Mycobacteriosis

Tuberclosis

اپیدمیولوژی:

- این بیماری یک بیماری سیستمیک و مزمن و متداول است.
- طیف وسیعی از جانداران را درگیر می کند: آب شیرین و شور و زینتی
- مخصوصا اعضای خانواده ماهیان آب شیرین مثل **Anabantidae**، **Cyprinidae**، **Characidae**
- قدیم عامل مایکوباکتریوزیس در ماهیان زینتی را دو گونه ***Marinum***, ***Fortuitum*** می دانستند اما الانه گونه های زیادی است که در گیر می کند.
- در گونه های پرورشی مثل **European sea bass**, **Striped bass** و تیلاپیا و مخصوصا سالمونیدا که با مواد غذایی خام تغذیه می شوند.
- بالای **25%** هچری های سالمونیدا با گونه ***Chelonae*** درگیر می شوند و باعث درگیری قفس های پرورش آزادماهیان اقیانوس اطلس نیزمی شوند.
- گونه ***Marinum*** *باعث آلودگی ماهی های بیگانه در پرورش قفس و ماهی های بومی می شود.*

Table II-55. Examples of *Mycobacterium* infections of fish. All reports are from cultured fish unless noted otherwise.

Host	Species	References
Freshwater aquarium fish	*M. marinum*, *M. fortuitum*, *M. chelonae*, *M. gordonae*, *M. peregrinum*,	Pate et al. (2005), Sakai et al. (2005), Austin and Austin (2007)
Moray eel	*M. montefiorense*	Levi et al. (2003)
Zebrafish	*M. marinum*, *M. peregrinum*	Astrofsky et al. (2000), Harriff et al. (2007)
Medaka	*M. abscessus*	Teska et al. (1997)
European sea bass	*M. marinum*	Colorni et al. (1998)
Chinook salmon	*M. neoaurum*	Backman et al. (1990)
Atlantic salmon	*M. chelonae*	Brocklebank et al. (2003)
Salmonids (asymptomatic)	*M. chelonae* subsp. *piscarum*	Arakawa and Fryer (1984)
African catfish	*M. marinum*	Antychowicz et al. (2003)
Milkfish	*M. abscessus*	Chang et al. (2006)
Striped bass (wild)	*M. shottsii*, *M. pseudoshottsi*, *M. interjectum*, *M. marinum*, *M. scrofulaceum*, *M. szulgai*, *M. triplex*	Rhodes et al. (2004, 2005)
Atlantic menhaden (wild caught)	*M. marinum*, *M. fortuitum*, *M. gordonae*	Stine et al. (2005)

اتیولوژی:

- باسیل های گرم مثبت، هوازی، غیر اسپورزا، غیر متحرک، بخاطره مواد **WAX** که در دیواره دارند نسبت به اسید الکل مقاوم هستند.
- اکثرا به صورت آزاد در خاک و آب حضوردارند.
- بعضی گونه ها مثل مایکوباکتریوم مرینوم در انسان بیماری ایجاد می کنند و زئونوز هستند.
- ماهیان استخوانی را سه گونه مهم ***Chelonae،Marinu ,Fortuitum*** درگیر می کند.

انتقال:

- افقی است، از طریق زخم های پوستی، مخصوصا از طریق خوردن و بلعیدن
- عمودی در بعضی گونه های ماهی مثل Platy Fish دیده می شود اما درآزادماهیان رخ نمی دهد.

Figure 5. Pink-staining acid-fast rods visible in a bench-top stain of fresh tissue from a fish infected with mycobacteriosis (1000x). Photo courtesy of D. Pouder

علائم بالینی:

- لاغری، کاهش رشد، کاهش باروری
- تغییر رنگ پوست
- تغییر شکل اسکلت و ستون مهره ها
- زخم های مزمن کم عمق و سطحی همراه با پوسیدگی باله ها
- اگزوفتالمی

Figure 3. Largemouth bass showing clinical signs consistent with mycobacteriosis. The fish is thin and has obvious scale loss and shallow ulcers visible on the skin. Photo courtesy of Bass Pro Shops

Fig. 1. Ulcerative skin lesions attributed to infection with *Mycobacterium* spp. in striped bass (*Morone saxatilis*) from Chesapeake Bay, USA.

نکروپسی:

- اریتمای زیر پوستی و ادم
- ندول های سفید mm1-4 در احشا نظیر قلب ، کلیه و کبد وطحال دیده می شود.
- هایپر تروفی اندام ها خصوصا کلیه و طحال
- آسیت شکم

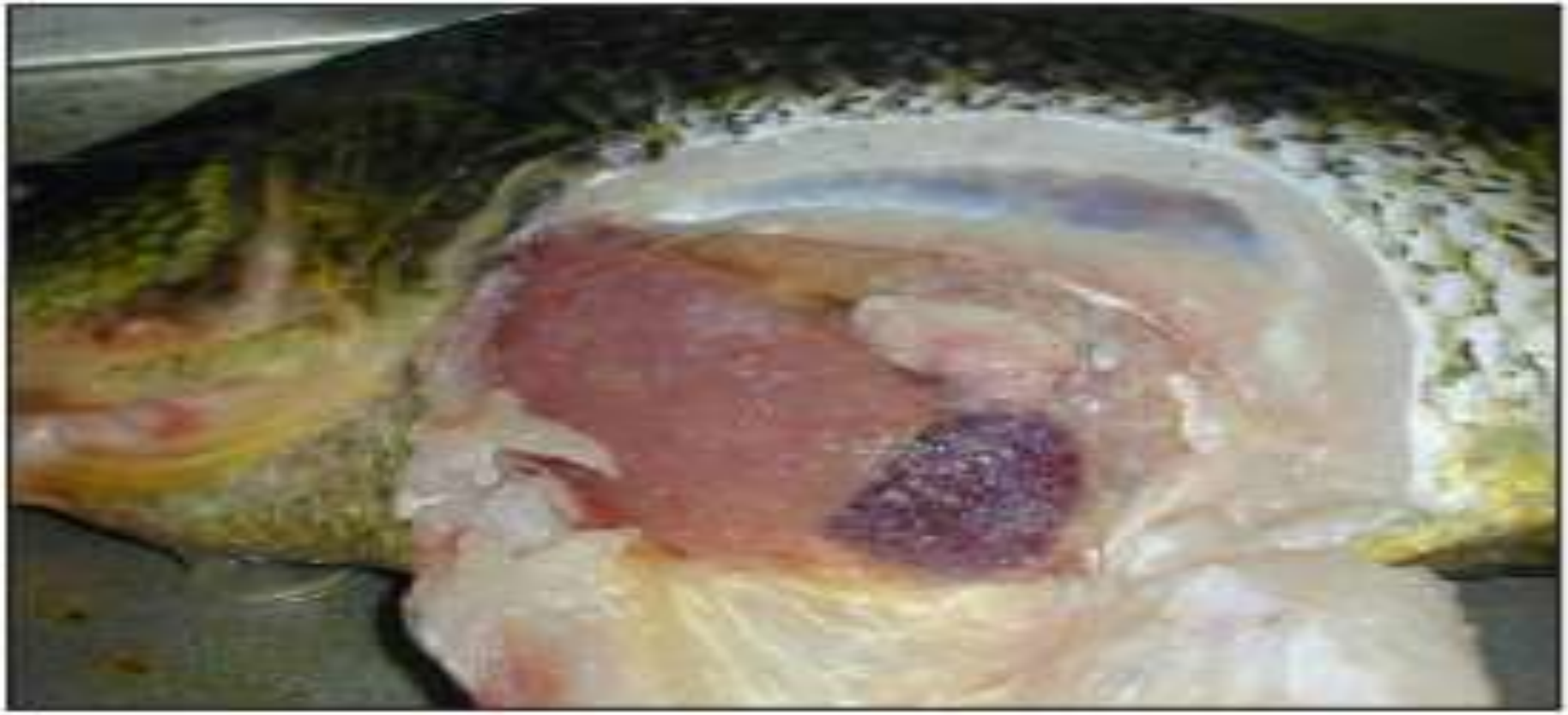
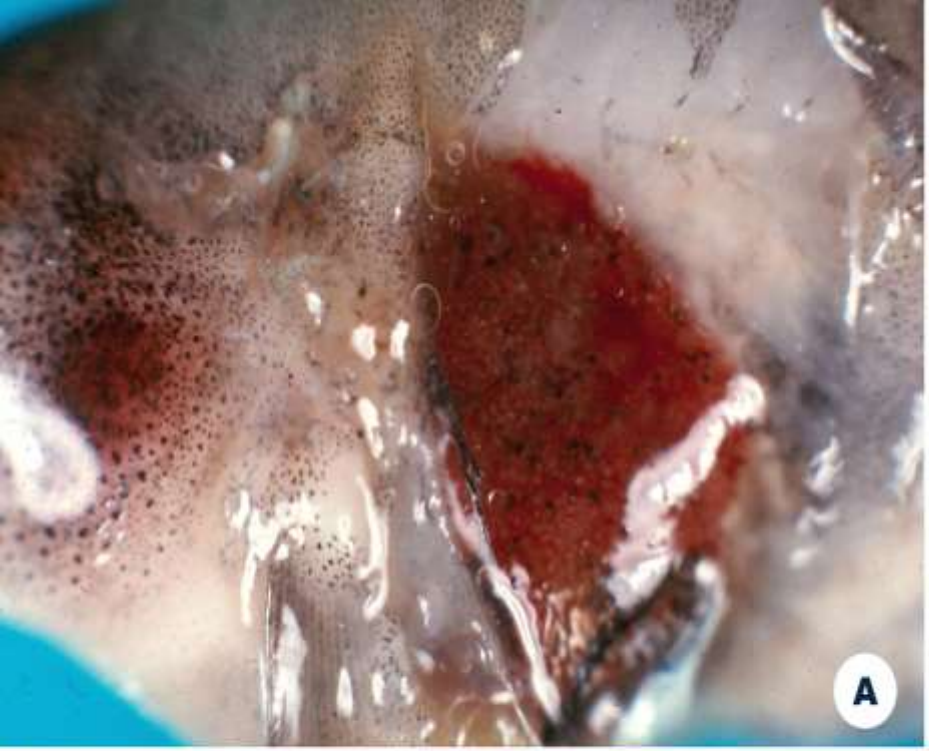


Figure 2. Small gray nodules visible within the spleen of a black crappy during necropsy. These small granulomas are consistent with a diagnosis of *Mycobacterium* spp. and a special bench-top stain for acid-fast organisms should be done on a small sample of tissue. Photo courtesy of B.D. Petty

Fig. 6.43 Granulomas and necrotic areas in the kidney of Atlantic salmon infected with *Mycobacterium* sp.



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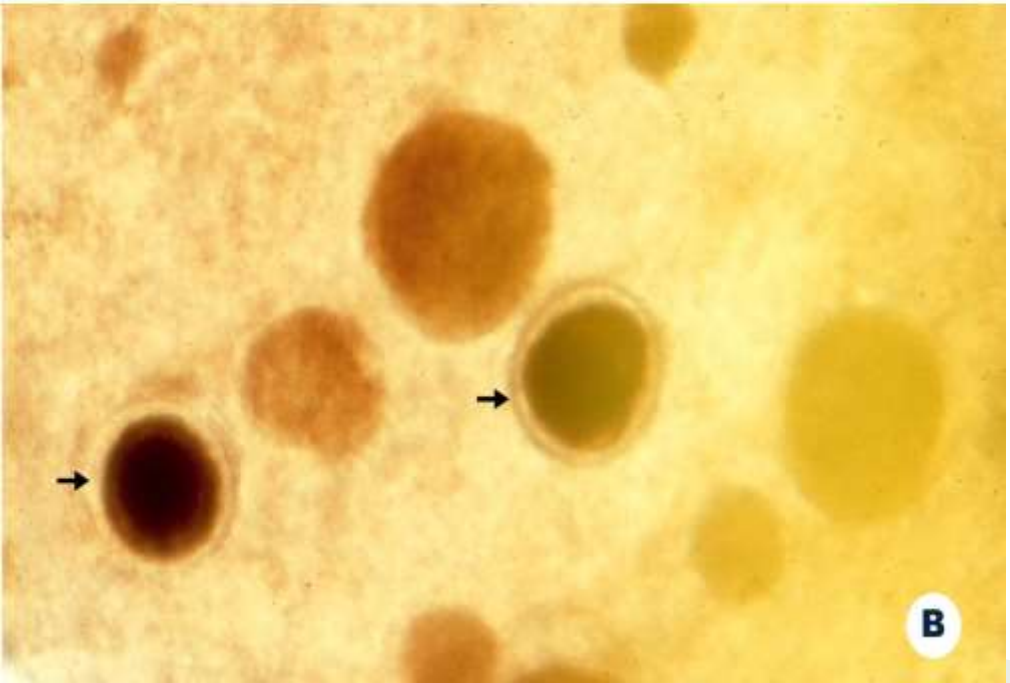
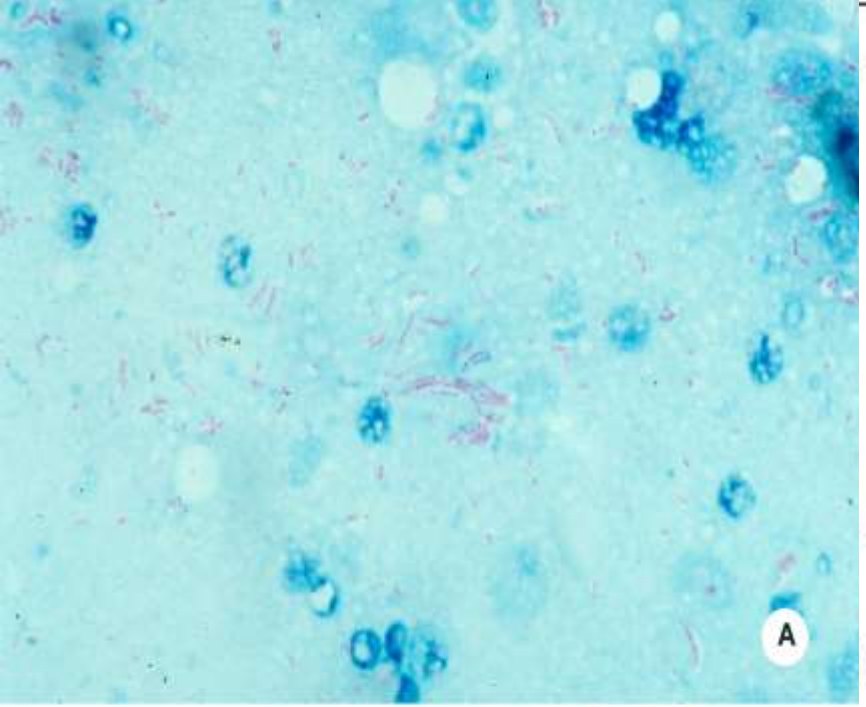
Mycobacterisosis.

A. Multiple granulomas (which appear as white spots) in the head kidney of a green knifefish with severe mycobacteriosis.

B. Wet mount images of granulomas. Numerous granulomas in tissue squash preparation. Granulomas often contain macrophages with pigment (e.g., melanin), but the former may be differentiated from melano- macrophage centers (which are normal in the spleen and kidney) by the presence of a capsule (arrows).





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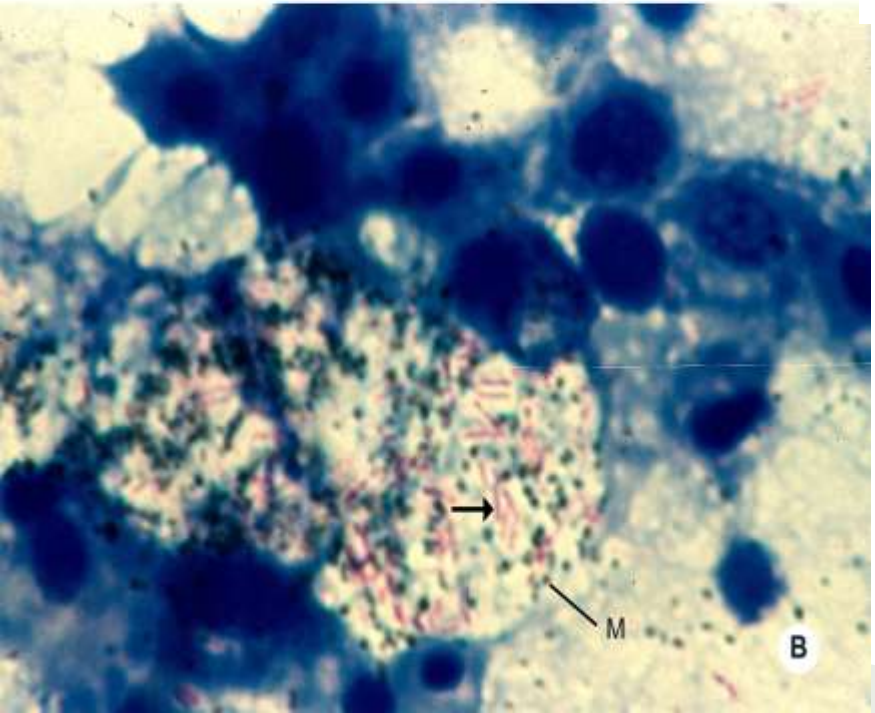


Mycobacterium spp. in imprints stained with Ziehl-Neelsen.

A. Acid-fast (red) bacilli.

B. Imprint showing *Mycobacterium* bacilli (arrows) in pigment-containing macrophages (M = melanin granule).

هیستوپاتولوژی:

- اشکال مزمن و پرولیفراتیو از گرانولوماهای کانونی که شامل فیبروسیت ها و گرانولوسیت ها ودر مرکز سلول های اپیتلوئید و ماکروفاژهای حاوی باکتری هستند.
- در اطراف این گرانولوماها ملانوسیت و واکوئل ها قرار می گیرند.
- باکتری ها به طور مشخص در مراکز التهابی قرار میگیرند.

تشخیص بیماری:

- رنگ آمیزی اسیدفست
- کشت باکتری روی بلاد آگار و یا تریپسین سویا آگار
- PCR

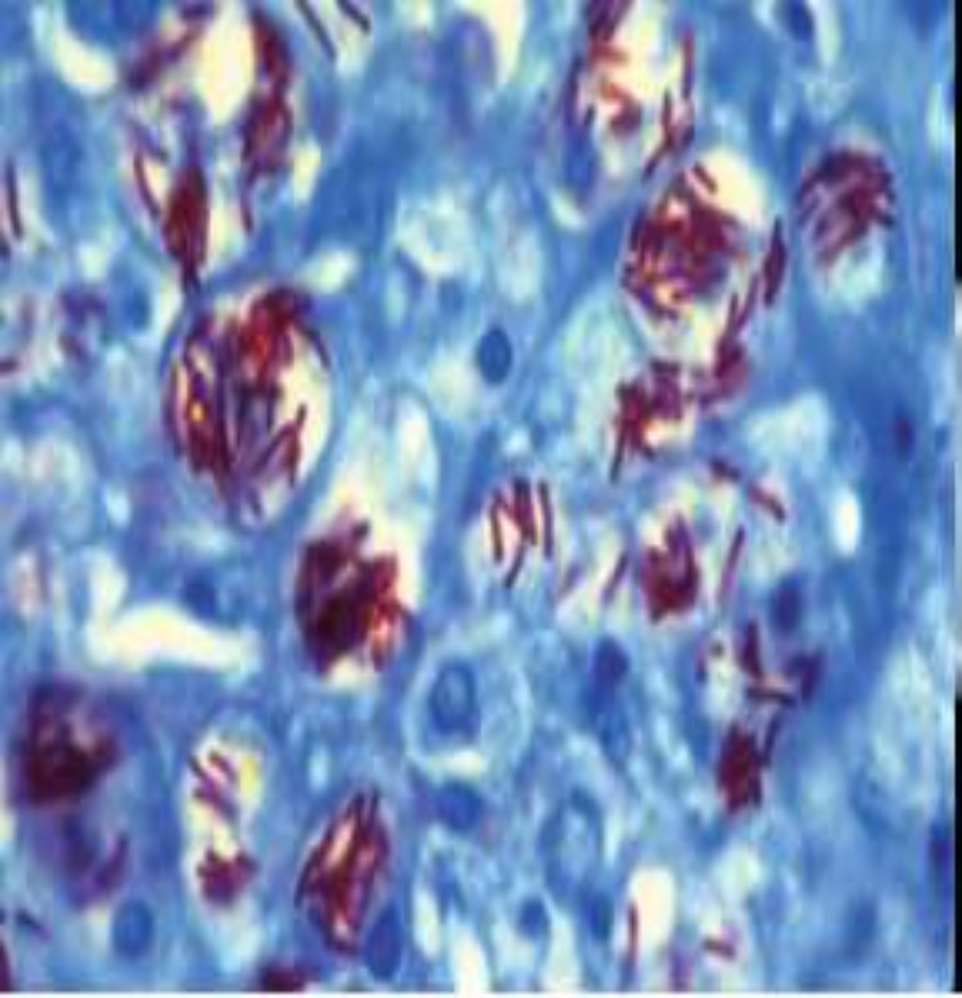


Fig. II-55.—cont'd. G. High magnification of a granuloma with numerous acid-fast mycobacteria. Fite-Faraco. H. Culture of *Mycobacterium marinum* on Löwenstein-Jensen agar. Note bright yellow (photochromogenic) colonies. (*C* and *G* photographs courtesy of A. Colorni; *H* photograph by L. Khoo and E. Noga.)

Click for high resolution image

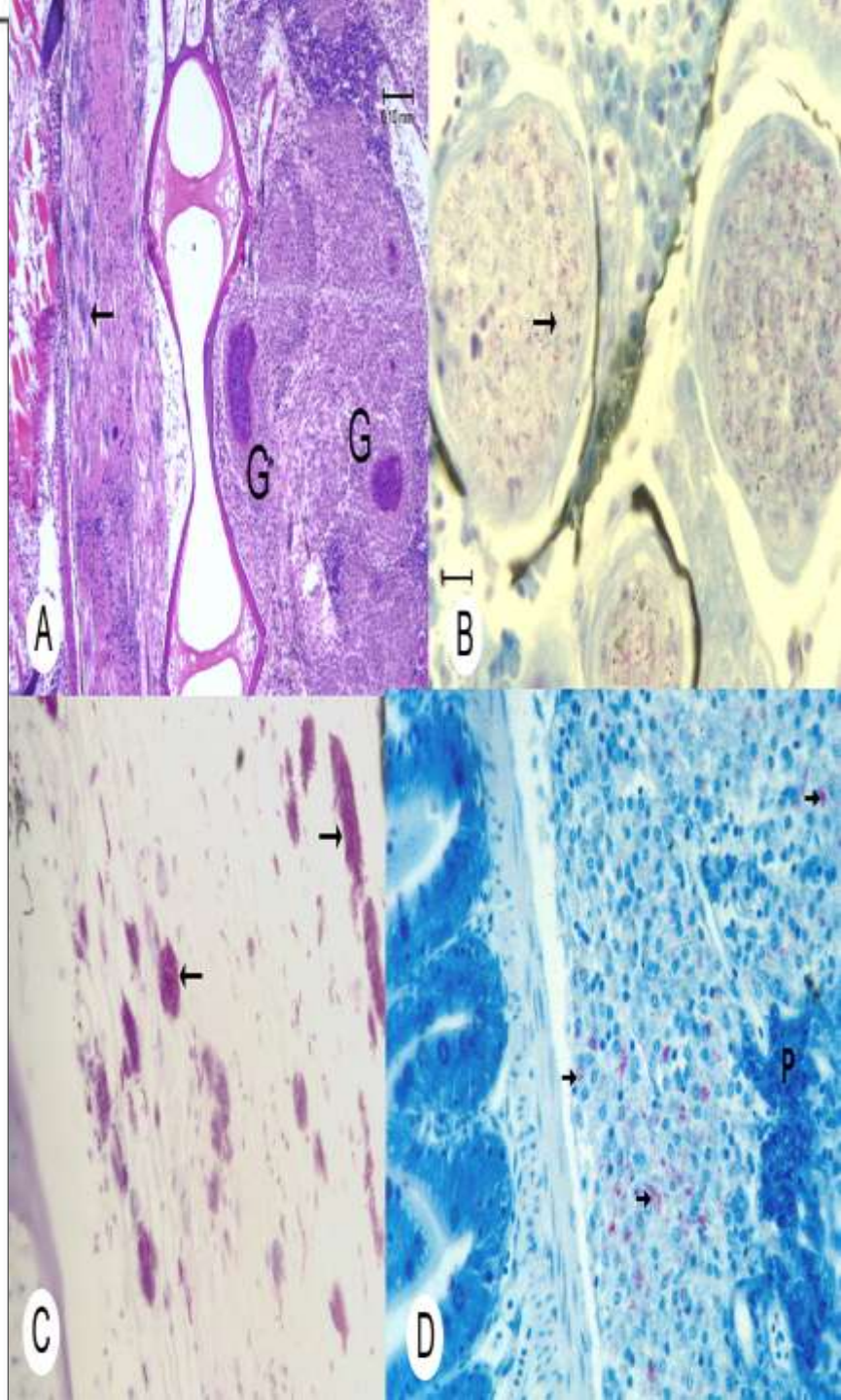
Histology of *Mycobacterium* infections.

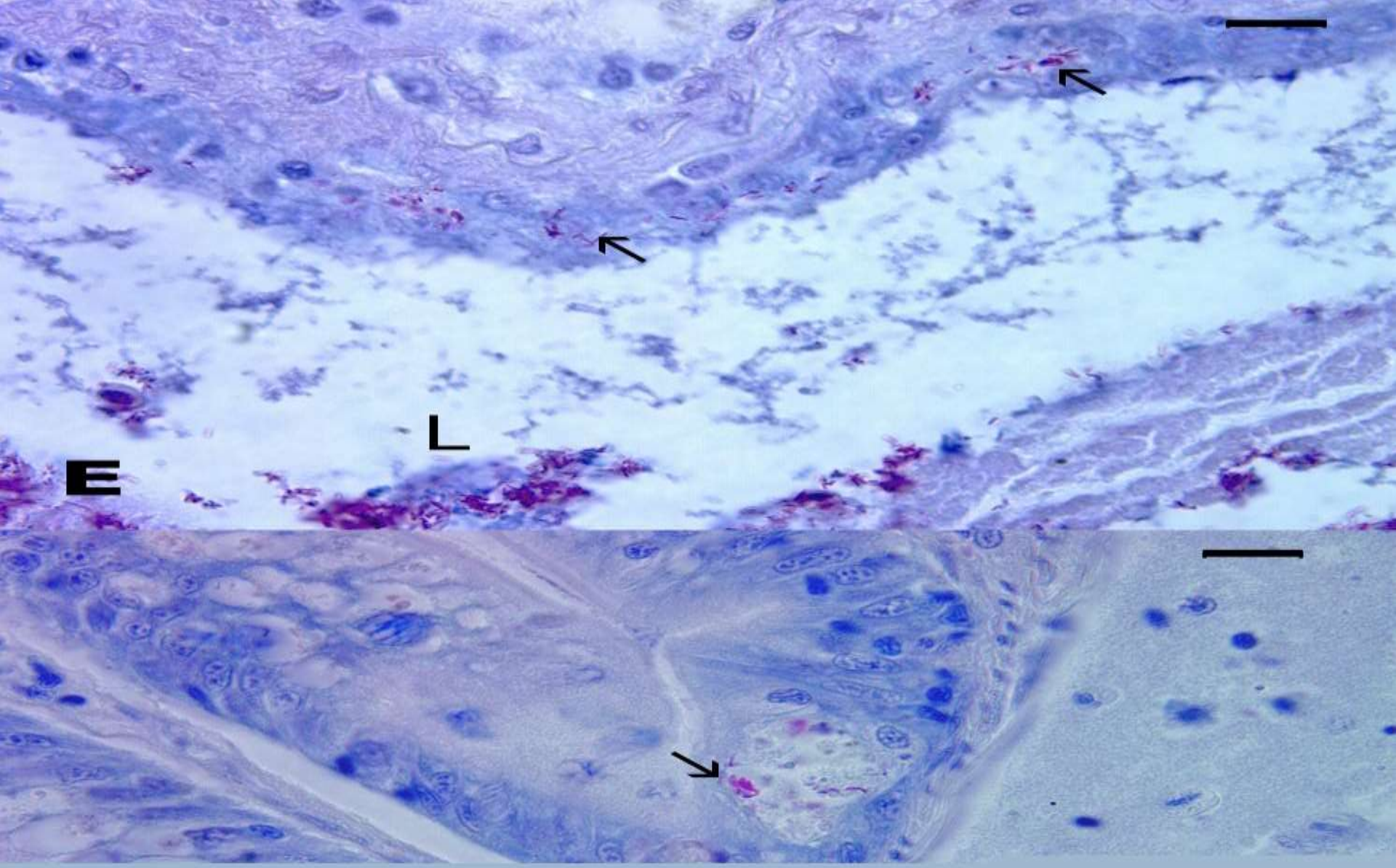
A. Low magnification of severe infection with several granulomas (G) in visceral cavity and free colonies of *Mycobacterium* sp. (arrows) in spinal cord. Bar 100 µm. H&E.

B. Typical granulomas with acid-fast bacilli (arrow). Bar = 10 µm. Ziehl-Neelsen.

C. Acid fast stain of same section as "A" showing acid-fast positive colonies in spinal cord. Ziehl-Neelsen.

D. In zebrafish, we occasionally see aggressive, diffuse infections. Instead of well-organized granulomas, the lesions present as massive proliferation of phagocytes in the viscera, with diffuse distribution of bacteria (arrows). P = pancreas. Ziehl-Neelsen.

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E. Swimbladder infected with mycobacteria. Note acid fast staining bacteria in the swimbladder wall (arrows) and lumen (L). Kinyoun's acid fast stain. Bar = 10 µm.

F. Intestine infected with mycobateria, with numerous bacteria in the epithelium (arrow). Kinyoun's acid fast stain. Bar = 10 µm.

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Review

Mycobacteriosis in fishes: A review

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Abstract

Mycobacterium species have long been recognised as a significant source of morbidity and mortality in finfish aquaculture, as well as in wild finfishes. Mycobacteria infecting fishes also include zoonotic pathogens that can cause protracted illness, especially in immunocompromised individuals. Several basic aspects of mycobacterial pathobiology in aquatic animals remain poorly understood, although a number of important recent developments have been made, especially with respect to identification of novel *Mycobacterium* spp. infecting fishes and a new group of mycobacteria closely related to the human pathogen *Mycobacterium ulcerans*. This review will encompass important aspects of mycobacterial disease in fishes, discuss recent research including studies of mycobacteriosis in striped bass (*Morone saxatilis*) of Chesapeake Bay, USA, and suggest directions for future work.

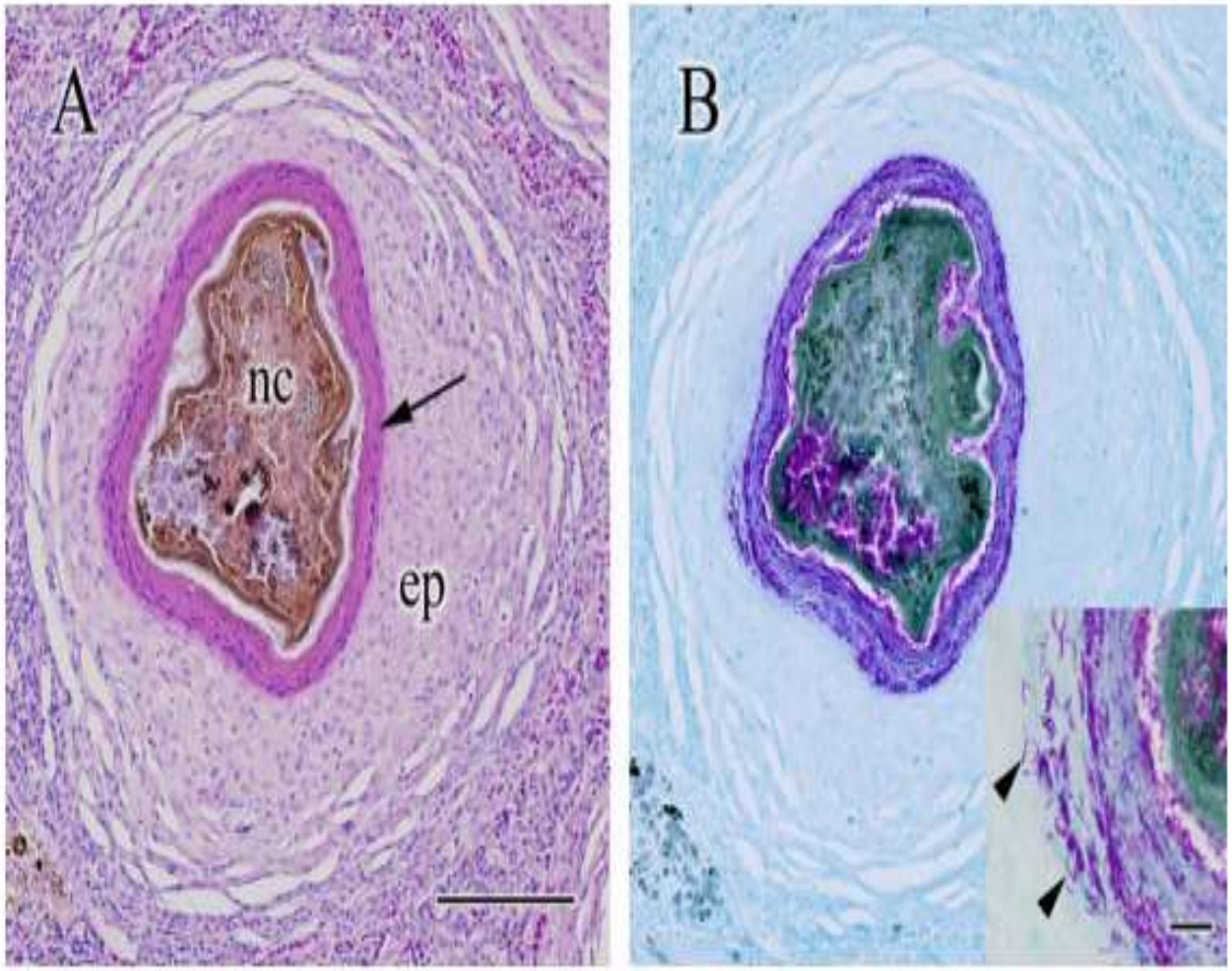

Fig. 2. *Mycobacterium marinum* granuloma induced in the spleen of a striped bass by intraperitoneal injection (Gauthier et al., 2003). (A) Photomicrograph of granuloma with necrotic core (nc), compressed epithelioid cell (spindle-cell) layer (arrow), and a epithelioid cell layer (ep). Hematoxylin and eosin stain (bar = 100 μm). (B) Photomicrograph of Ziehl–Neelsen-stained section with inset illustrating *M. marinum* bacteria (arrowheads) in the necrotic core and in the surrounding cellular layers. Ziehl–Neelsen stain (Inset bar = 10 μm).

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Mycobacteriosis in zebrafish (*Danio rerio*) research facilities☆

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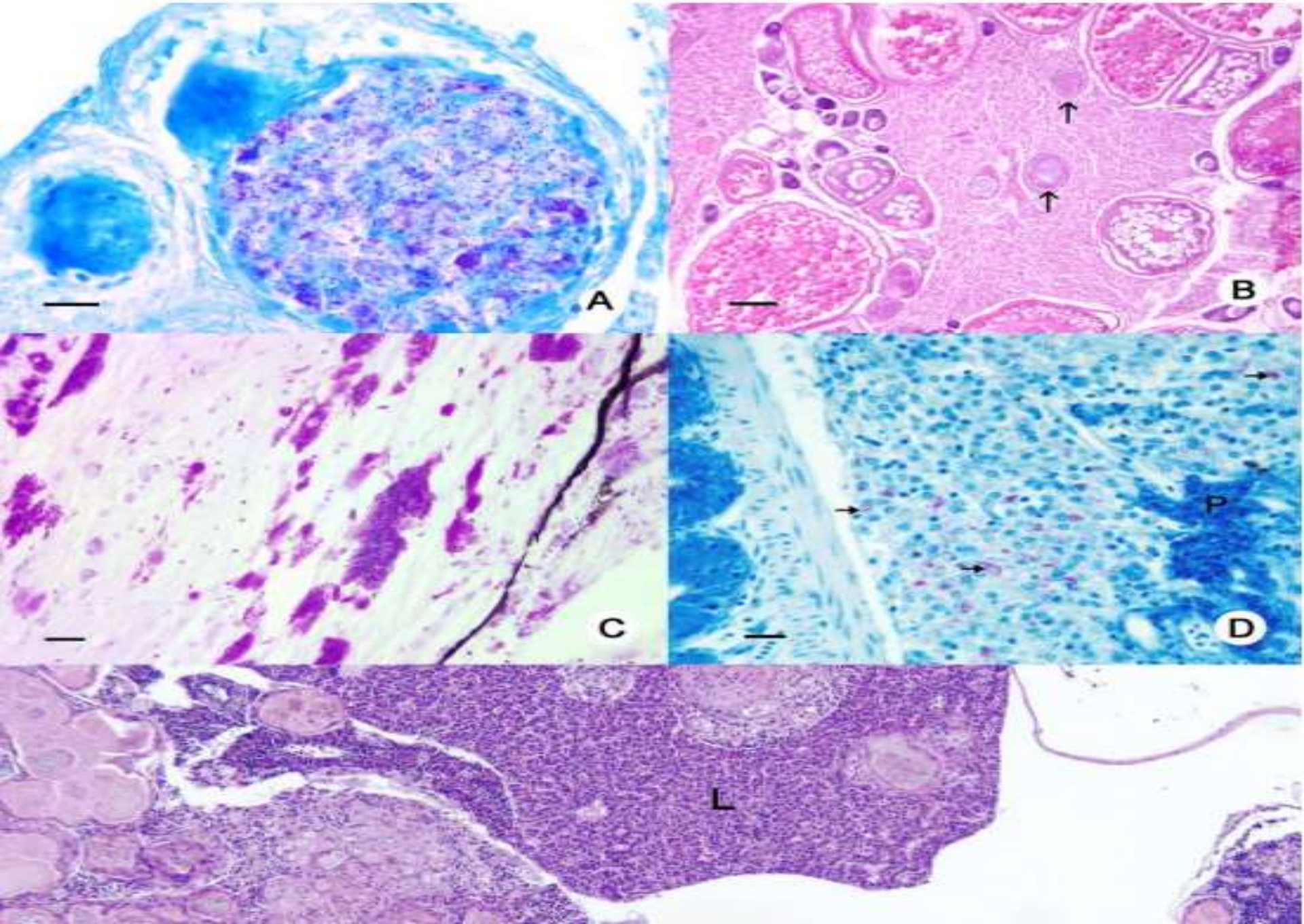
Abstract

The Zebrafish International Resource Center was established to support the zebrafish research community, and includes a diagnostic service. One of the most common diseases that we have diagnosed is mycobacteriosis, which represented 18% of the diagnostic cases submitted from November 1999 to June 2003. We describe here the severity of the disease and associated pathological changes of 24 diagnostic cases from 14 laboratories. Identifications of the bacteria are provided for seven of these cases. For two cases in which culture of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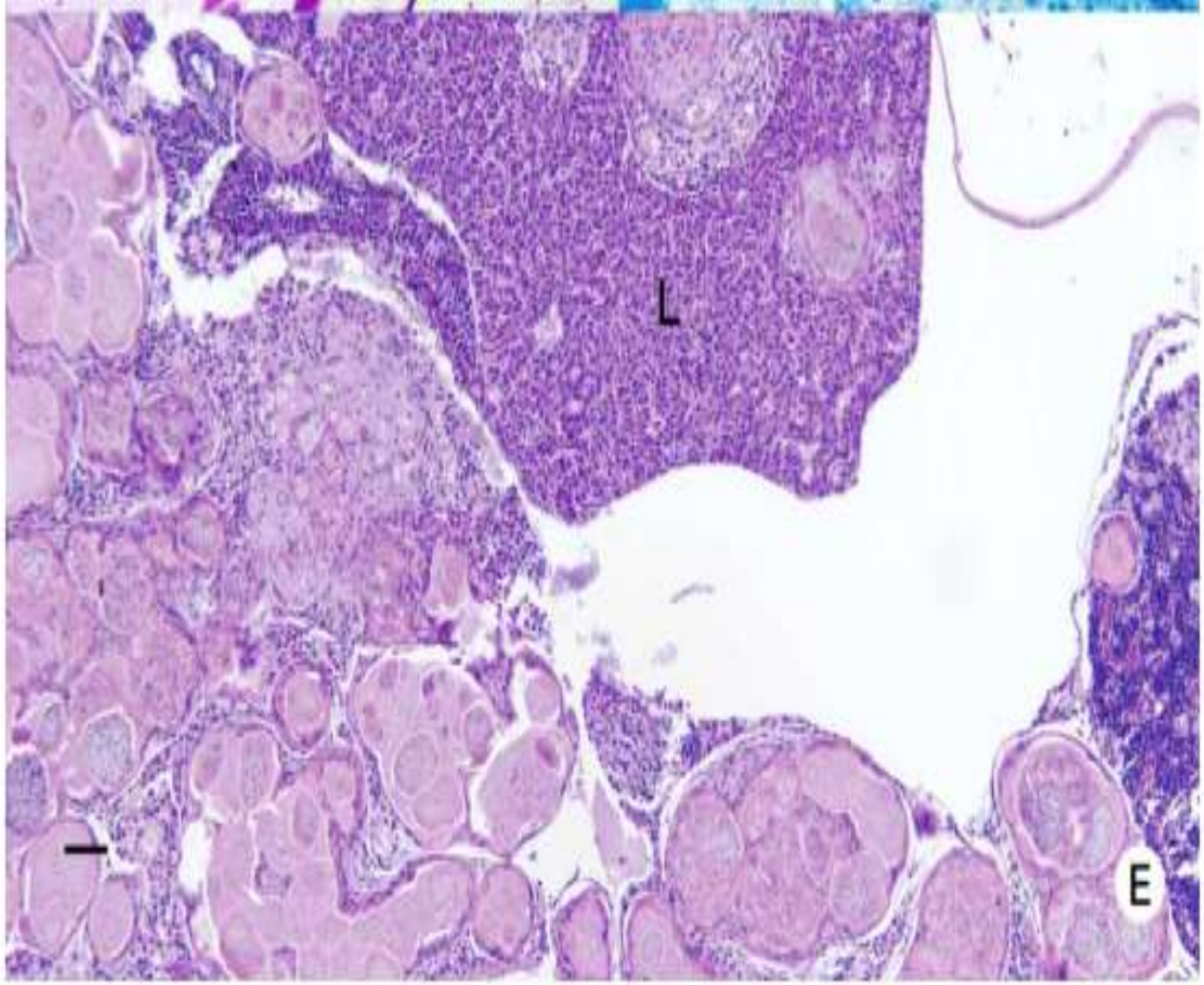

Fig. 1. Histopathology of mycobacteriosis in zebrafish. Ziehl–Neelsen acid fast unless otherwise indicated. (A) Typical granuloma with numerous acid-fast bacteria. Bar=10 µm. (B) Severe, chronic, diffuse inflammation of ovaries. Granulomas (arrows) contain acid-fast bacteria. Hematoxylin and eosin. Bar=100 µm. (C) Neurotropic mycobacteriosis. Numerous colonies of *M. haemophilum* in spinal cord not associated with inflammation. Bar=20 µm. (D) Disseminated mycobacteriosis. Massive infiltration of visceral cavity by macrophages with no granuloma formation. Numerous acid-fast bacteria are found in macrophages (arrows). P=pancreas. Bar=20 µm. (E) Typical mycobacteriosis. Numerous granulomas coalescing in visceral cavity and in the liver (L). Hematoxylin and eosin. Bar=50 µm.

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Mycobacterial Infections of Fish

Ruth Francis-Floyd[1]

Mycobacterial diseases of fish are common, particularly in intensive aquaculture systems and display aquaria. These diseases are collectively referred to as "atypical mycobacteriosis" or simply "mycobacteriosis." The term "fish tuberculosis" has been used in the past to refer to this group of diseases, but the term is not appropriate and should not be used. Tuberculosis is a very important disease of humans and mammals, but fish do not get tuberculosis.

All fish are susceptible to mycobacteriosis, though some species seem to be at greater risk than others. The disease has been reported in a broad range of fish species important infectious disease in zebrafish colonies so it is important to avoid introducing infected fish into valuable research colonies.

In addition to causing disease in cultured fish, atypical mycobacteriosis is also a concern in zoological collections. It is the most important disease of sea dragons and other members of the sea horse family. It has also been reported in cultured amphibians and reptiles, as well as in other aquatic animals from a broad range of taxa.

Though rare in mammals, mycobacteria sometimes cause localized and systemic disease in captive marine mammals, including manatees, pinnipeds (seals or

Figure 1. Multiple granulomas visible on a wet-mount of a gill biopsy from a largemouth bass (100x).

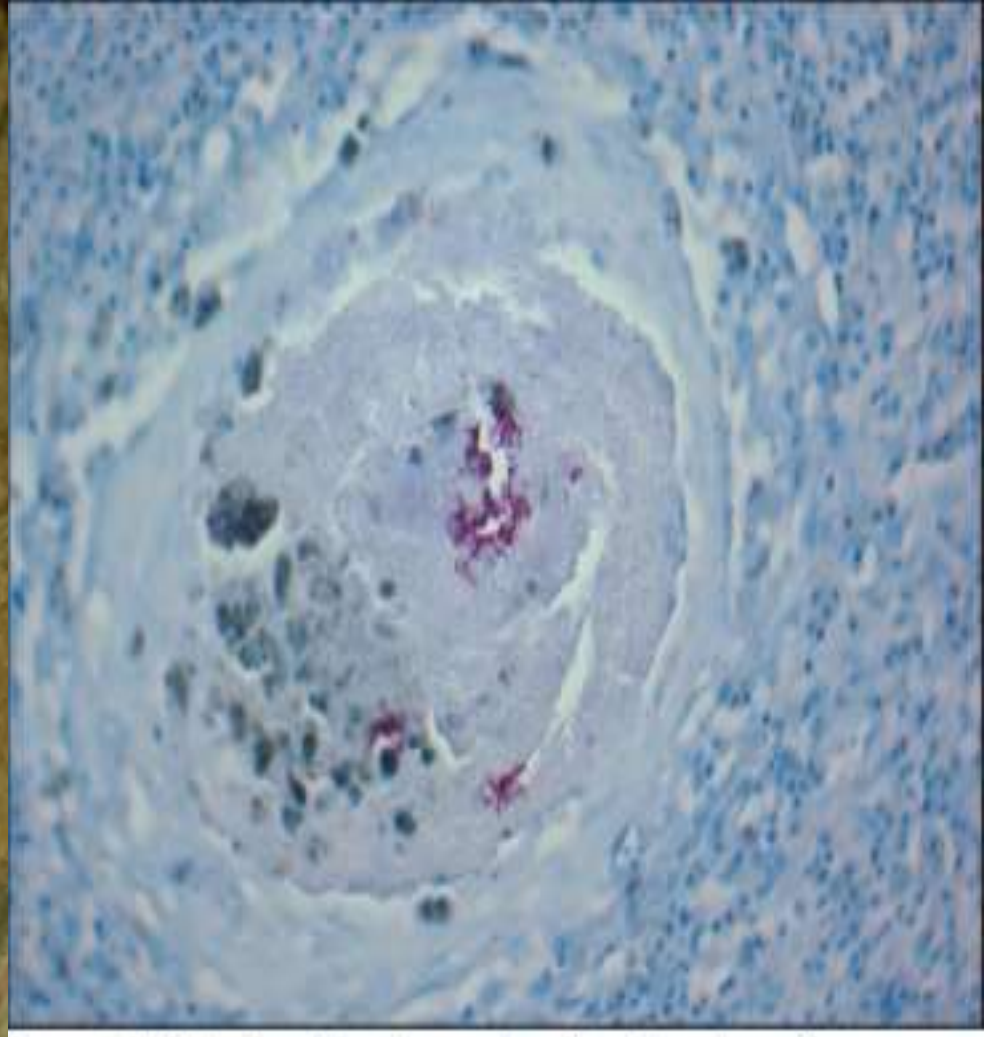

Figure 4. Histologic section of a granuloma from the spleen of a largemouth bass (400x). The tissue has been stained to demonstrate the presence of acid-fast organisms. Note the pink acid-fast organisms in the center of the granuloma, consistent with a diagnosis of mycobacteriosis. Photo courtesy of B.D. Petty