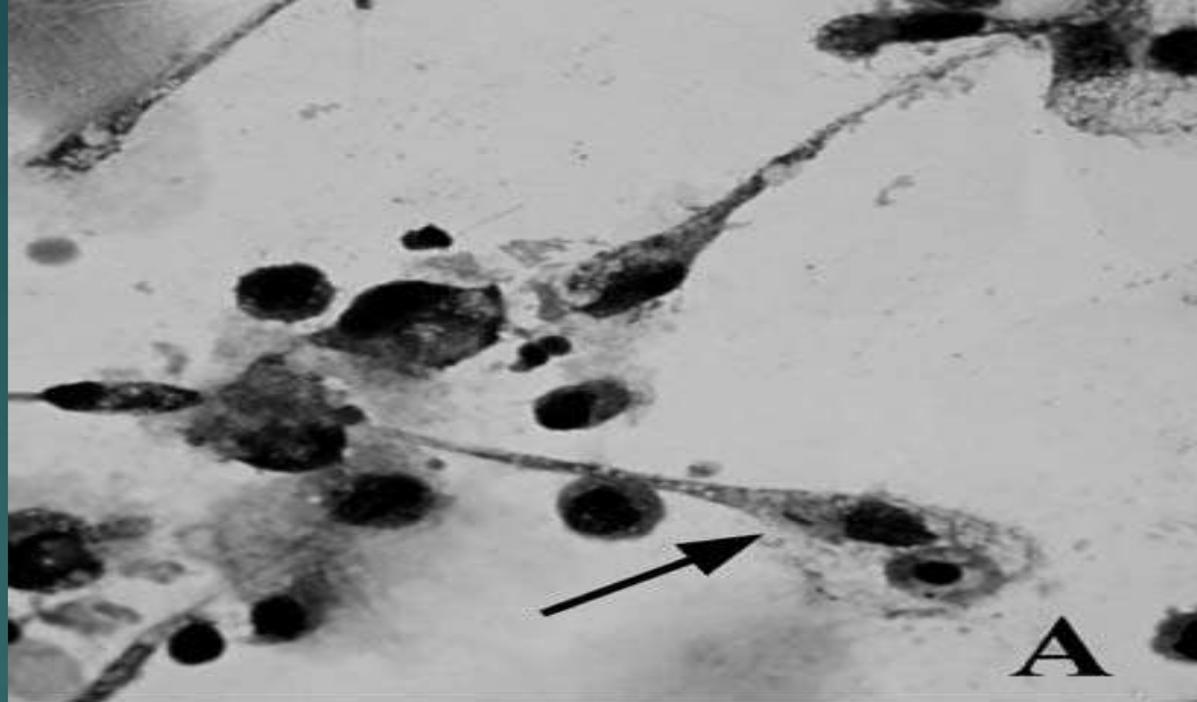
**Mortality and pathology in brown bullheads
Amieurus nebulosus associated with a
spontaneous *Edwardsiella ictaluri* outbreak
under tank culture conditions**

Luke R. Iwanowicz^{1,2,*}, Alison R. Griffin¹, Deborah D. Cartwright^{1,3}, Vicki S. Blazer¹

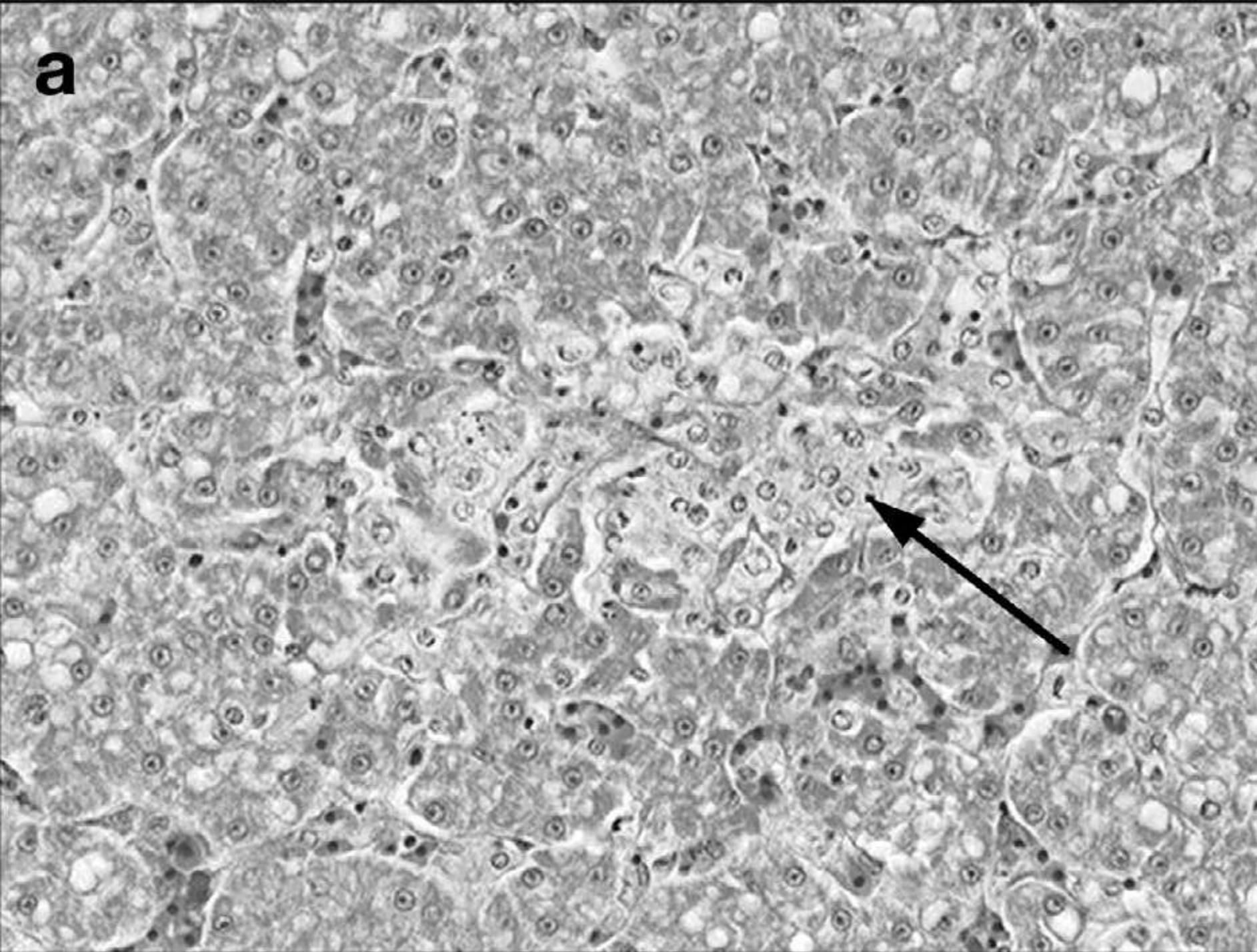
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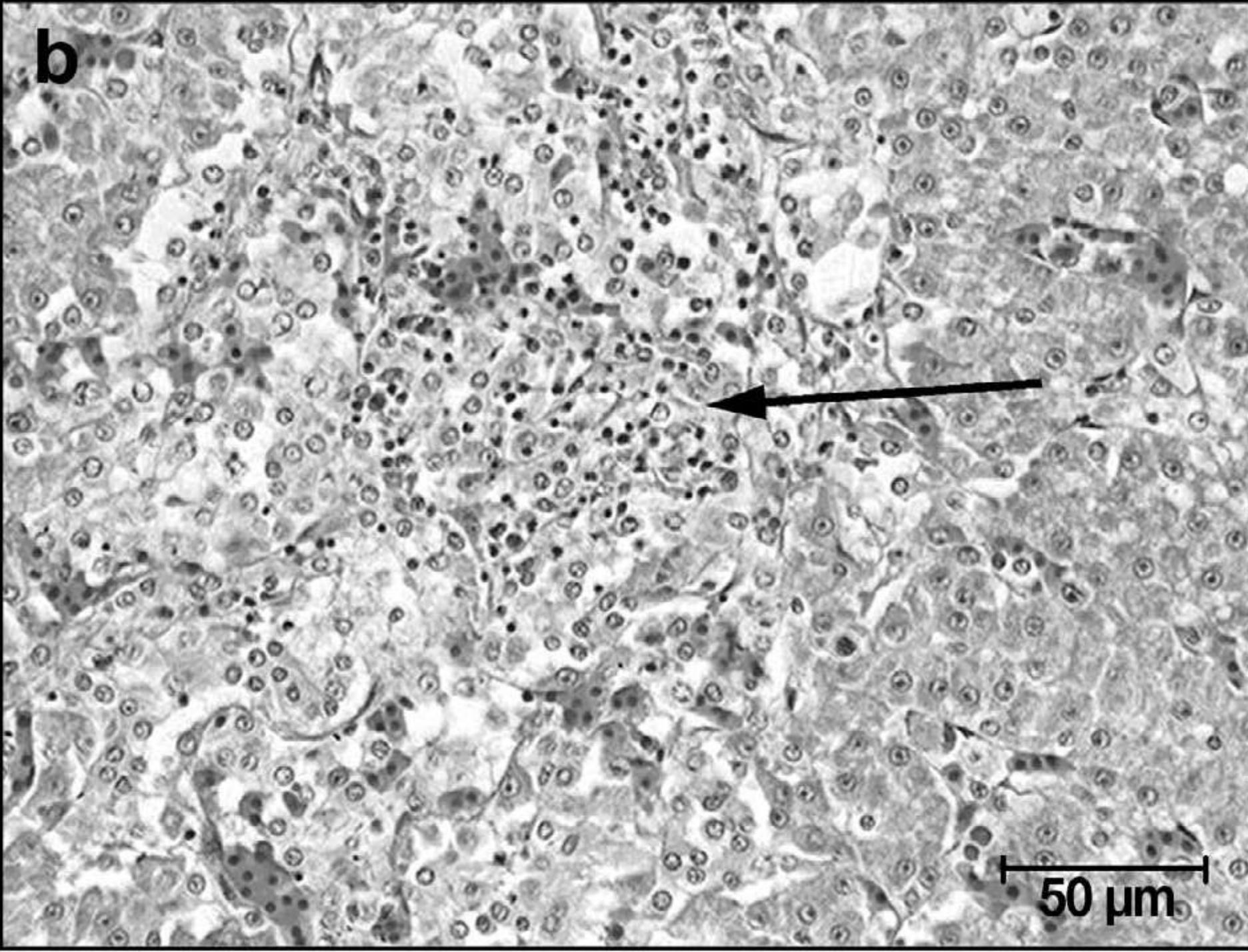


a



**diffuse,
multifocal
granulomatous
inflammation
(arrow) and
hepatocyte
necrosis**

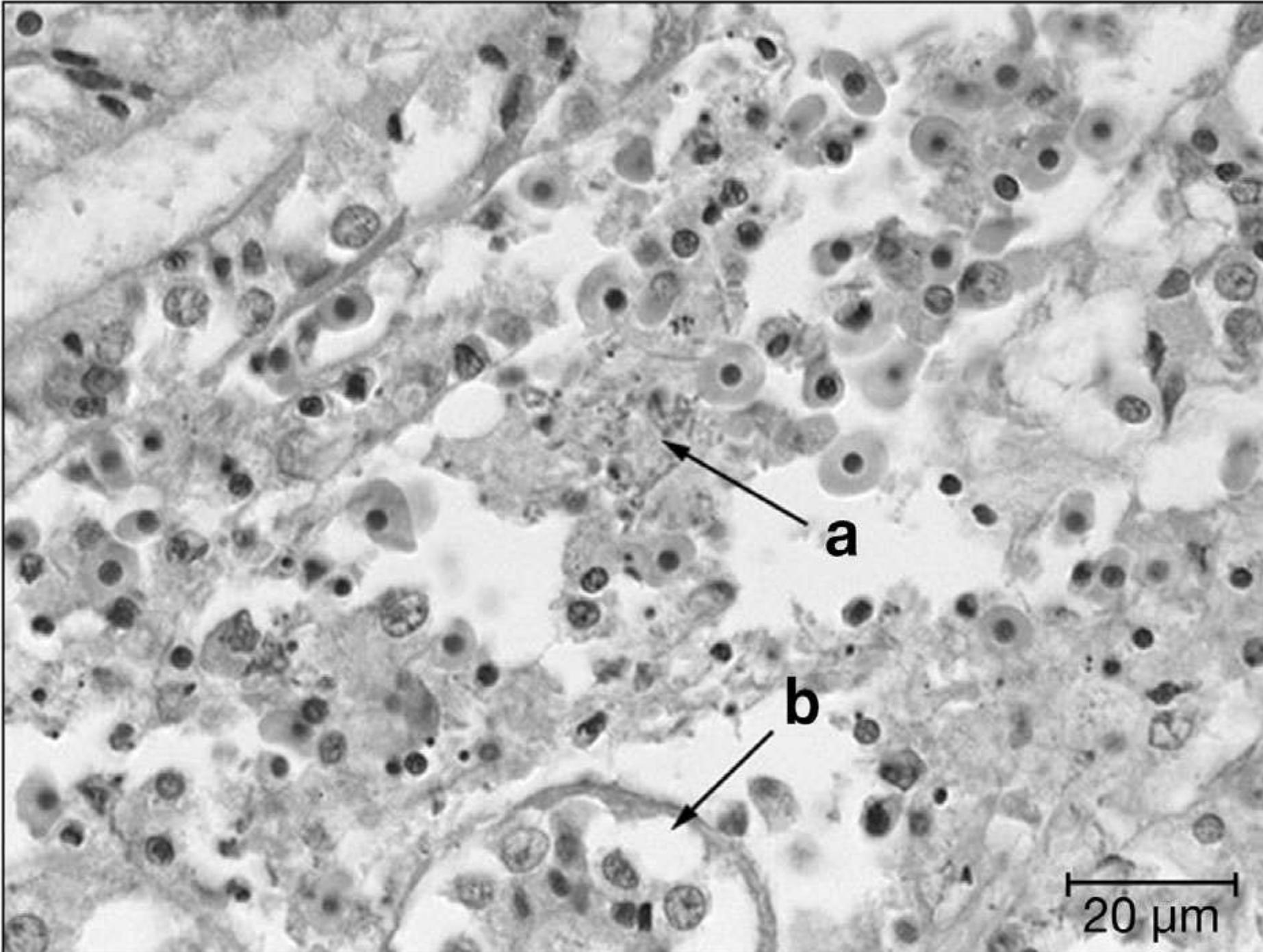
b



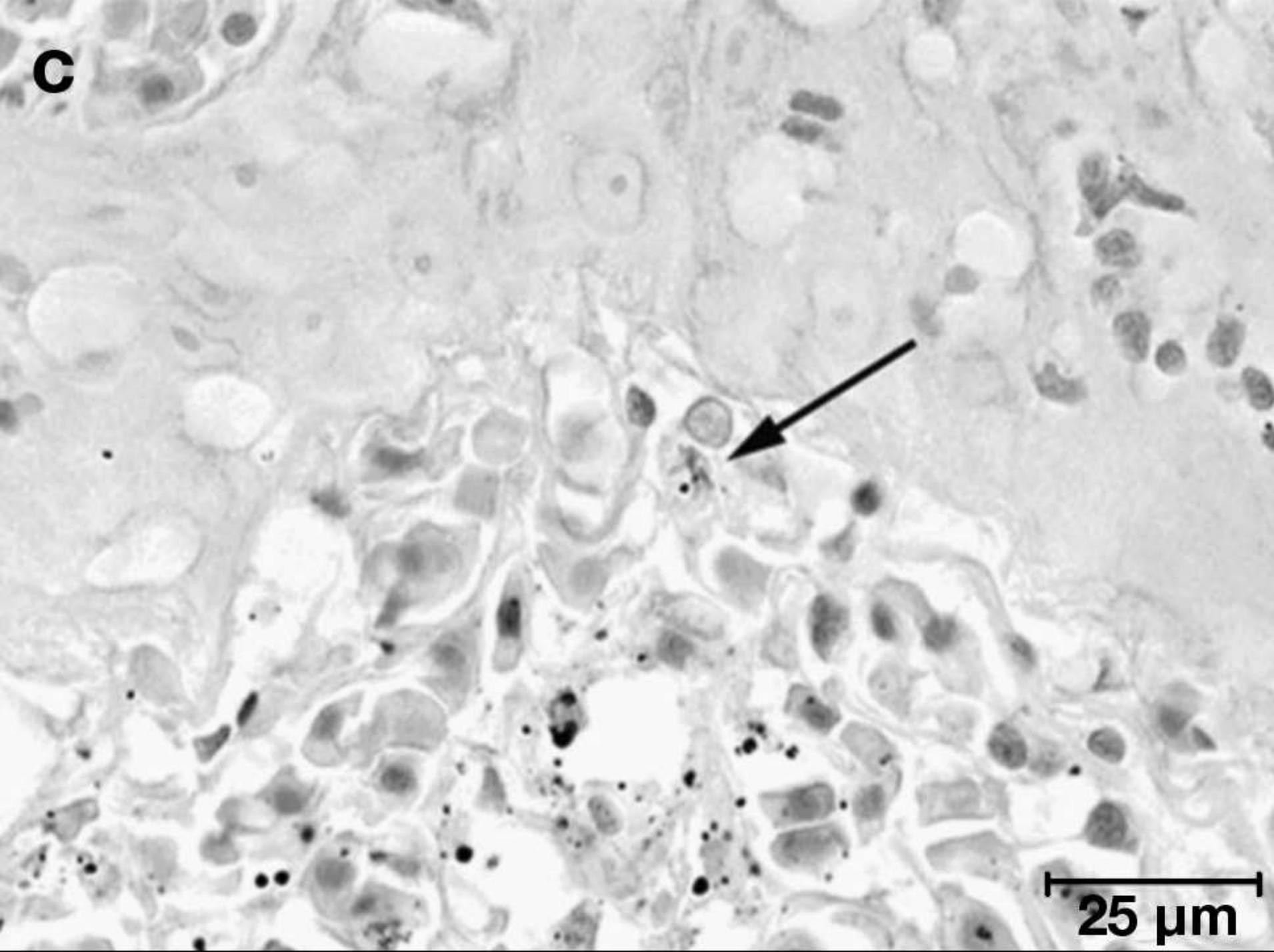
lymphocyte
infiltration
associated with
granulomatous
inflammation
(arrow).

50 μm

Edwardsiella ictaluri
Histological
section of an infected
posterior kidney.
Focal area of
bacteria in a necrotic
focus in the
interstitial space of the
posterior kidney
(arrow a). Vacuolation
of renal tubular cells
(arrow b)



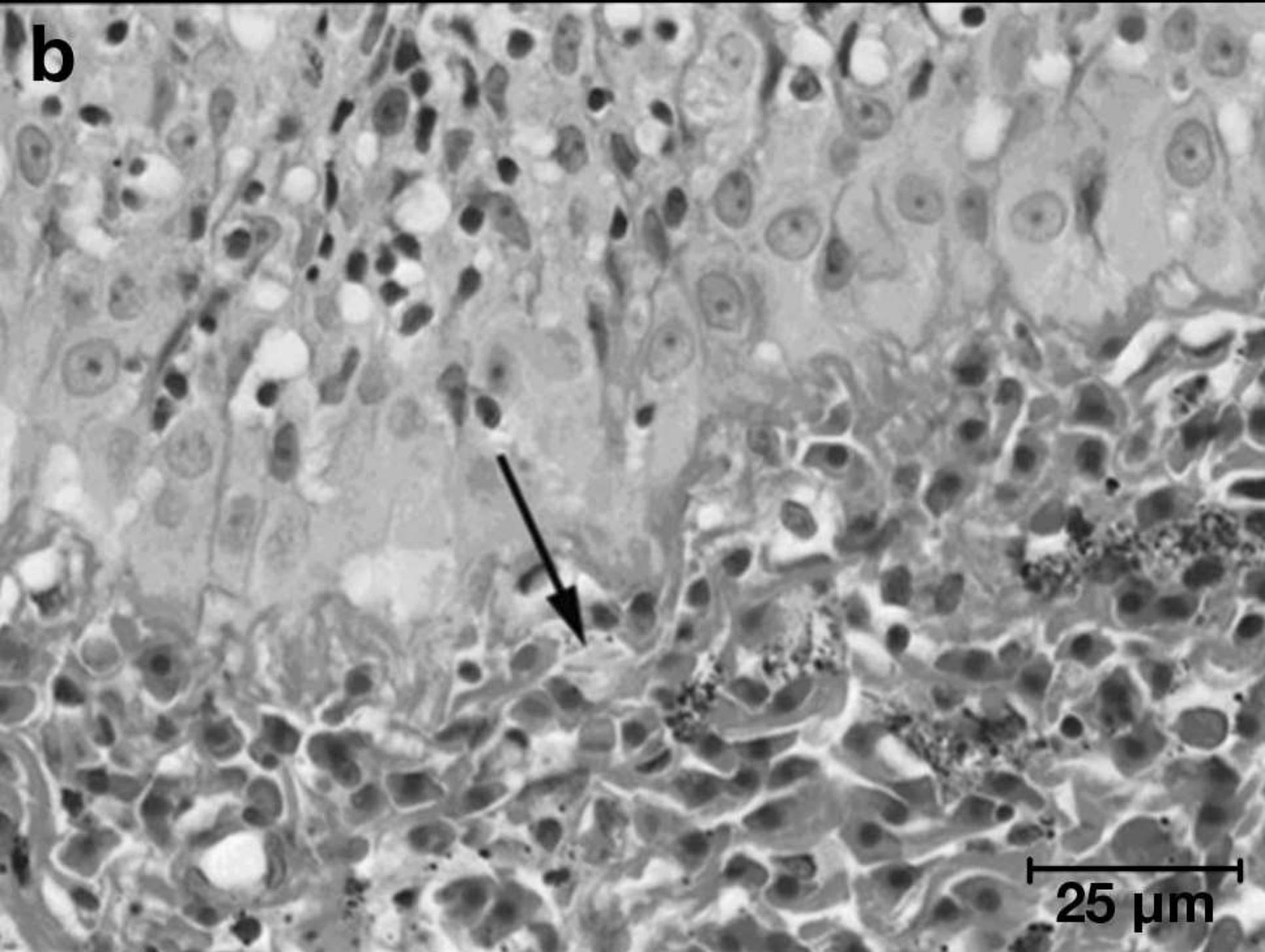
C



phagocytes
(arrows)
containing
bacteria. (a,b) H&E
staining

25 μm

b



25 μm

Journal of Aquatic Animal Health

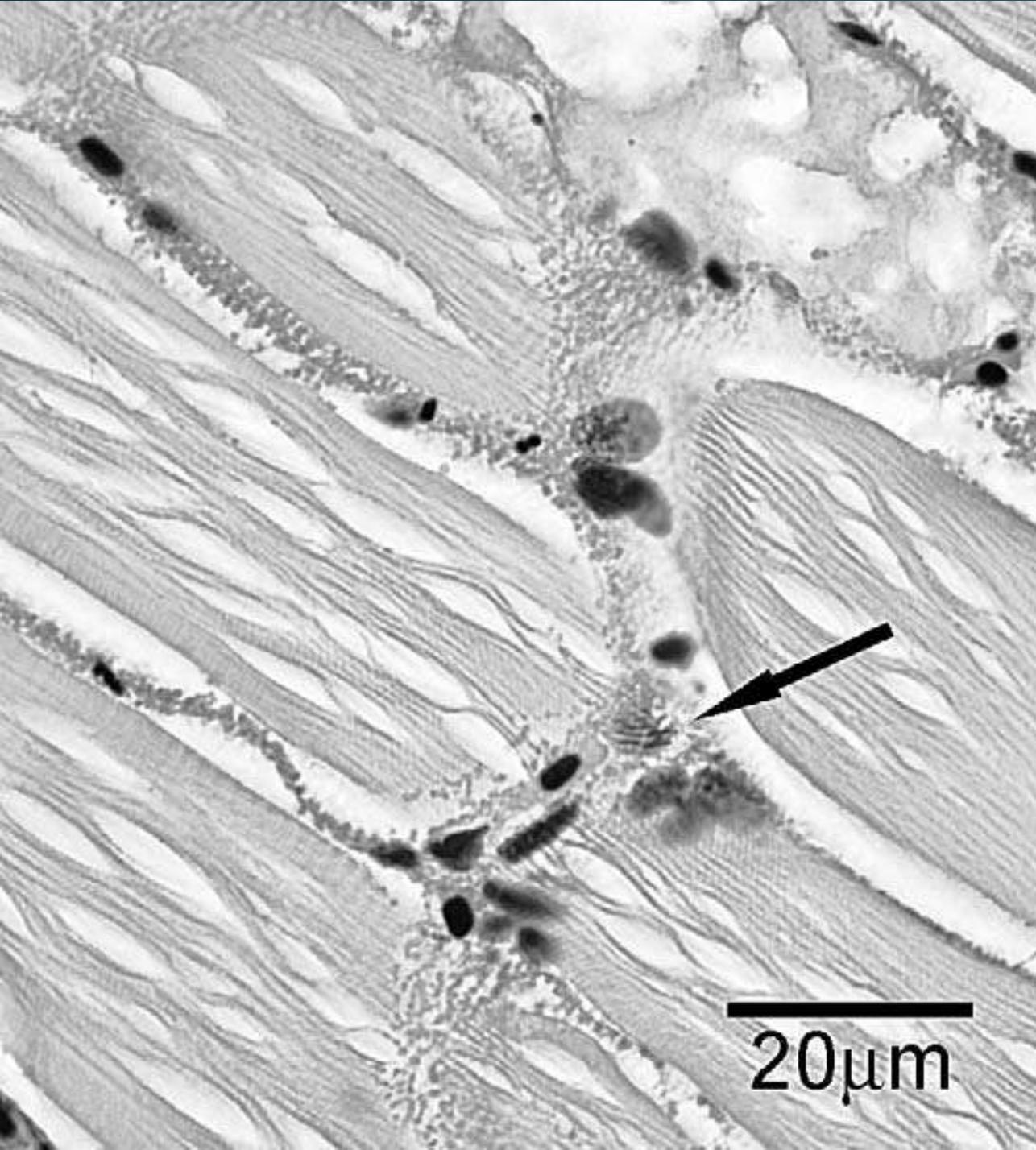
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Evaluation of Zebrafish *Danio rerio* as a Model for Enteric Septicemia of Catfish (ESC)

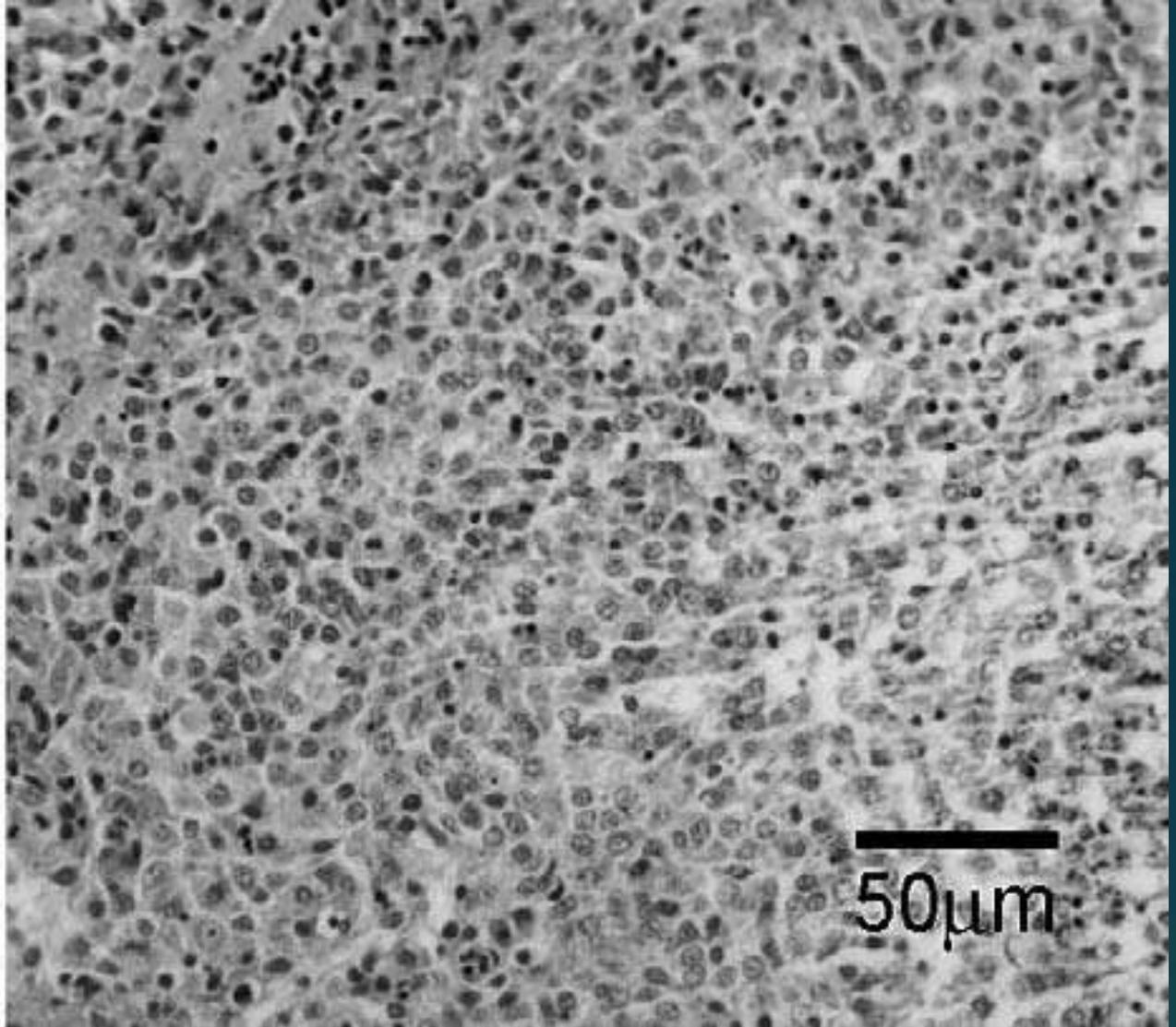
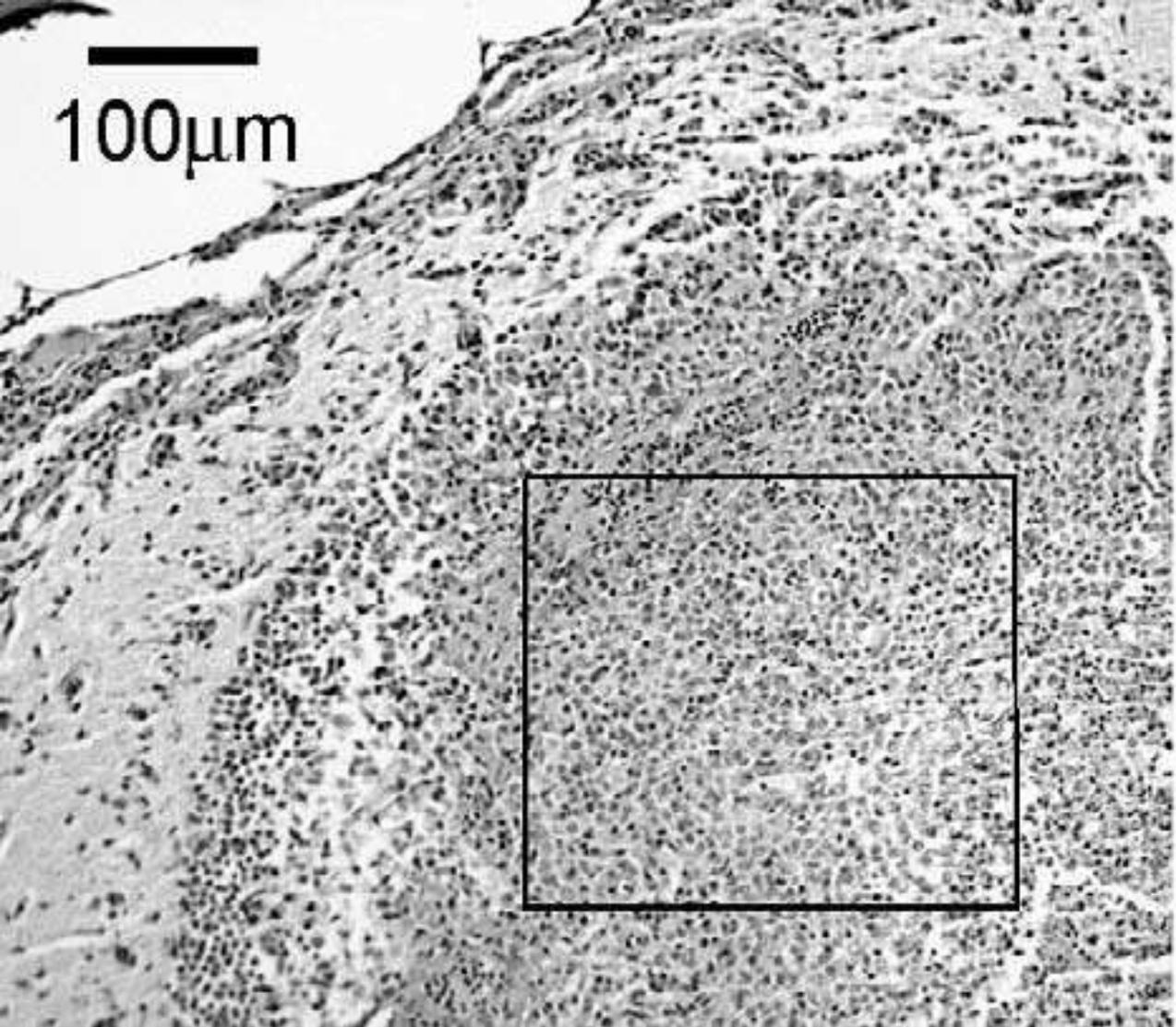
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Zebrafish muscle tissue demonstrating infiltrating leukocytes associated with bacteria (arrow)

20 μ m



Zebrafish brain tissues exhibiting necrotizing encephalitis. Right image is an increased magnification of the boxed area in the left image

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Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/uahh20>

Edwardsiella ictaluri as the Causative Agent of Mortality in Cultured Nile Tilapia

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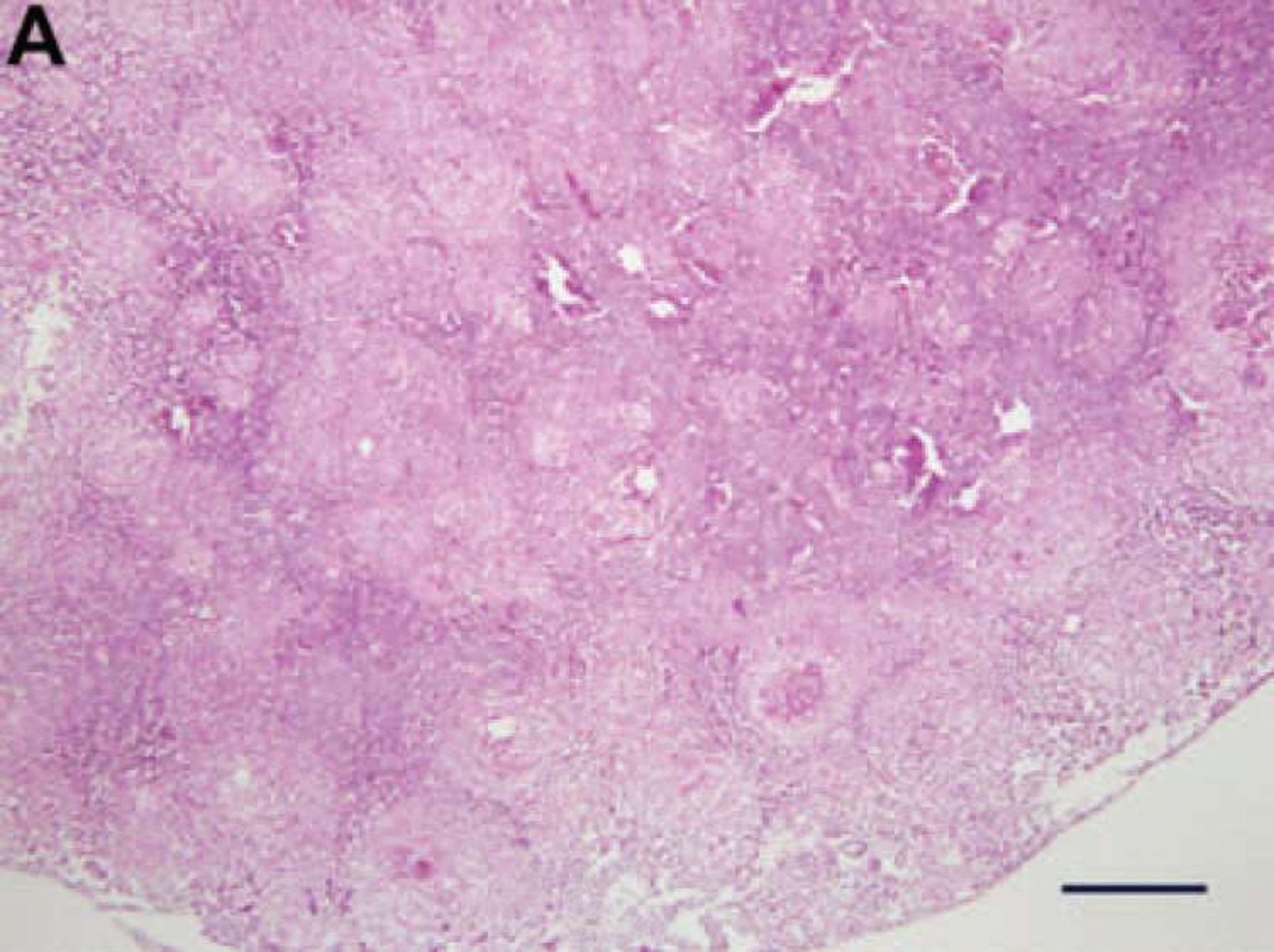
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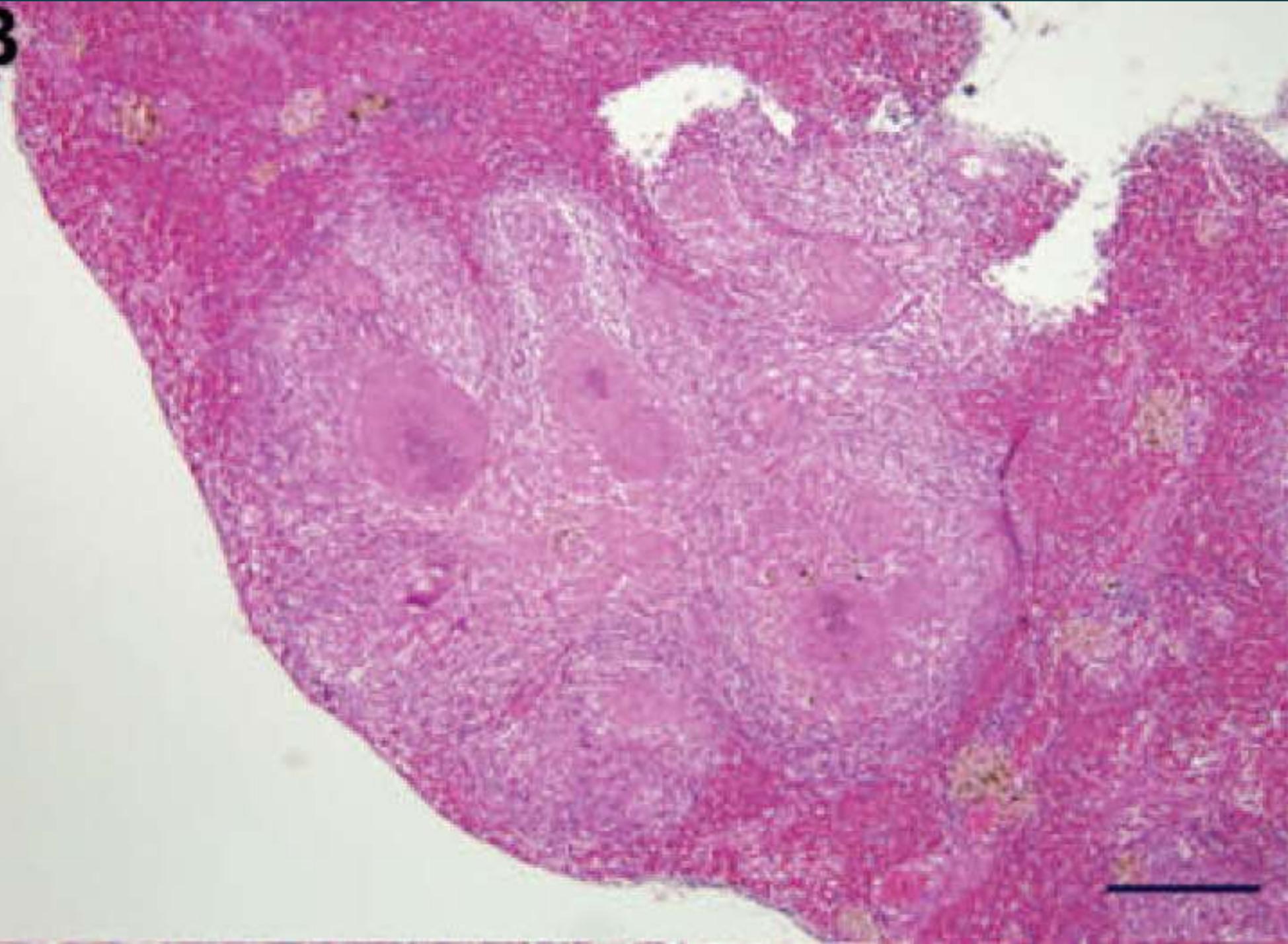
^c Aqualnovo, Polpaico 037, Barrio Industrial , Puerto Montt , Chile

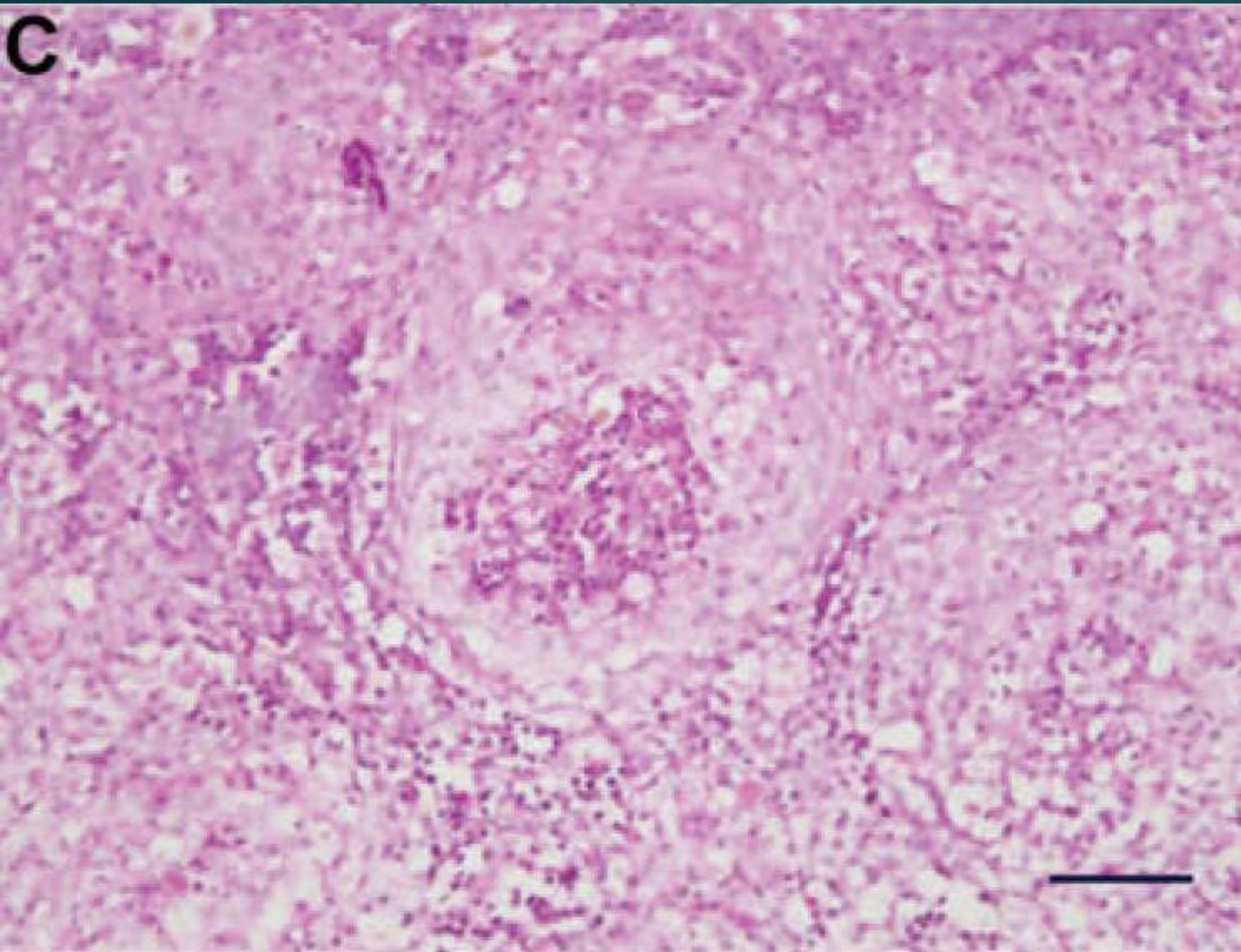
Published online: 30 May 2012.

A



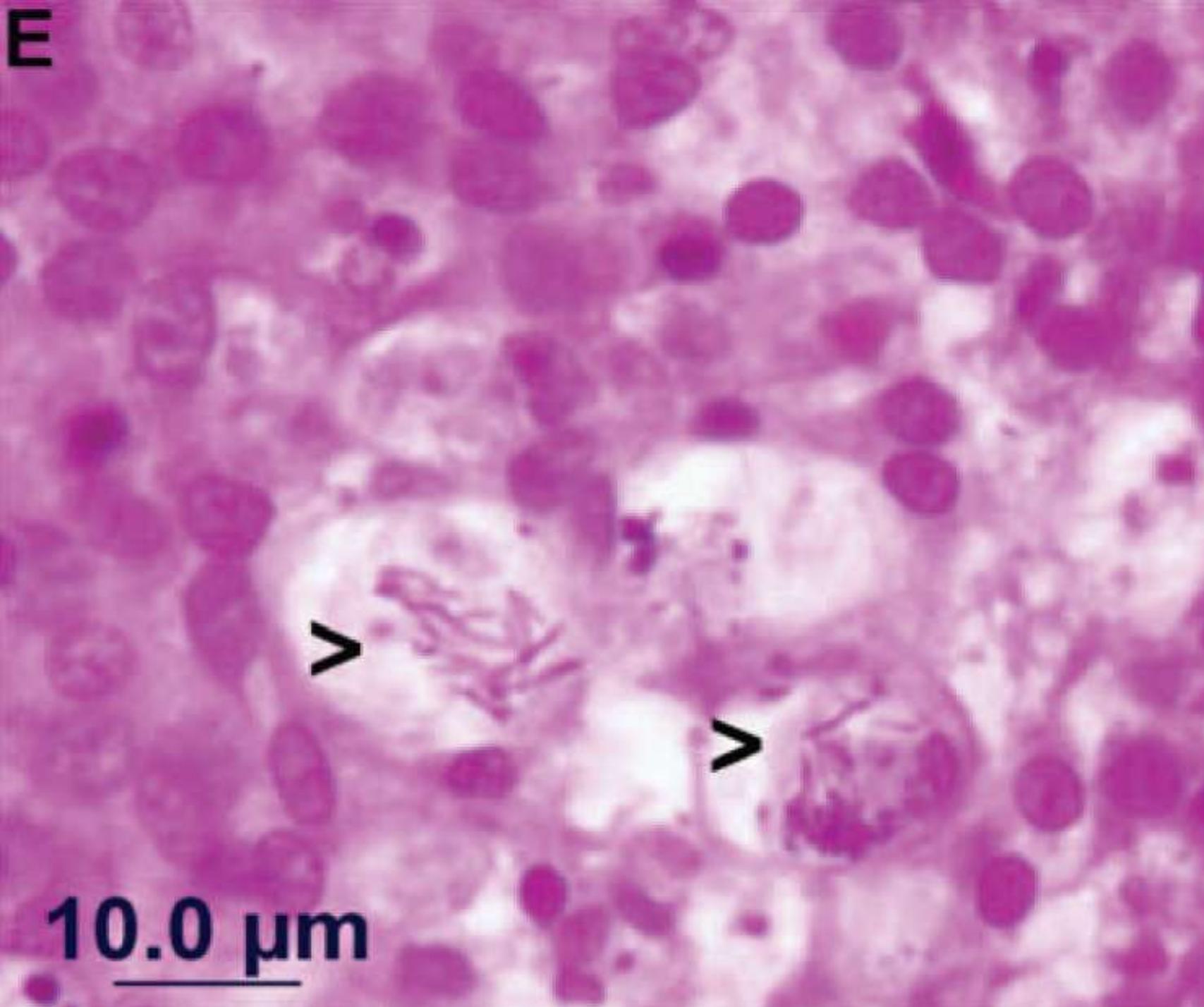
**multifocal granulomatous
inflammatory response in
spleen**

B



**granuloma presenting
central areas of
necrosis surrounded by
inflammatory cells
composed
largely of macrophages
and lymphocytes**

E



intracellular gram-negative rods (see arrows) in splenic macrophage

10.0 μm

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<http://www.tandfonline.com/loi/uahh20>

Edwardsiellosis Caused by *Edwardsiella ictaluri* in Laboratory Populations of Zebrafish *Danio rerio*

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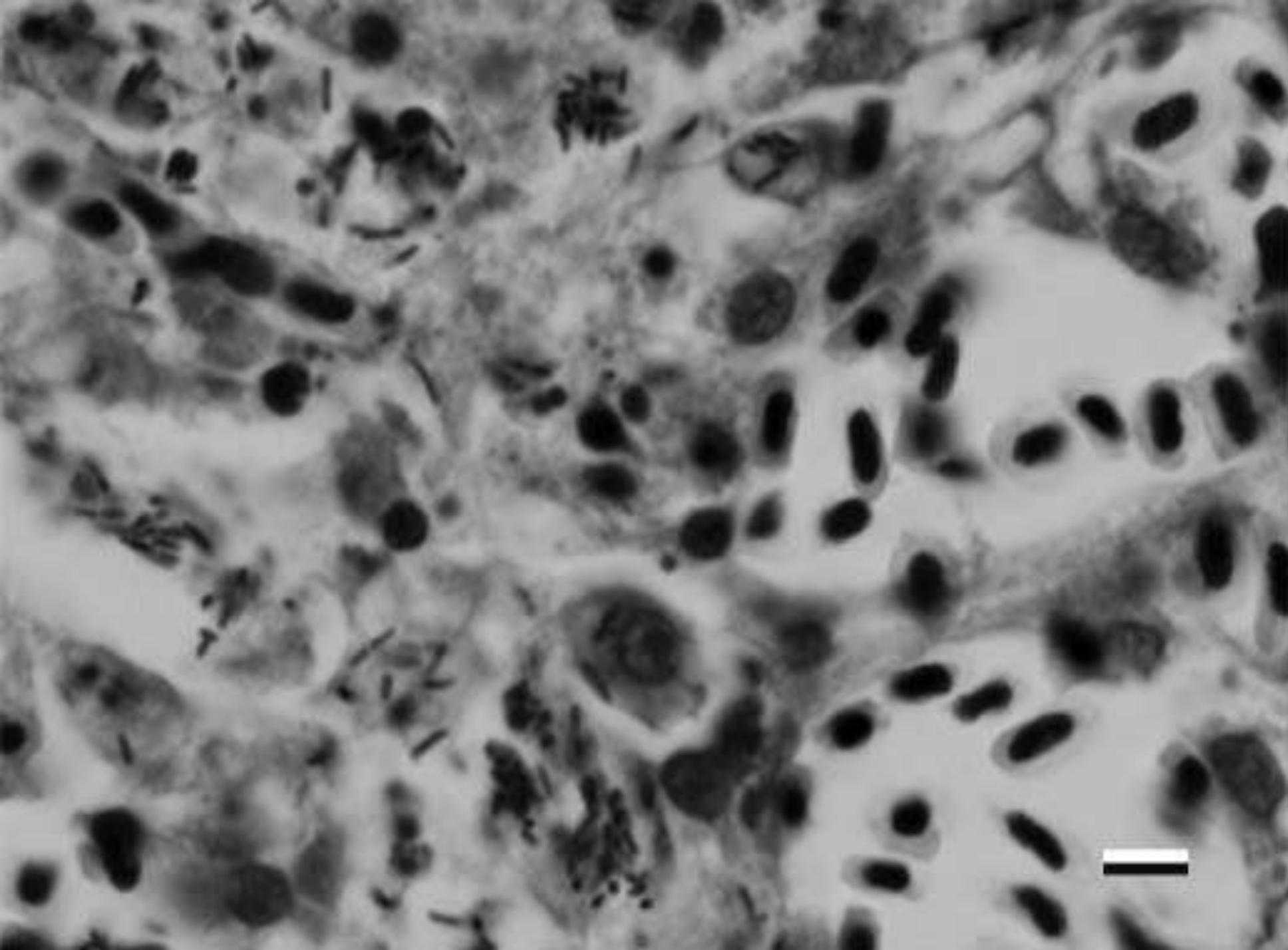
^f Division of Laboratory Animal Resources, University of Pittsburg, 4200 Fifth Avenue, Pittsburg, Pennsylvania, 15261, USA



C

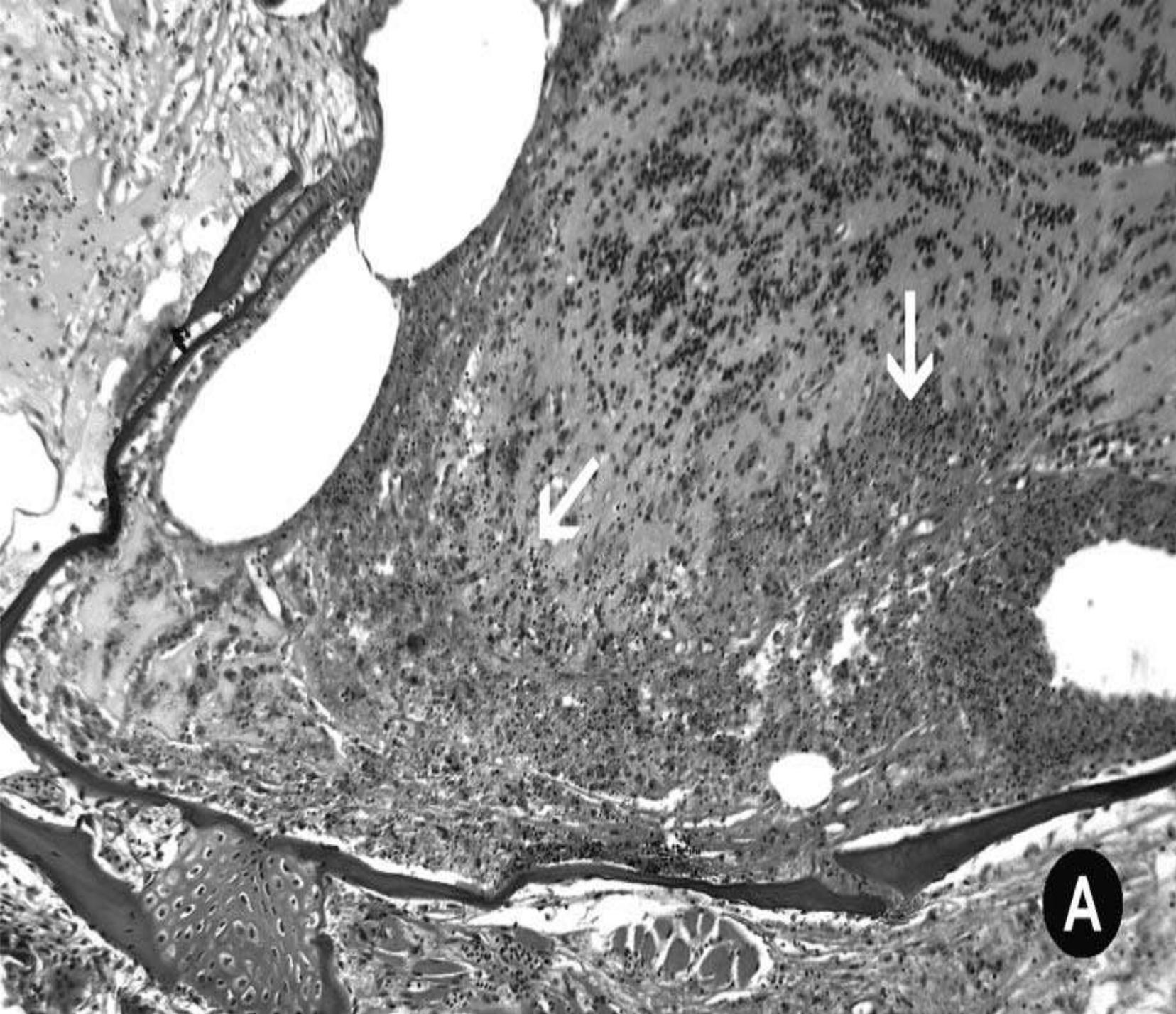


D



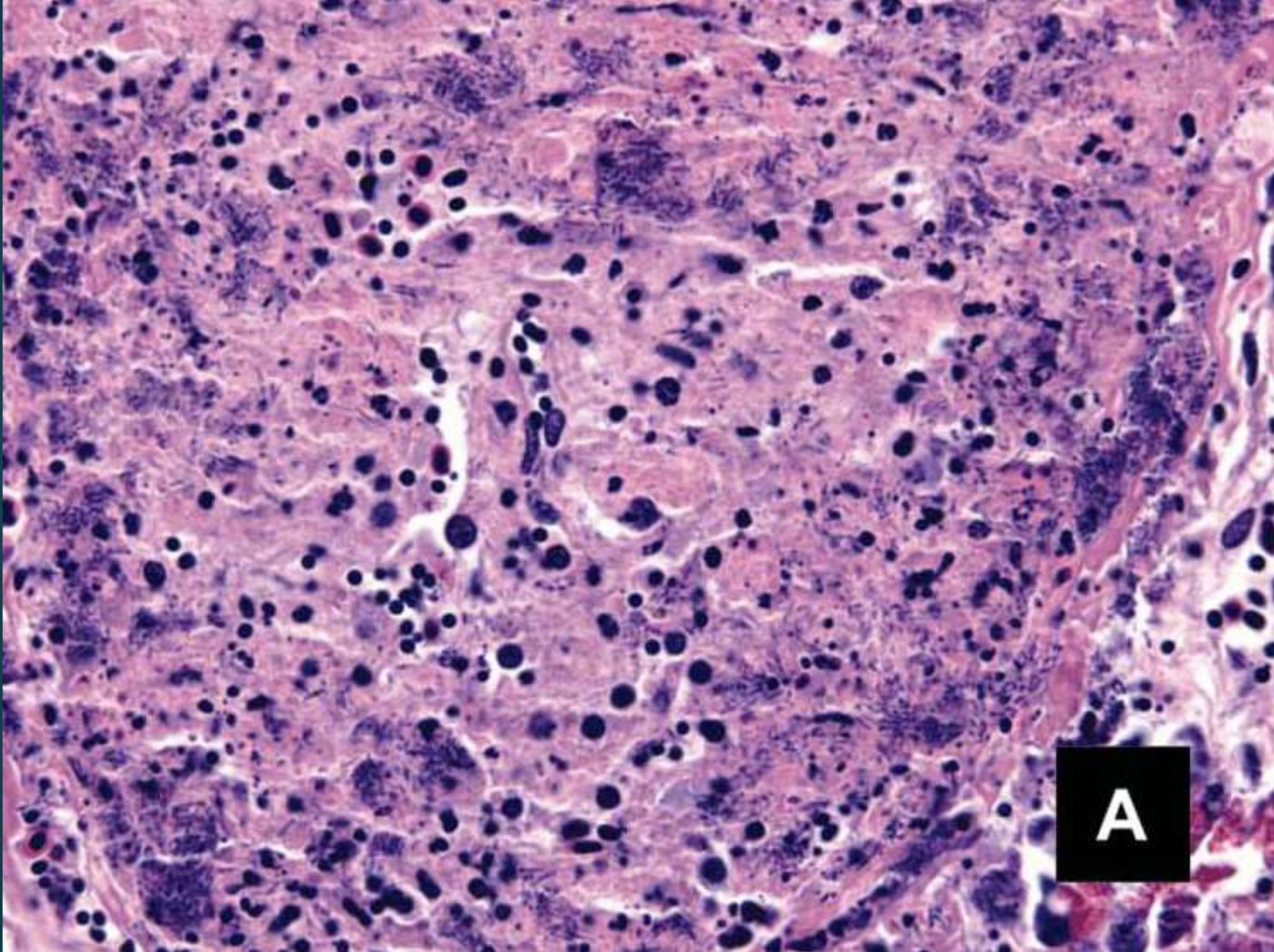
Anterior kidney of Zebrafish with *Edwardsiella ictaluri* visible within macrophages



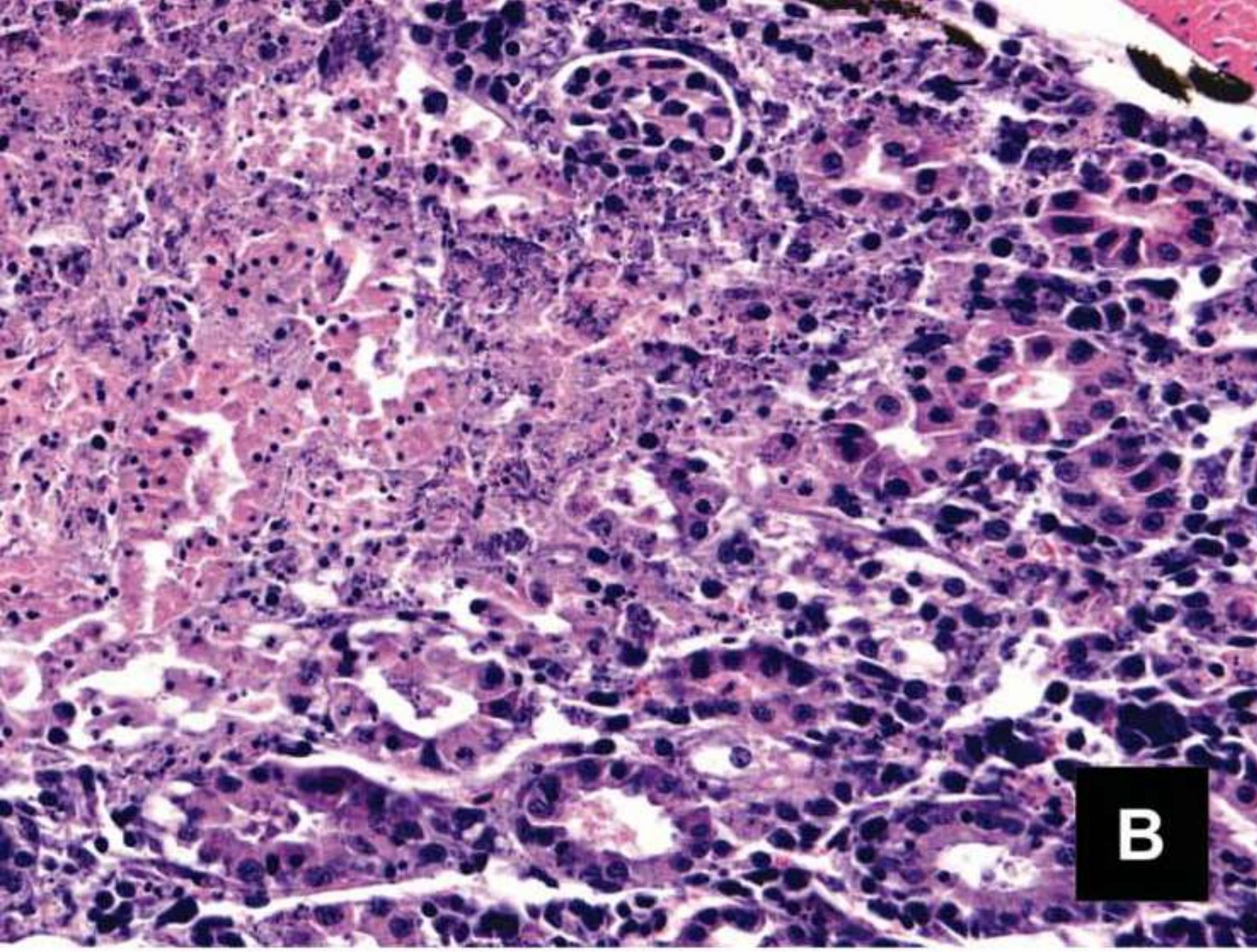


Severe, chronic inflammation of the forebrain (arrow), extending into the olfactory bulb.

A

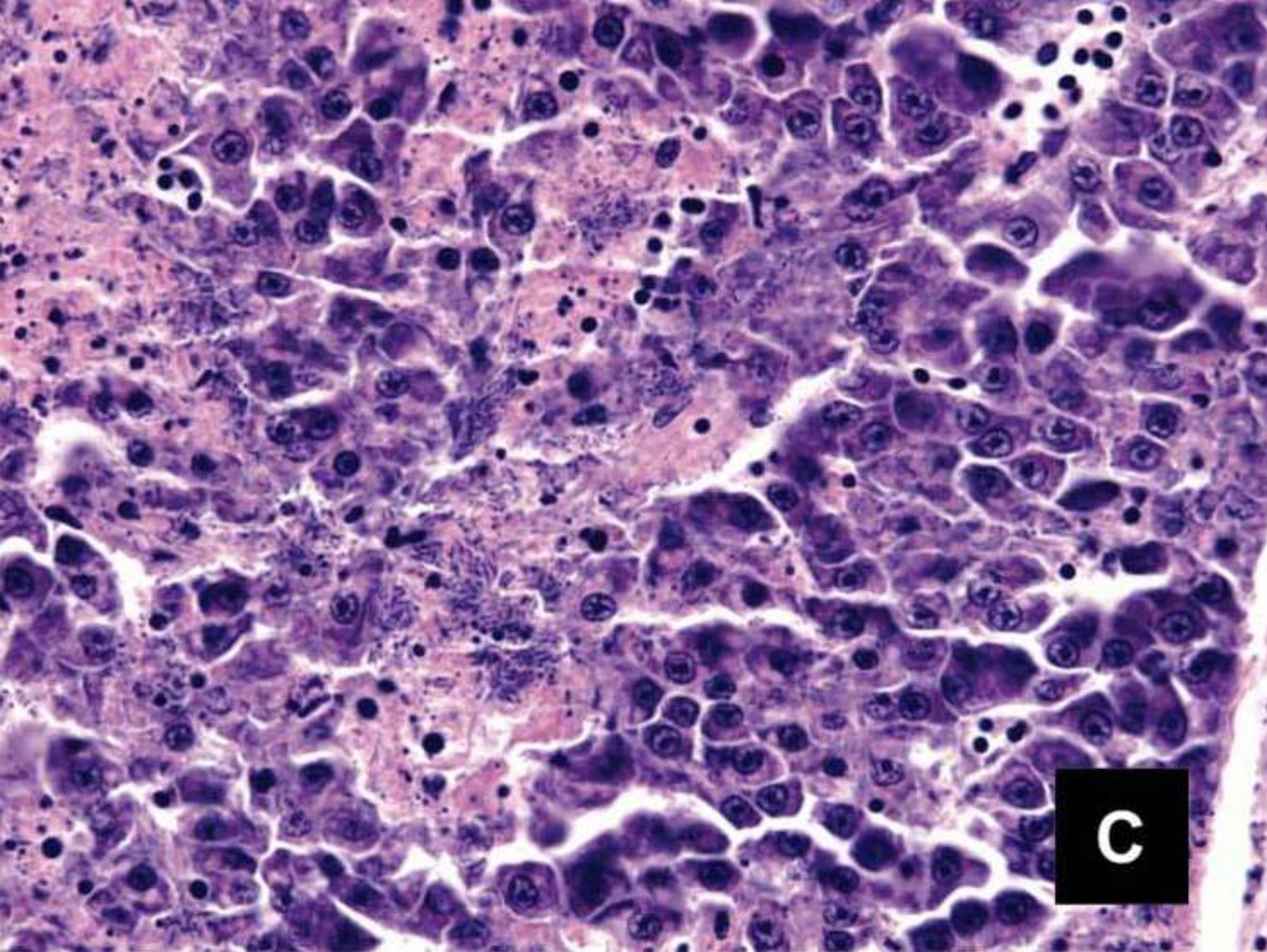


The spleen exhibits necrosis in more than 95% of the parenchyma with numerous necrotic macrophages and innumerable rod-shaped bacteria within and between cells. Pancreatic exocrine tissue is present at lower right

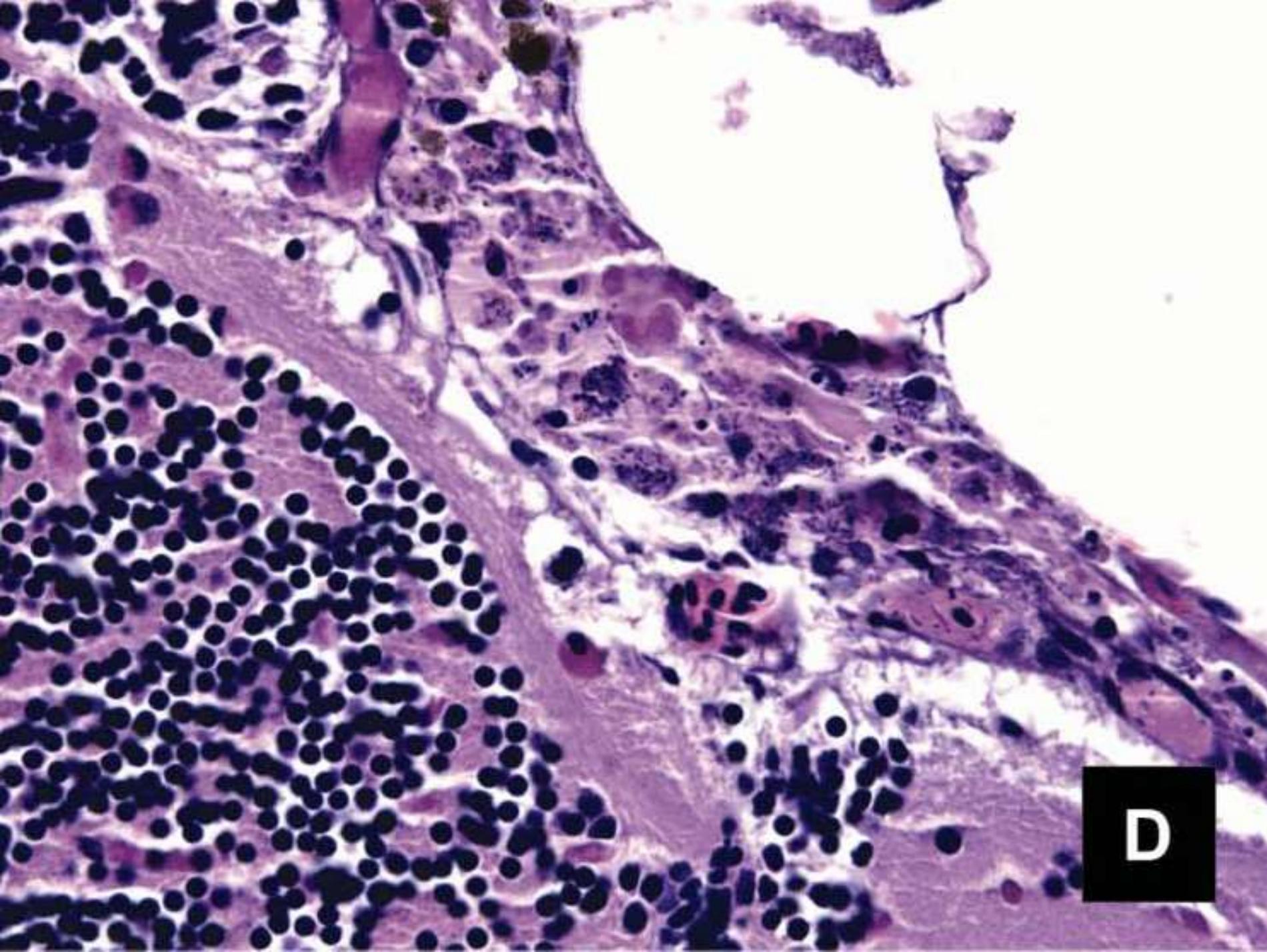


Areas of inflammation and necrosis were evident in the kidney as discrete expansive foci with progression of severity preferentially affecting hematopoietic cords prior to nephron necrosis. In the left of the image many small shrunken pyknotic cells and karyorrhectic debris (necrosis) are evident admixed with many bacteria

B



The liver contains several foci of necrosis with numerous bacteria



The endomeninges are expanded two to three times their normal size by aponecrotic leukocytes and bacteria. The brain is at lower left of the image, pericephalic adipose at upper right

D

Outbreaks of *Edwardsiella ictaluri* Infection in Ayu *Plecoglossus altivelis* in Japanese Rivers

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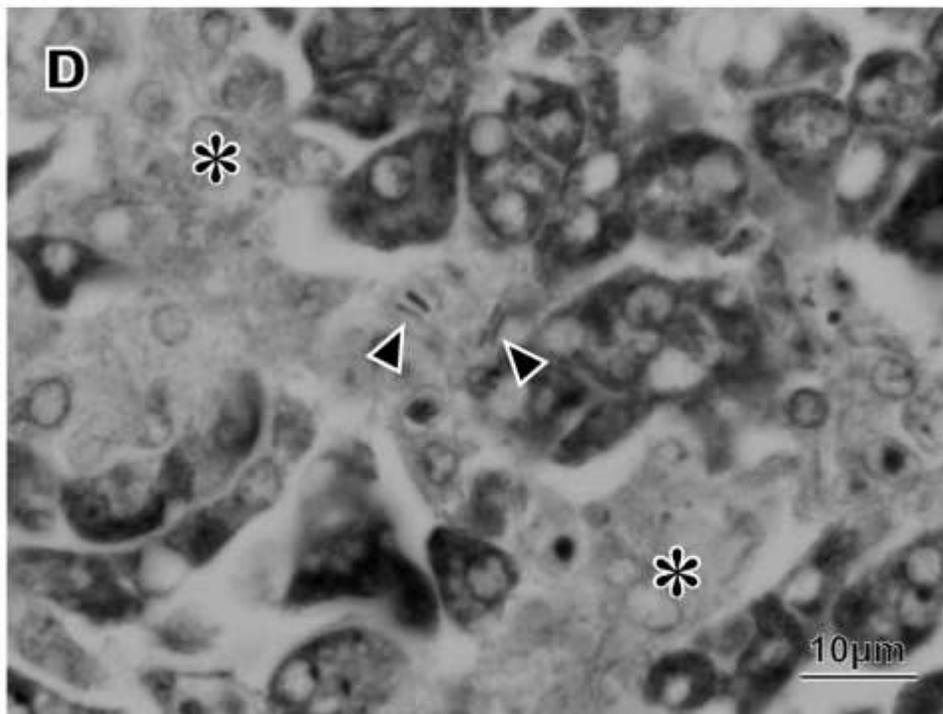
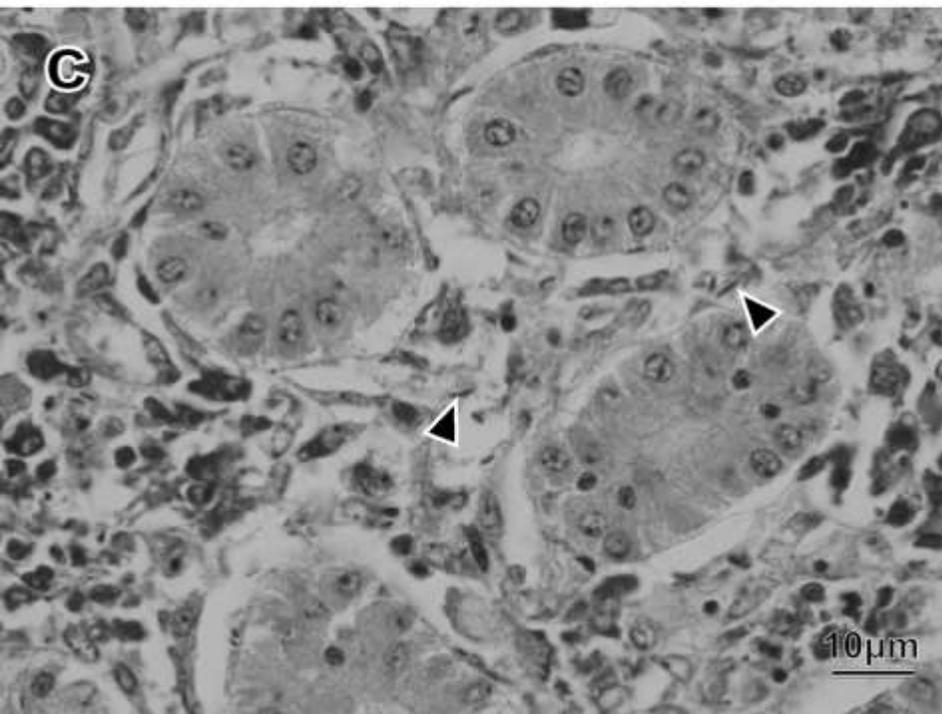
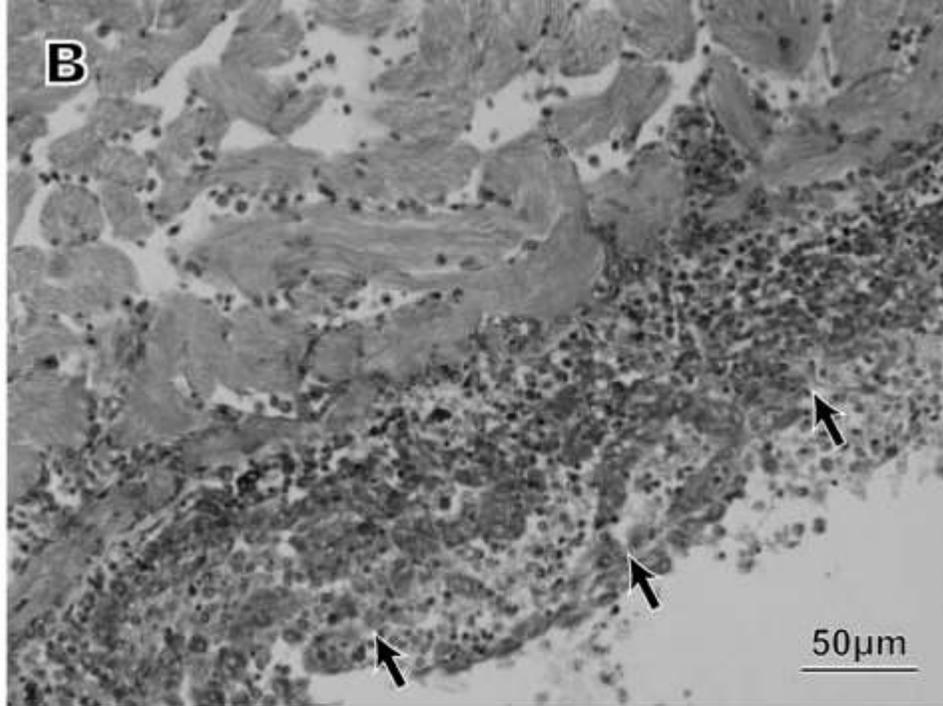
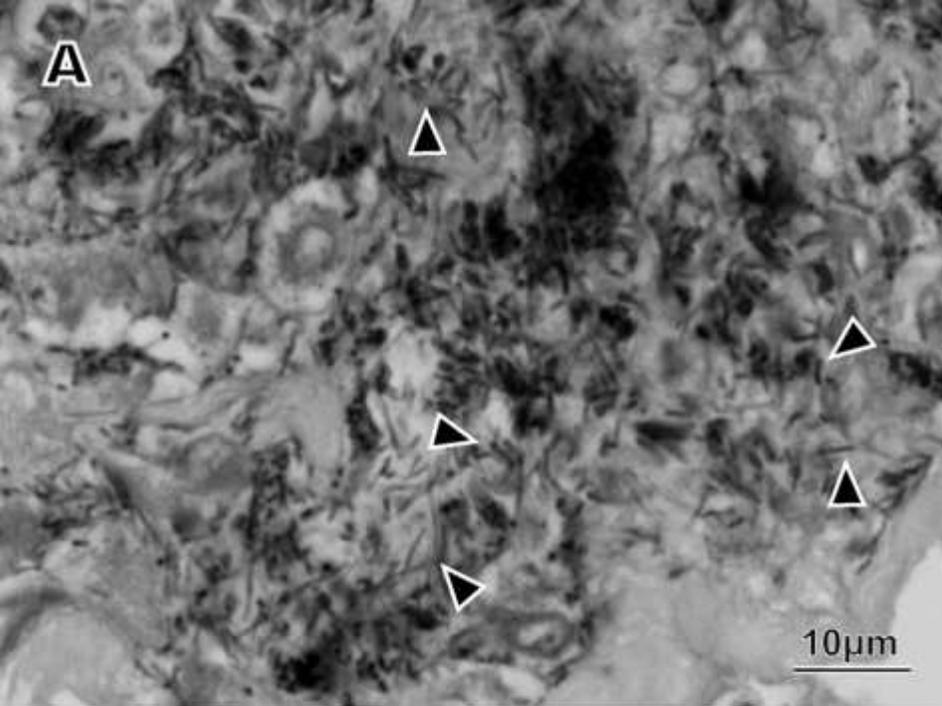
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B





Pericardium (A and B),
kidney (C) and liver
(D).

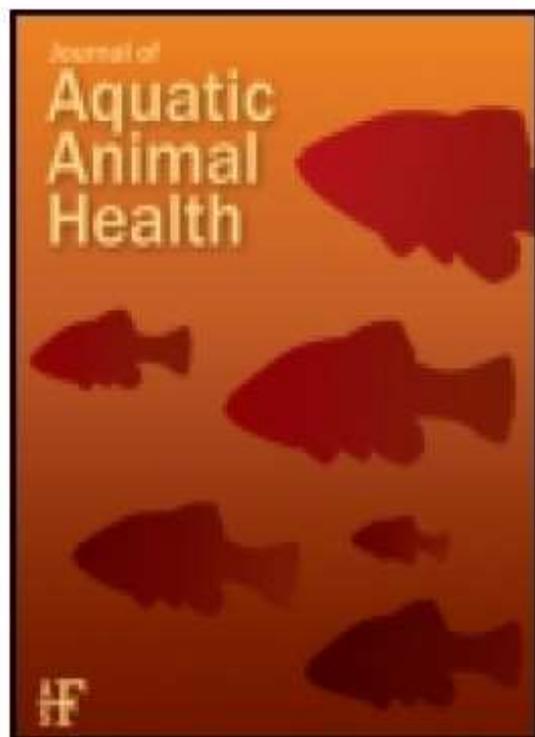
Note bacteriumlike
rods (arrowheads),
pericarditis (arrow)
and focal death of
hepatocyte (*)

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Histopathology and Pathogenesis of Experimental Infection with *Edwardsiella tarda* in Channel Catfish

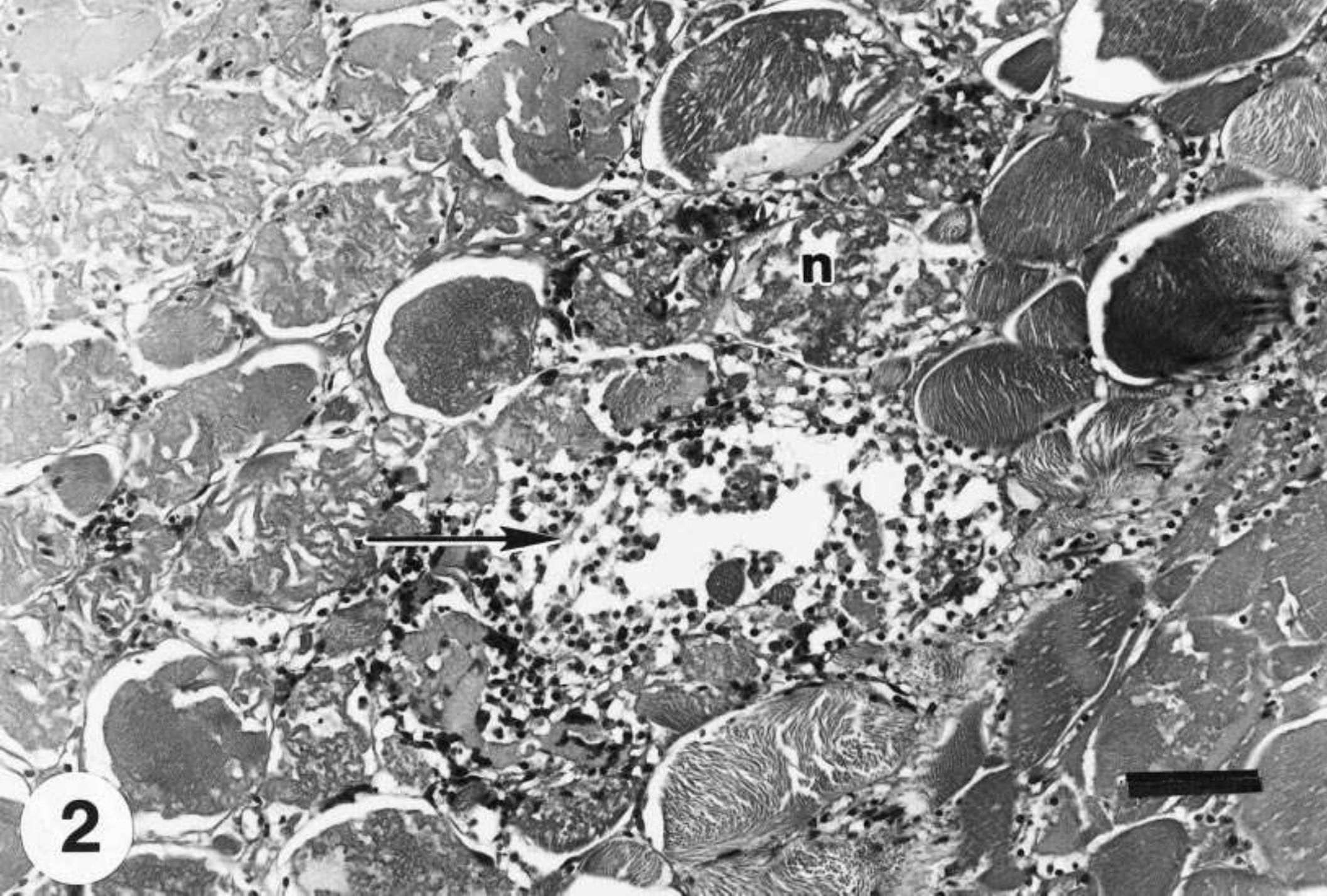
Ahmed Darwish^a, John A. Plumb^b & Joseph C. Newton^a

^a Department of Pathobiology, College of Veterinary Medicine, Auburn University, Auburn, Alabama, 36849, USA

^b Southeastern Cooperative Fish Disease Project, Department of Fisheries and Allied Aquacultures, College of Agriculture, Auburn University, Auburn, Alabama, 36849, USA

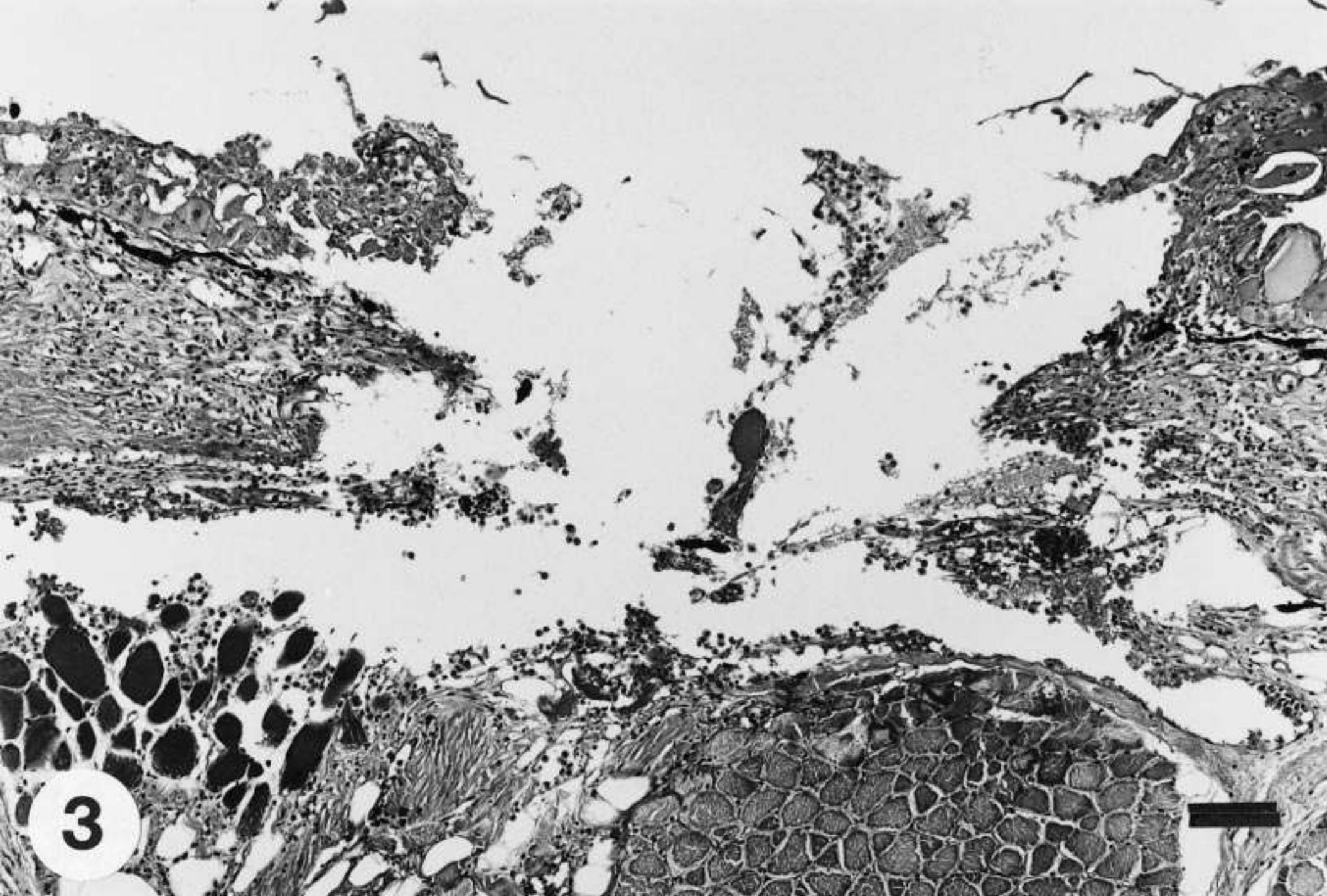
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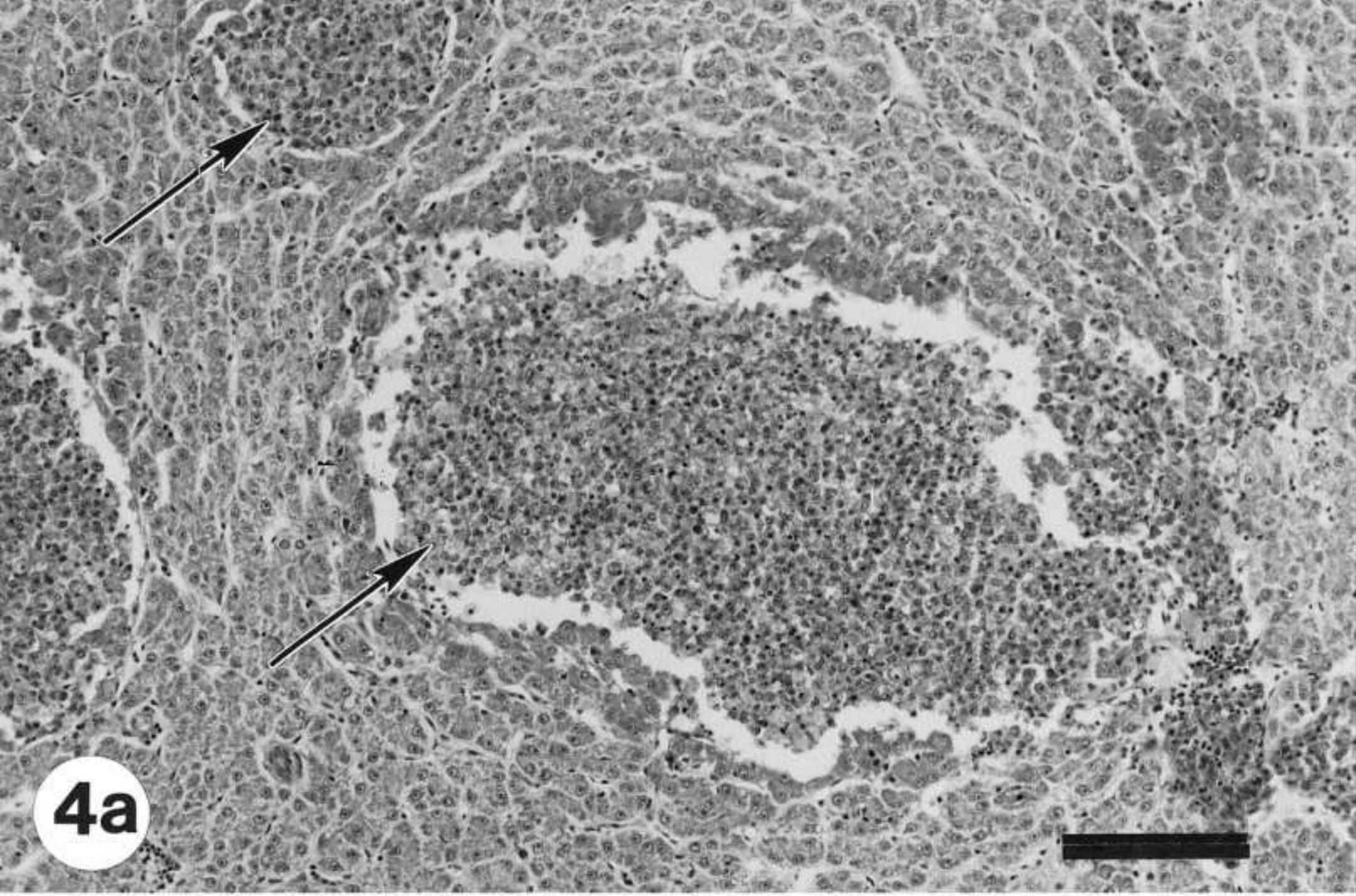


Macrophage infiltration (arrow) in the muscle of *E. tarda*, Necrotic muscle fibers (n)

2



A cutaneous
ulcer in *E.*
tarda-infected



Severe multifocal necrotizing hepatitis (arrows) in *E. tarda*-infected channel catfish

4a

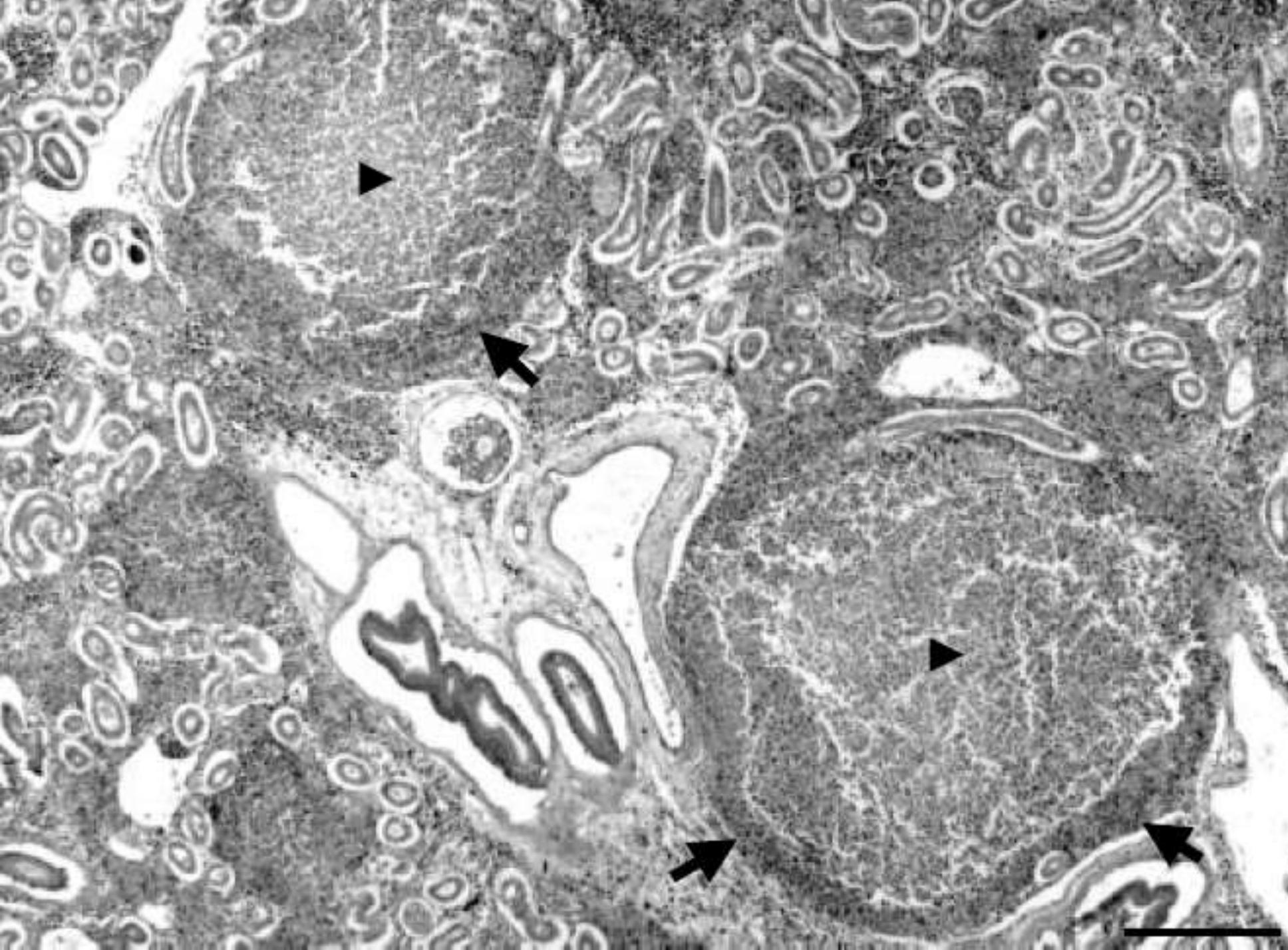


Pathology of *Edwardsiella tarda* infection in turbot, *Scophthalmus maximus* (L.)

F Padrós¹, C Zarza², L Dopazo¹, M Cuadrado¹ and S Crespo¹

1 Servei de Diagnòstic Patològic en Peixos and Centre de Referència i Desenvolupament en Aqüicultura (Generalitat de Catalunya), Departament de Biologia Animal, de Biologia Vegetal i d'Ecologia, Facultat de Veterinària, Universitat Autònoma de Barcelona, Bellaterra (Cerdanyola del Vallès), Barcelona, Spain

2 Skretting, Carretera de la estación s/n, Cojóbar, Burgos, Spain



Large abscesses in turbot trunk kidney. Note the presence of a core loaded with necrotic material (arrowheads) and an inflammatory zone (arrows) surrounding the abscess

Assessment of the susceptibility of polyculture reared African Catfish and Nile tilapia to *Edwardsiella tarda*

M. D. Ibrahim¹, Iman, B. Shaheed^{2*}, H. Abo El-Yazeed³, and H. Korani³

¹Department of Fish Diseases and Management, ² Department of Pathology, ³ Department of Microbiology, Faculty of Vet. Med., Cairo University. *imanshaheed@yahoo.com

Fig 1: catfish experimentally infected by E tarda showing external skin hemorrhages and ulcers and fin rot



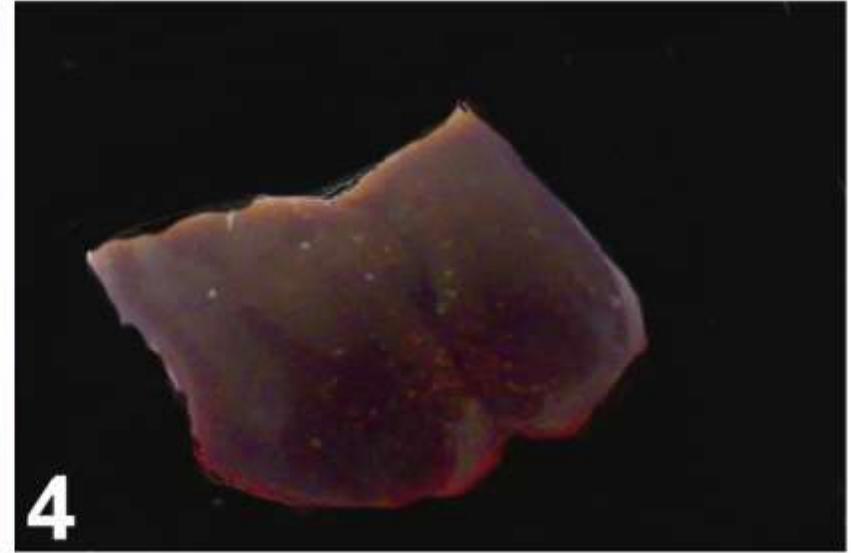
Fig 2: catfish experimentally infected by E tarda showing deep ulceration reached the dorsal muscles



Fig 3: Nile tilapia experimentally infected by E tarda showing signs of septicemia



Fig 4: liver of catfish showing a multiple tiny white foci and congestion



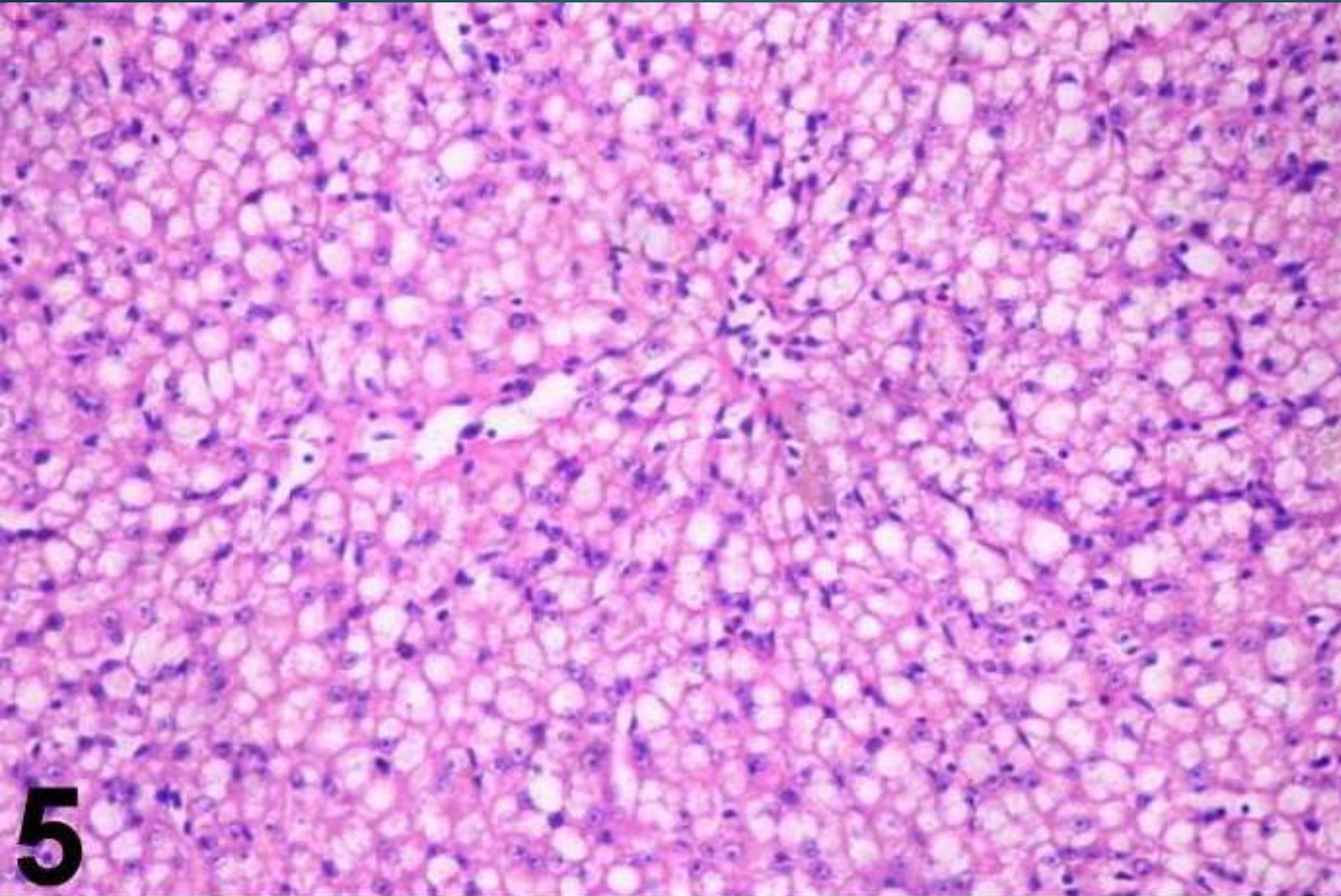


Fig 5: Liver of African catfish experimentally infected I/p by *E. tarda* showing fatty changes in most of hepatocytes

5

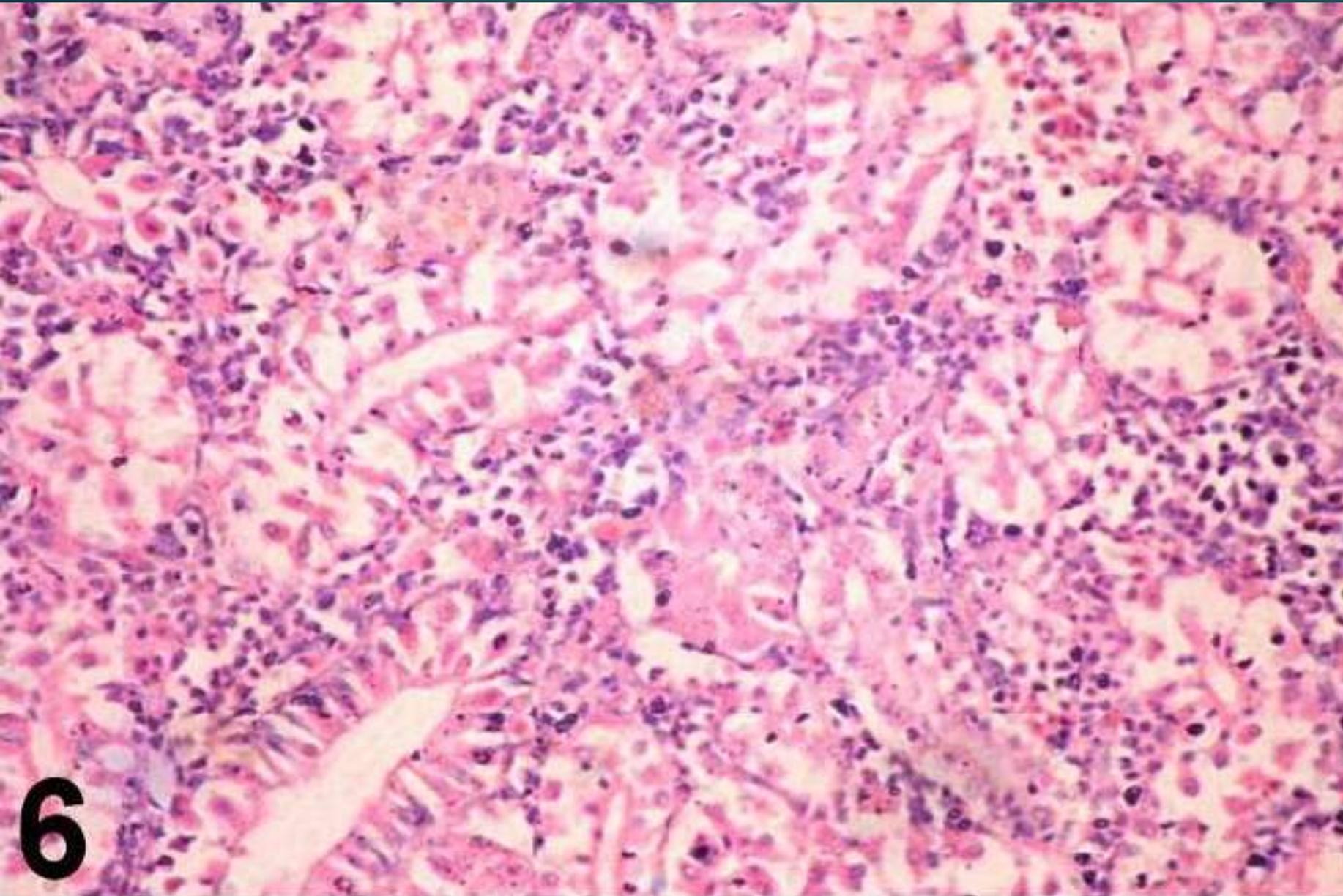


Fig 6: Kidney of African catfish experimentally infected I/p by *E. tarda* showing necrobiotic changes in renal tubules

6

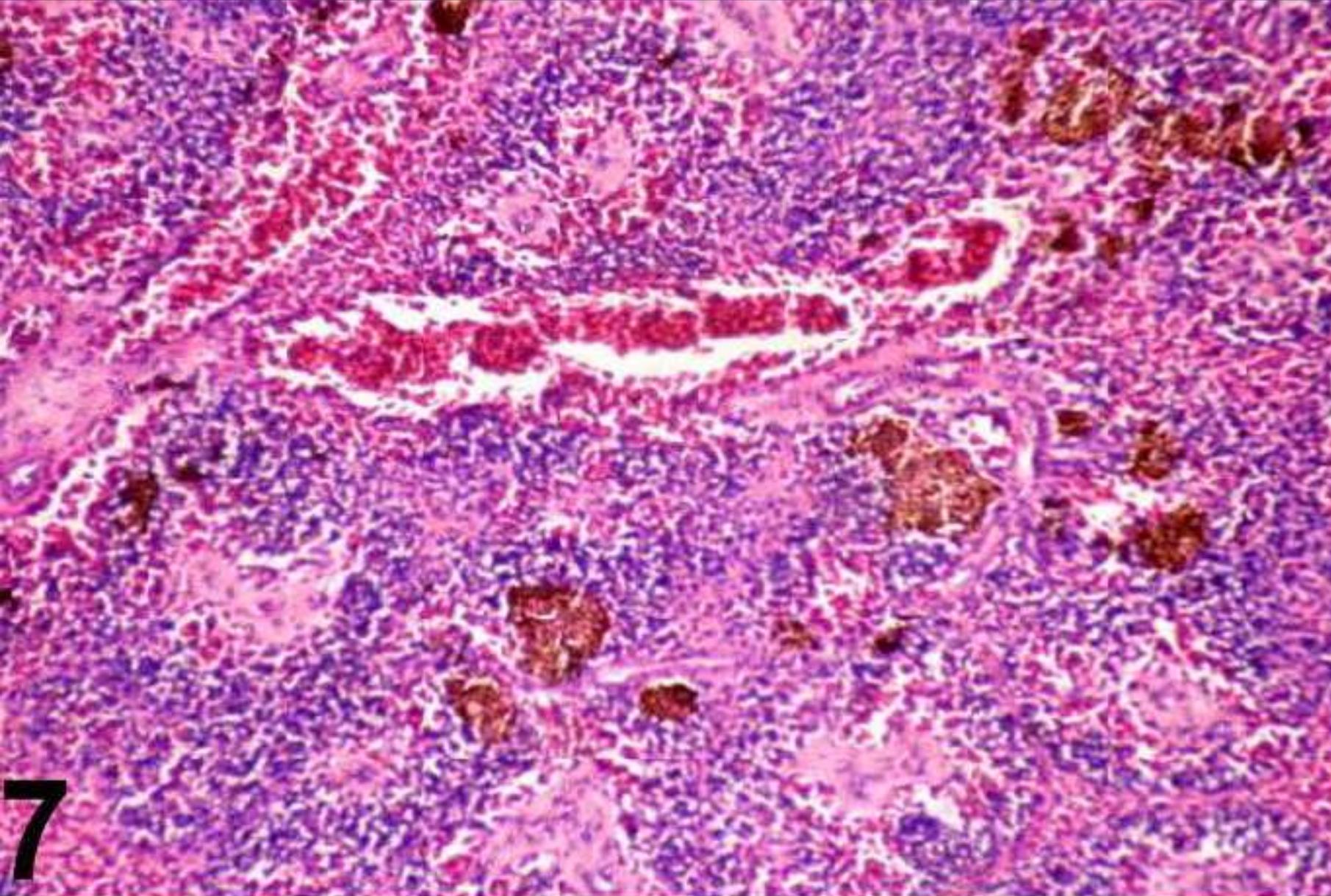


Fig 7: Spleen of African catfish experimentally infected I/p by *E. tarda* showing congestion of blood vessels and increase in melano-macrophage center

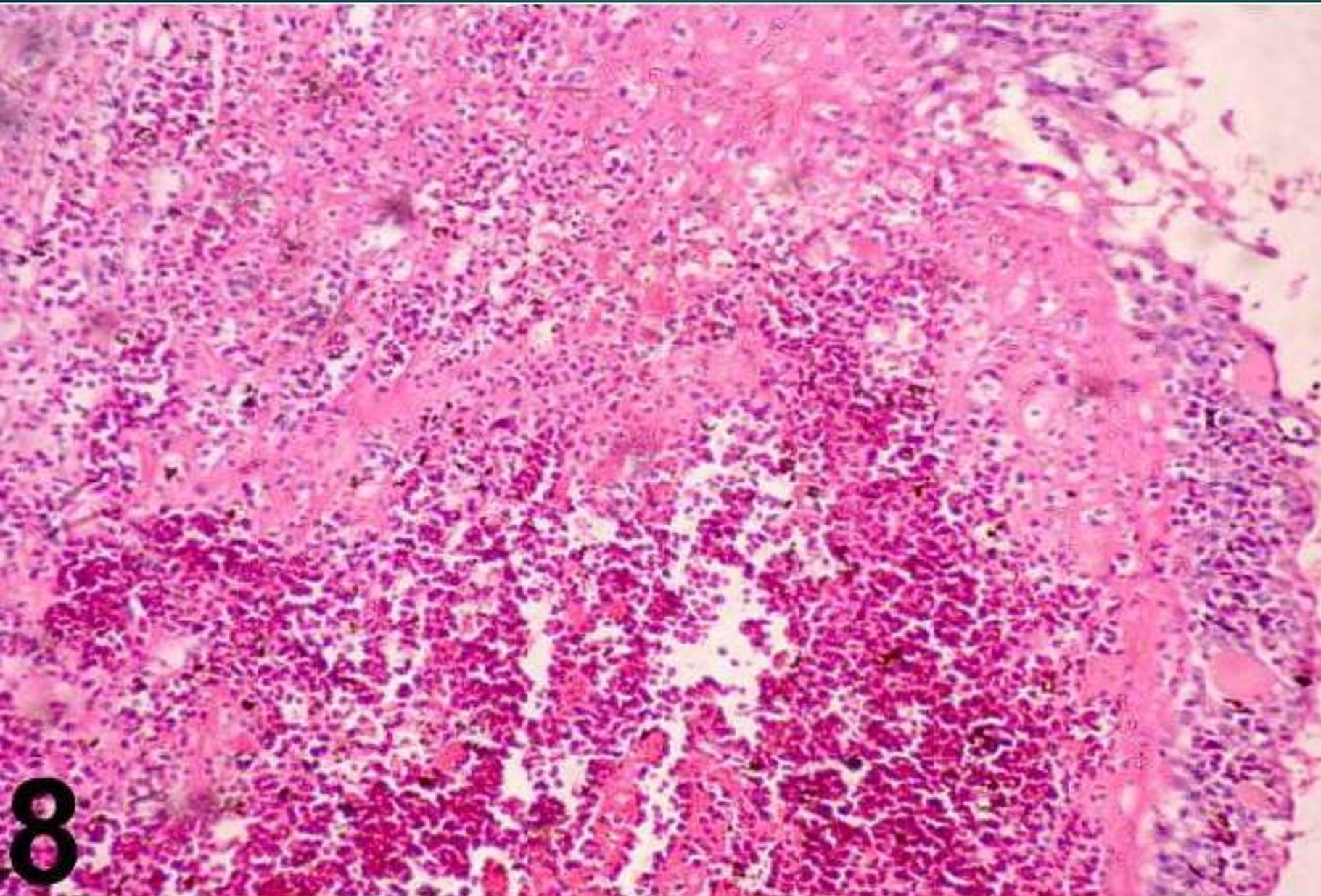
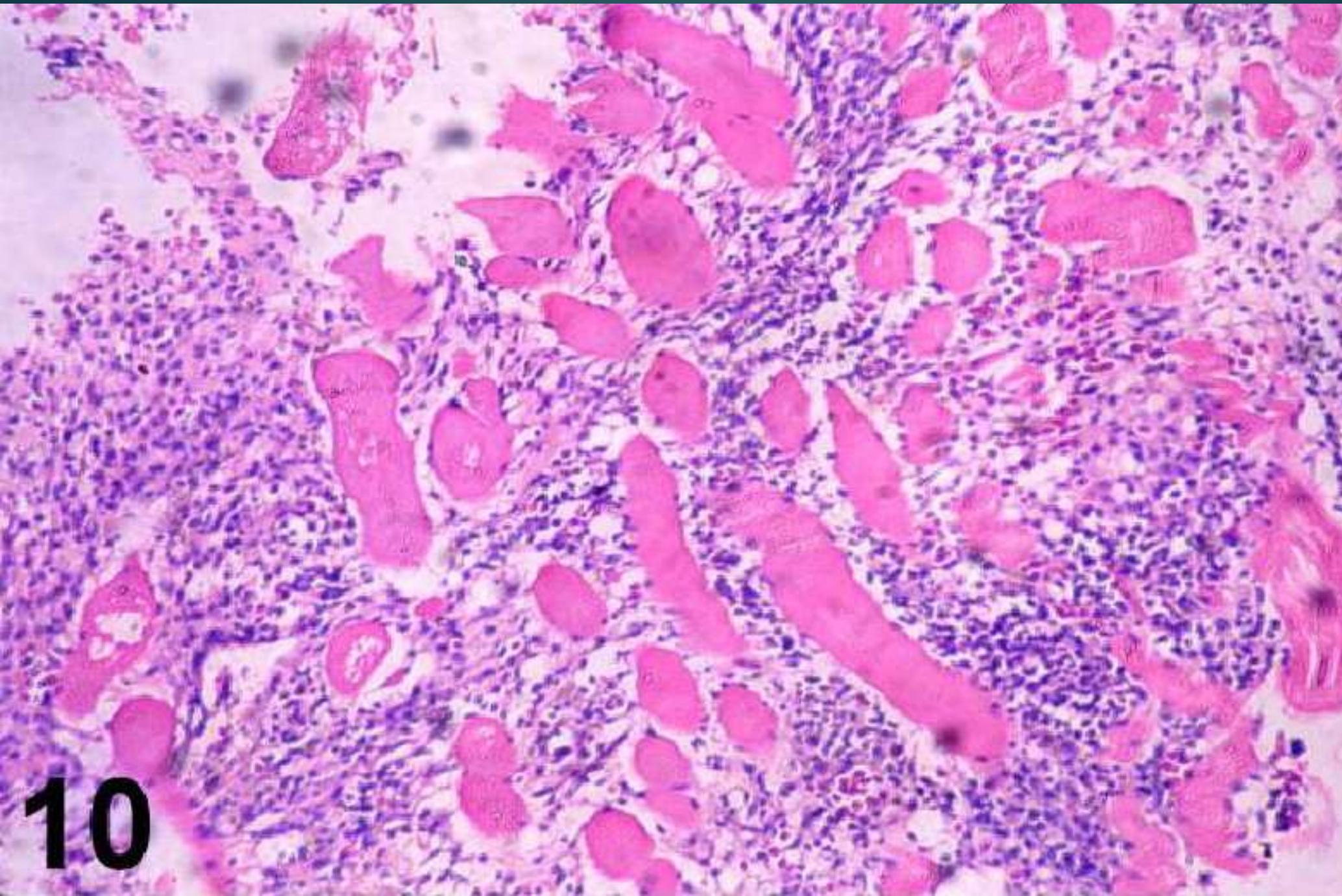


Fig 8: Skin of African catfish experimentally infected I/p by *E. tarda* showing necrosis of epidermal layer with hemorrhage and congestion of dermal layer

8



Muscle of African catfish experimentally infected I/p by *E. tarda* of showing severe infiltration of mononuclear cells in-between the muscle bundles with necrosis of some bundles

10



Aquaculture Research

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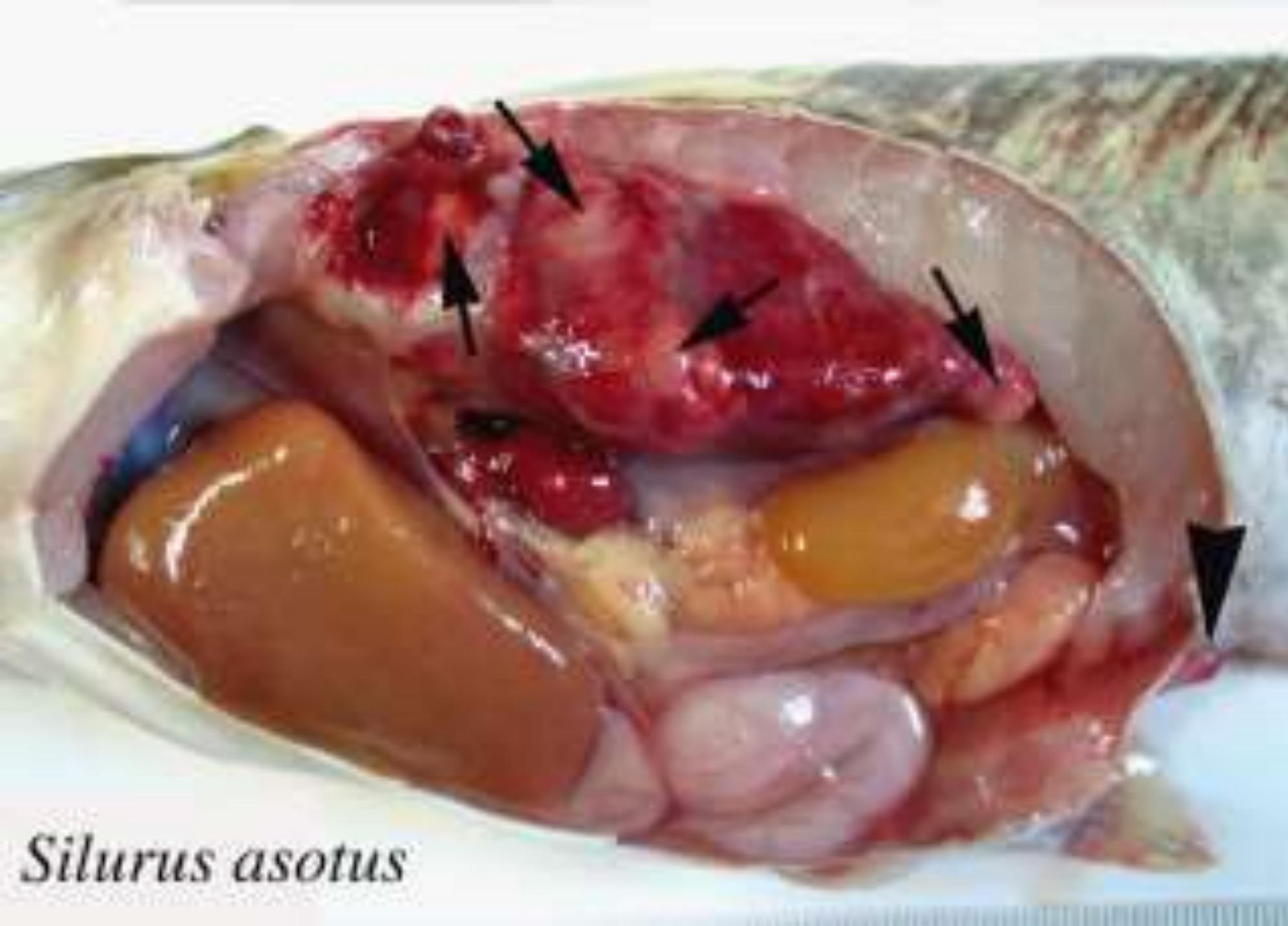
***Edwardsiella tarda* infection in Korean catfish, *Silurus asotus*, in a Korean fish farm**

Jin-Ha Yu¹, Jung Jo Han², Kwon Sam Park³, Kwan Ha Park¹ & Sung Woo Park¹

¹Department of Aquatic Life Medicine, Kunsan National University, Gunsan, Jeollabukdo, Korea

²Gyeonggi Province Freshwater Fisheries Research Institute, Yangpyeong-gun, Gyeonggido, Korea

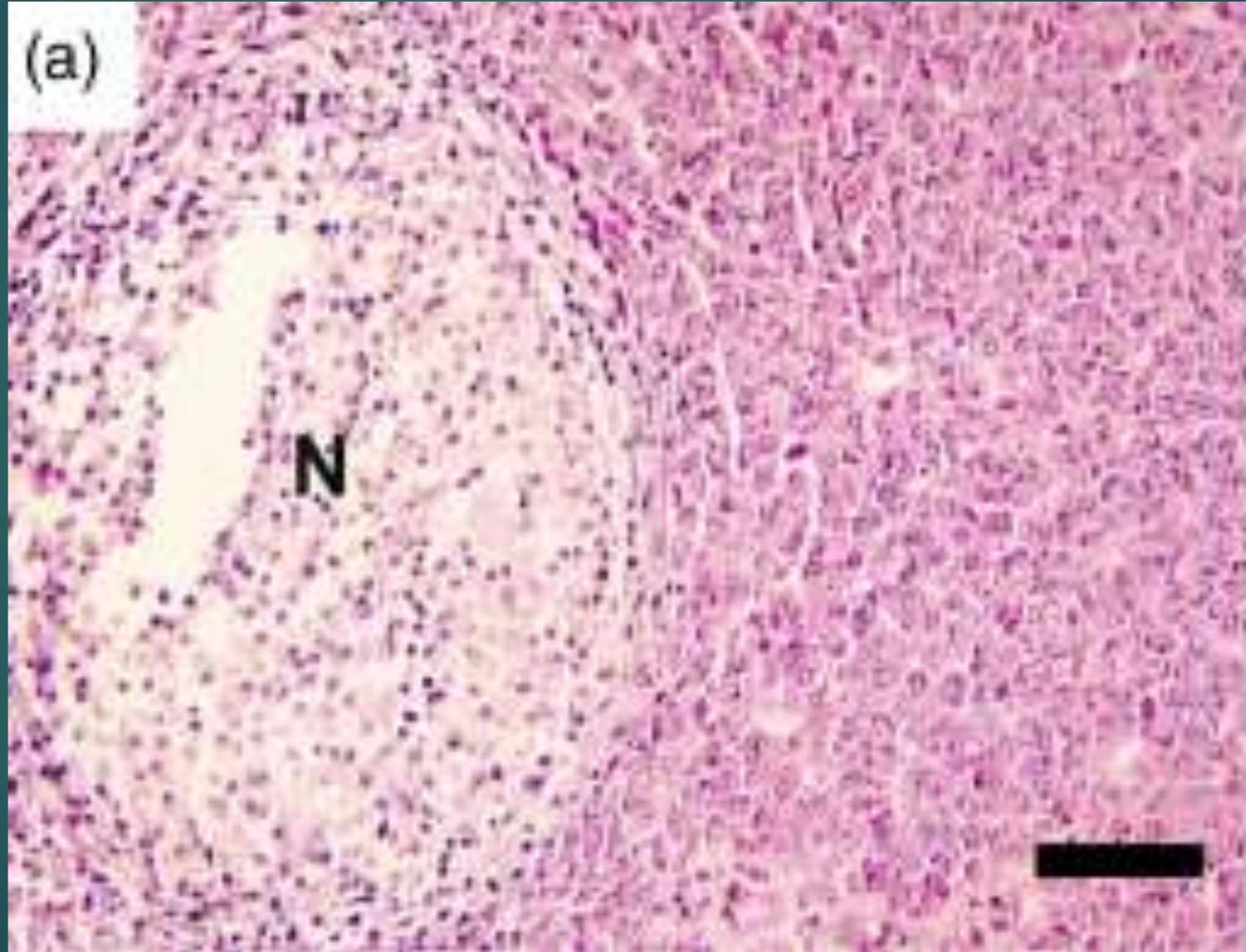
³Department of Food Science & Biotechnology, Kunsan National University, Gunsan, Jeollabukdo, Korea



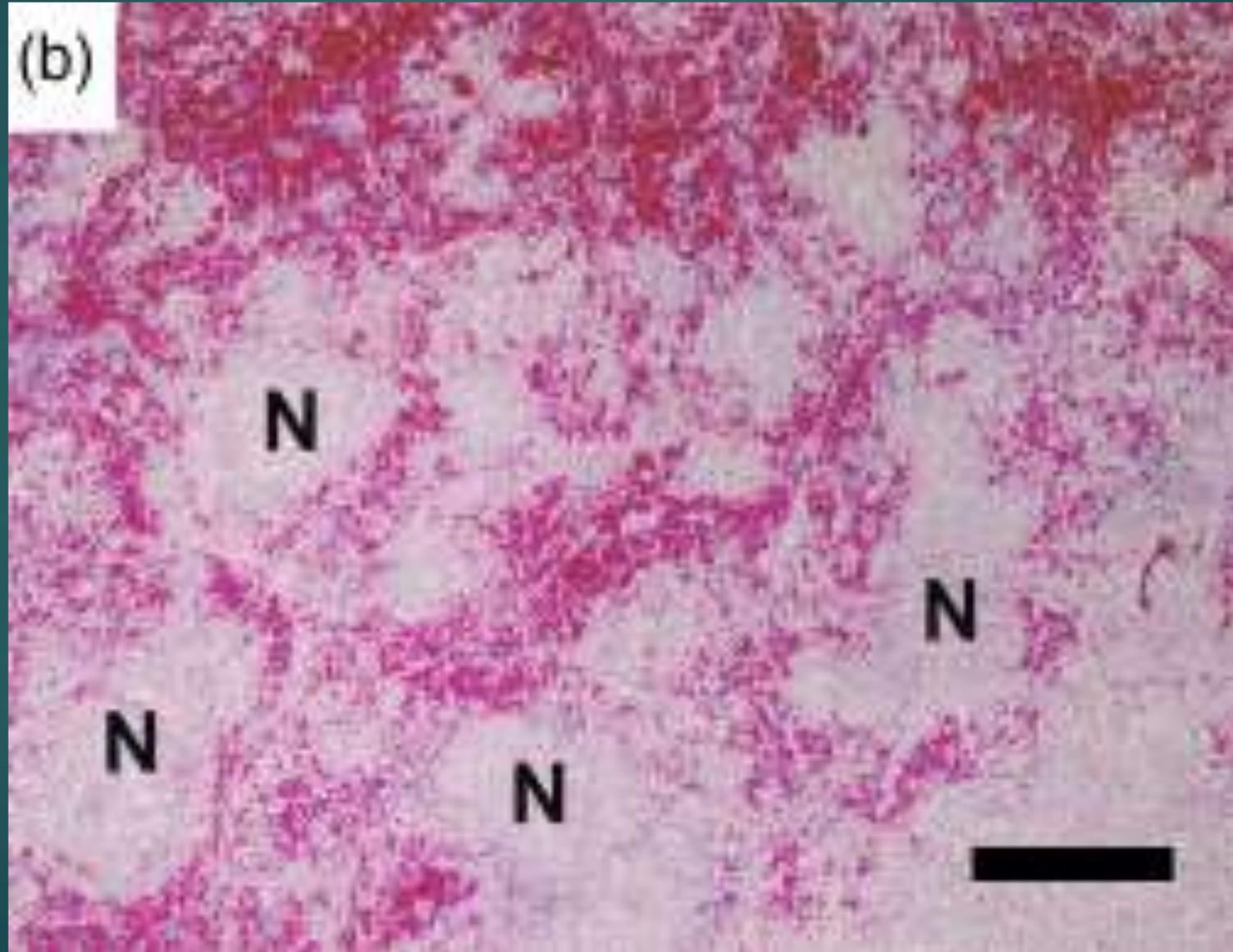
enlarged kidney with various size abscesses (arrows)

Silurus asotus

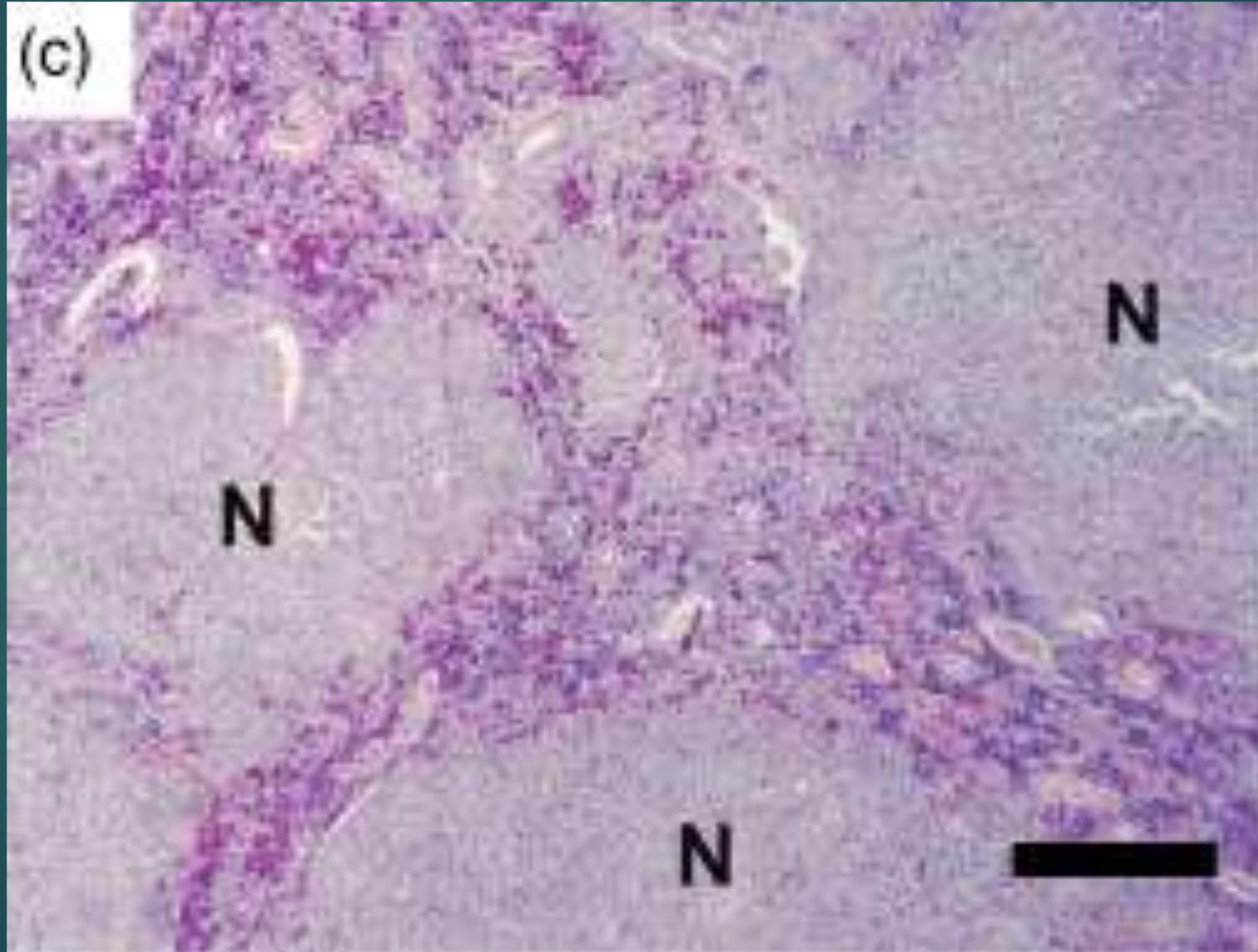
(a) Liver showing necrotizing hepatic cells (N).



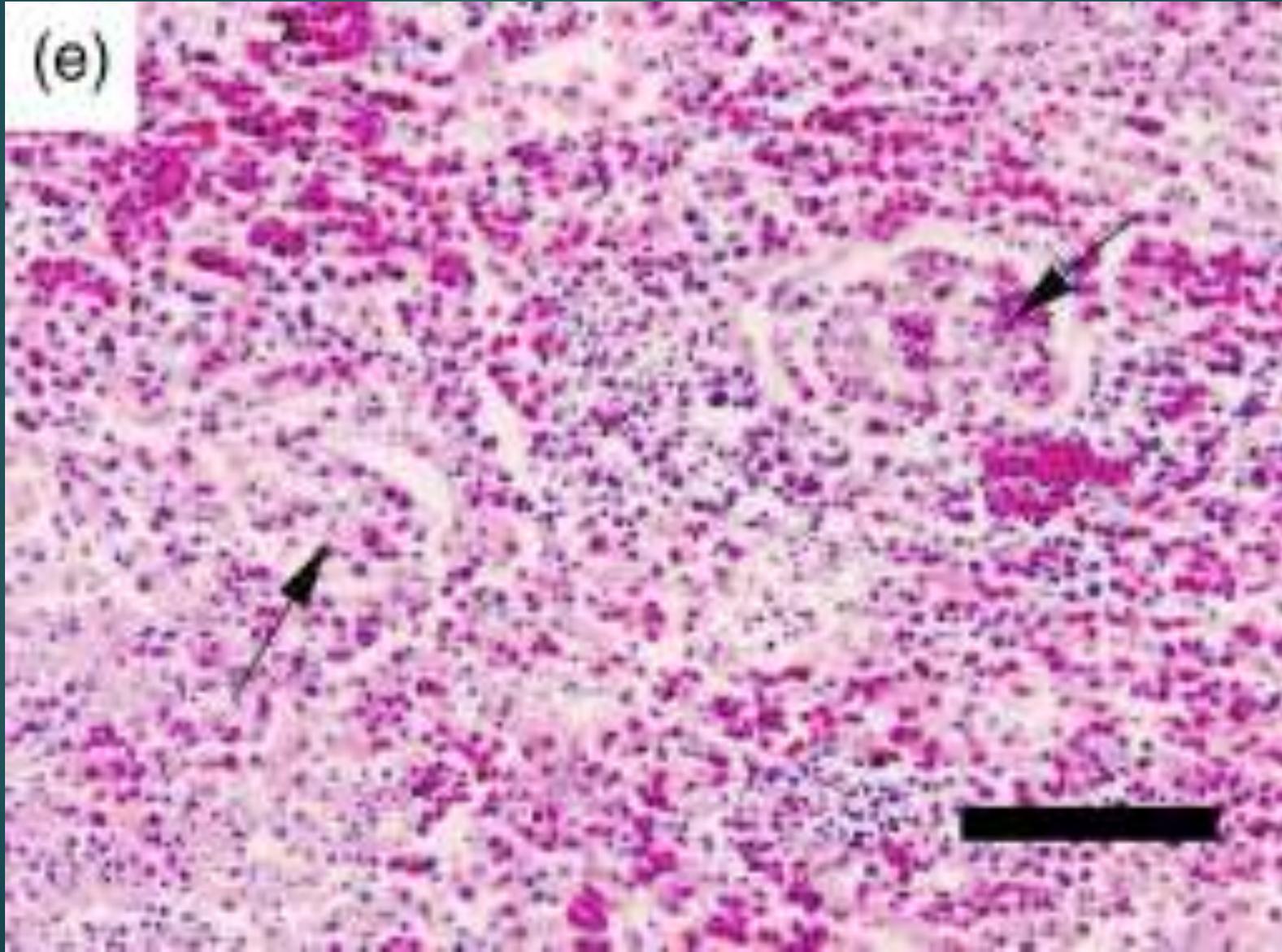
b) Spleen showing necrosis (N) and haemorrhage.



(c) Several multifocal necrotizing zones (N) of the kidney



(e) Glomerulus presented necrosis (arrows) and haemorrhage.



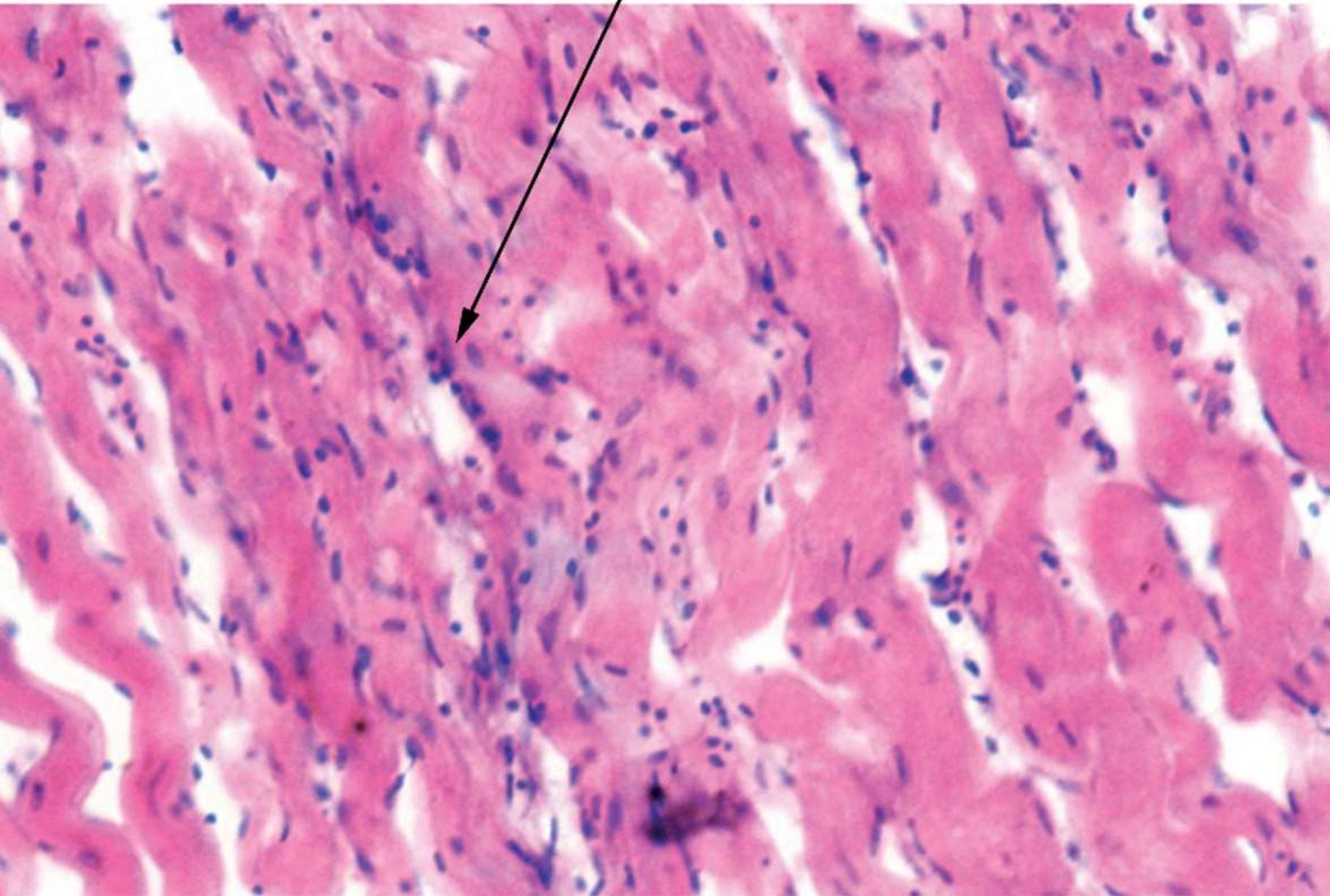
Pathology of *Edwardsiella tarda* infection in African catfish, *Clarias gariepinus* (Burchell 1822), fingerlings

Thangapalam Jawahar Abraham, Prakash Kumar Mallick, Harresh Adikesavalu, Sayani Banerjee

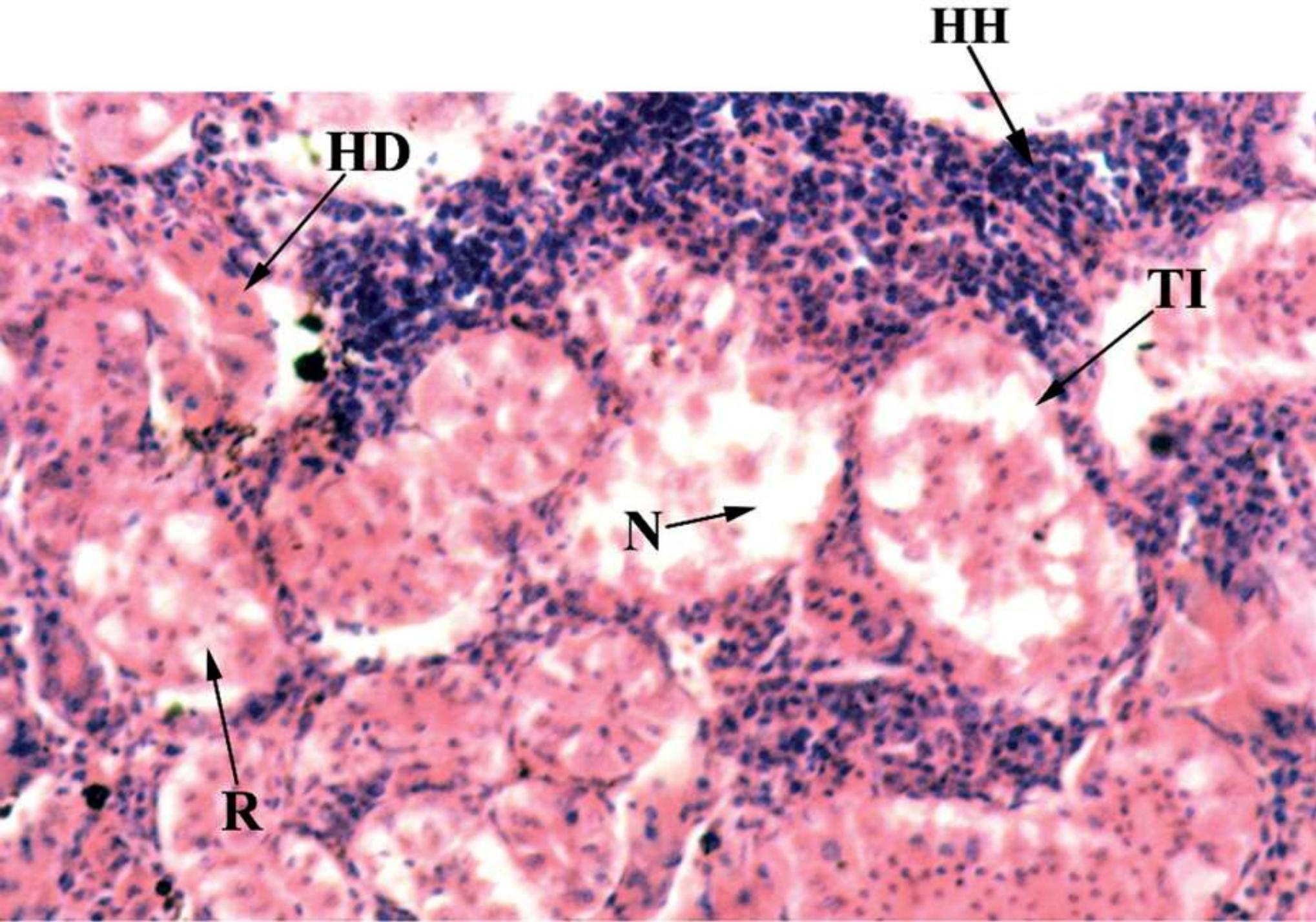
Received – 04 July 2015/Accepted – 28 August 2015. Published online: 31 October 2015; ©Inland Fisheries Institute in Olsztyn, Poland

Citation: Abraham T.J., Mallick P.K., Adikesavalu H., Banerjee S. 2015 – Pathology of *Edwardsiella tarda* infection in African catfish, *Clarias gariepinus* (Burchell 1822), fingerlings – Arch. Pol. Fish. 23: 141-148.

LI



muscle showing
lymphocytic
infiltration
(LI)



kidney showing ischemic type tubulopathy (TI), necrosis of nephritic tubules (N), rupture of tubular basement membrane (R) and hydropic dystrophy of nephritic cells (HD)

Journal of Veterinary Diagnostic Investigation

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Novel brain lesions caused by *Edwardsiella tarda* in a red tilapia (*Oreochromis* spp.)

Carlos A. Iregui, Marly Guarín, Victor M. Tibatá and Hugh W. Ferguson

J VET Diagn Invest 2012 24: 446

DOI: 10.1177/1040638711435232

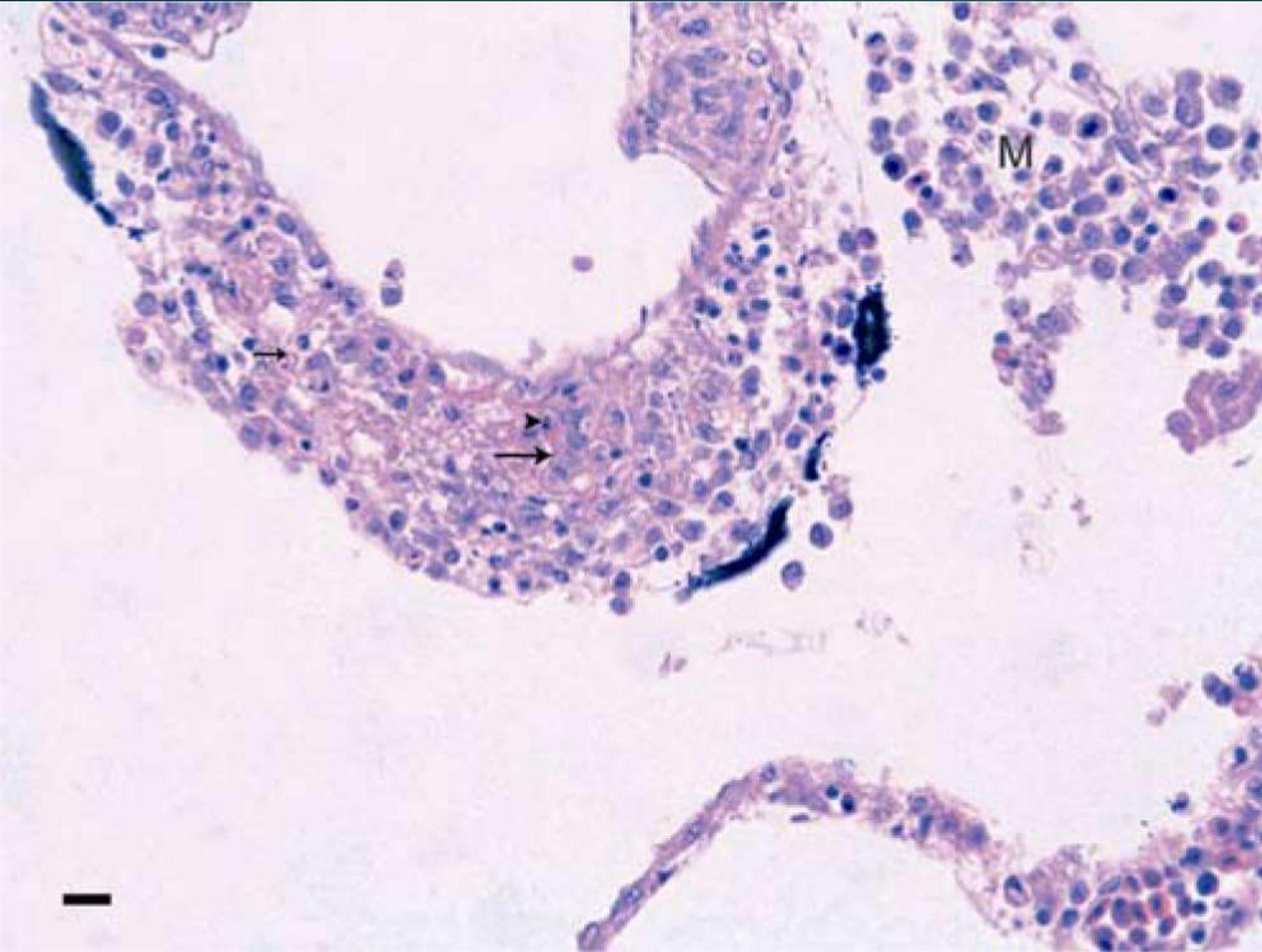
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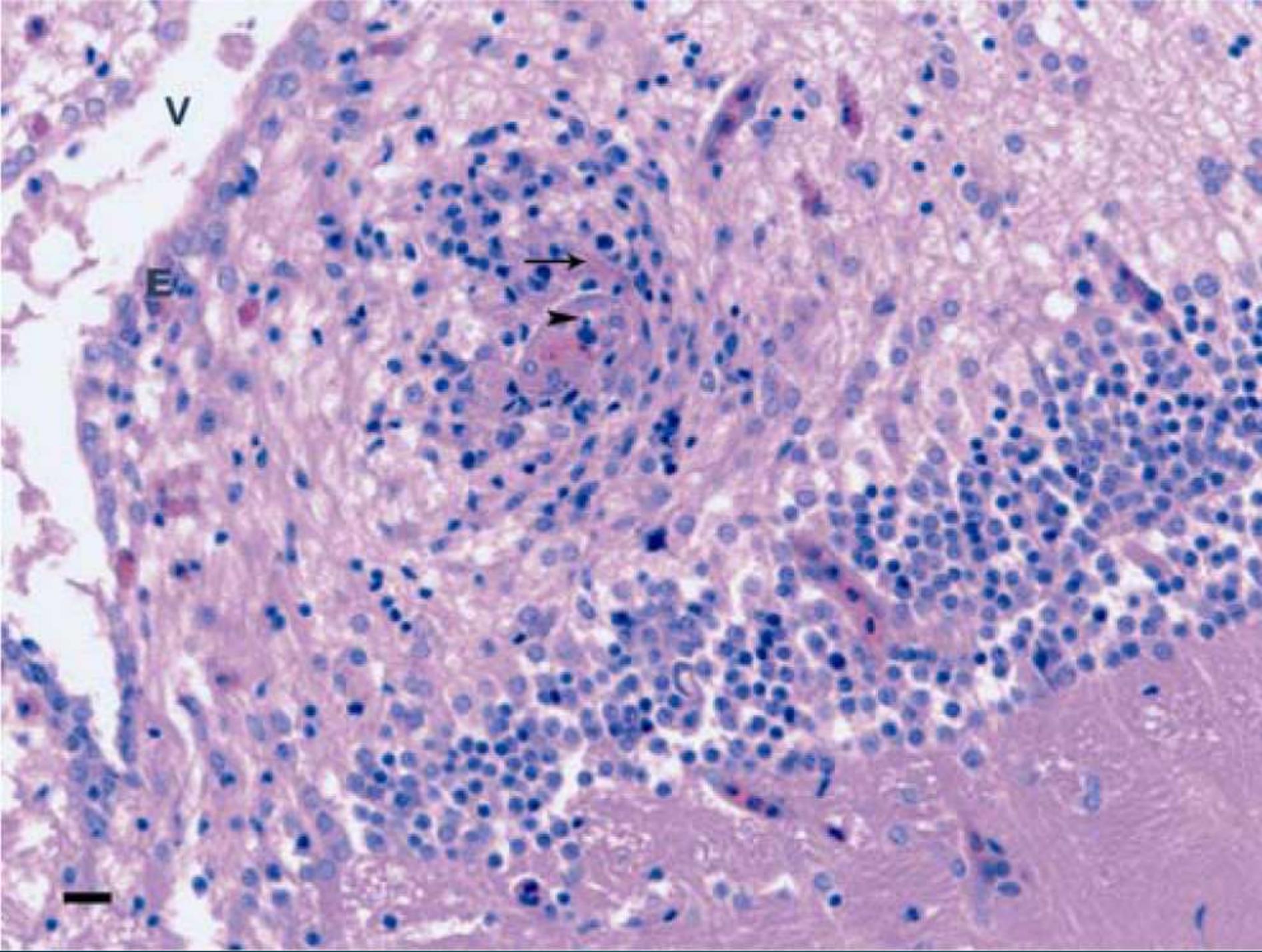
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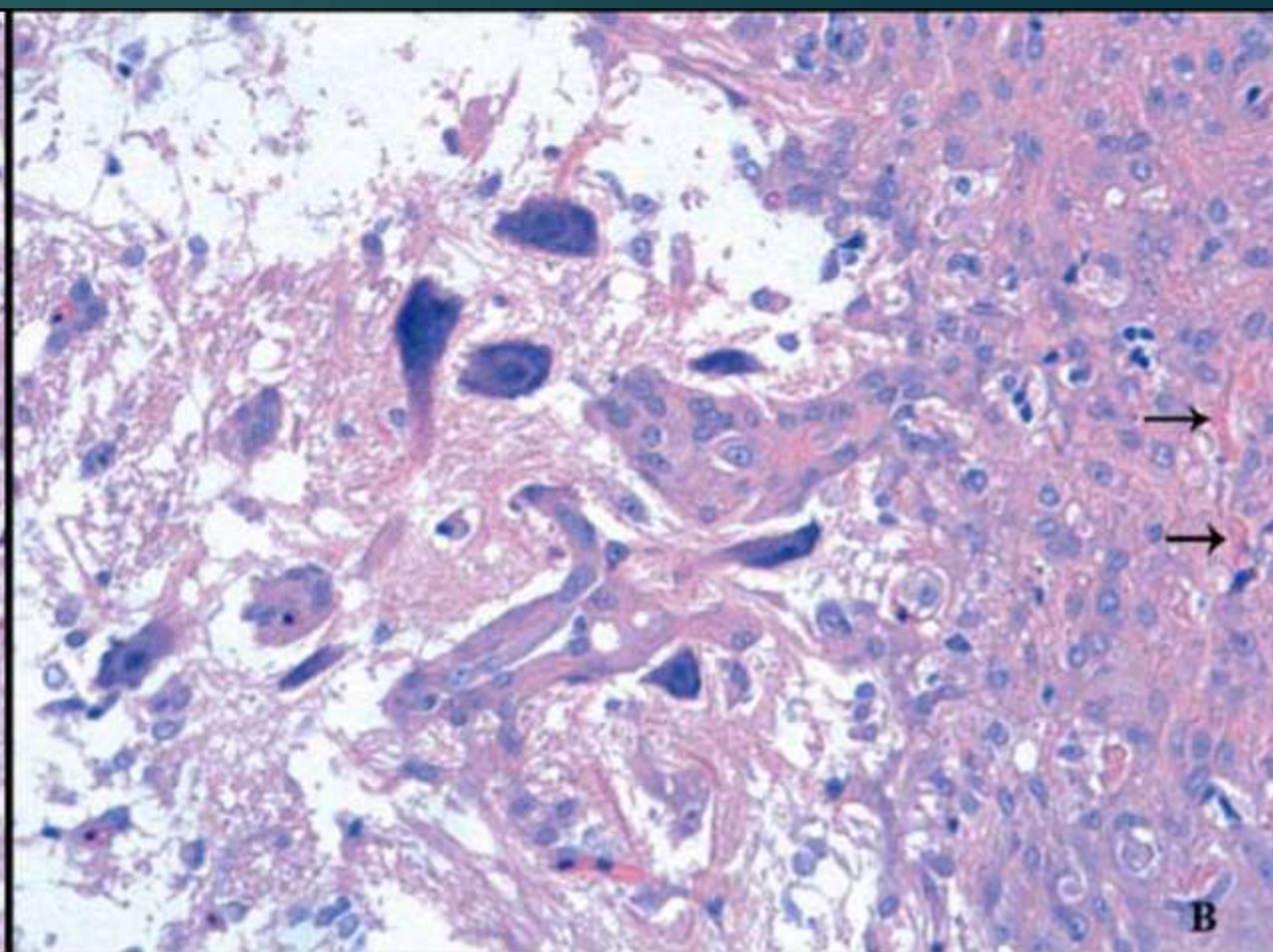
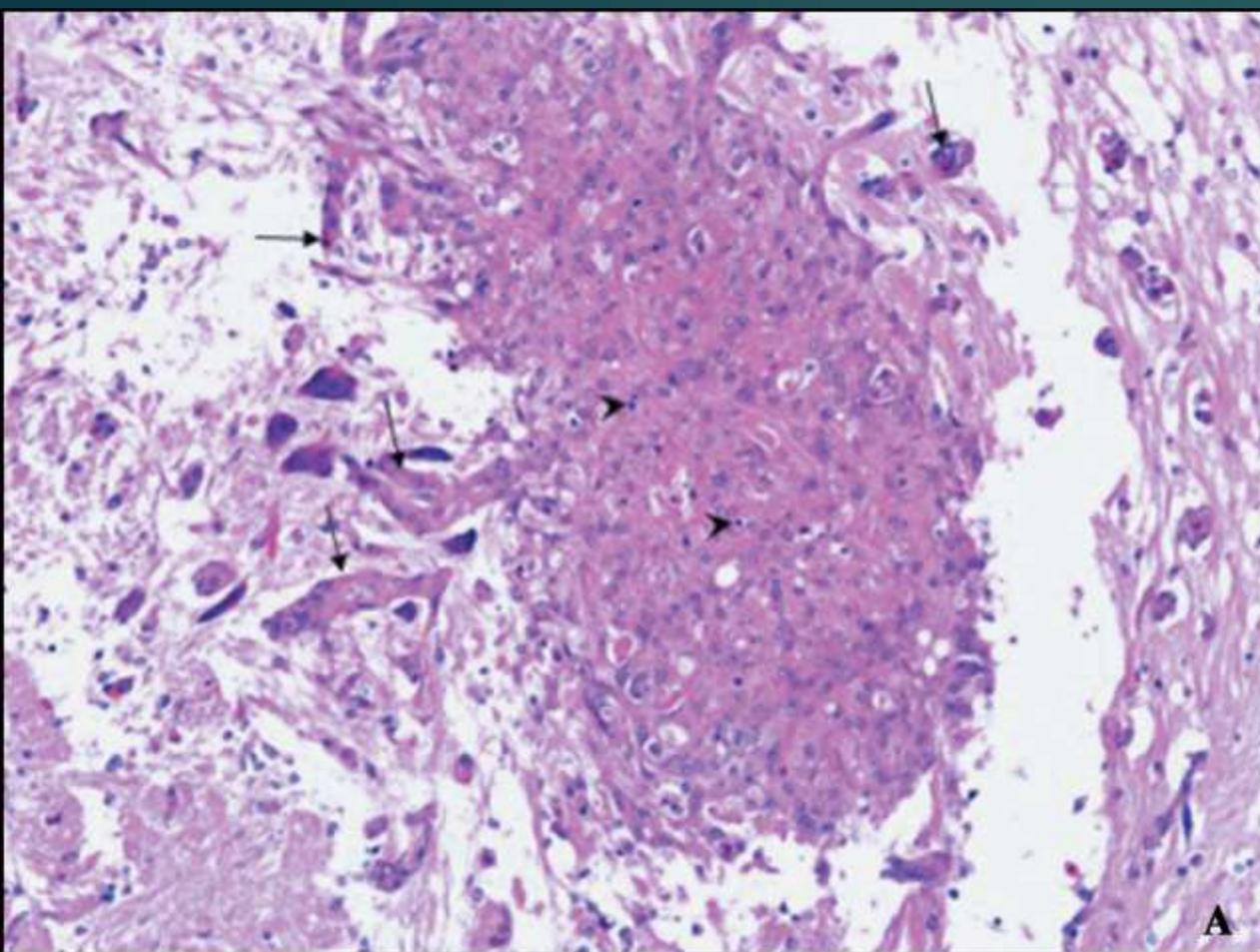
The lesions consisted of inflammatory, necrotic, and proliferative changes affecting the walls of the blood vessels of the meninges and brain parenchyma. Inflammatory responses in the brain were mainly represented by meningitis, with fibrinoid necrosis of vessel walls. This was accompanied by an abundant influx of mononuclear leukocytes and fewer neutrophils, some of which were necrotic, characterized by nuclear pyknosis and cytoplasmic eosinophilia



Red tilapia; meninges. Eosinophilic material (arrows), most probably fibrin, exudes between the muscle cells of the vessel wall; necrotic cells, mostly leukocytes, show karyorrhectic nuclei and deeply eosinophilic cytoplasm (arrowhead). M = mononuclear meningitis. Hematoxylin and eosin



mononuclear
encephalitis with
vasculitis.
An eosinophilic exudate
is visible in the upper
part of the vessel
(arrow), probably fibrin.
Remnants of nuclei,
indicating necrosis
probably of leukocytes,
are in the lumen of the
vessel (arrowhead).
V = ventricle; E =
ependyma.



A, optical lobe. Plaque-like structure in the limit of the gray and white matter; vessels with thick walls arise or converge in the structure (arrows); the plaque itself is composed of an entanglement of vessel walls with some remnants of fibrin and necrotic leukocytes (arrowheads). **B**, closer view of fibrin (arrows) from panel A.