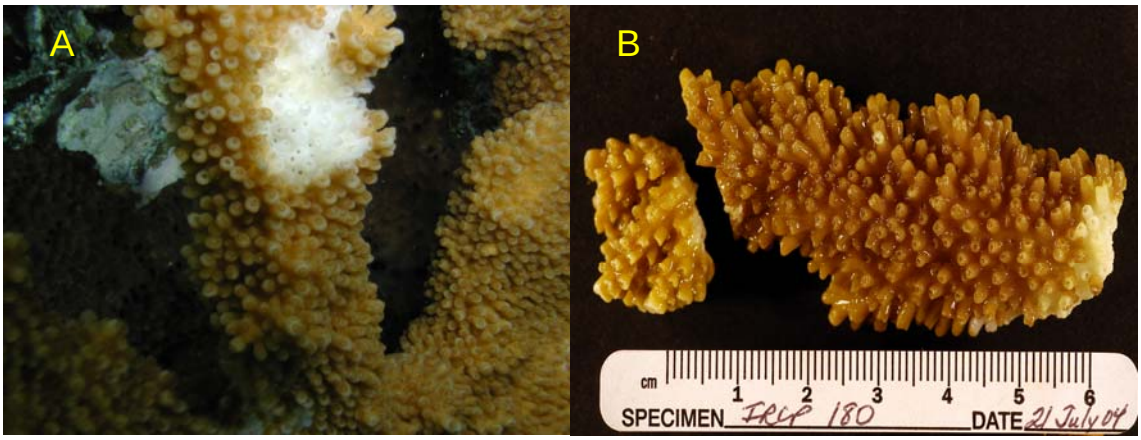
CONSENSUS HISTOPATHOLOGY DESCRIPTIONS FOR SELECTED CORAL LESIONS

Slide 1

Signalment/History: *Acropora palmata* (IRCP 180-A2) collected from Lameshur Bay, US Virgin Islands on 15 July 2004 by Lou Sileo, Thierry Work and Caroline Rogers.

Field Diagnosis: Presumed White Patch



Figures 5 A & B. White patch lesions on *Acropora palmata*: **A-** field photo (Thierry Work); **B-** fixed specimen (Kathy Price).

Histopathology Description (Fig. 6):

Coenenchyme: Viable tissue terminates abruptly and is characterized by full thickness tissue loss. A narrow edge of necrotic tissue precedes the termination (Fig. 6B, ↑). There is focal ulceration of the surface body wall characterized by ablation of epidermis and mesoglea and dissociation of gastrodermal cells with liberation of zooxanthellae some of which exhibit vacuolization of the cytoplasm. These vacuolated zooxanthellae are found within gastrovascular canals and are admixed with necrotic debris in the superficial peristome. There is multifocal to focally extensive vacuolization of gastrodermis which was more severe within the deep region. The epidermis is focally sloughed and vacuolated. No bacterial aggregates are seen. Aborally, there are scattered areas of necrotic gastrodermis occasionally associated with hyalinized mesoglea.

Polyp: Within ova there is central clumping of eosinophilic granules (yolk); vacuolization of surrounding wall (Fig. 6C, ↑); presence of multiple round structures with basophilic stippling surrounded by a vacuole. Occasional filamentous structures infiltrate gastrodermis; there is no associated necrosis. Cnidoglandular bands are necrotic and characterized by pyknosis and dissociation

of gastrodermal cells, of many proximal mesenteric filaments. Occasional spermaries are noted.

Skeleton: Well within the portion denuded of tissue, there are abundant mixed populations/mats of endolithic organisms.

Other, mucus: There are scattered clumps of eosinophilic debris and spirocysts (Fig. 6A, ↑).

Morphologic Diagnosis: None

Recommendations:

- Gram stains for bacteria
- GMS for fungi
- Giemsa for suspect organisms in the tissues surrounding ova.
- Trichrome or Aniline Blue for hyalinized mesoglea.

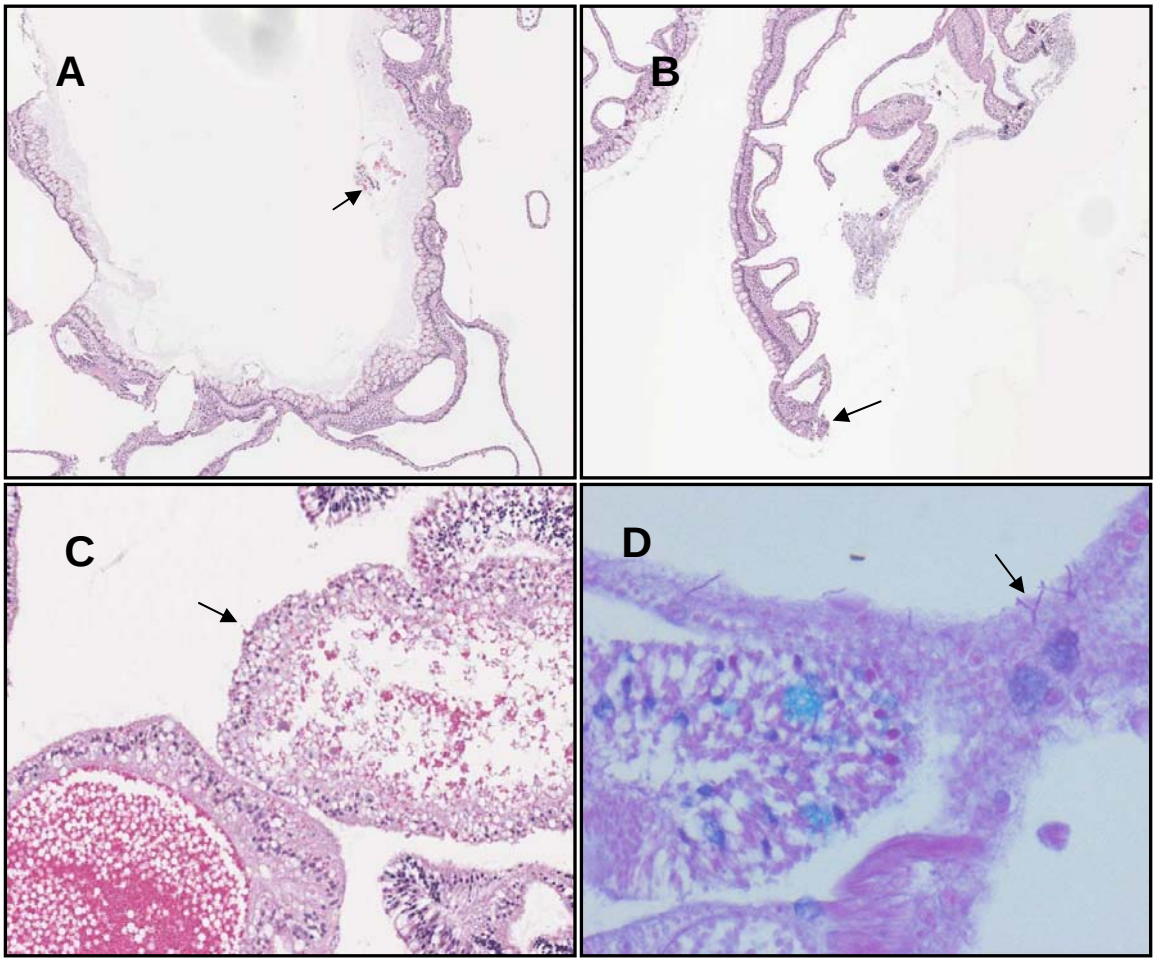
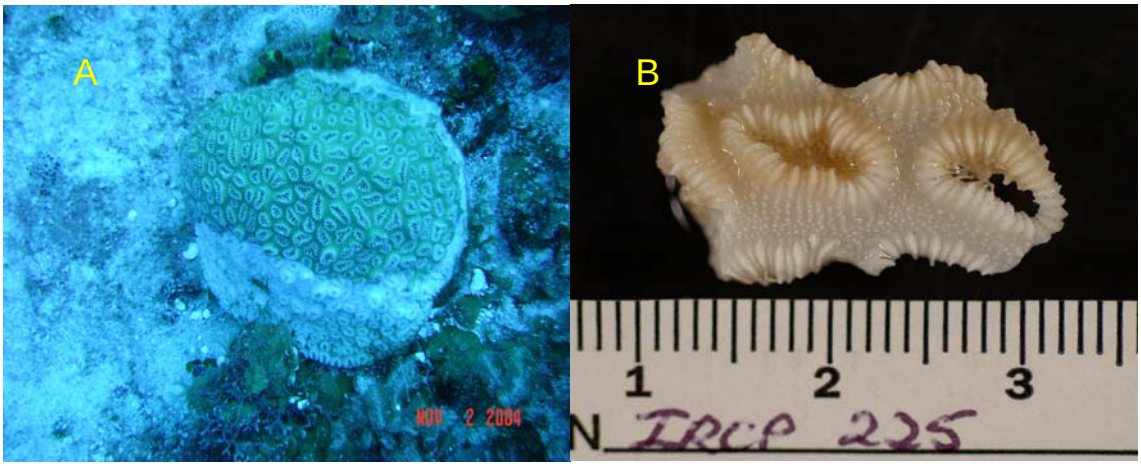


Figure 6 A-D. Photomicrographs of diseased *Acropora palmata* tissue fixed in seawater:Z-Fix[5] and stained with MHE[6] (A, B, C) and PAS/AB[7] (D): **A-** 4x[8], surface body wall showing eosinophilic debris and spirocysts in mucus layer (↑); **B-** 2x, surface body wall showing necrotic tissue preceding the termination (↑); **C-** 20x, showing ovum vacuolization of surrounding wall (↑); **D-** note fungal hyphae invading gastrodermis of basal body wall (↑).

Slide 2

Signalment/History: *Dichocoenia stokesii* (IRCP 225) collected from Navassa Island, US National Wildlife Refuge, on November 2004.

Field Diagnosis: Presumed white plague.



Figures 7 A & B. White plague lesion on *Dichocenis stokesii*: **A-** field photo (Dana Williams); **B-** fixed specimen (Molly Billmyre).

Histopathology Description (Fig. 8):

Coenenchyme: Diffusely, in surface body wall, there are few zooxanthellae. Surface body wall diminishes progressively. There is abrupt termination of the epidermis and gradual diminution of the basal body wall.

Polyp: Near the edge of the section, there is full thickness ablation of the surface body wall revealing underlying mesenteric filaments with necrotic gastrodermis characterized by dissociation of cells (Fig. 8A&B, ↑). Moderate numbers of coccidian oocysts are within lobes of mesenterial filaments (Fig. 8C, ↑). The apposition of these 2 layers at the edge of a lesion is indicative of the first stages of tissue repair (Fig. 8D, ↑).

Skeleton: No remarkable lesions seen.

Morphologic Diagnosis:

- Severe, focal, ablation associated with gastrodermal necrosis, surface body wall, and polyp.

Recommendations:

- Conduct further characterization to investigate and better understand the process of tissue repair in corals.
- Conduct laser capture of the coccidian oocysts within the lobes of the mesenterial filaments in order to further identify.

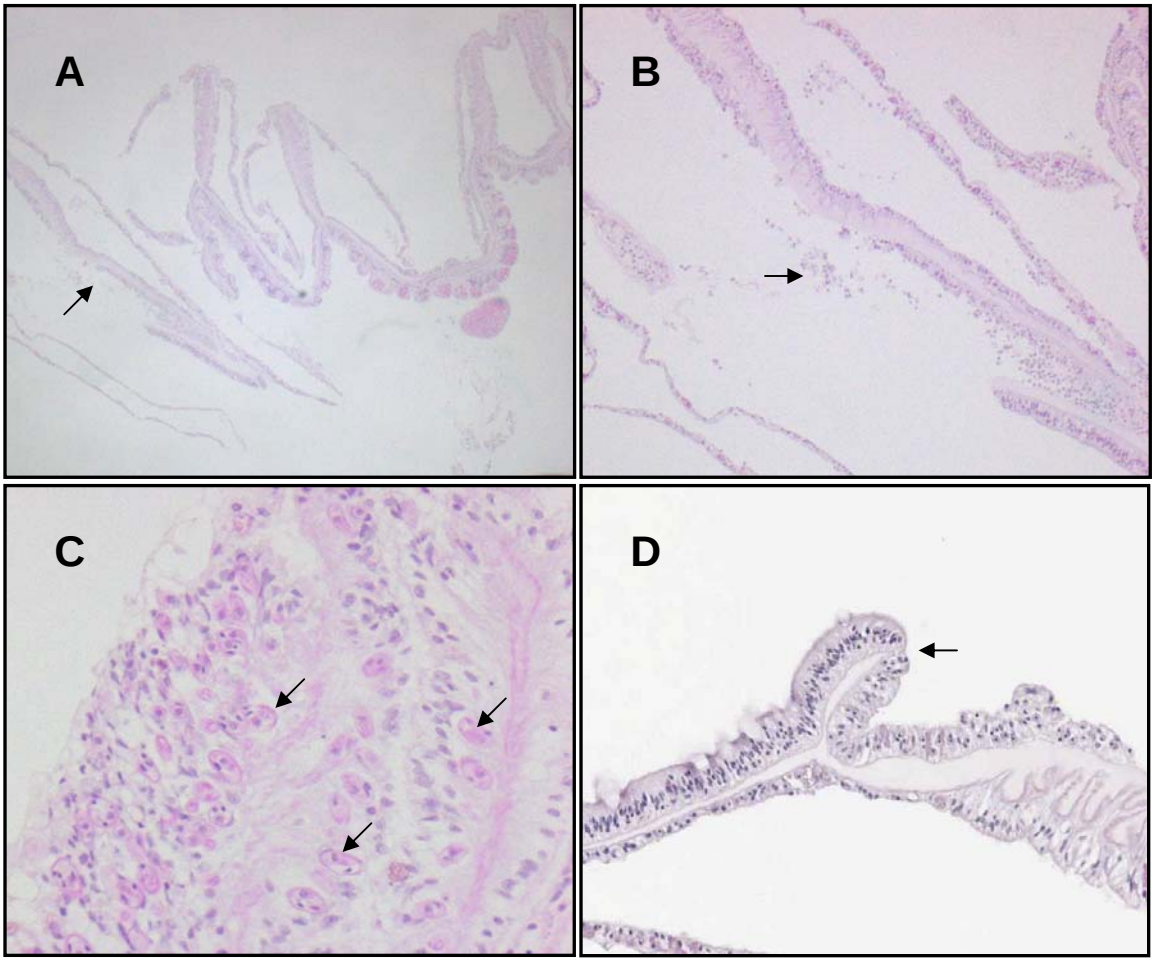


Figure 8 A-D. Photomicrographs of diseased *Dichocoenia stokesii* tissue fixed in seawater:Z-Fix and stained with MHE: **A-** 4x, necrotic gastrodermis (↑); **B-** 20x enlargement of **A** showing necrotic gastrodermis (↑); **C-** 40x, Coccidia in mesenterial filaments (↑); **D-** apposed epidermis and gastrodermis (↑).

[5] Anatech Ltd., Battle Creek Michigan.
[6] MHE = Mayer's Hematoxylin and Eosin (AFIP).
[7] PAS/AB = Periodic Acid Schiff/Alcian Blue (AFIP)
[8] All magnifications provided for photomicrographs reflect the objective used, not that the image is magnified that many times

Slide 3

Signalment/History: *Acropora palmata* (IRCP 206-3B) collected from Mona Island, Puerto Rico on 13 July 2004 by Andy Bruckner.

Field Diagnosis: Presumed white band disease.

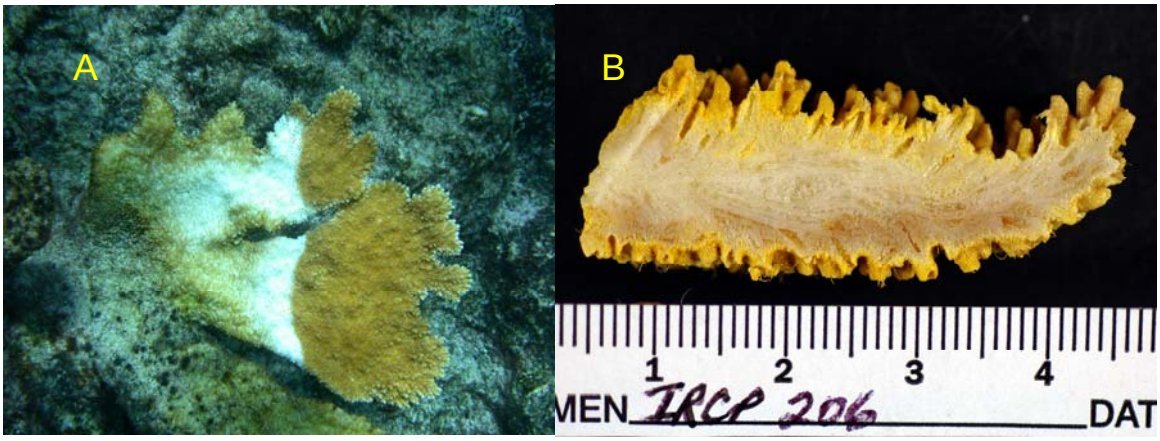


Figure 9 A & B. Presumed white band disease observed on *Acropora palmata*: **A-** field photo (Andy Bruckner); **B-** fixed specimen (Kathy Price).

Histopathology Description (Fig. 10):

Coenenchyme/Polyp: There are numerous nematodes (Fig. 10B) mixed with debris and fragments of laminar eosinophilic material (hyalinized mesoglea). Cellular debris with intact nuclei (2-3 µm) is present in the intestine of the nematodes. Surface body wall is dissociated and there is multi-focal loss of epidermis. Zooxanthellae appear pale and vacuolated. There is multifocal necrosis of gastrodermis characterized by cytoplasmic fragmentation, pyknosis, karyorrhexis and liberation of zooxanthellae with swelling of mesoglea (Fig. 10A, ↑). Accumulations of cellular debris are present in the lumen of the gastrovascular canals.

Polyp: Epidermal nematocysts are infrequent. There is segmental loss of mesoglea.

Skeleton: No remarkable lesions are seen.

Morphological Diagnosis:

- Mild multifocal necrosis in the gastrodermis of the coenenchyme and polyps.

Recommendation: Obtain larger section of coral tissue for examination.

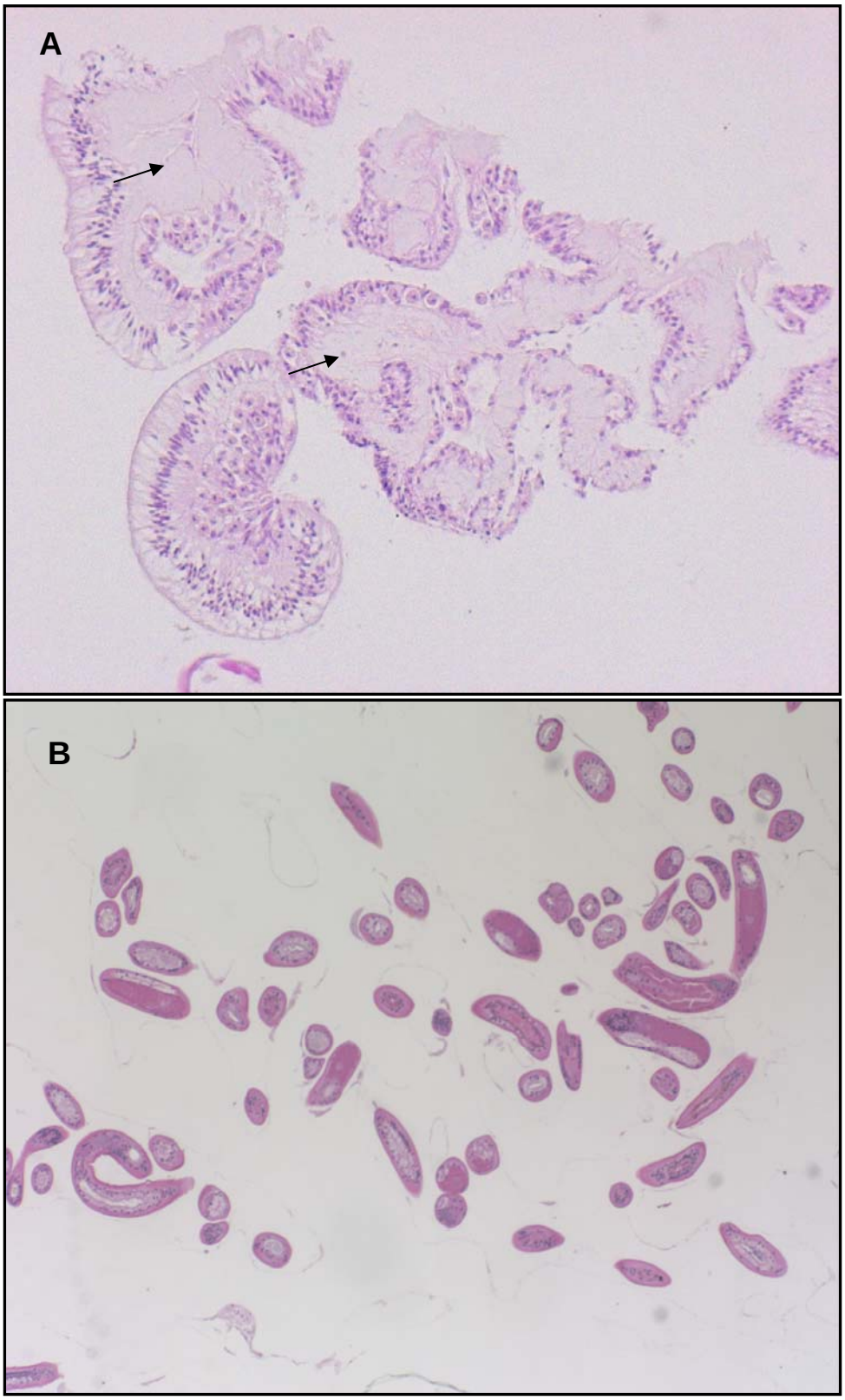


Figure 10. A. Photomicrograph of diseased *Acropora palmata* tissue fixed in Helly's and stained with MHE: 4x, note swelling of mesoglea (↑); **B.** Nematodes in *A. palmata* tissue; undetermined whether they are scavenging or are involved in the pathology.

Slide 4

Signalment/History: *Acropora prolifera* (IRCP 110) collected from Dry Tortugas, Florida on 23 July 2003 by Dana Williams and Margaret Miller.

Field Diagnosis: Presumed white band disease.

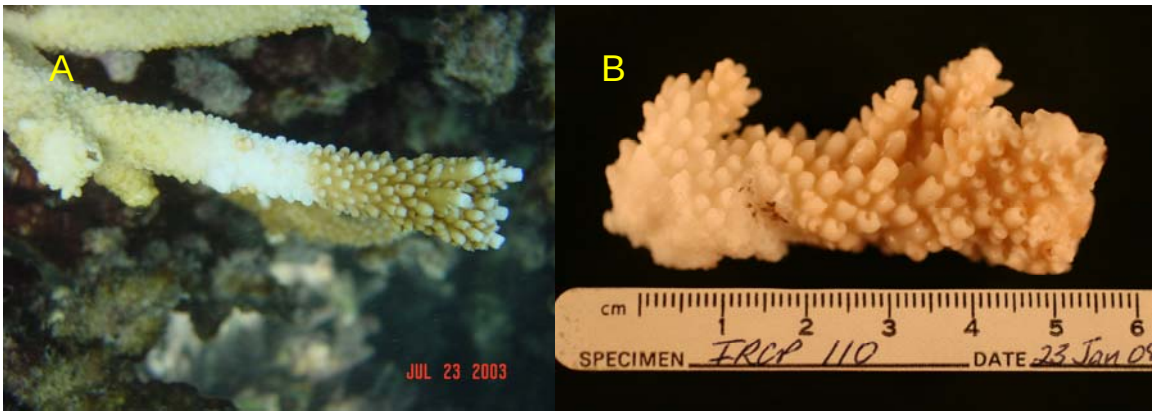


Figure 11 A & B. Presumed white band disease observed in *Acropora prolifera*: **A-** field photo (Dana Williams); **B-** fixed specimen (Kathy Price).

Histopathology Description (Fig. 12):

Coenenchyme: Tissue terminates abruptly as evidenced by rare isolated nests of viable tissue within gastrovascular canals within denuded skeleton remote from contiguous tissue. Numerous aggregates of basophilic rods are within mesoglea. Zooxanthellae within gastrodermis of the surface body wall appear pale. Basal body wall epidermis is segmentally attenuated and full thickness surface body wall characterized by linear arrangement of gastrodermal cells with shrunken cytoplasm. Scattered arthropods are present, adjacent to terminus of tissues, significance unknown.

Polyp: No remarkable lesions seen.

Skeleton: No remarkable lesions seen.

Morphologic Diagnosis:

- Numerous bacterial aggregates within the mesoglea of the coenenchyme.
- Moderate multifocal attenuation of the surface and basal body wall of the coenenchyme.

Recommendation: None.

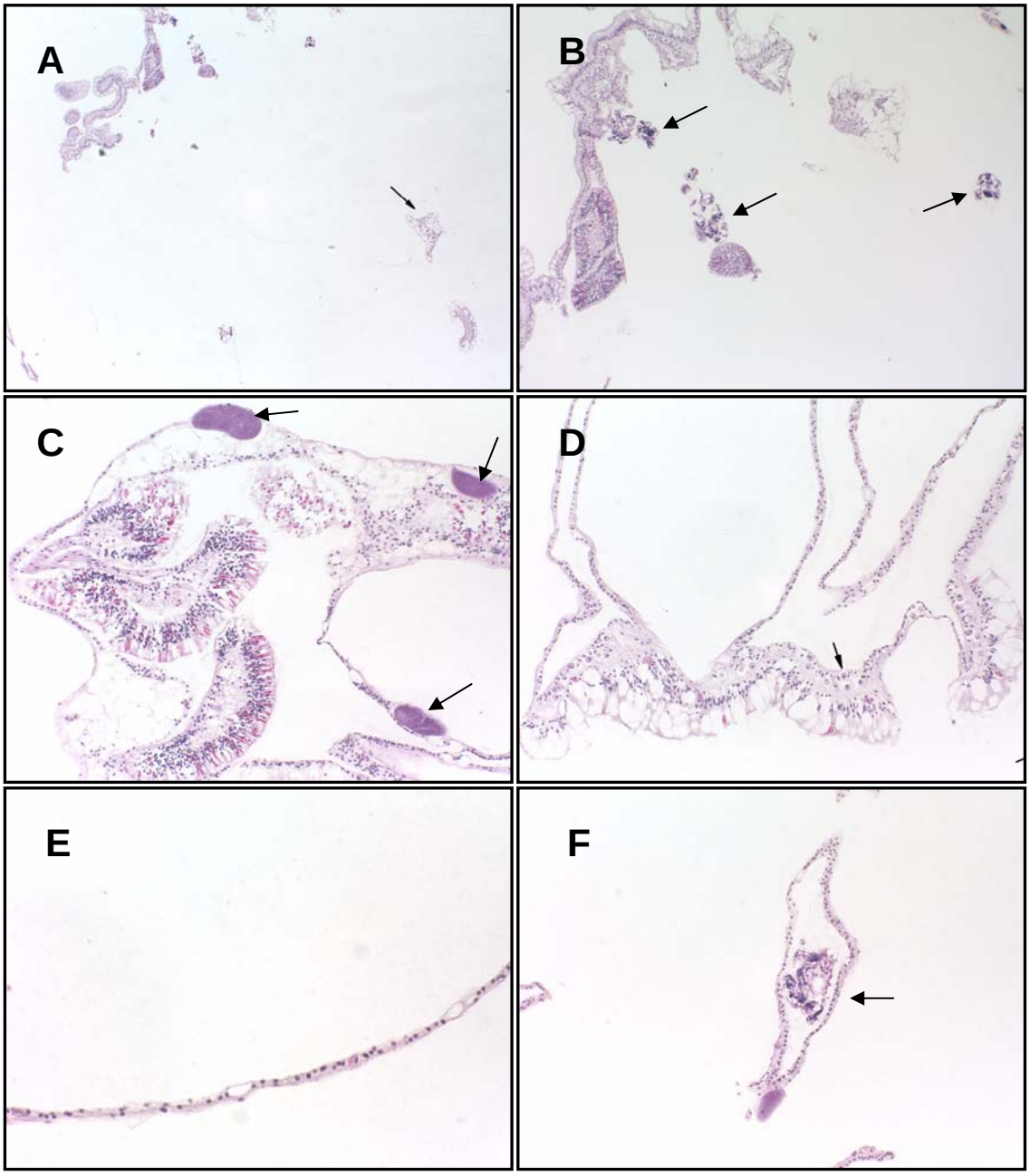


Figure 12 A-F. Photomicrographs of diseased *Acropora prolifera* tissue fixed in seawater:Z-Fix and stained with MHE: **A-** 4x, remnant tissue; **B-** 10x, arthropods; **C-** 20x, bacterial aggregates (↑) in coenenchymal basal body wall (↑); **D-** 20x, surface body wall, zooxanthellae (↑); **E-** 40x, attenuation of coenenchymal basal body wall; **F-** 20x, arthropod (↑) in lumen of gastrovascular canal, bacterial aggregate in basal body wall.

Slide 5

Signalment/History: *Siderastrea siderea* (IRCP 156-B2) collected from Turrumote, Puerto Rico on 4 April 2004 by Ernesto Weil.

Field Diagnosis: Presumed dark spots.

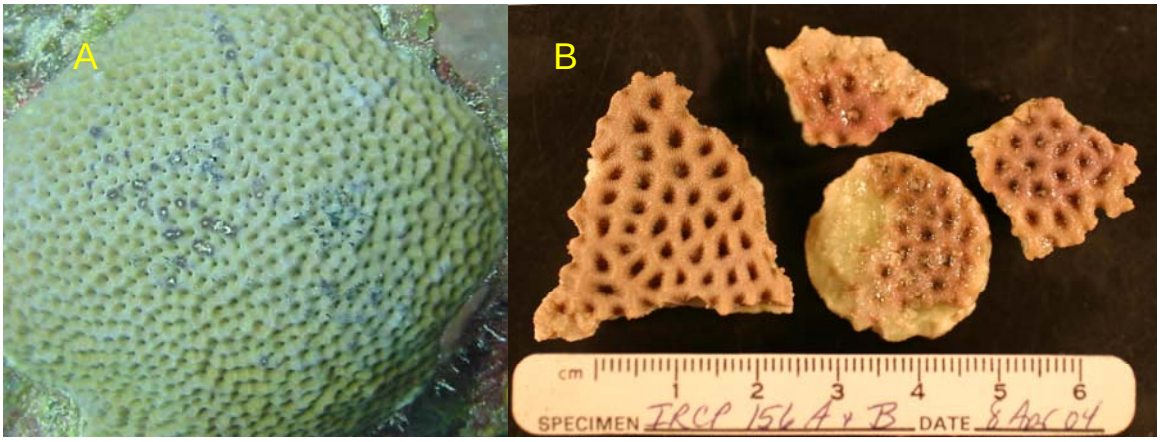


Figure 13 A & B. Presumed dark spots observed in *Siderastrea siderea*: **A-** field photo (Ernesto Weil); **B-** fixed specimen (Kathy Price).

Histopathology Description (Fig. 14):

Coenenchyme: There is multifocal exfoliation of 20-30% of the surface body wall. This observation may be an artifact rather than a lesion (Fig. 14B&C, ↑). Free zooxanthellae and cell debris are within canals. Diffusely, variably sized large clear vacuoles distort all cell layers (normal for *Siderastrea*) (Fig. 14D, ↑). At interface between deep gastrovascular canals and skeleton, there are multifocal dense accumulations of pleomorphic bulbous thick walled nonseptate organisms with irregular walls (fungi) (Fig. 14E, ↑). In a separate area, there is an extra-cellular matrix with cellular debris necrosis intermixed with islands of viable tissue.
Polyp: No remarkable lesions seen.
Skeleton: No remarkable lesions seen.
Other, Mucus: Sloughed cellular debris is entrapped within the mucus layer multifocally overlying regions of depressed coral tissue (Fig. 14A, ↑).

Morphologic Diagnosis:

- Severe multifocal full thickness tissue loss of the coenenchyme.
- Endolithic mycosis.

Recommendation: Prepare undecalcified sections for histopathologic preparation to examine the interaction of suspect fungi with tissue and skeleton.

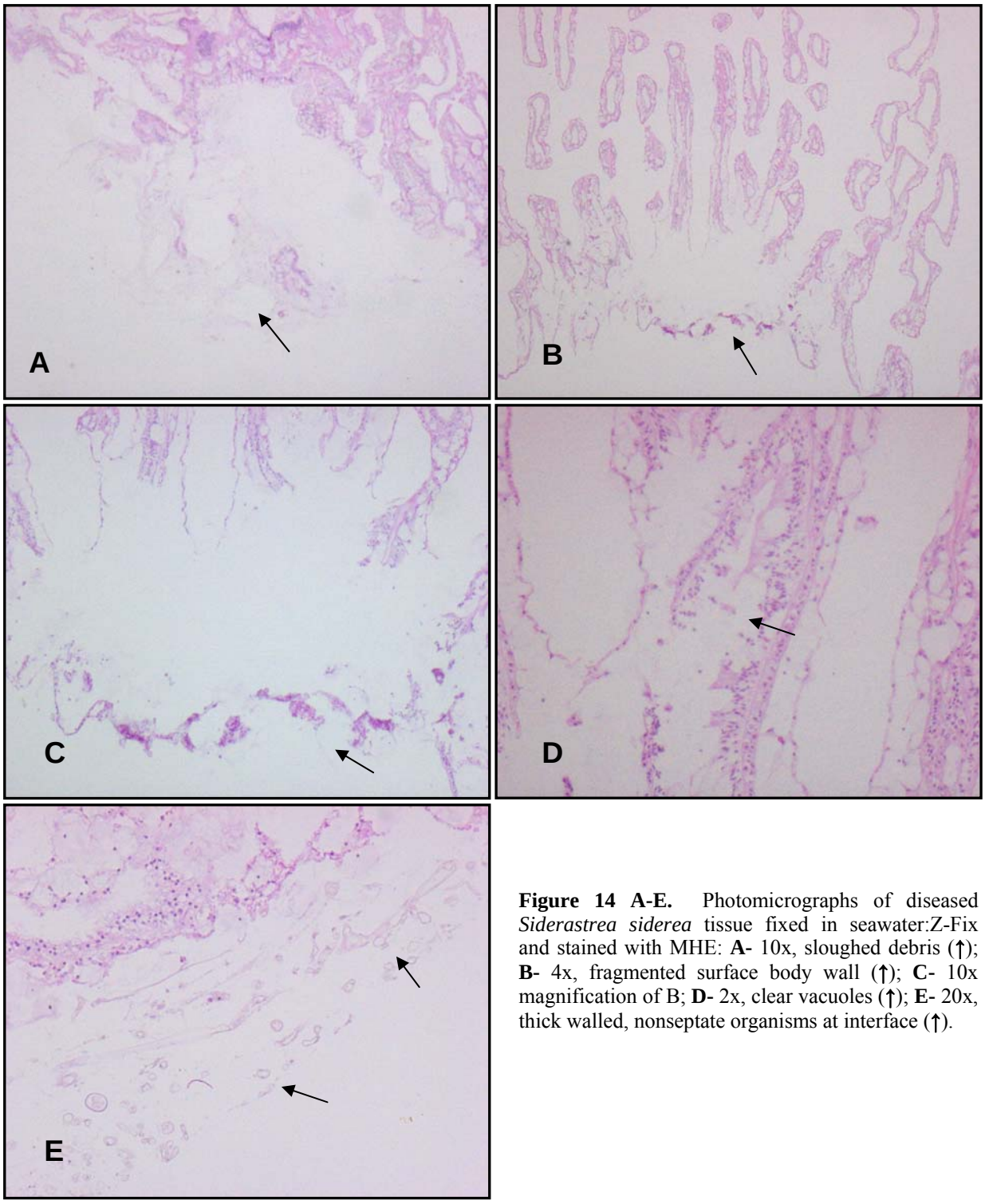


Figure 14 A-E. Photomicrographs of diseased *Siderastrea siderea* tissue fixed in seawater:Z-Fix and stained with MHE: **A-** 10x, sloughed debris (↑); **B-** 4x, fragmented surface body wall (↑); **C-** 10x magnification of B; **D-** 2x, clear vacuoles (↑); **E-** 20x, thick walled, nonseptate organisms at interface (↑).