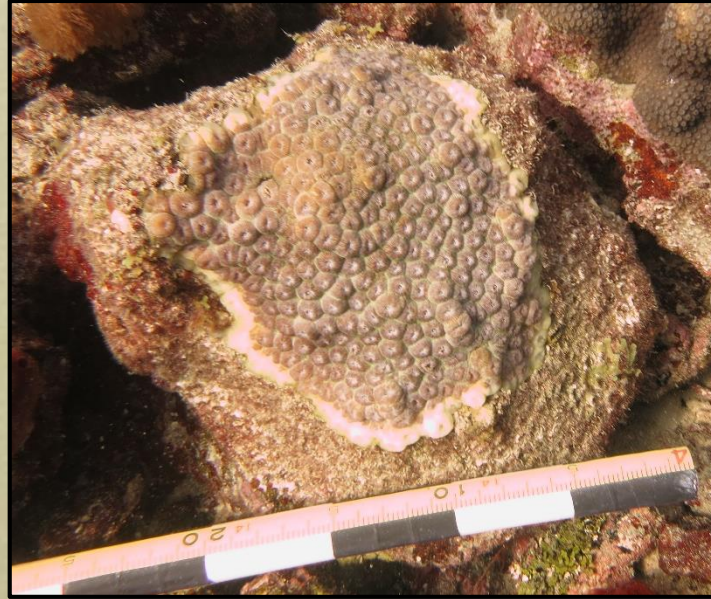


# MCAV disease lab analyses update



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Patrick Wilson, Noretta Perry, Yvonne Waters

Sample collection and field photos:  
Lindsay Huebner, Ananda Ellis, Vanessa Brinkhuis

In consultation with Thierry Work (USGS/NWHC) and  
Esther Peters (GMU)



# November 2016, Broward Co. MCAV#101 (HD sample)



Diseased sample (HD)



Post-fix

Surface



Zooxanthellae loss,  
vacuole coalescence,  
lesion necrosis

gastrovascular canal

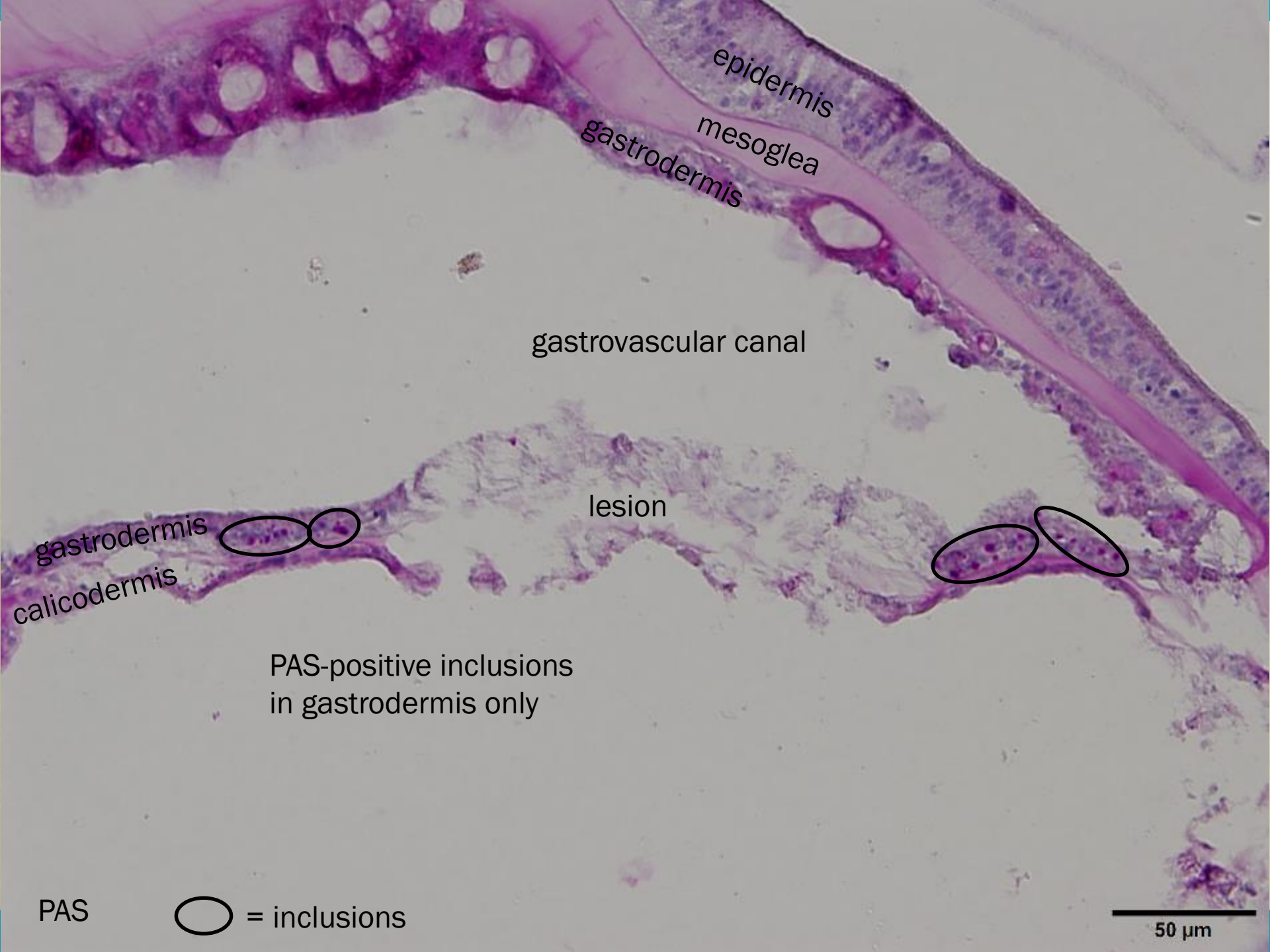
gastrovascular canal

○ = inclusions

Eosinophilic inclusions at edge  
of lesion and near vacuoles or  
mucocytes in the gastrodermis

50  $\mu$ m

H&E



epidermis

mesoglea

gastrodermis

gastrovascular canal

lesion

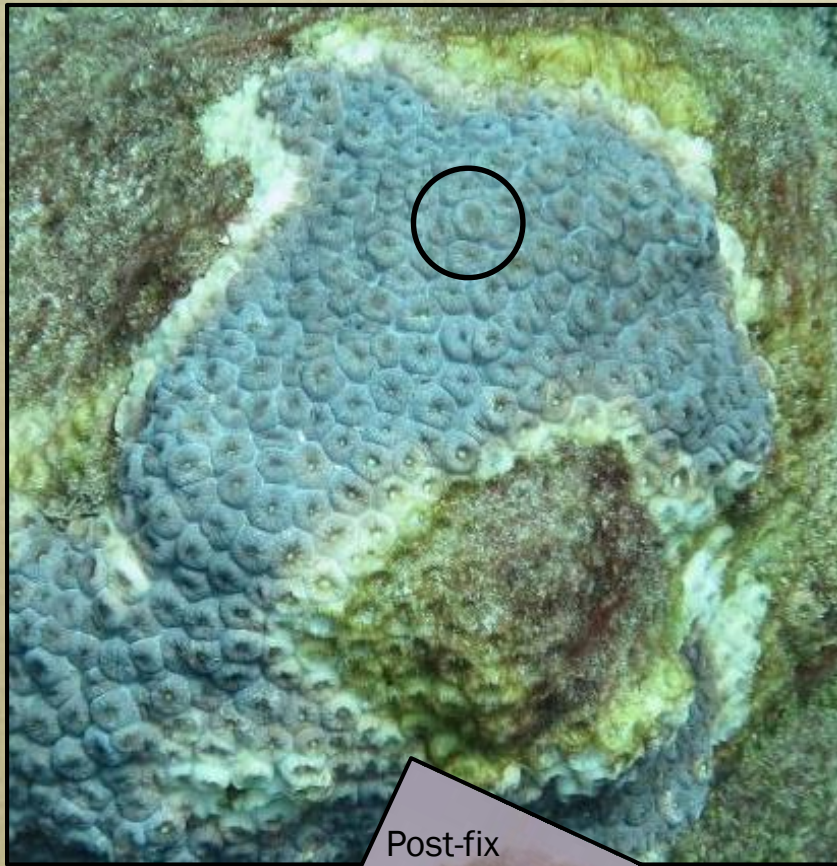
gastrodermis  
calicodermis

PAS-positive inclusions  
in gastrodermis only

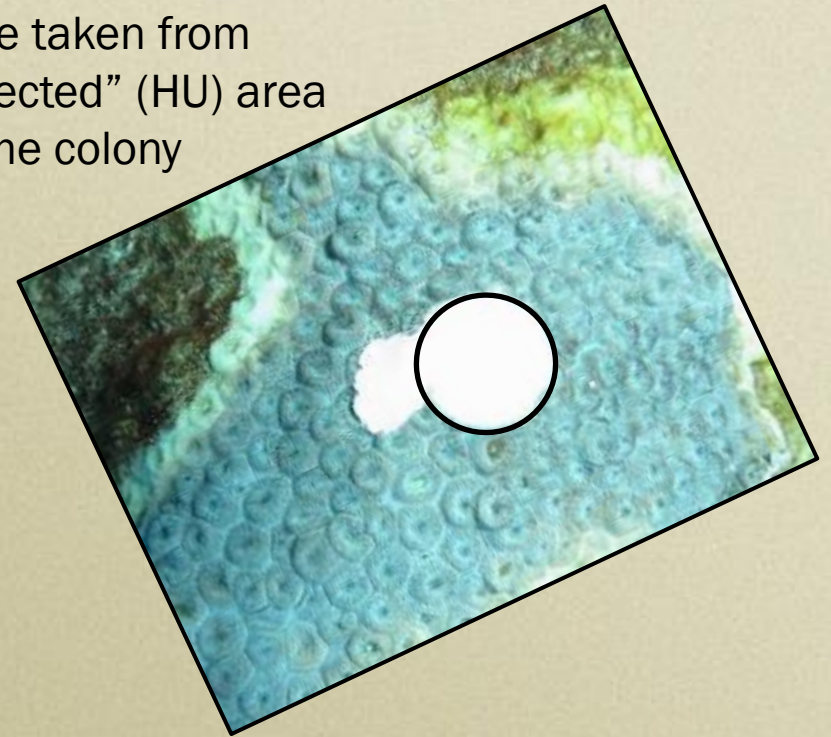
PAS ○ = inclusions

50 μm

# November 2016, Broward Co. MCAV#101 (HU sample)



Sample taken from  
“unaffected” (HU) area  
on same colony



Post-fix



inclusions in gastrodermis



PAS

10 μm



# November 2016, Broward Co. MCAV#108 (HD sample)



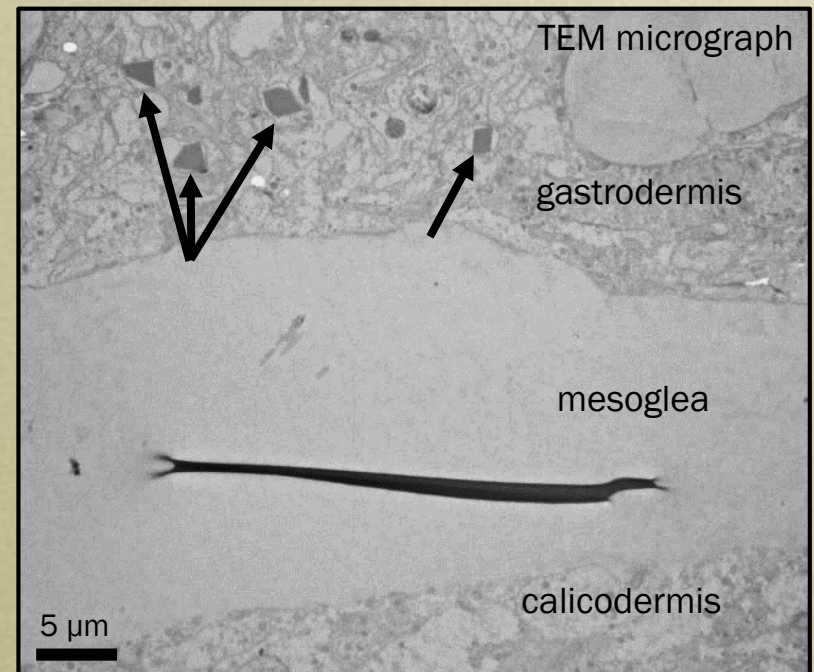
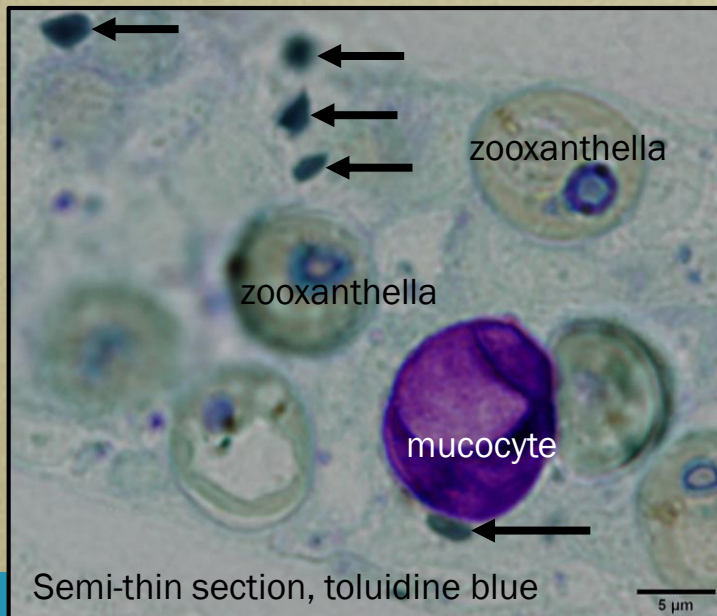
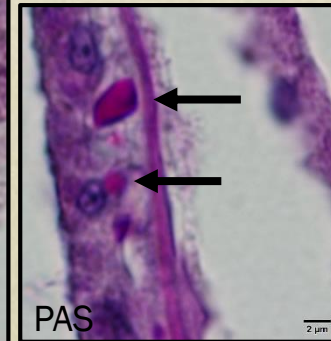
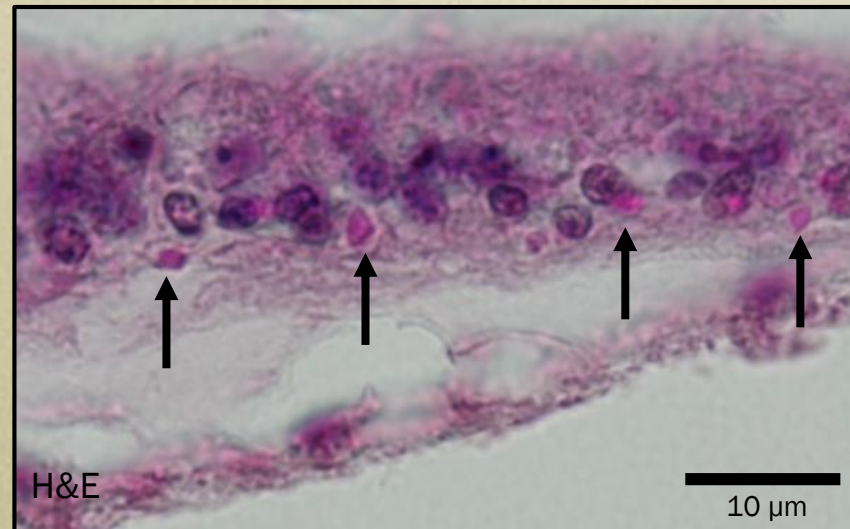
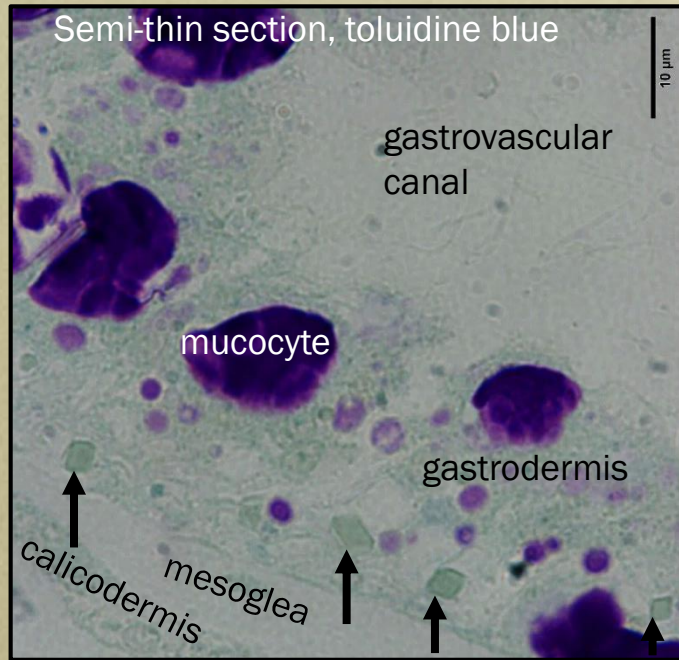
Post-fix



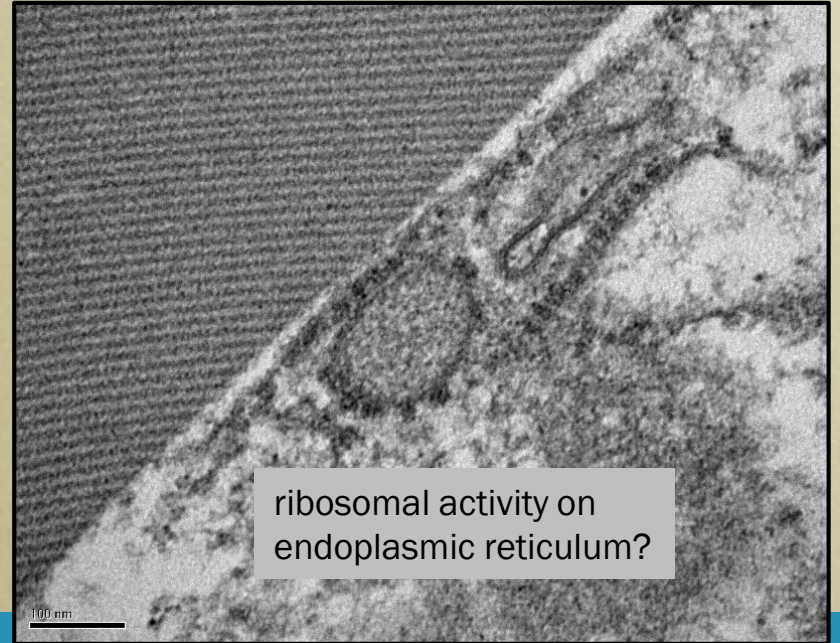
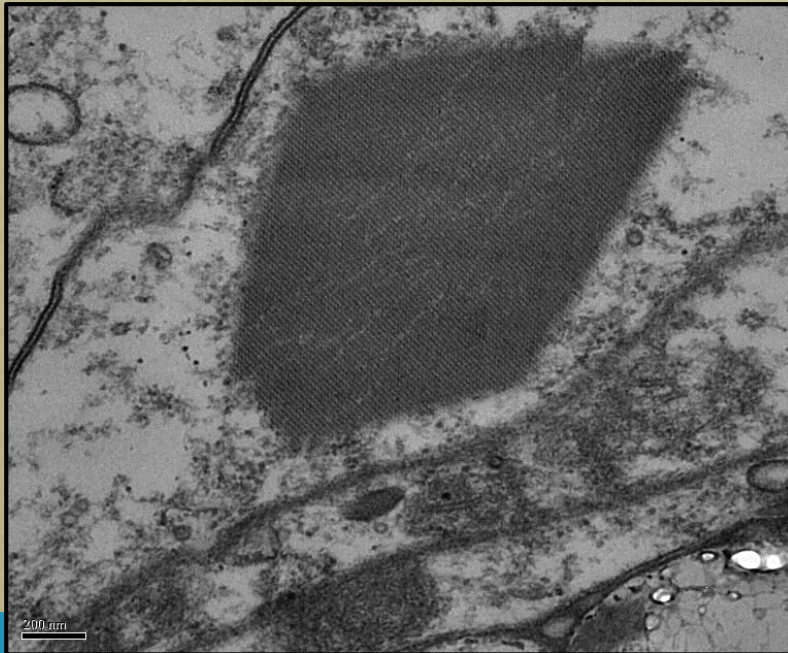
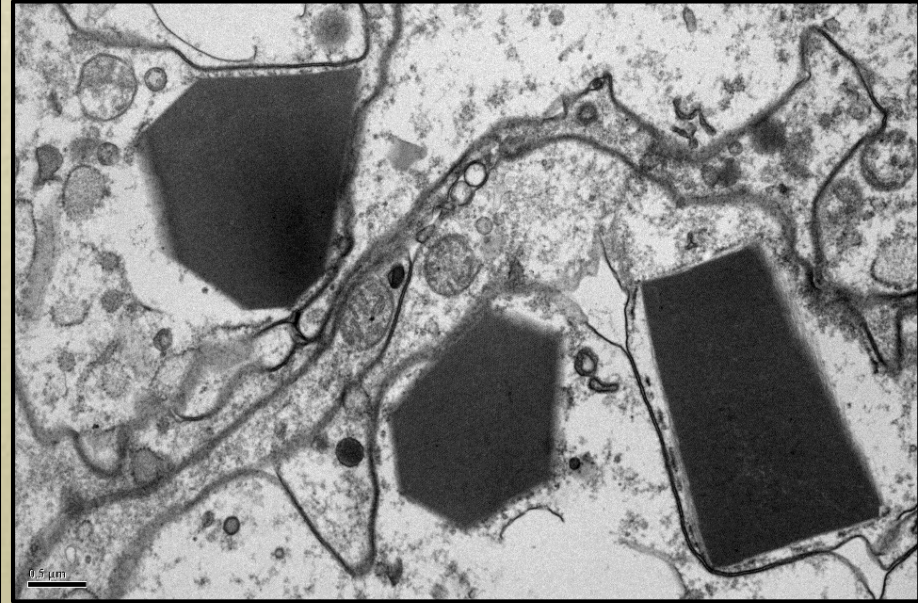
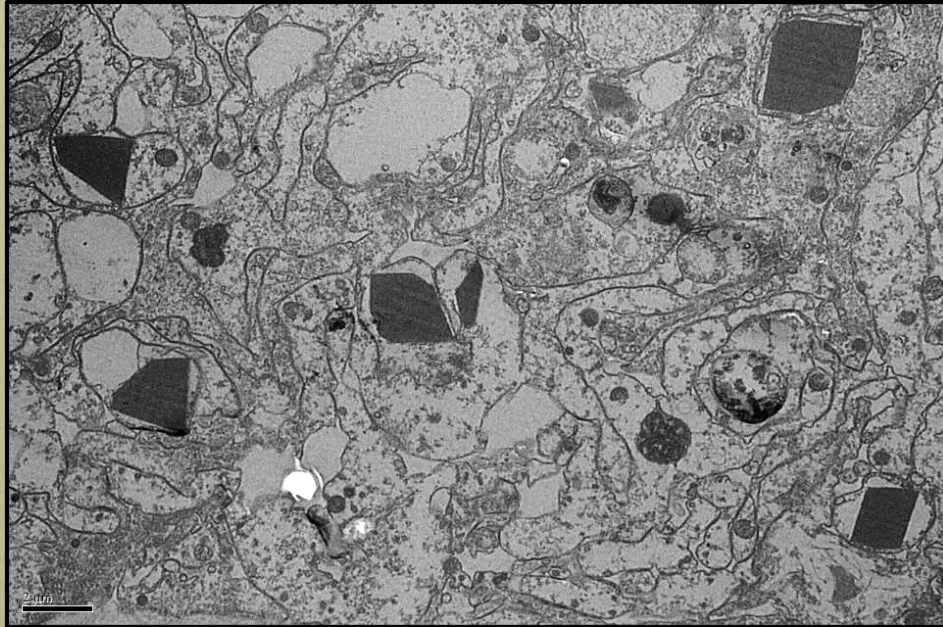
Post-fix



# Crystalline inclusion bodies (CIBs)

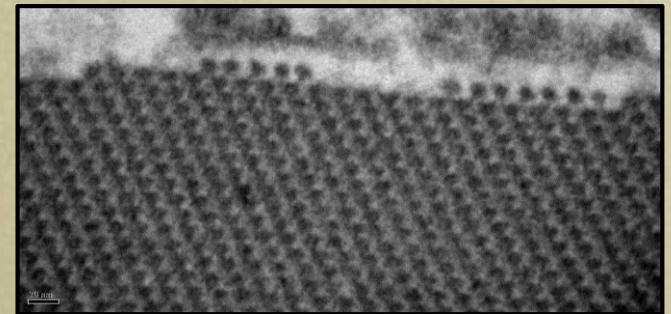
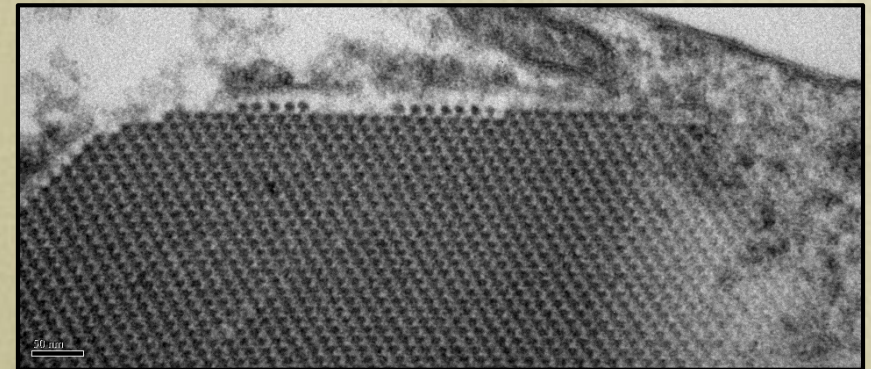
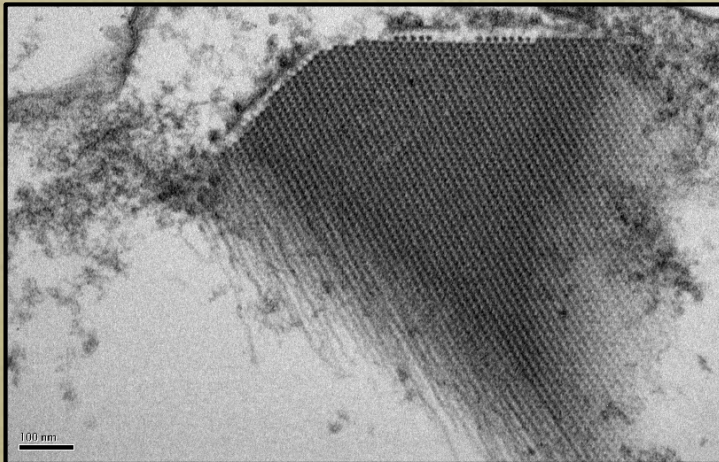
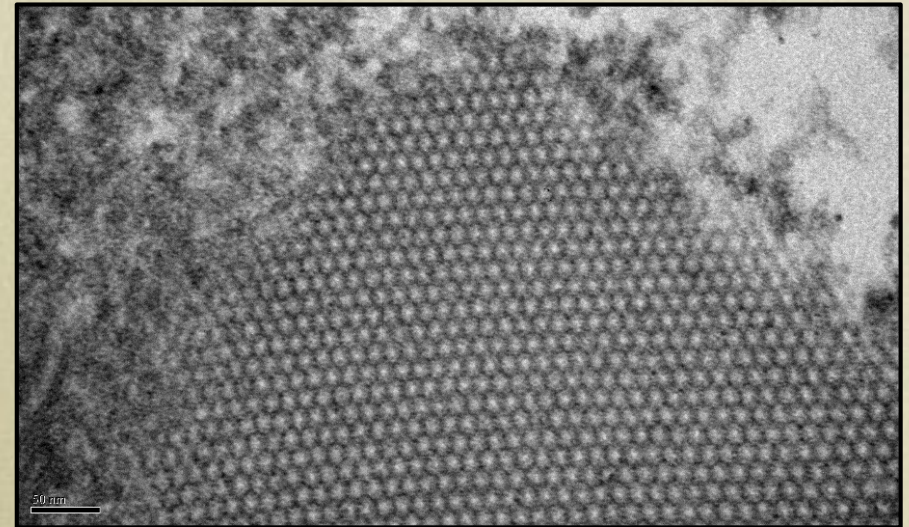
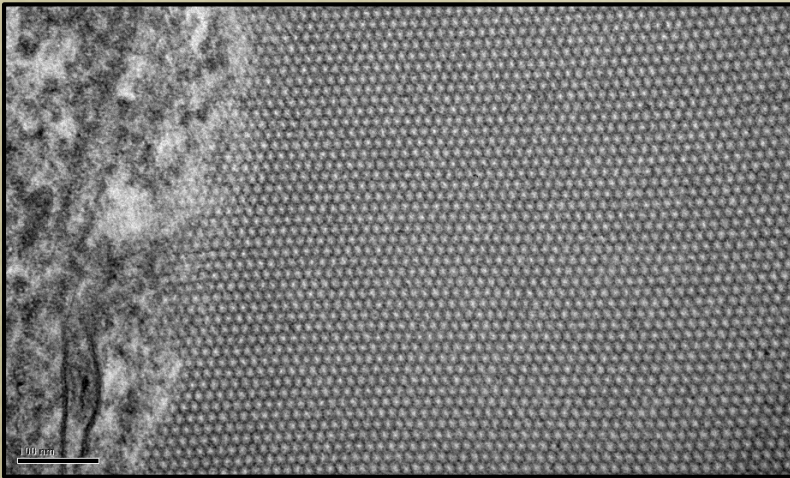


# CIBs, TEM (1)





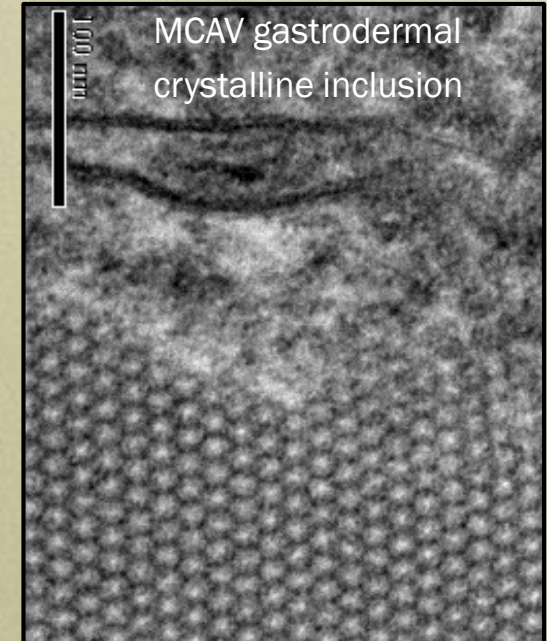
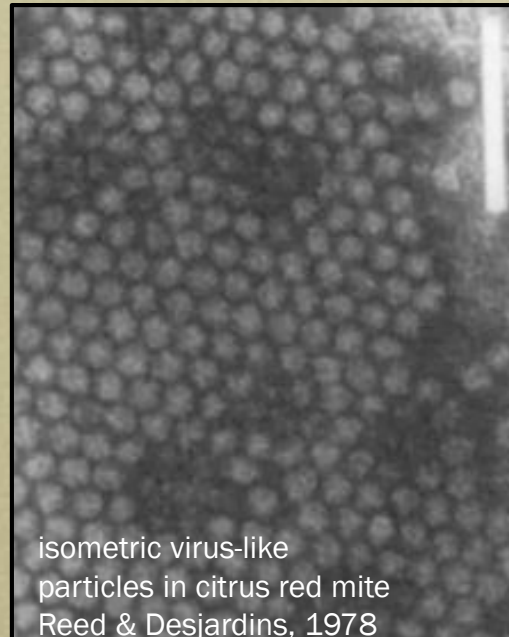
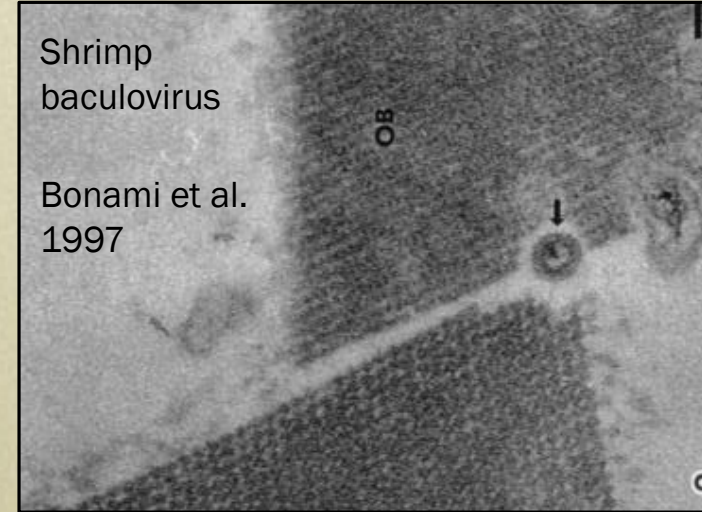
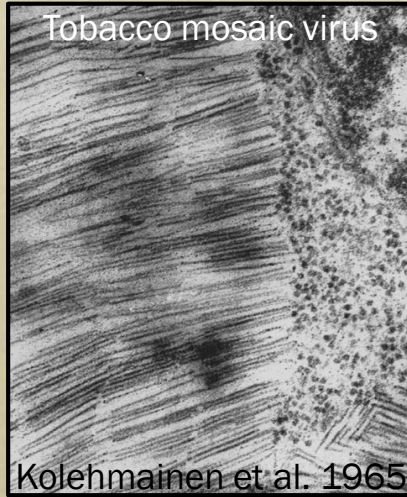
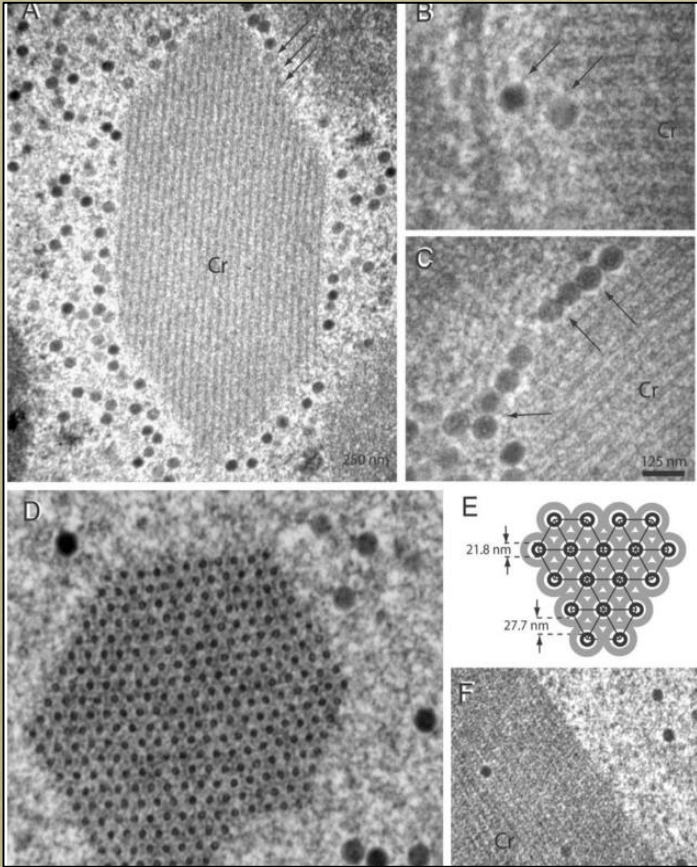
# CIBs, TEM (2)



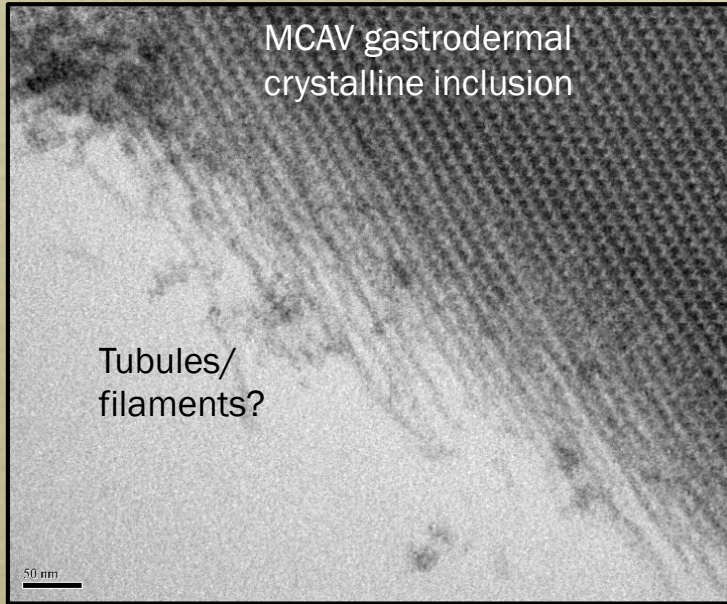
- rhomboid, diamond shape
- only intracytoplasmic
- not enclosed by obvious membranes
- not in vacuoles

# Virus?

Adenovirus Type 5, protein crystals  
Franqueville et al. 2008

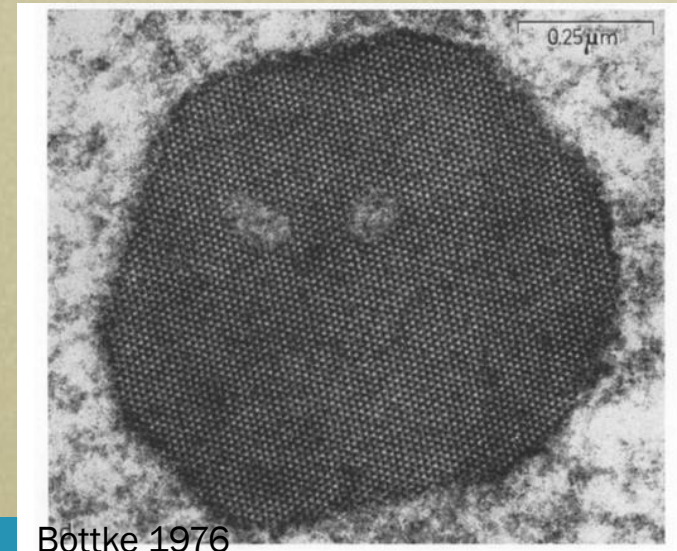
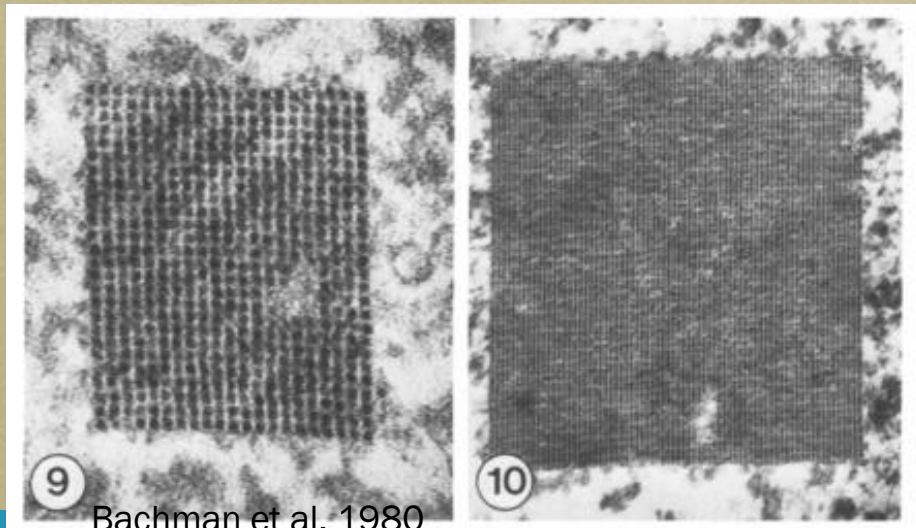


# Crystalline inorganics/organics?

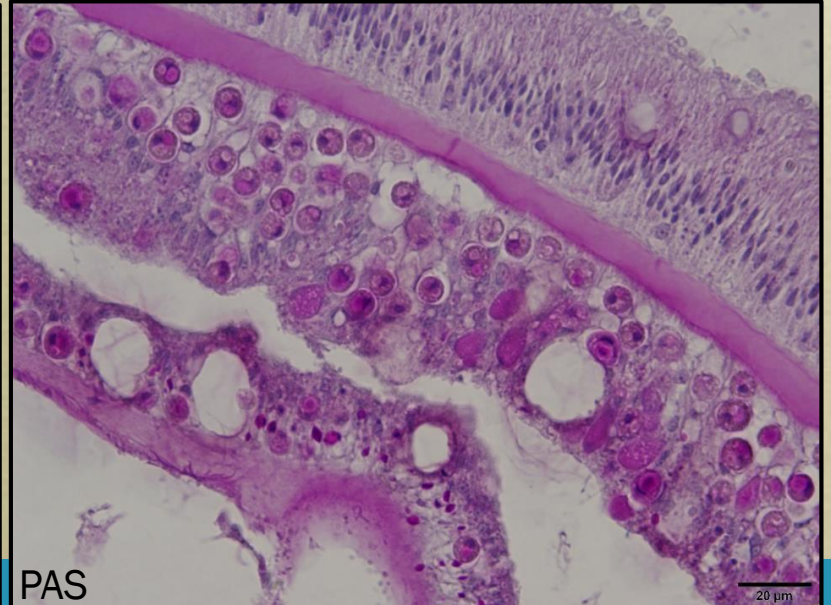
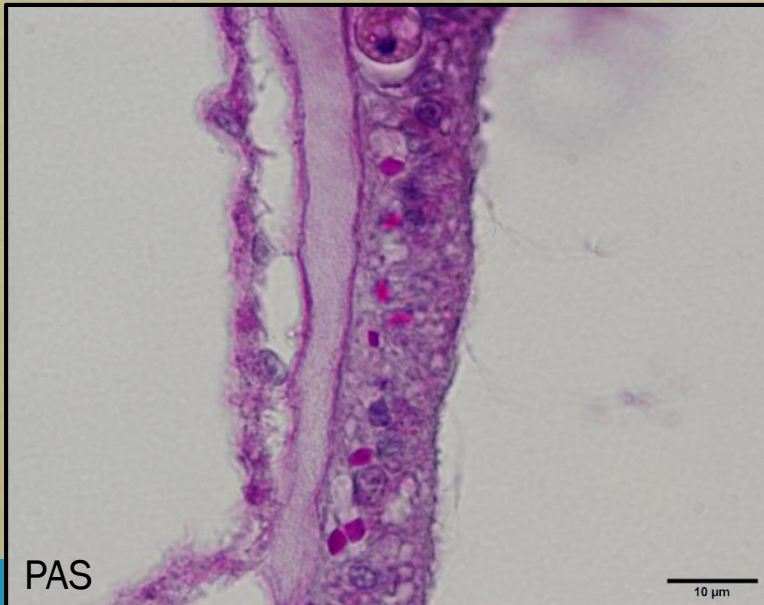
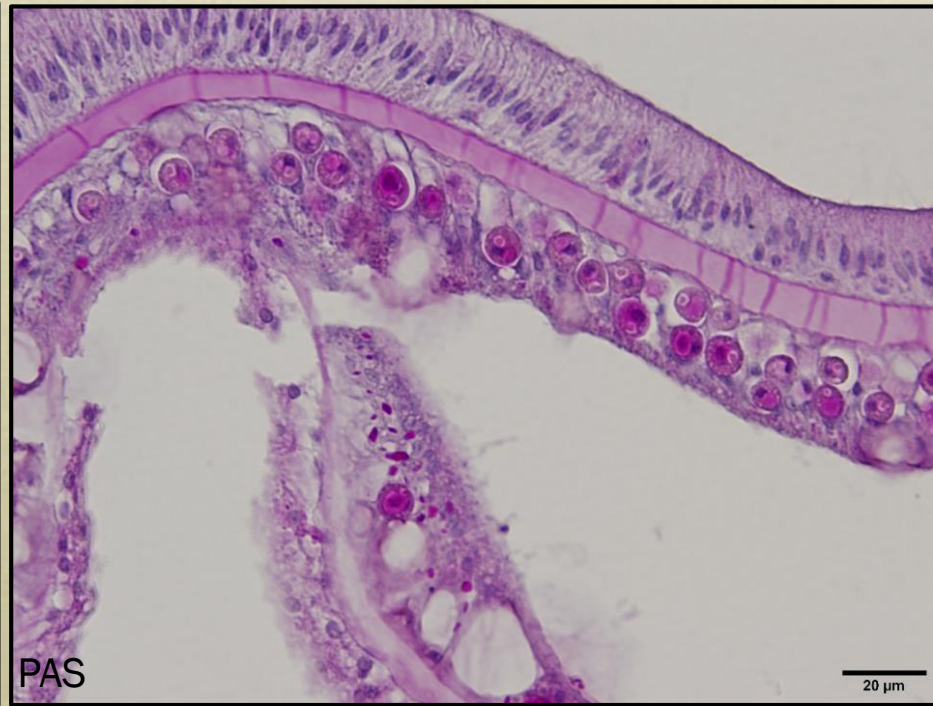


Intranuclear crystalloid inclusions in sea urchin phagocytes  
Iron and sulfur

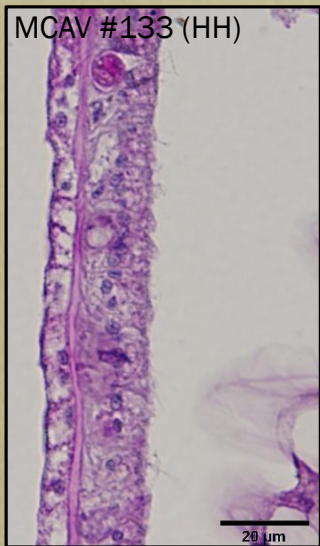
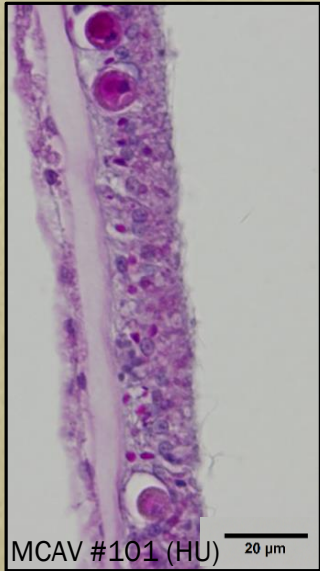
Paracrystalloid nuclear inclusion  
in pulmonate snail spermatocyte



# November 2016, Broward Co. MCAV#108 (HU sample)



# Summary: MCAV gastrodermal lesions/CIBs (Nov.2016)

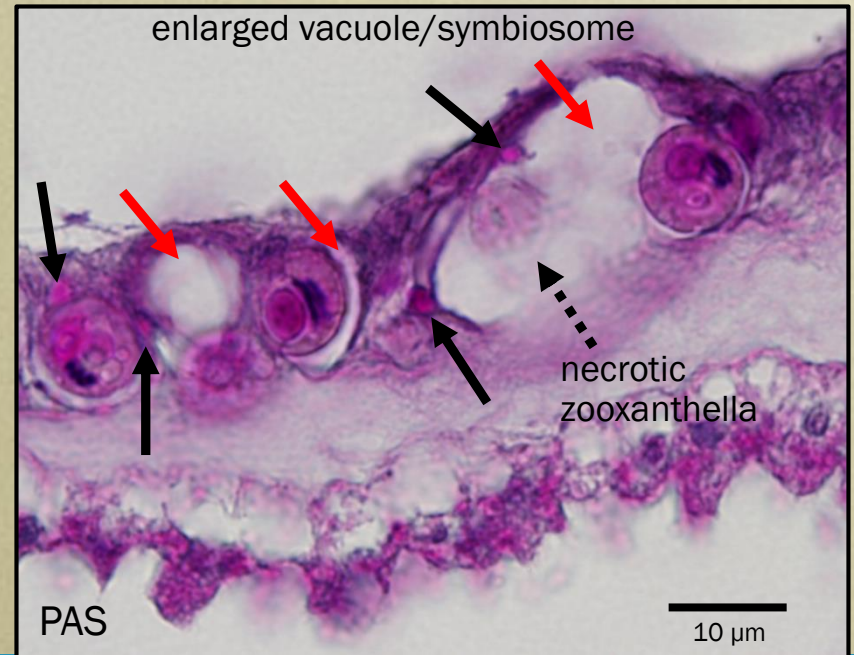
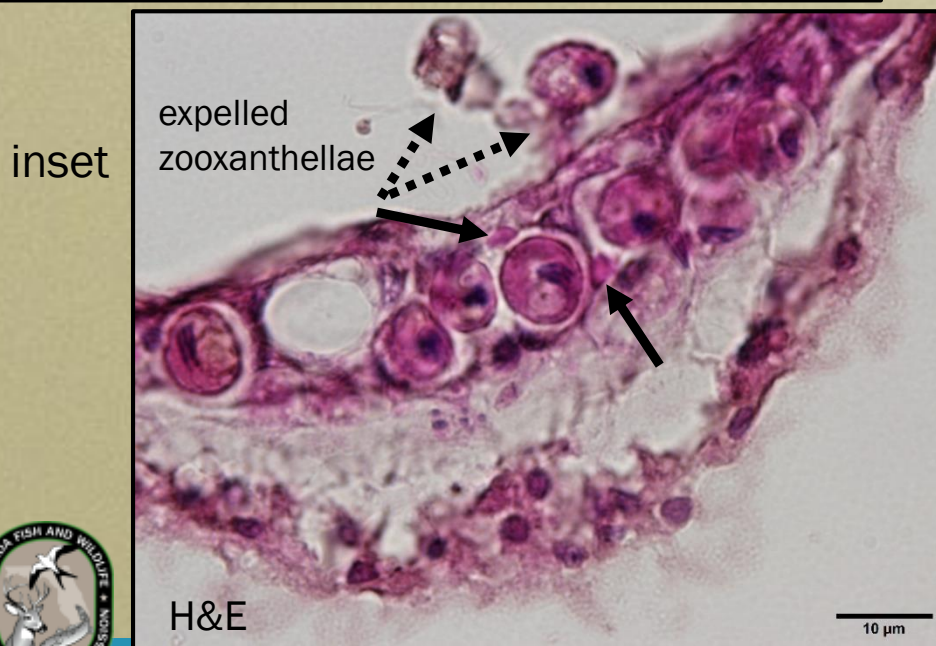
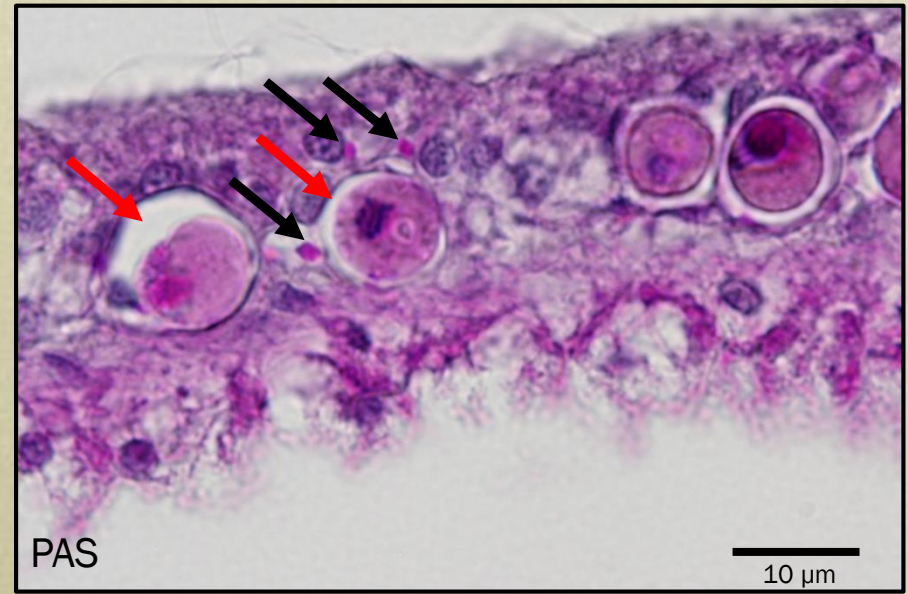
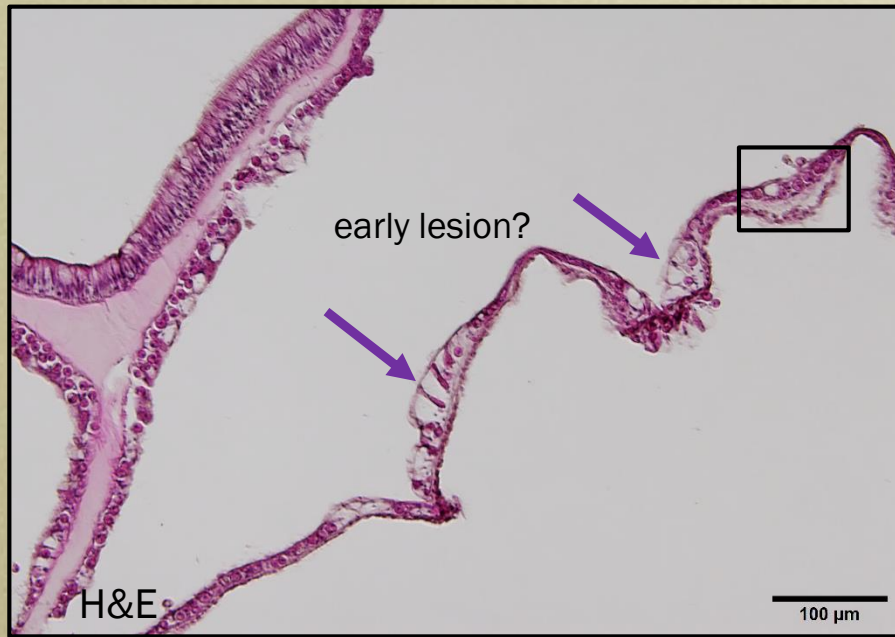


Specimen #	HD lesions	HD CIBs	HU lesions	HU CIBs	HH CIBs
MCAV101	necrosis	+++	vac**	+++	
MCAV102	necrosis	-	-	-	
MCAV103	?*	-	vac	-	
MCAV104	necrosis	-	-	+	
MCAV105	necrosis	+	-	-	
MCAV107	necrosis	+	vac	-	
MCAV108	necrosis	+++	necrosis, vac	+++	
MCAV109	necrosis	+	-	-	
MCAV110	necrosis	+++	-	+++	
MCAV114	necrosis	-	-	-	
MCAV131					-
MCAV132					-
MCAV133					-
MCAV134					-
MCAV135					-

\* Not enough tissue in section; \*\*vacuolation around zooxanthellae, HH = "healthy"



# "Healthy" reference sample, April 2017 (MCAV#233, Dustan Rocks)



# MCAV summary (1)

- disease different from “white plague”
- basal body wall (BBW), gastrodermal lesions often present  
w/o surface BW or epidermal lesions
- surface lesions more adv. stage of disease?
- ~liquefactive necrosis (~fast-acting)
- tissue digestion? (e.g. ?lytic bacteria/virus, toxin, metabolites)
- no obvious pathogens (multiple stains; n = 1 bacteria in TEM)
- CIBs in gastrodermis only (usually BBW > surface, near lesions),  
and in “unaffected” areas
- CIBs not seen in all specimens



# MCAV summary (2)

- are the CIBs:
  - ? virus
  - ? inorganic/organic crystals
  - ? metabolic by-product of coral or zooxanthellae or X
  - ? pathological/physiological response
  - ? contributing to lesion formation
  - ? normal
- how is zooxanthellae health being compromised?

