59th TSM Meeting, March 6th-8th, 2025

University of Houston, Texas

CALL FOR PAPERS

The deadline for submission of abstracts for the 2025 Texas Society for Microscopy (TSM) meeting is **January 18th, 2025**.

Registration and abstract submission are available on our website:
http://texas.microscopy.org/

ABSTRACT INSTRUCTIONS (SEE SAMPLE ABSTRACT)

- Abstracts should be sent as Word documents (.doc or .docx).
- Use a proportionally spaced font equivalent to Times New Roman at a 10-11 point type.
- Margins should be fully justified, avoiding large gaps between words.
- The title should be all capitals in 12 point, bold type followed by author's names and affiliations as shown in the sample abstract.
- Mark the presenter's name and show the affiliation, if different, for each author.
- Go to the next line, indent ¼ inch for each paragraph or use only one paragraph. The abstract should be either one page long with one figure or two pages long with more than one figure (please see attached examples). Abstract should present results and state clearly and concisely what was determined or could not be determined by the microscopy studies conducted.
- Abstracts that do not present results but elaborate on future work will not be accepted for presentation and publication in the *Texas Journal of Microscopy*.

ABSTRACT SUBMISSION REQUIREMENTS: Please indicate at the time of online submission whether the abstract is for platform or poster presentation and the appropriate category (Biological, Materials, Educational, etc.).

STUDENTS: Please indicate during online registration whether or not the platform presentation is to be entered into the Student Competition. Students can apply for student travel support during online registration. Application for travel support for students will be available during online registration. The TSM supports students that live within 50 miles of the venue with $50 and students that live more than 50 miles from the venue with $200.

PLATFORM PRESENTATIONS: will be scheduled for 12 minutes (students) or 17 minutes (all others), with an additional 3 minutes for questions on either Friday or Saturday morning. If you have a conflict with one of those days, consideration will be given to your needs. In such a case please contact the program chairperson. Otherwise, you will be expected to present at the time scheduled by the program chair. Please, prepare your presentation using PowerPoint (4:3 format) and bring it to the meeting on either a flash drive or your own laptop.

POSTER PRESENTATIONS: Poster orientation must be portrait with a maximum size of 33" by 47".

TSM – Model of Abstract with Figure

AN INVESTIGATION ON *IN VITRO* CULTURE OF SUGAR BEET (*BETA VULGARIS* L.) USING LIGHT AND FLUORESCENT MICROSCOPY. Mandy Whiteside[1], Esther Villanueva[1], Edward Caraway[1], Nabarun Ghosh[1] and Don W. Smith[2], [1]Department of Life, Earth and Environmental Sciences, West Texas A&M University, Canyon, TX 79016, [2]Department of Biological Sciences, University of North Texas, Denton, Texas 76203.

Sugar beet (*Beta vulgaris L.*) is a member of the family *Ama- ranthaceae*, subfamily *Chenopodiaceae*. Sugar beet roots contain _5-20% sucrose representing a major source for the sweetener industry. Rhizomania, the most devastating disease caused by BSBMV (*Beet Soil Borne Mosaic Virus*) and BNYVV (*Beet Ne- crotic Yellow Vein Virus*) resulted in vast decline of production in United States in the last decade. We established *in vitro* cultures of sugar beet for the regeneration of improved varieties and to study the pathogenesis from systemically infected tissue in culture. We excised the hypocotyl and cotyledon explants from the seedlings of *Beta-1395* germinated on 1⁄2 MS medium and implanted them into modified MS medium. After 2_ days culture, callusing was observed from the cut ends of the explants. Development of shoot was achieved by the addition of various growth factors and coconut milk (5% v/v) to MS medium. Rhizogenesis was obtained using 2 mg/L of IAA to MS medium. After three weeks of transfer, the formation of roots at the bottom of the regenerated shootlets was recorded. Using callus we established cell suspension cultures to obtain protoplasts for further experimentation. The morphogen- esis process was studied using light and fluorescent microscopy. Staining the cultured cells with vital stain Evan's Blue helped us screen the regenerative cells from suspension culture. We observed the torpedo shaped embryonic initial that exhibited characteristic fluorescence with FITC filter (Fig. 1).

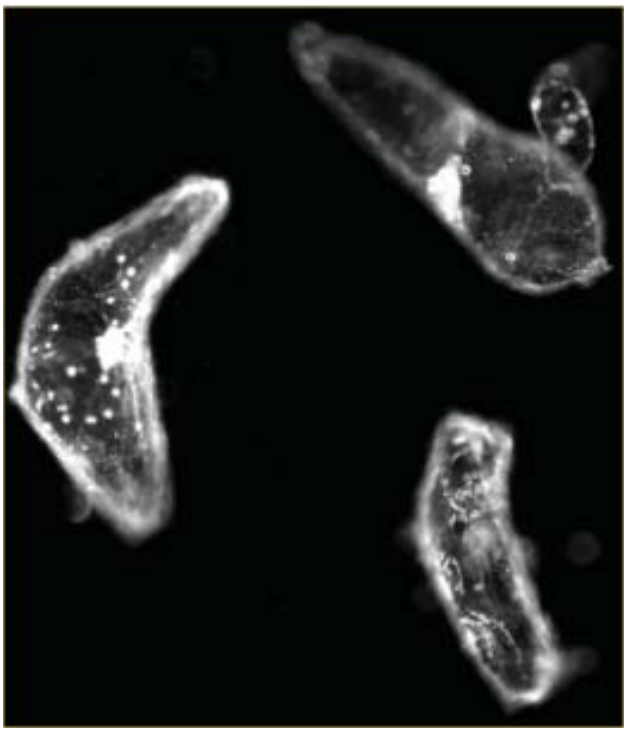

Fig. 1 – Viable cells from sugar beet suspension cultures stained with fluorescein under FITC filter.

TSM – MODELS OF LONG ABSTRACTS (ONE-PAGE AND TWO-PAGE ABSTRACTS WITH FIGURES

BGA Solderability Issues Due to Nickel Carbonate Contamination

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Electrical failures of an assembled board led to an investigation into root failure cause. In-circuit testing identified electrical opens at Ball Grid Array (BGA) solder bumps to the Printed Wire Board (PWB) interface. Scanning Electron Microscopy (SEM), Energy Dispersive Spectroscopy (EDS), optical inspection and Fourier Transform Infrared were used to investigate this failure.

Failure was determined to be the result of poor solder connection of the BGA solder bumps to the gold plated PWB pads. Contamination was identified on the PWB pad surfaces causing the poor solderability. The cracked flaky appearance of the contaminant indicated the material was at one time in liquid form (Figure 1). A typical joint results in the SnPb solder bump wetting to the pad on the PWB by absorbing the gold plating and forming an intermetallic with the underlying nickel plating. In instances where the pads on the board contain contamination, the gold was unable to be absorbed by the solder and no solder joint was formed. Elemental analysis determined the contamination contains C, O and Ni (Figure 2). FTIR identified this material as nickel carbonate (Figure 3). The source of the nickel carbonate was isolated to the plating house but the exact cause could not be identified.

Considering the cost to manufacture this type of board, it was necessary to formulate a cleaning process in an attempt to salvage the populated boards. A significant concern with cleaning a populated board includes inducing damage to the board that could potentially go unnoticed resulting in a latent failure. This cleaning technique was deemed acceptable since the boards would only be used in test units and would not be placed in the field. Investigative studies into various acidic solutions led to success with a 10% Hydrochloric Acid solution. This solution was found to clean the pads in a reasonable amount of time. Damage was only identified from the 10% HCl cleaning process in instances when the gold plating was cracked or flaking. A microsyringe was used to isolate the acid to a contaminated pad thereby reducing the risk of damage to the board. Successful cleaning of pads allowed multiple boards to be cleaned and put back into process flow to later be installed in test units. This resulted in a significant cost savings to the program.

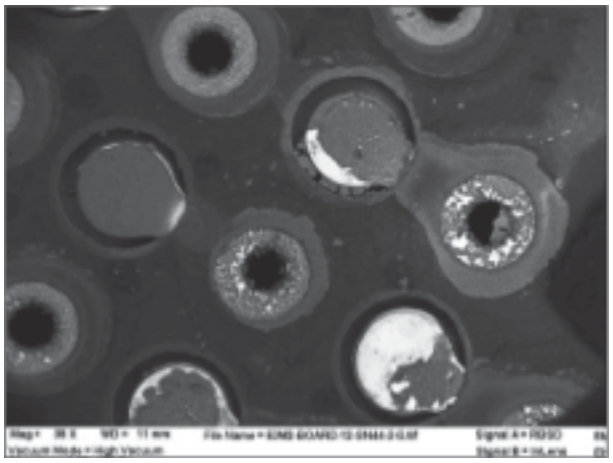

Figure 1: Low magnification image of contaminated pad on PWB. The bright areas contain gold and the dark areas on the pads contain nickel carbonate contamination. The contamination ex- tends out onto the board surface.

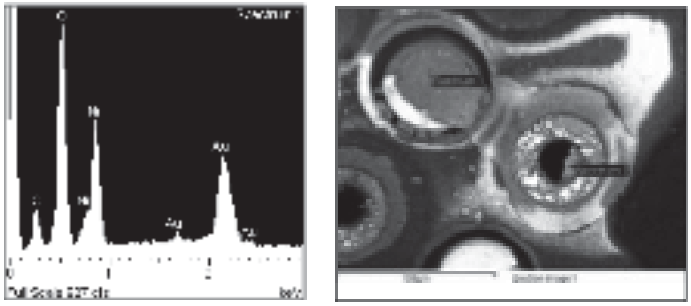

Figure 2: EDS data suggest the presence of C, O, and Ni on the gold plated surface.

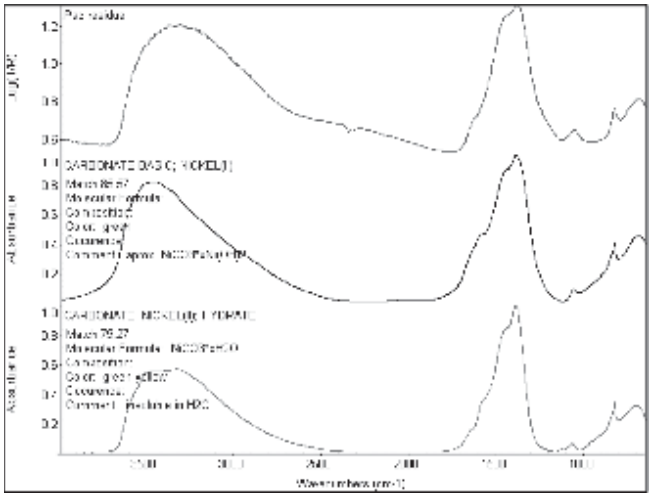

Figure 3: FTIR suggests the material is a nickel carbonate.

FROST RINGS IN TIMBERS FROM ROOM 43, SPRUCE TREE HOUSE, MESA VERDE, COLORADO

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Spruce Tree House (Fig. 1) is one of the larger cliff dwellings in Mesa Verde National Park. Fewkes (1909) reported 114 rooms in Spruce Tree House and published photographs of Spruce Tree House as it was, before and after it was first "cleaned up." His photos clearly show both the breathtaking architectural characteristics of this place as well as the problems of maintaining it as a safe site for the public. Fewkes (1909) described many of the rooms in detail. Speaking of Room 43 he said, "Several rooms in this part of the ruins, especially rooms 43 (Pl 9) and 44 still have roofs and floors as well preserved as when they were built." Plate 9 contains photos of the inside of Room 43/1 (first floor) and "Main Street" where the entrance to Room 43/_ was located. The current nature of Room 43/1 and "Main Street" are shown in Figs. 2-4 taken in 2006.

Through the kindness of Professor Jeff Dean in the Laboratory for Tree-Ring Research (LTRR) I have been able to examine cores from both Spring House (Arnott and Adams, 2006) and from Spruce Tree House to determine whether they show frost rings. Frost rings are annual rings, which show damage caused by freezing temperatures during the growing season. Many of the timber cores from Spring House and Spruce Tree House have frost rings. Almost all the freezing damage occurs in the early wood, hence they are called early frost rings. Because of rigor of dendrochronology, this ancient wood can often be dated to the exact year. Timbers from Spruce Tree House have frost rings from AD 906 to 1259. Because of the age of the trees used in the construction of this site, most of the frost rings date between 1150-1225 (Arnott, unpublished).

The cores from timbers of Room 43/1 are especially interesting because a comparison can be made between the timbers in a 2006 photos (Figs. 3-4) with those in Fewkes photo of 1909. Clearly, there were two primary timbers upon which 13 secondary timbers rested. The secondary timbers supported numerous tertiary members, which supported fill and dirt forming the floor in Room 43/2 (Fig. 3-4). The timbers in the 2006 photos are the same as in Fewkes (1909) photo and thus, by extrapolation, the roof timbers are the same as the occupants left them in approximately 1300. Ten dated juniper wood cores from Room 43/1 were available in the LTRR's collection. Seven of the ten have the following numbers of frost rings per core: 1, 2, 3, 3, 5, 6 and 8 (Fig. 5); the other three had none. The timbers, dated by the LTRR, have beginning dates as early as 1143 and cutting dates from 1240 to 1250. Frost rings in 1149, 1154 and 1189 were each found in three cores. The 1179 frost ring is found in four cores; the earliest frost ring in Room 43/1 was in 1143, and the latest in 1209. All 29 frost rings found in the timbers of Room 43/1 are in the early wood. The individual frost rings are variable (Figs. 6-9) and each appears to chronicle a somewhat dissimilar incident. The 1179 frost ring is very narrow and is only approximately 15 cell layers thick with the frost damage extending throughout the radial dimension of the ring (Fig. 6). Other frost rings have only a limited number of aberrant cells, principally ray cells, demonstrating their frost damage. The 1162 frost ring shows that several rows of tracheids were already formed before the freezing episode occurred thus producing a "delayed early frost ring" (Fig. 8).

Frost rings were found in 70% of the cores available from Room 43/1. This percentage is substantially higher than in the overall samples from Spruce Tree House (Arnott, unpublished). Many frost rings occur in the early years of the trees that supplied the timbers for Room 43/1. However, frost rings also occur in much later annual rings, for example in the 25th, 36th, 42nd, 49th and 66th years. Fritts, *et al*. (1965) using dendrochronology discovered a "prolonged dry period from 1276 to 1289" and suggests that it might be a factor in the abandonment. Salzer (2000) pointed to the cooling of the climate in the 12th and 13th centuries as important in considering the factors involved in abandonment. Obviously, the occurrence of many frost rings in these timbers merits further consideration regarding the climate at the time of abandonment. The frost rings are direct evidence of weather phenomenon at the Mesa Verde site.

REFERENCES

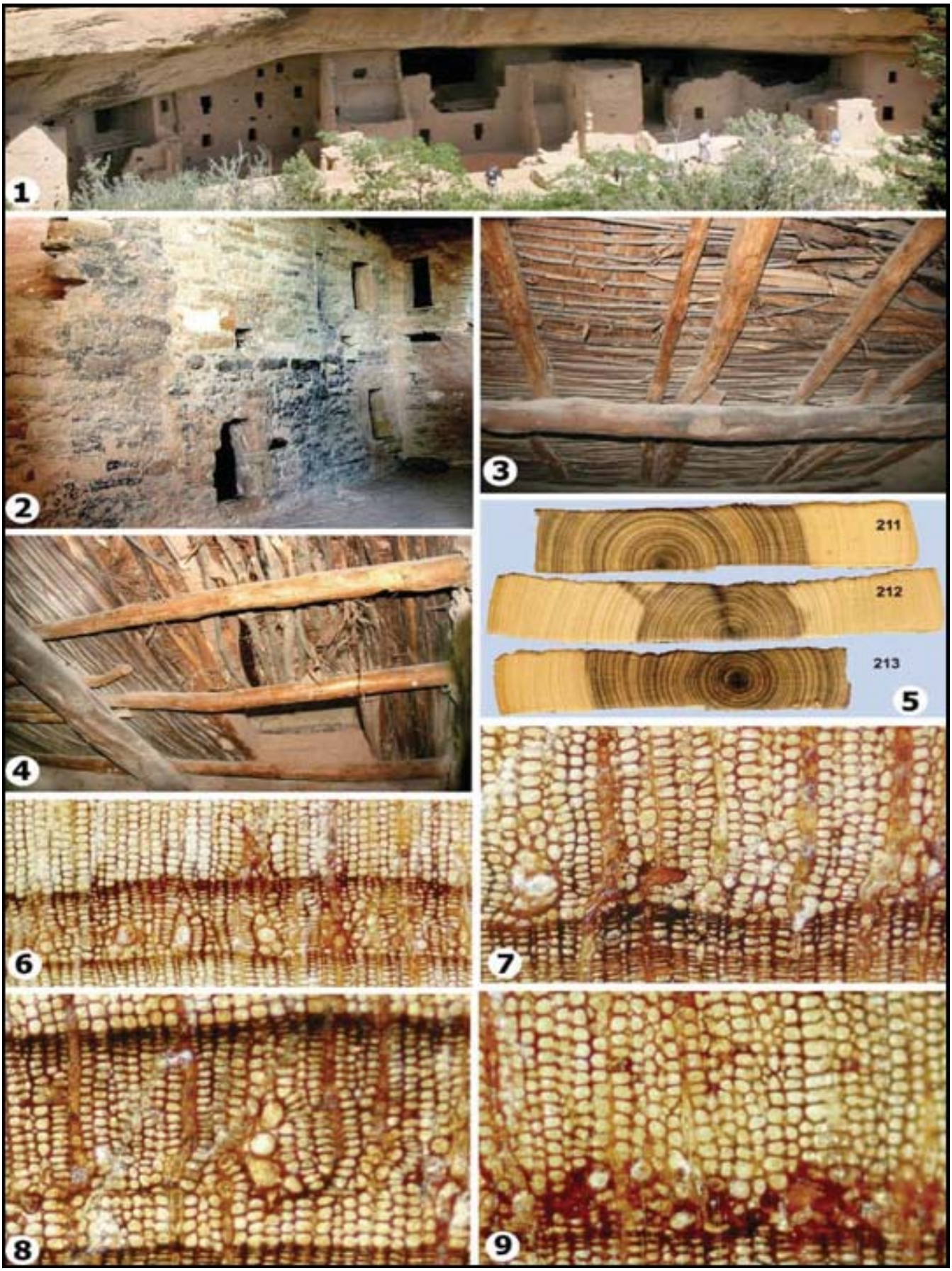
Arnott, H.J. and R. Adams. 2006. Frost Rings in Timber Cores from Spring House, Mesa Verde, Colorado. *Texas Journal of Microscopy* 37:56-57.

Fewkes, J. W. _909. Antiquities of the Mesa Verde National Park. Spruce-Tree House. Bull. Bur. Amer. Ethnol. No. 41.

Fritts, H. C., D.C. Smith and M. A. Stokes. 1965. The Biological Model for Paleoclimatic Interpretation of Mesa Verde Tree-Ring Series. Am. Antiquity 31:101-121.

Salzer, M., 2000. Dendroclimatology in the San Francisco Peaks Region of Northern Arizona, USA. Dissertation University of Arizona, Tucson.

Figures 1-4 taken in 2006. **Figure 1.** Site view of Spruce Tree House, Mesa Verde, Colorado. **Figure 2.** View of "Main Street" in Spruce Tree House. The entrance to Room 43/1 is the first "door" on the left as you look down "Main Street." **Figure 3.** Roof of Room 43/1 showing one of the primaries and several secondaries. At right angles to the secondary many smaller "tertiaries" support the floor of the room above. **Figure 4.** Roof of Room 43/1 (the photo is almost perpendicular to Fig. 3). In this photo one can see the passageway that leads to the room above. Careful examination of the secondary beams reveals numbers and white core holes (filled). **Figure 5.** Examples of cores from the timbers in Room 43/1; number 213 contained 8 frost rings. ***Figures 6-9. Light micrographs of Core 211.*** **Figure 6.** The 1179 frost ring showing its scope. **Figure 7.** The 1154 frost ring showing typical rearrangement of the rays often seen in frost rings. **Figure 8.** The 1162 frost ring showing that several layers of tracheids were produced before the freeze occurred. **Figure 9.** The 1187 frost ring showing areas of cell damage which appear red in this rendition.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