

HIDDEN IN PLAIN SITE:

MYCOBACTERIUM ON THE
ROUTINE BENCH

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Introduction

- The importance of the possibility of AFB appearing in a “routine” culture.
- How to recognize AFB on a Gram smear.
- How to recognize AFB on routine bacterial media.
- What to do when there is a suspicion.
- Does it “makes sense” for the source?
- Further staining, media inoculation.

“Rapid Growers”

- Classification of Rapid Growers: AFB that grow < 1 week (Examples: *M. abscessus*, *M. chelonae*, *M. fortuitum*, *M. mucogenicum*)
- It is this group that can show up on routine media, especially in broth cultures (blood, body fluids) that are incubated for >48 hours or plated cultures incubated in CO₂ for >48 hours.
- *M. abscessus*: most pathogenic, most likely to cause pulmonary infections (not seen in bacterial Respiratory cultures due to short incubation time). May cause soft tissue infections as subcutaneous nodules, ulcers.
- *M. chelonae*: associated with disseminated disease, skin and soft tissue infections.
- *M. fortuitum*: associated with skin and soft tissue infections, surgical wound infections, keratitis and catheter-related infections.
- *M. mucogenicum*: usually considered a contaminant from water/soil, can be pathogenic in immunocompromised patients associated with catheter-related infections, IV drug abuser injection site infections (skin and soft tissue) both leading to disseminated disease.

CASE STUDIES: BLOOD CULTURES

Patient #1

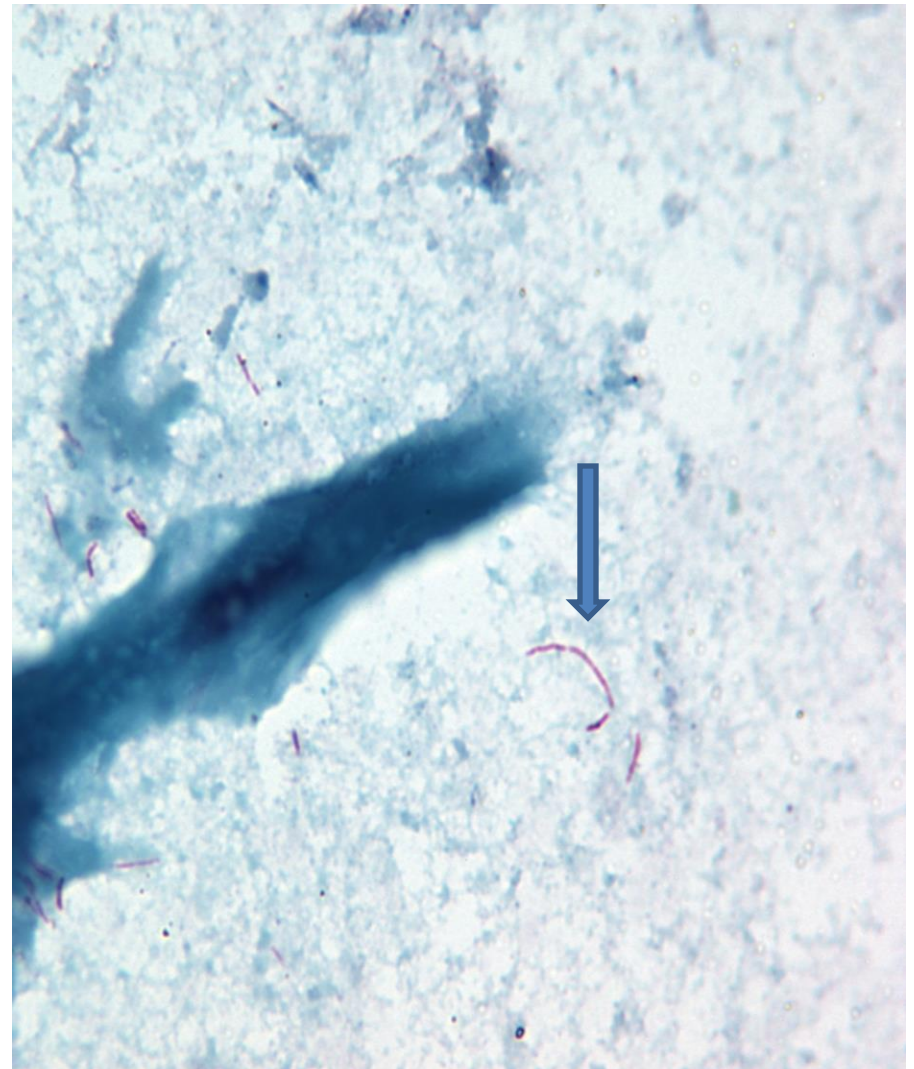
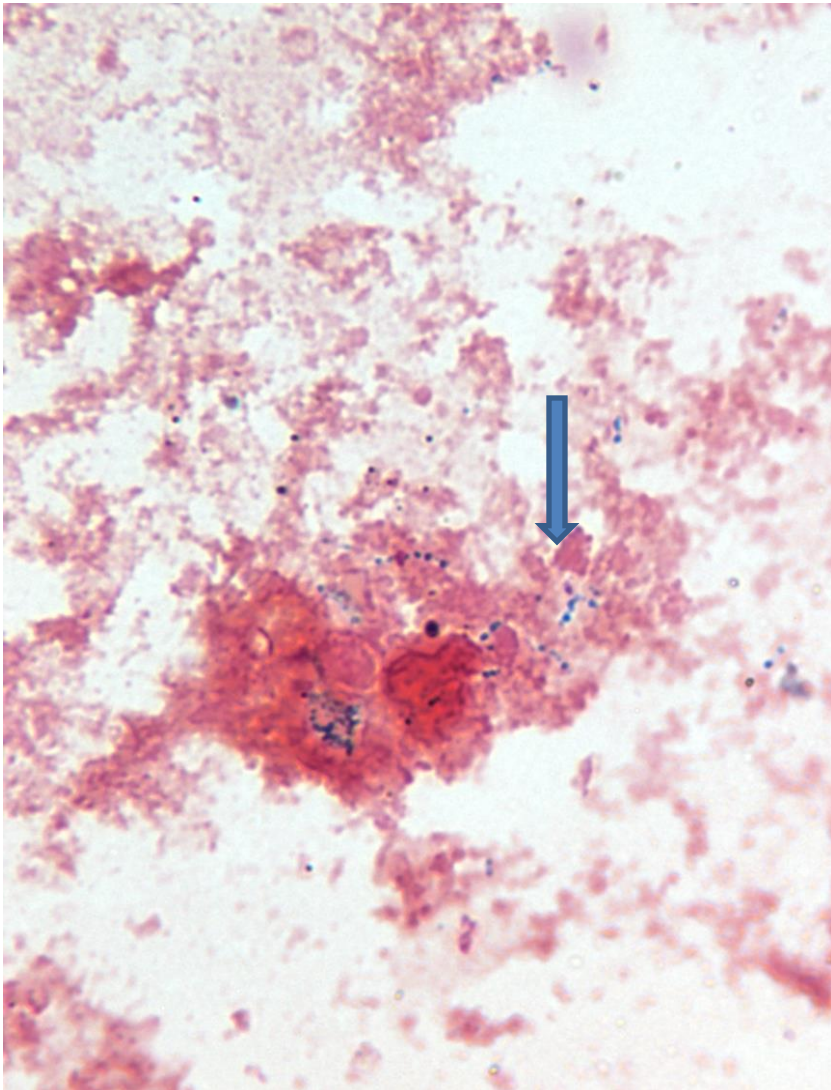
- 06/19/2018: 82 yr. old female admitted through ER with a complex medical history including mitral valve dysfunction, bladder cancer, multiple pulmonary nodules, pancreatic cysts, renal mass, decubitus ulcers and multiple bilateral erythematous nodule lesions on upper and lower extremities.
- 06/19/2018: Blood cultures ordered and drawn.
- 06/20/2018: Biopsy of left arm nodule submitted to pathology for tissue analysis (*no cultures ordered*).
- 06/22/2018: Patient discharged to palliative care.
- 06/23/2018: Blood cultures go positive.

Patient #1 Positive Blood culture

- 06/23/2018: Aerobic bottles positive at 4 days
- Gram: NOS (questionable?) Acridine Orange stain: bacteria indicated.
- Aerobic sub plates NG 24 hours.
- 06/25/2018: Tiny colonies visible on BAP at 48 hours.
 - Gram = Beaded Gram Positive bacilli
 - Kinyoun = AFB
 - Sent to WSLH for identification and susceptibility
- 06/25/2018: Pathology reports AFB seen on arm nodule biopsy smear.
- 06/27/2018: ID'd as Mycobacterium abscessus.
- 06/28/2018: Infectious Disease physician consulted.
- 07/09/2018: Patient expired.

Patient #1 Aerobic bottle at 4 days
Gram Stain (NOS?)

Kinyoun Stain



BLOOD CULTURES

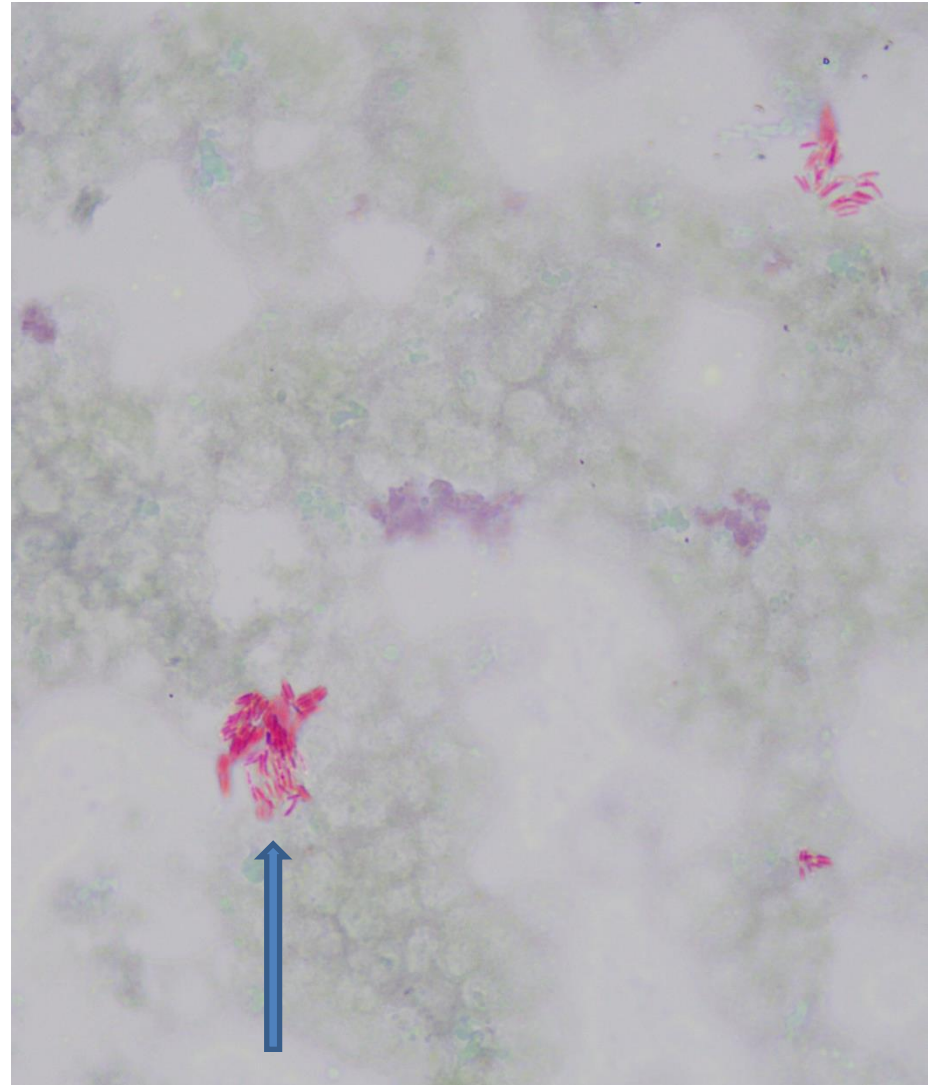
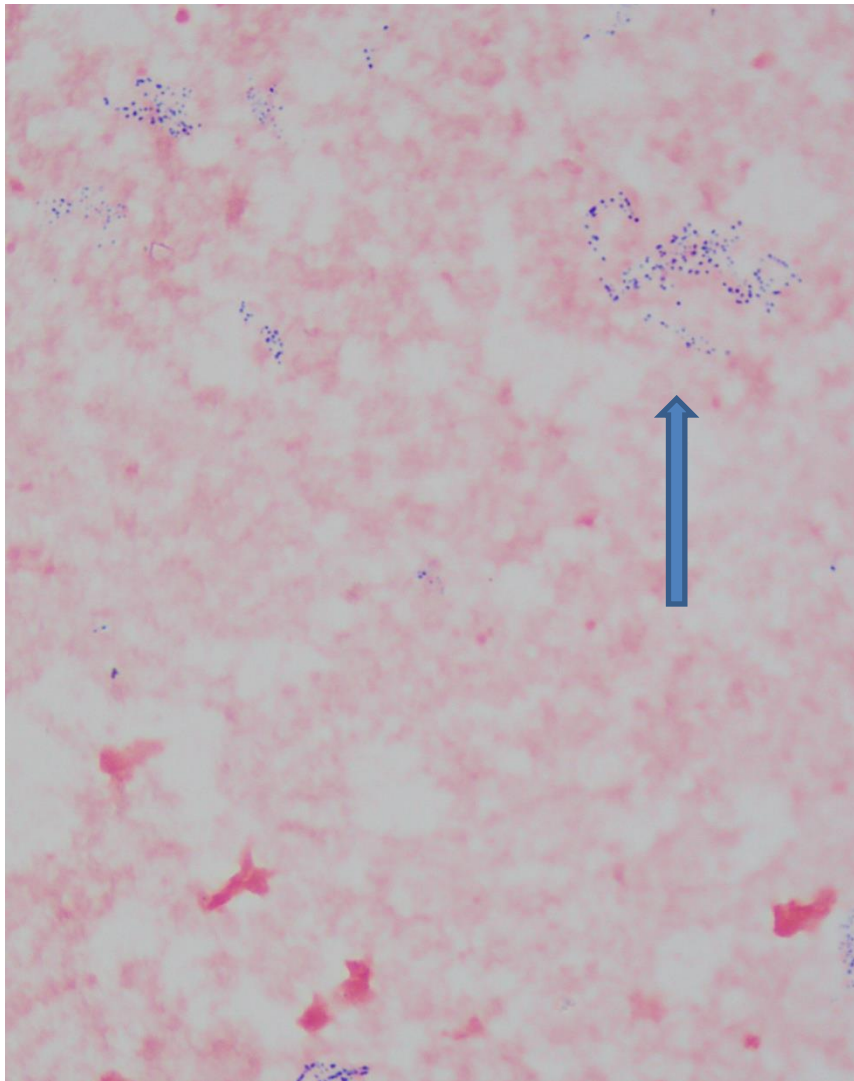
Patient #2

- 07/07/2018: 24 yr. old male admitted to ER brought by police for erratic and dangerous behavior due to drug use. Admits to using cocaine, heroin and marijuana. Presents with finger joint laceration that requires treatment. Diagnosed with fever and SIRS (systemic inflammatory response syndrome).
- 07/07/2018: Blood cultures ordered and drawn. Laceration treated (no cultures taken). Patient discharged from ER with directions to contact primary care physician.
- 07/11/2018: Aerobic bottle goes positive (4 days).
- Gram: NOS Acridine Orange stain: Neg for bacteria
- Subbed to routine media (BAP, CHOC, MAC, Brucella[anaerobic])
- 07/13/2018: BAP exhibits small white colonies (48 hrs).
 - MALDI = No ID
 - Gram = Beaded GPB, Kinyoun = AFB
 - Sent to WSLH for identification and susceptibility
- 07/18/2018: ID'd as *Mycobacterium mucogenicum*.

Patient #2 Aerobic bottle at 4 days

Gram (NOS?)

Kinyoun



Patient #2 Positive Blood Culture: *M. mucogenicum*
Blood Agar plate (48 hours)



Patient #2 continued

- Between 07/13 -07/21: Medical personnel tried to contact the patient without success. They contacted police to send them to the residence for wellness check. The police informed them the patient was incarcerated and they would bring him to the hospital.
- 07/21/2018: Infectious Disease consulted. Patient presented with no fever, still IV drug abuser. Consult ordered repeat Blood Cultures (not specific for AFB) which were negative. Concluded that infection was cleared. Testing for HIV was neg.

BLOOD CULTURES

Patient #3

- 07/10/2018: 33 yr. old male admitted to ER for suicidal ideation, hand abscess (3 day duration), ankle abscess (1 week). IV heroin, cocaine and alcohol abuser.
- Ultrasound of hand demonstrates diffuse subcutaneous edema and fluid collection. No cultures of abscesses taken. Note that he was seen at a different institution for hand abscesses 5 months earlier and treated with IV antibiotics (no cultures indicated).
- Blood culture ordered and drawn.
- 7/11/2018: Patient left against medical advice. Homeless, no contact info.
- 7/14/2018: Blood culture goes positive.

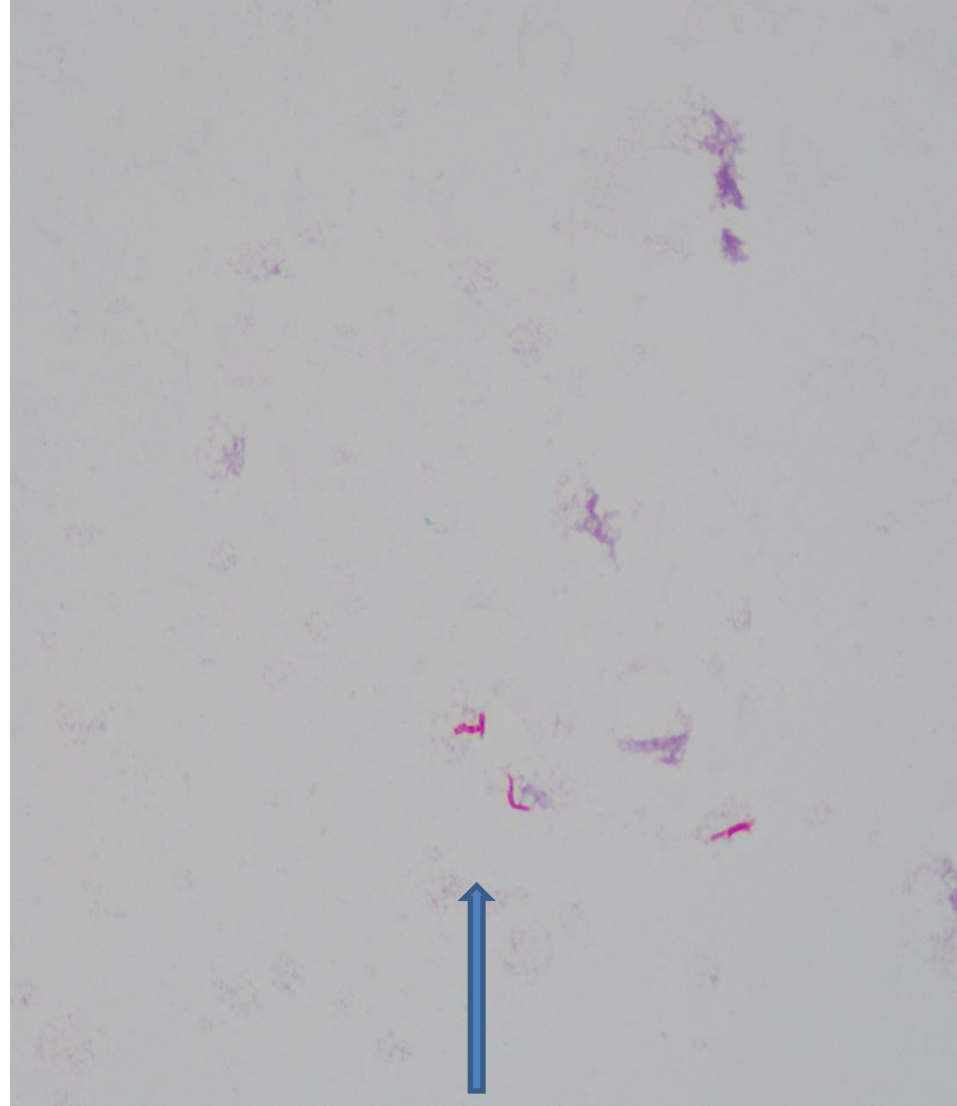
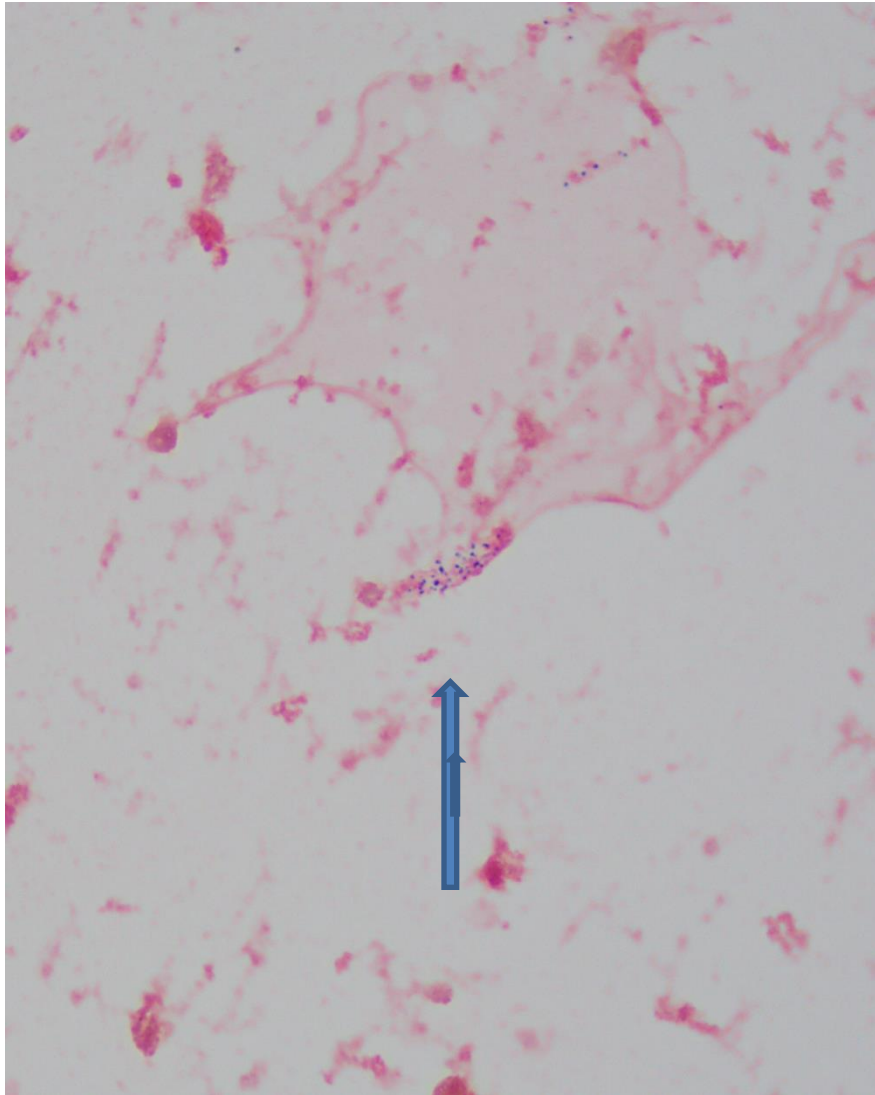
Patient #3 Positive Blood Culture

- 7/14/2018: Aerobic bottle positive at 4 days.
- Gram: NOS Acridine Orange stain: bacteria indicated (bacilli).
- 7/17/2018: Dry, flat white colonies on BAP and Choc. plates
 - Gram: Beaded GPB Kinyoun: AFB
 - Sent to WSLH for ID and susceptibility
- 07/20/2018: ID'd as *Mycobacterium fortuitum*.
- Unable to contact patient for treatment.
- 08/04/2018: Patient admitted to ER for hand and forearm abscesses. They were incised and drained. Aerobic/Anaerobic cultures taken (*no mycobacterial cultures ordered*) as well as Blood Cultures. Staph aureus, coag neg staph and Finegoldia were isolated from the abscess. Blood cultures were NG 5 days. Patient again left against medical advice.

Patient #3 Aerobic bottle at 4 days

Gram

Kinyoun



Patient #3 Positive Blood Culture: *M. fortuitum*

Blood Agar plate (48 hours old) Chocolate Agar plate



WOUND/BODY FLUID CULTURES

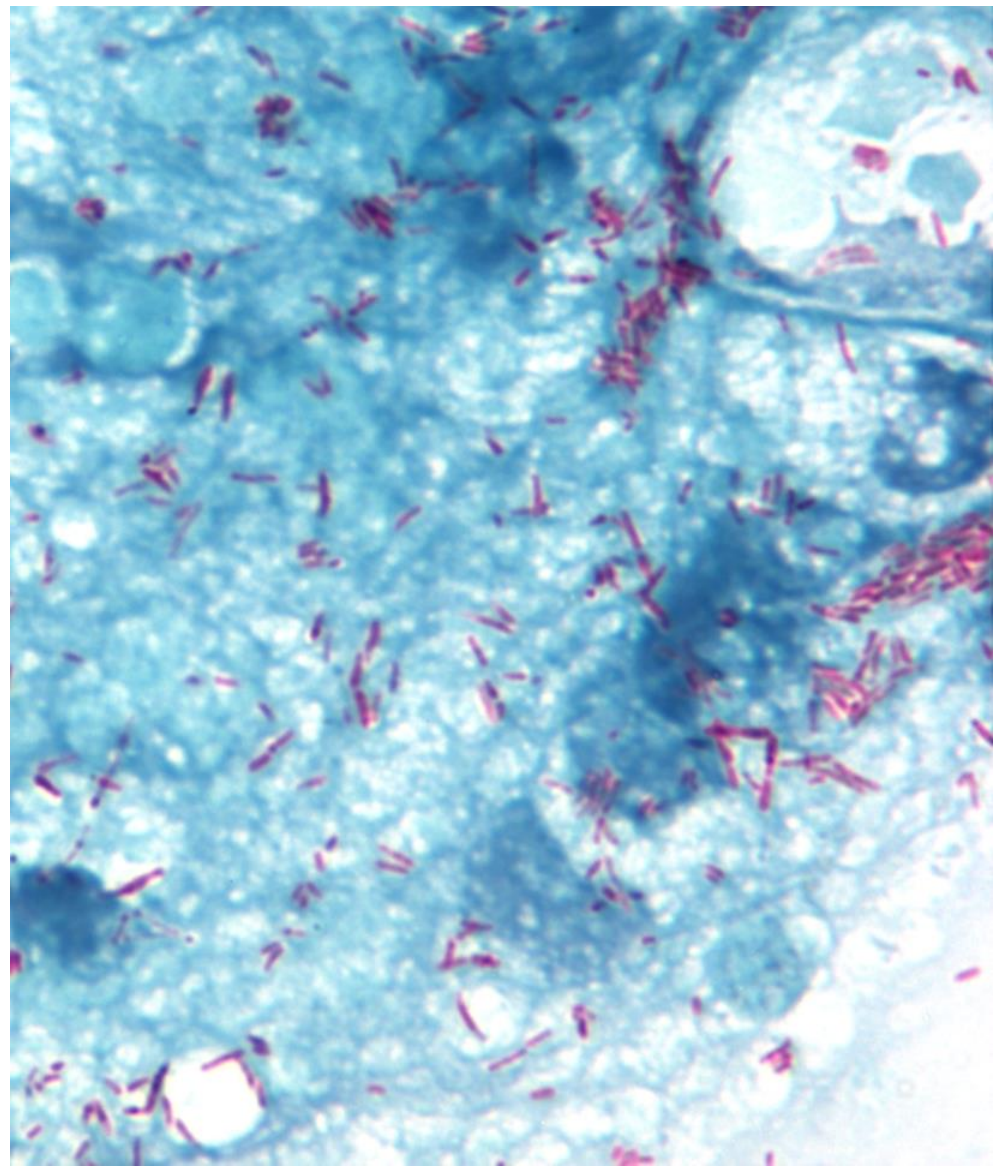
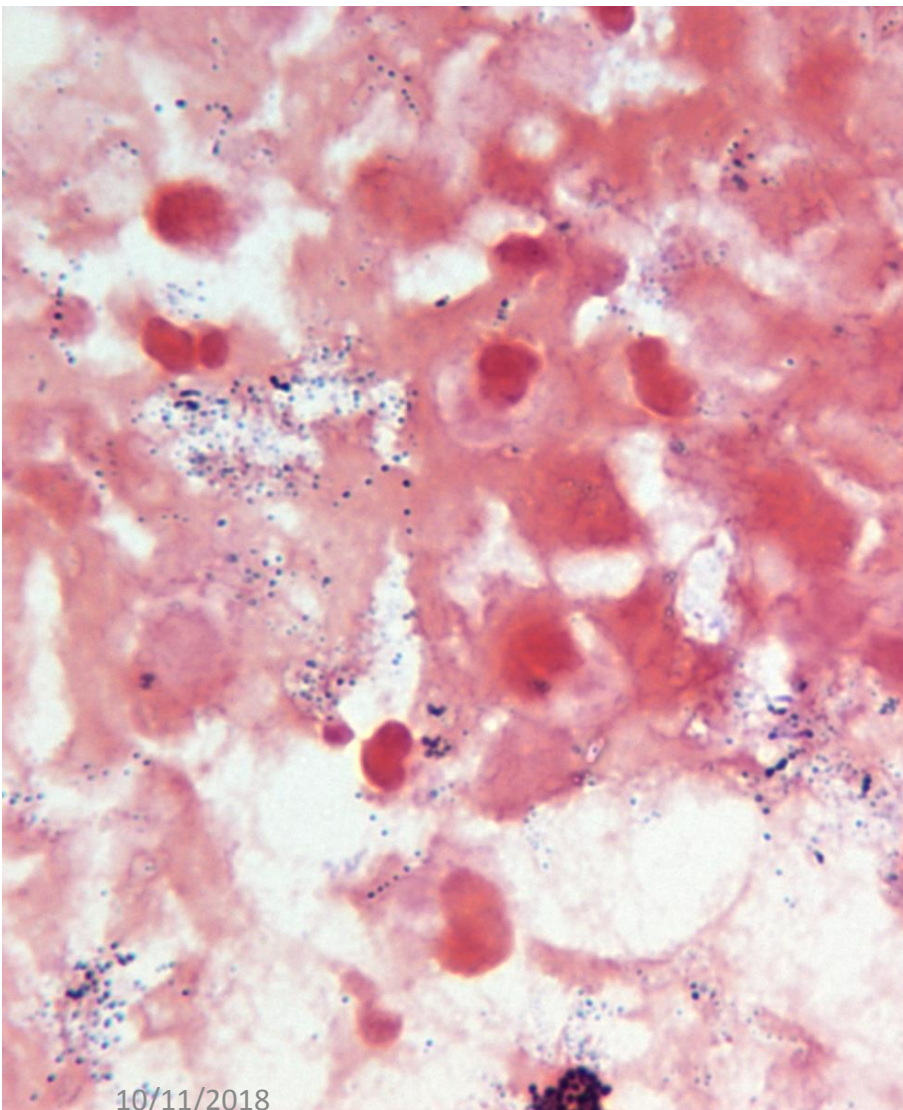
Patient #4

- 04/04/2018: 39 yr. old female scheduled for surgery to relieve left breast abscess subsequent to breast reduction mastectomy performed 4 months ago.
- Tissue removed for Aerobic/Anaerobic and Mycobacterium cultures. Both Gram and AFB smear were negative
- 04/08/2018: Aerobic/Anaerobic culture final result: No growth 4 days
- 04/17/2018: Mycobacterium culture: 1 colony on LJ slant at 12 days. Reported as “Mycobacterium, not tuberculosis, ID to follow”.
- 04/19/2018: Sent to WSLH for identification
- 04/25/2018: ID'd as Mycobacterium fortuitum
- 04/25/2018: Patient returned to surgery for further debridement and drain closure. Surgical note indicates M. fortuitum infection. Swab sent for Aerobic/Anaerobic culture only (*no Mycobacterium culture ordered*).
- 04/28/2018: Few tiny dry colonies observed on chocolate plate. Kept 3 days due to late set up time.
 - Gram = Beaded GPB
 - Kinyoun = AFB
- Identified as M. fortuitum based on gross morphology, growth rate and staining.

Patient #4 Tissue culture

Direct Gram (NOS)

Kinyoun



10/11/2018

Patient #5 Body Fluid Culture

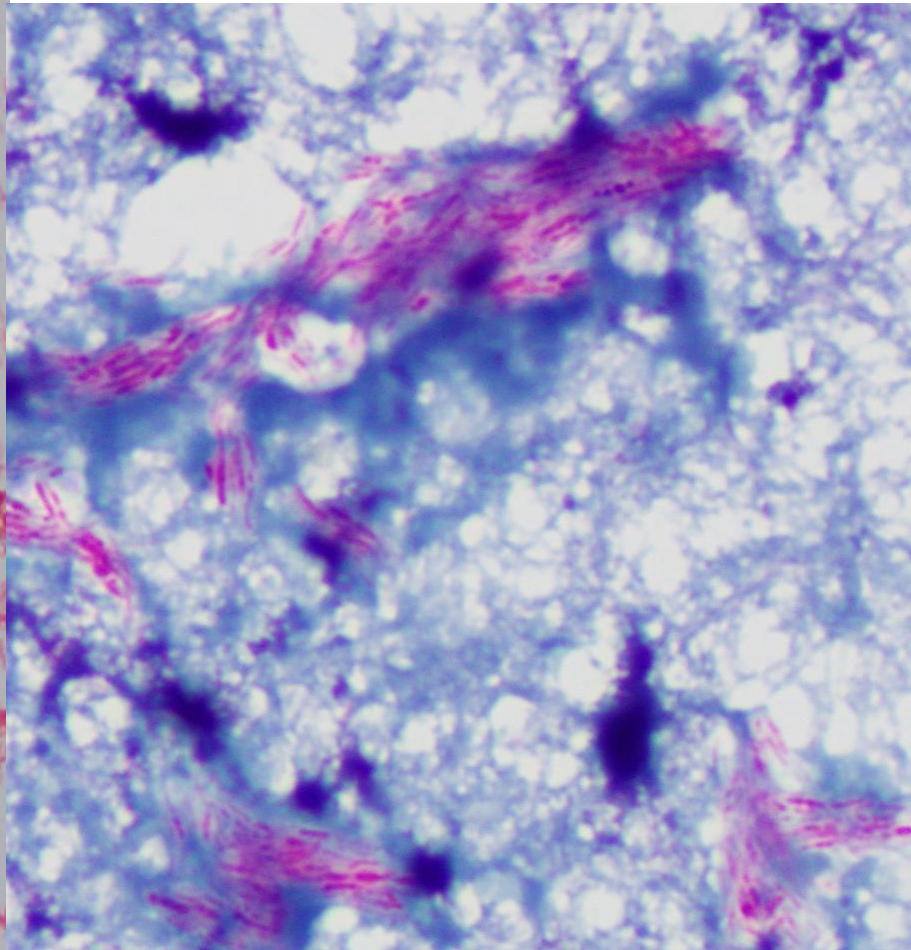
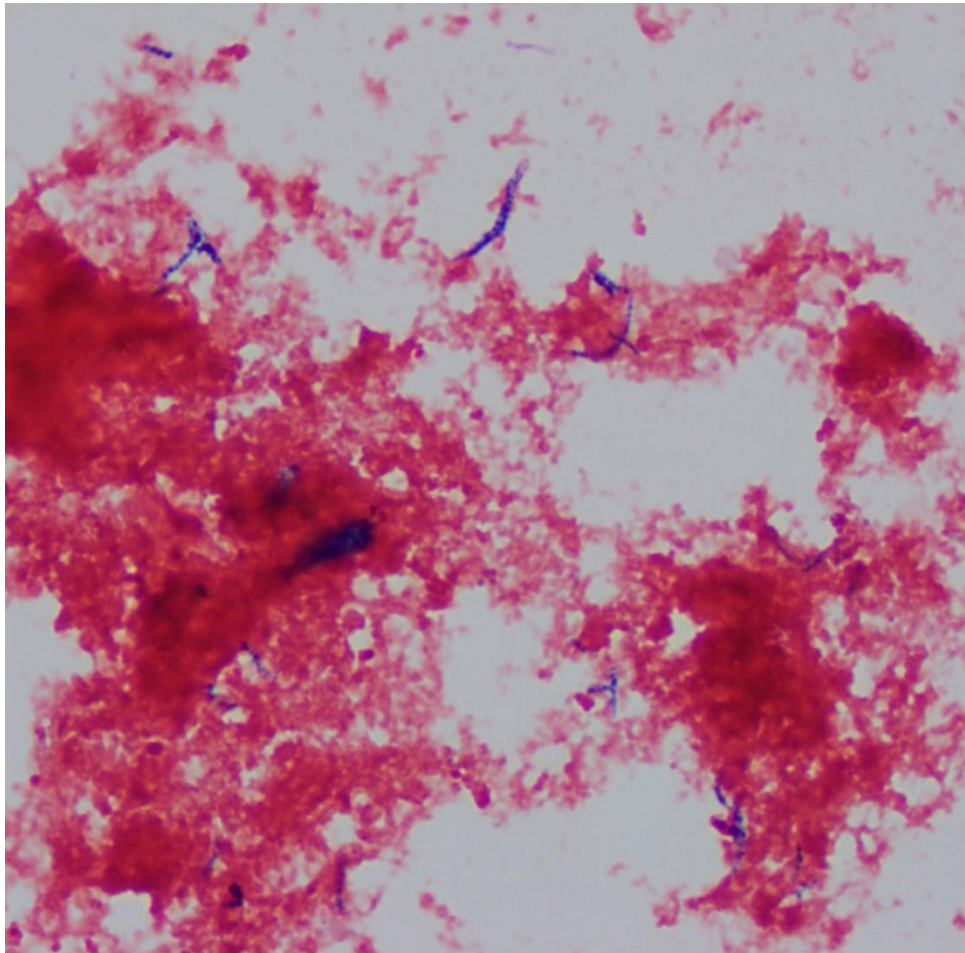
- 09/10/2018: 28 yr. old male seen in clinic for acute pain and swelling of right knee. Started 5-6 weeks prior. X-ray reveals prepatellar swelling and small foreign body. Denies injury or trauma but frequent kneeling for work. Consult to orthopedic.
- 09/11/2018: Orthopedic doc aspirates bursal fluid for culture. Recommends waiting for results before further treatment and knee protection.
- 09/12/2018: Micro receives bursa fluid. Inoculated into blood culture bottles for 5 day culture. Direct Gram = Many PMNs, NOS
- 09/17/2018: Aerobic bottle goes positive. Physician notified.
 - Gram = Beaded GPB
 - Kinyoun = AFB
 - Subbed to AFB media
- 09/19/2018: Dry white colonies present on 7H11 plate
 - Sent to WSLH for ID and susceptibility
- 9/26/2018: ID'd as *Mycobacterium peregrinum* (part of the fortuitum complex)

Patient #5 Body Fluid Culture

Gram

(Aerobic bottle)

Kinyoun



Patient #5 Body Fluid Culture

- Patient missed two appointments with Orthopedic physician. Also failed to act on messages to make an appointment with an Infectious Disease physician. Letter sent.
- 10/03/2018: Patient seen by Orthopedic physician. Knee still swollen and painful. Symptoms have increased. Another aspiration of the knee was obtained and ordered for Aerobic/Anaerobic and Mycobacterial cultures. Patient made an appointment with an ID physician.

CONCLUSIONS

- Awareness is paramount.
 - Mycobacterium can be an infectious agent in any part of the body.
 - Mycobacterium is NOT limited to tuberculosis.
- Education must be ongoing.
 - These are rare occurrences so when they come up: educate!
- If a gram “looks funny”, get a second opinion, do a Kinyoun.
 - Check incubation time. If pos or growth >48 hrs, think AFB.
- Providers need education also. Really helps when Infectious Disease physicians are involved.

References

- Infectious Disease Advisor #169/2017
- Case Report in Infectious Diseases
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