



# **Filtration**

**at the Bloomington, IL  
Water Treatment Plant**

**H<sub>2</sub>O'C**  
ENGINEERING

# **Old Plant Filters** **1929, 1956, 1966**





# Old Plant Filters

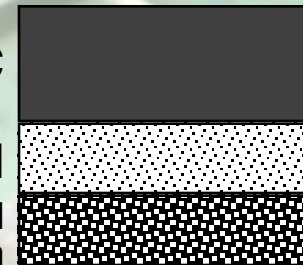
- Filters #1-12: GAC-Capped Sand
- 435 square feet per filter (20' x 21.75')
- Operated at a flow rate of ~ 1 gpm/ft<sup>2</sup>
- Fixed surface wash nozzles

19" GAC

12" sand

gravel

underdrain






# **Old Plant Filters: Influent Trough**





# **Old Plant Filters After Pressure Washing**

**PVC Surface Wash Piping**

The image shows a large, rectangular industrial structure, likely a filter tank, with a dark, textured interior surface. A network of metal pipes and fittings is visible, forming a grid-like pattern across the top and sides. The pipes are dark and appear to be made of metal, with some sections showing signs of rust or wear. The overall scene is dimly lit, with the primary light source coming from the top, creating strong shadows and highlighting the textures of the metal and the dark interior of the tank.



# **Old Plant Filters: Fixed Surface Wash Nozzles**

**PVC Pipe and Nozzles**





# **Old Plant Filters: Media Removed**





# **Old Plant Filters: Underdrain**

**Perforated Cast Iron Lateral Piping :  
Uniform Distribution of  
Backwash Water**





# **New Plant Filters - 1994**







## **New Plant Filters: GAC Cap**

**24" filter cap replaced with  
virgin GAC every two years**



# **New Plant Filters: Influent Trough**

**Wash Water Trough**

**Influent Channel and  
Wash Water Gullet**





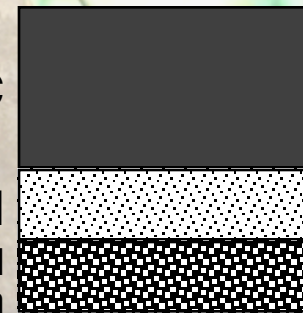
# New Plant Filters: Influent Trough

- Filters #13-18
- Dual-cell filters
- 462 square feet per filter (10.75' x 21.5' x 2 cells)
- Operated at a flow rate of ~ 2 gpm/ft<sup>2</sup>
- Rotating surface wash

24" GAC

12" sand

gravel  
underdrain





# **New Plant Filters: Rotating Surface Wash**

Surface Wash Header





# **New Plant Filters**

**GAC Removed  
Sand Layer Exposed**





# Granular Activated Carbon and Silica Sand





# Backwash





# **Sand Grab Sample**





# **Filter Core Sample**

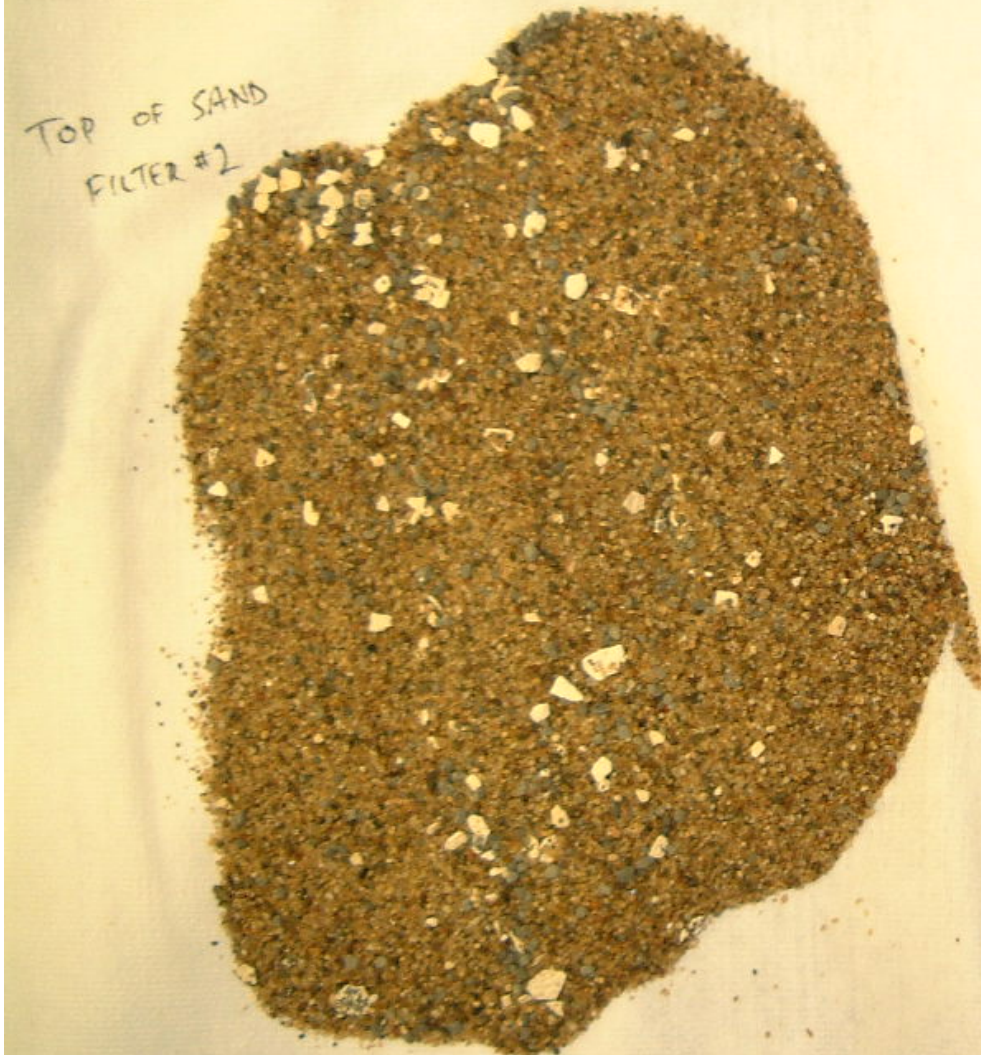


**Silica Sand**

**Granular Activated Carbon**



# Top / Bottom of Sand Layer



top

BOTTOM OF SAND  
FILTER #2



bottom



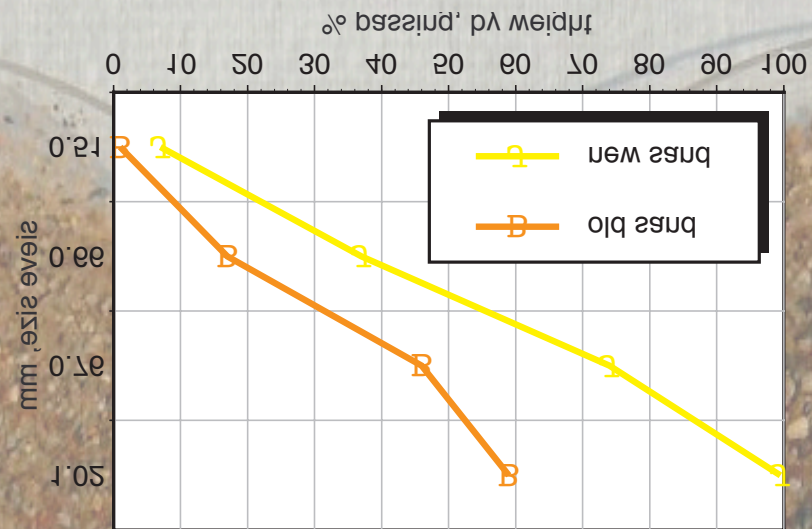
# **New / Old Sand**



**New sand is finer; more uniform**



# New / Old Sand



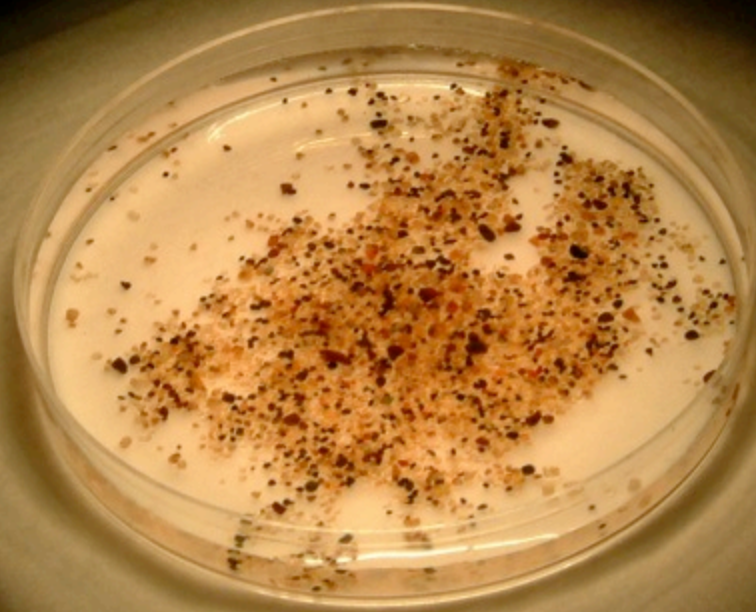


# Examination of Old Sand Stereo Microscope





# Examination of Old Sand



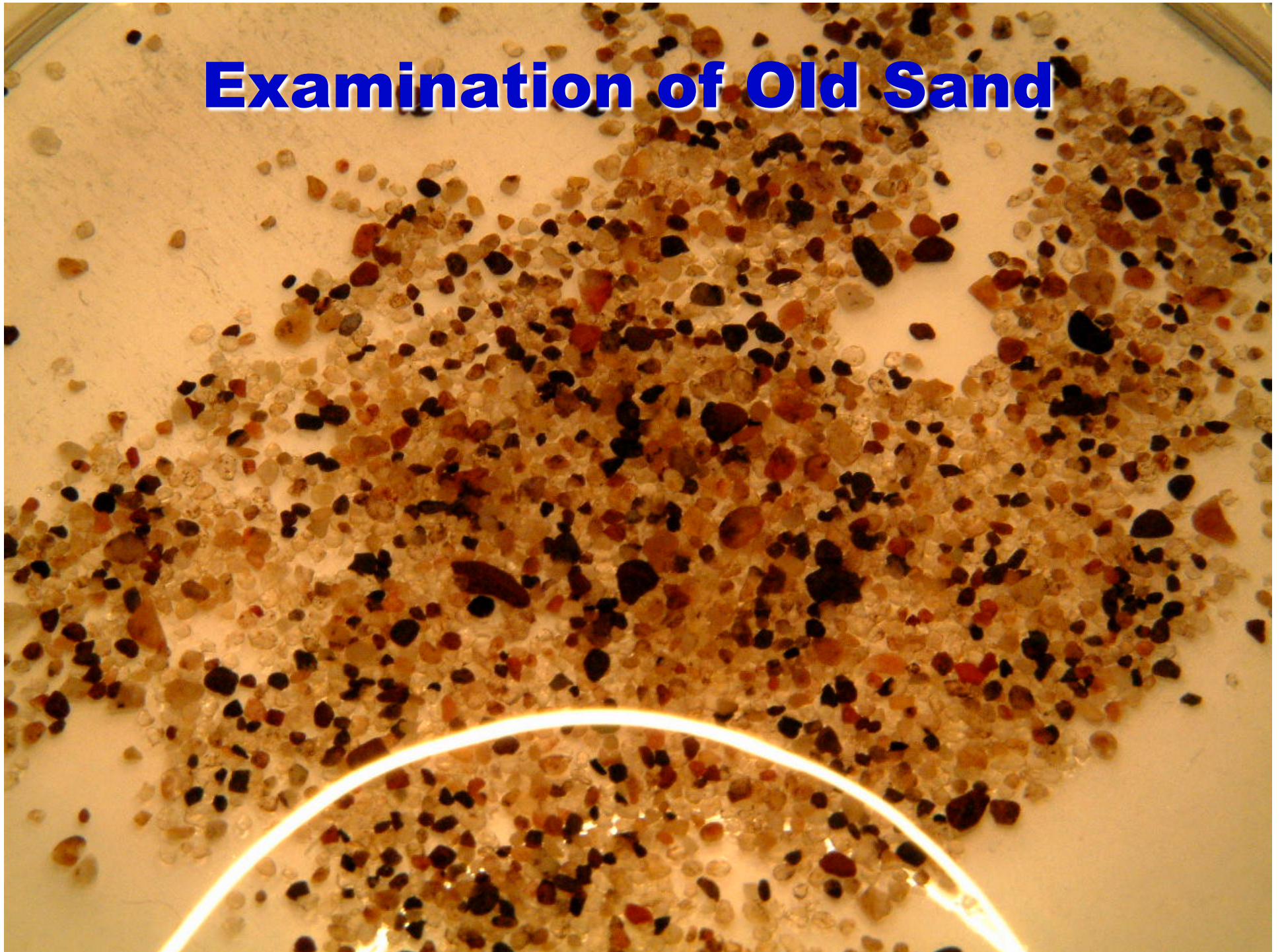


# **Examination of Old Sand**





# Examination of Old Sand





# **Examination of Old Sand**



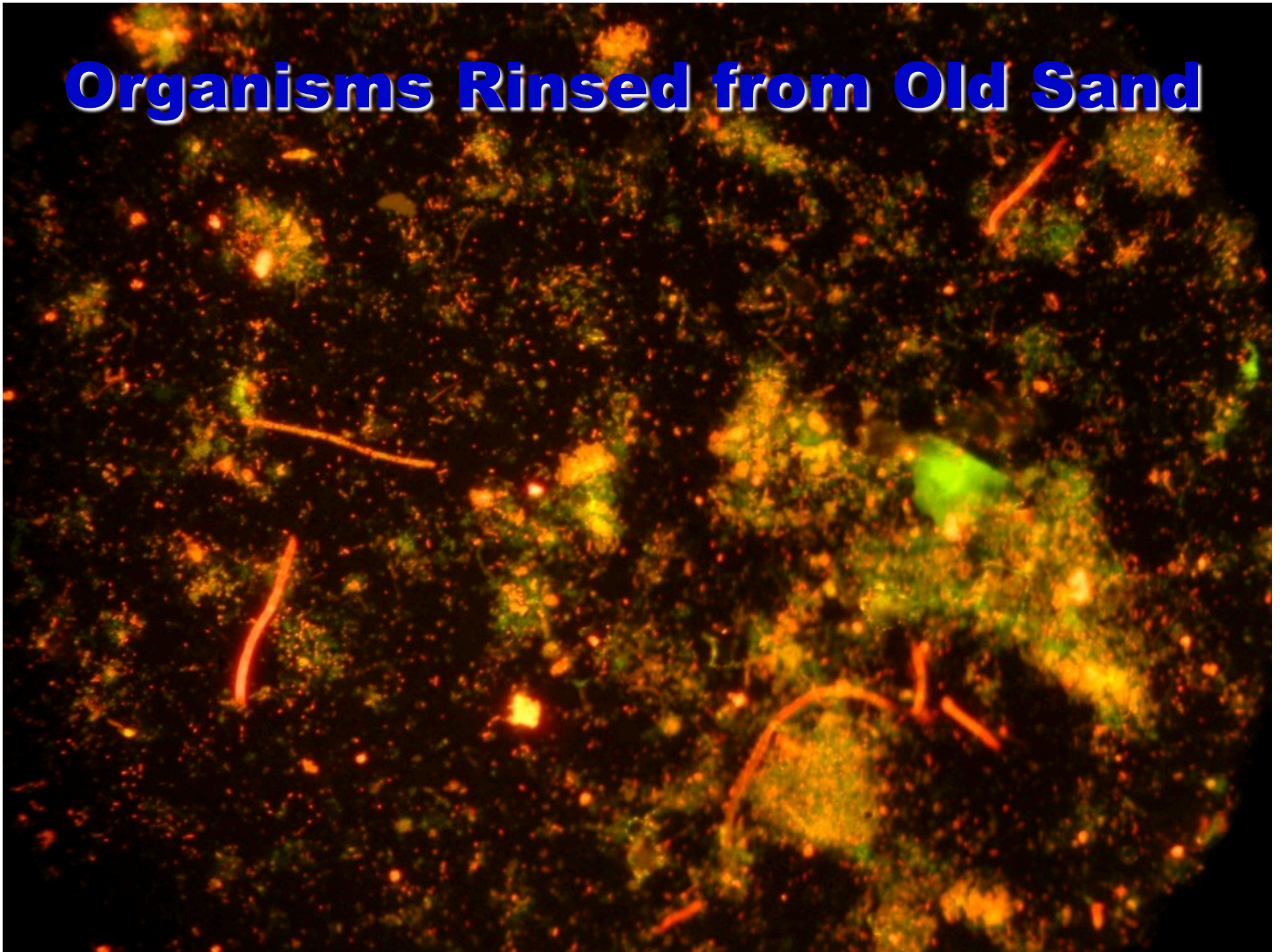


# Elution of Old Sand





# Organisms Rinsed from Old Sand





# GAC Grab Sample





# Chain of Custody





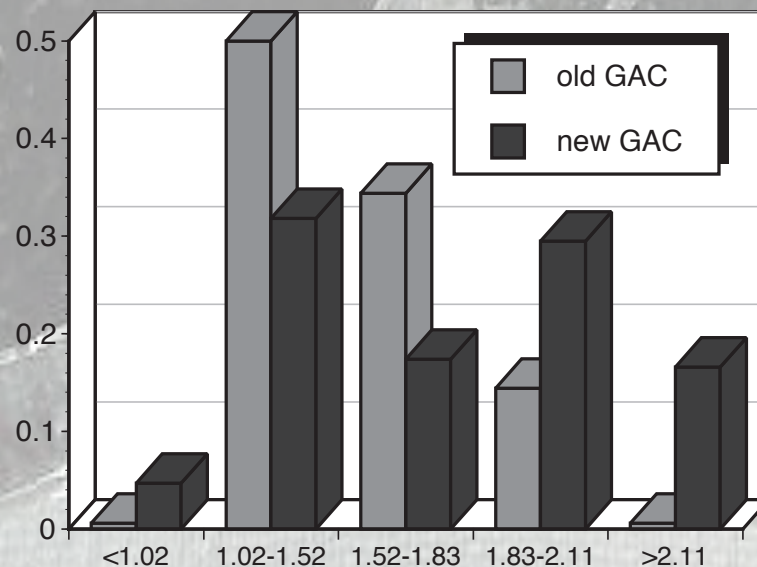
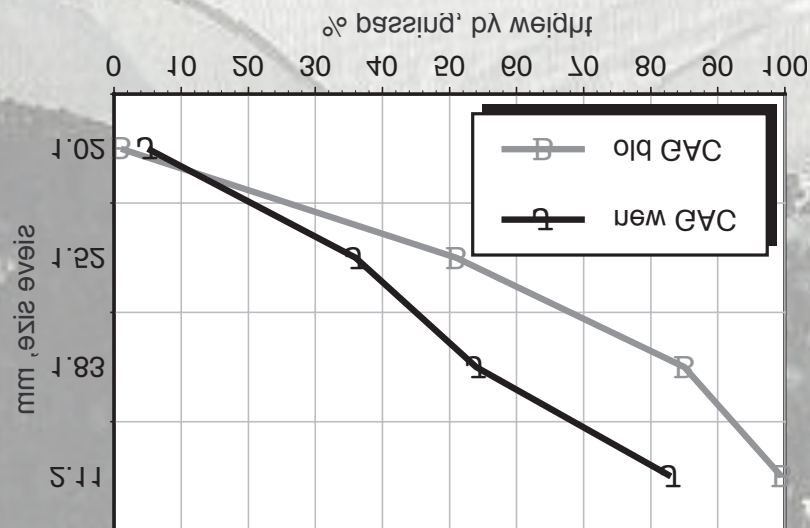
# New / Old Carbon





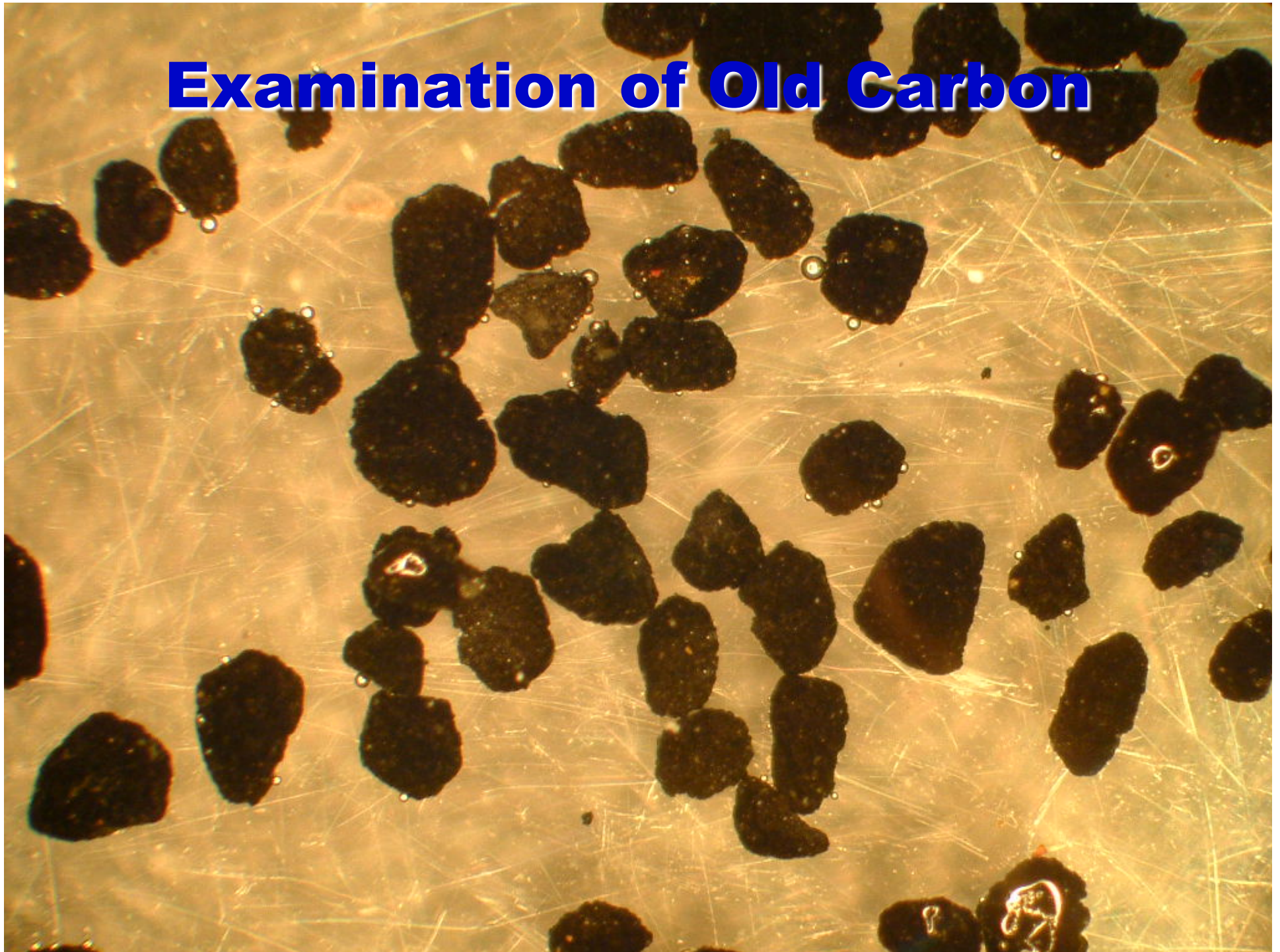
# New / Old Carbon

Old GAC has lost both 'fines' & larger particles



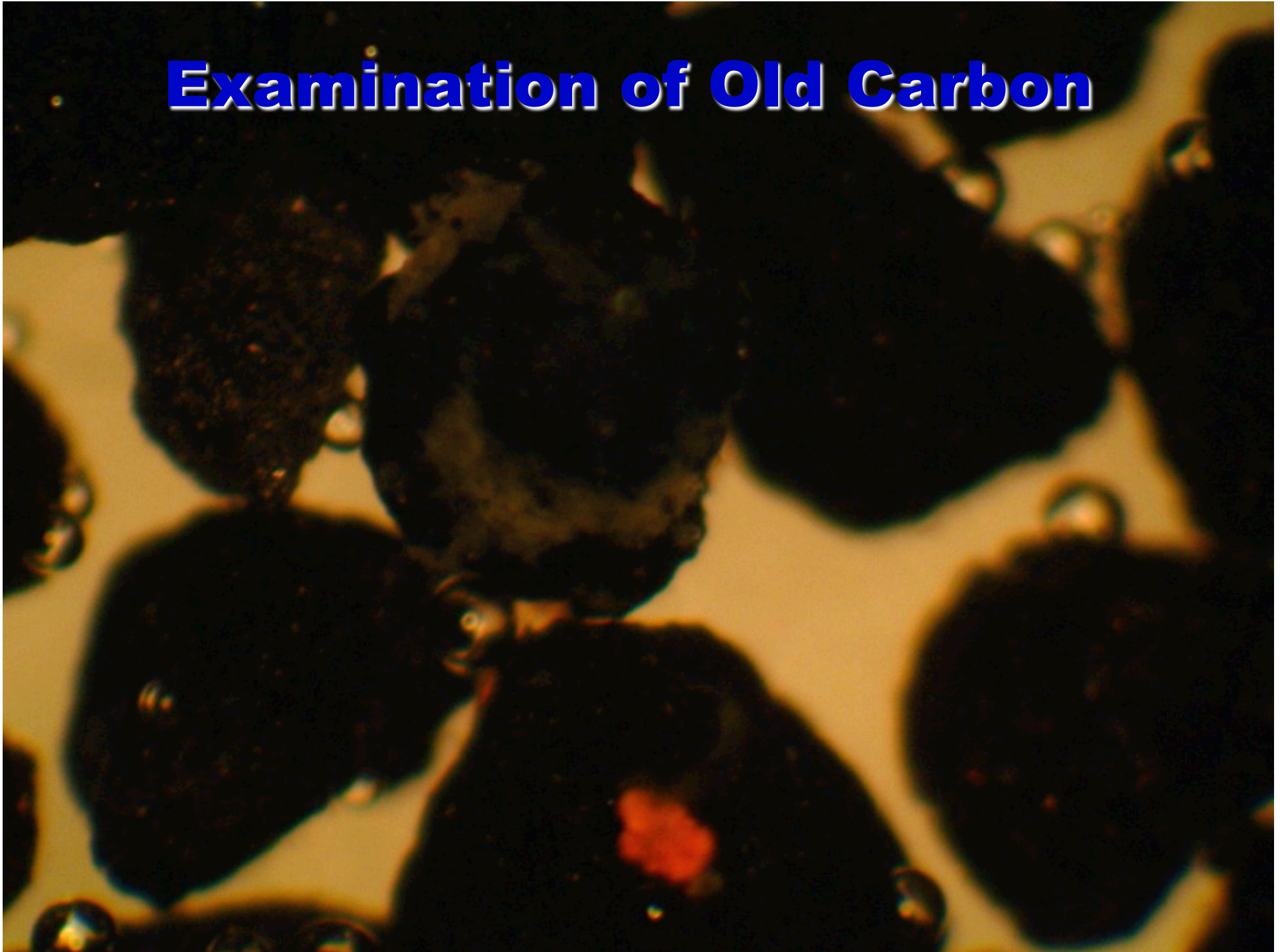


# Examination of Old Carbon



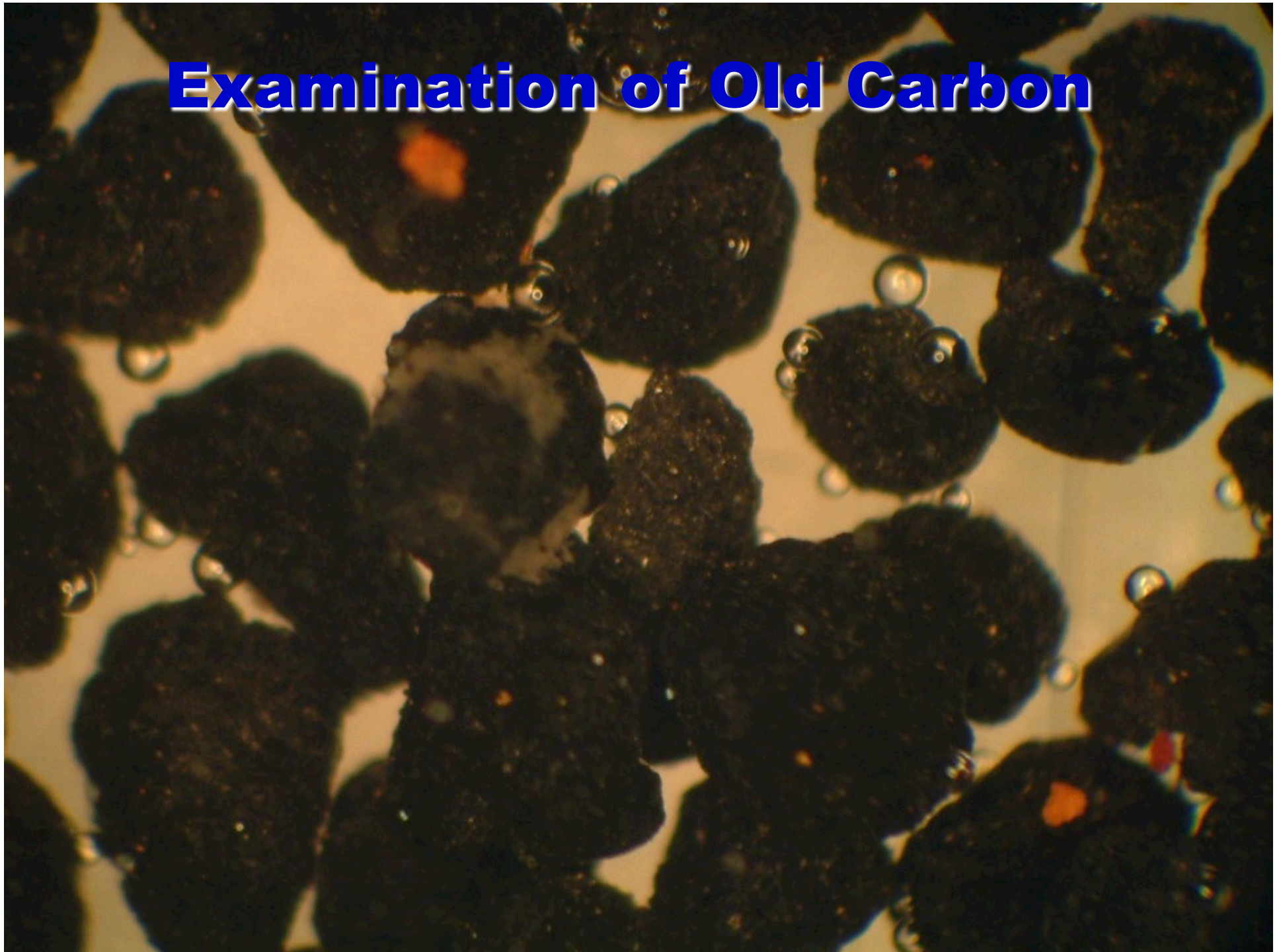


# Examination of Old Carbon





# Examination of Old Carbon





# **Examination of Old Carbon**

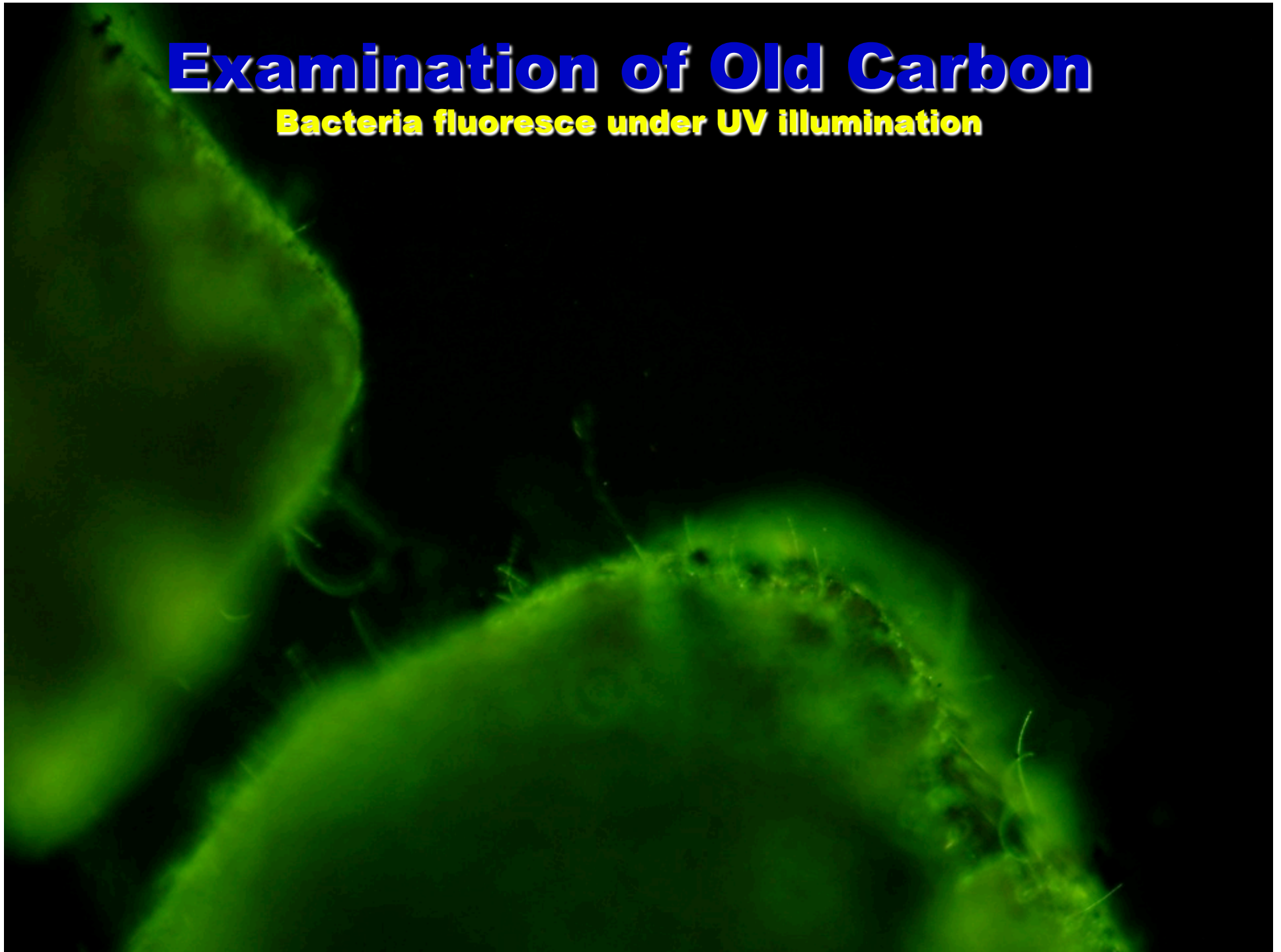
**Stalked, Epiphytic Bacteria extend from GAC surface**





# **Examination of Old Carbon**

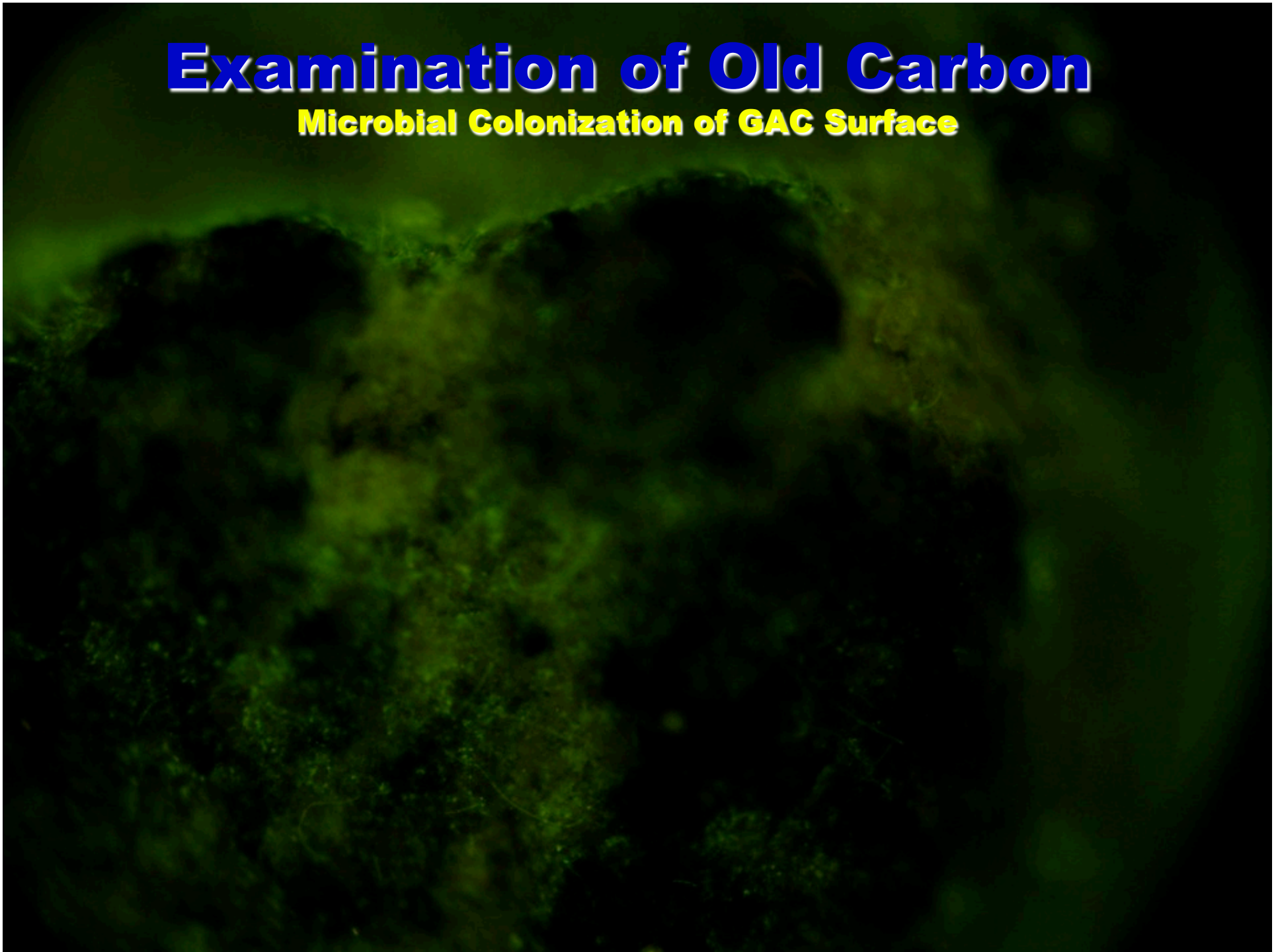
**Bacteria fluoresce under UV illumination**





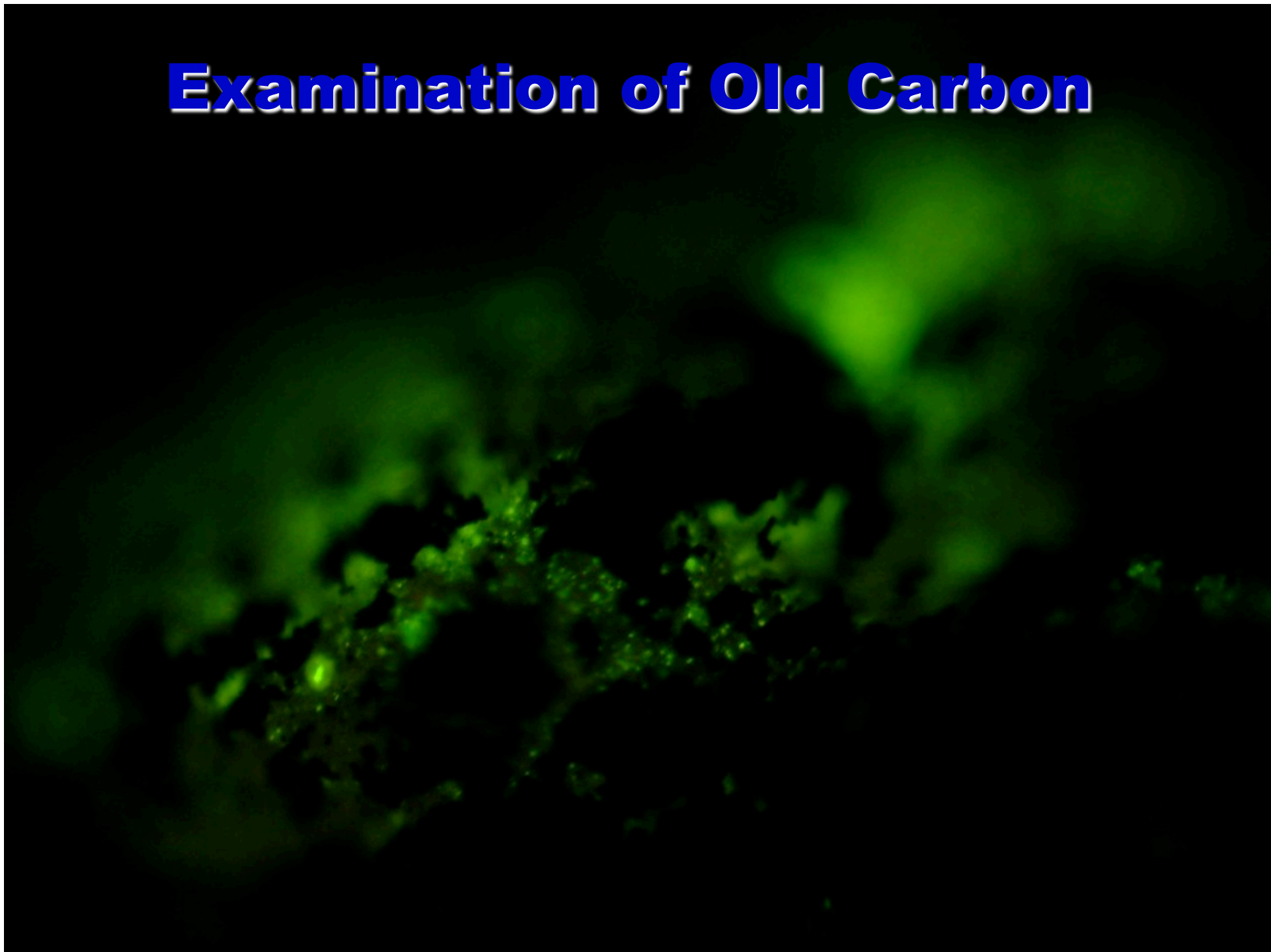
# **Examination of Old Carbon**

## **Microbial Colonization of GAC Surface**





# Examination of Old Carbon





# **Examination of Old Carbon**





# **Examination of Old Carbon**





# Replacing Lost Sand





# The Changing of the Carbon





tion after GAC/sand replacement

