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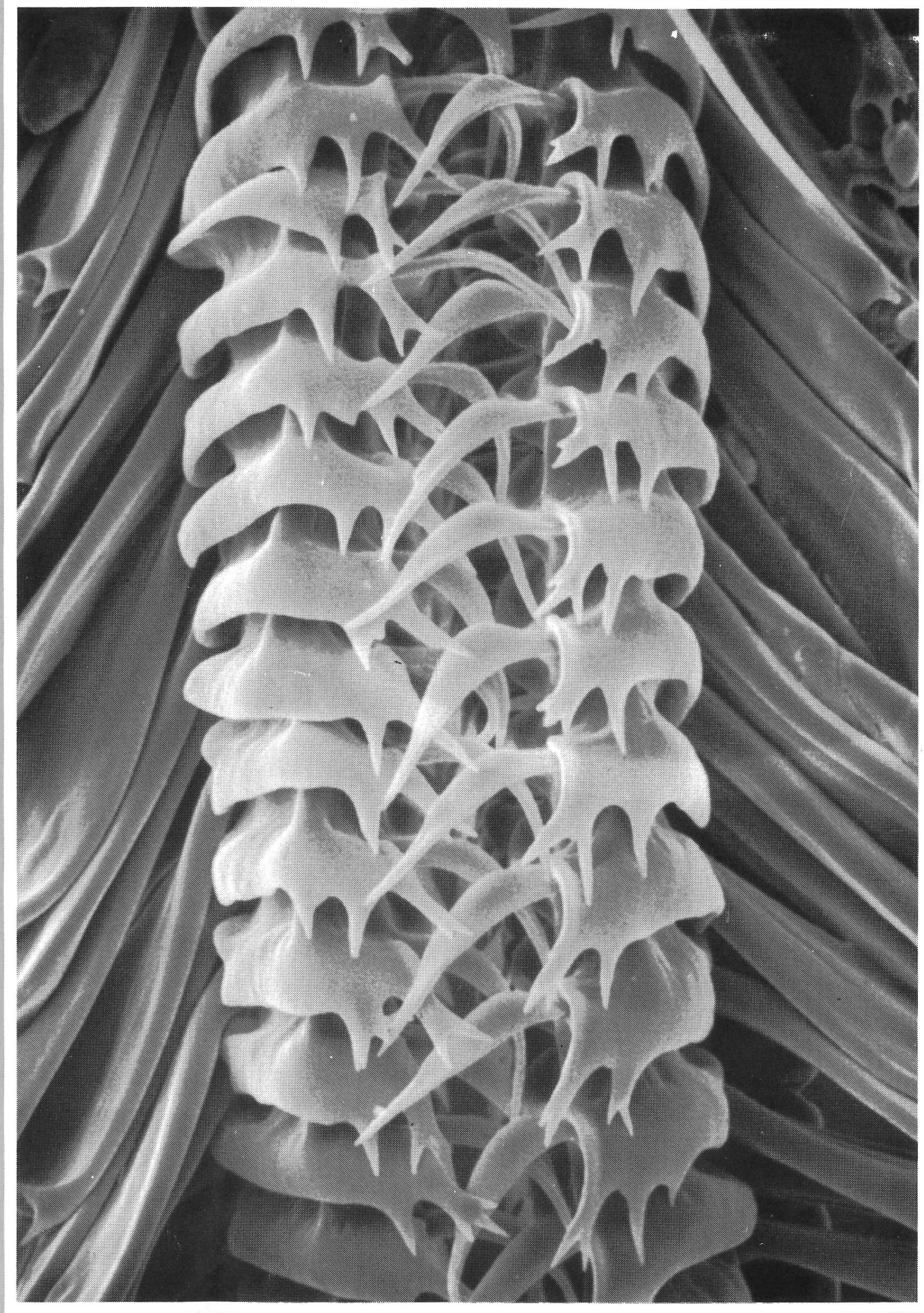

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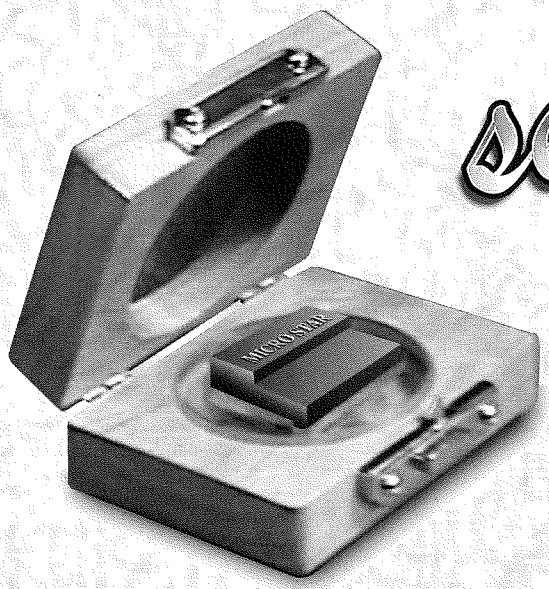

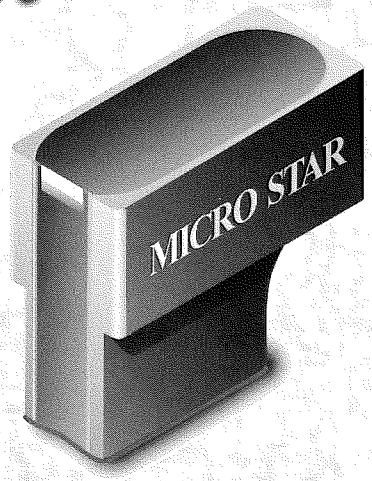

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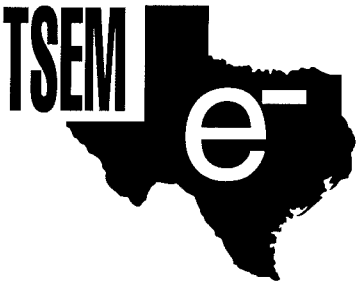

David C. Garrett, Editor
Department of Biological Sciences, University of North Texas, Denton, TX 76203

Official Journal of the Texas Society for Electron Microscopy
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ON THE COVER

Zipper-like apparatus holding together the galea of the proboscis of *Limenitis lorquini*, the Lorquin's Admiral butterfly (Lepidoptera: Nymphalidae). Projecting from each side are the styli of chemo-mechano sensilla styloconica. Magnification = 1000x. Micrograph by Daniel Petr, Department of Biological Sciences, University of North Texas, Denton, TX 76203; current address: Department of Biology, Southwestern Adventist University, Keene, TX 76059.

President's Message

Welcome to the fall 1997 meeting of the Texas Society for Electron Microscopy. The coming year should be an exciting one for the society. We are meeting at one of our recently favorite sites, the Tremont House in Galveston. Robert Spears, the Program Chairman, has planned an outstanding meeting despite little help from this preoccupied president. I appreciate his dedication. The workshop on molecular biological applications in microscopy should inspire us to find new ways to incorporate microscopy into this prominent area of research. Robert is working on a joint meeting with the Oklahoma society to be held north of the border in the Lake Texoma area in the spring of 1998. We look forward to the opportunity to interact with our colleagues in Oklahoma. I hope you will participate in this joint meeting.

As we plan for future meetings we encourage each of you to let us know where you would like to meet. We have had meetings at many different locations throughout the state and we are always interested in going to new places. We also need your ideas for invited speakers and topics for workshops. What areas of microscopy do you want to know more about? If you are willing to present a workshop in your area of expertise, please volunteer soon to share your knowledge with other members of the society.

On the national level, the Microscopy Society of America is initiating an outreach program: Project MICRO (Microscopy in the curriculum - Research Outreach). The project is designed to introduce inquiry based microscopy into schools across the country. A manual is being published and additional details of the program will be available at the next MSA annual meeting. We will appoint a committee to examine the potential involvement of TSEM in this project. Recently, Joe Dixon interfaced with teachers in the College Station area and found that many teachers have an interest in knowing more about microscopy and in having more resources available for their classes, particulary at the elementary and middle school levels. The poster presentations that he organized for our meeting in College Station (Spring 1996) and the enthusiasm displayed by participating students and teachers were an indication that we could have many calls for our expertise if we become involved in an outreach project. I will provide more details about the MSA project during this meeting for those of you who may be interested.

This has been an exciting few months for me watching the renovations of the electron microscopy facility here at Baylor and the installation of new microscopes funded by a grant from the Keck Foundation. I have been faced with choices that I never thought would come my way and it has been a stressful time. I have hardly had time to think about DOING electron microscopy but now I am looking forward to continuing my research in plant development, teaching microscopy, and having some fun learning new techniques. I hope to be able to show you our new instruments at the future meeting of the society! With the changes taking place in our facility I retain my optimism about the future of microscopy teaching and research.

Sincerely,

Ann E. Rushing President 1997-1998

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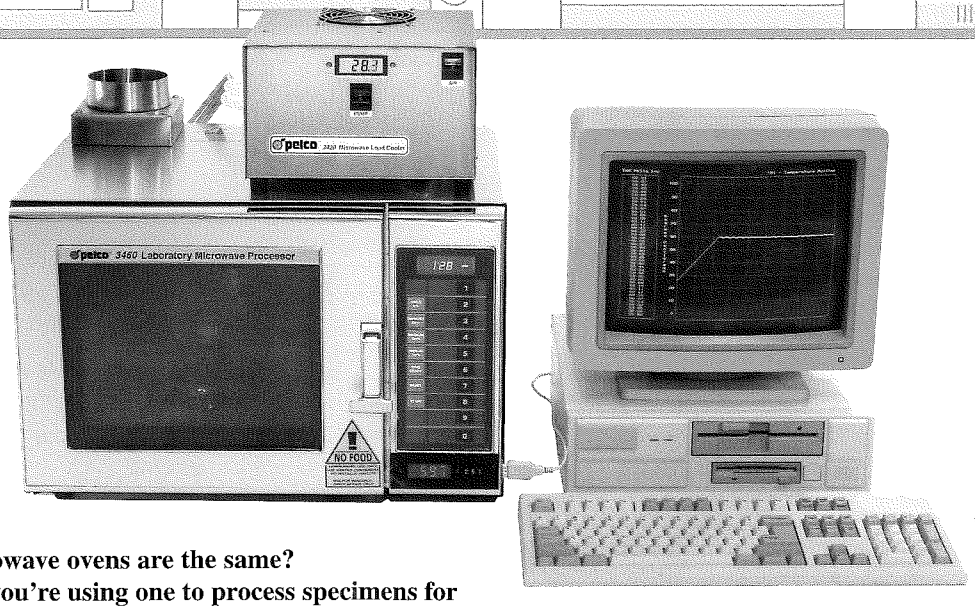

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ULTRASTRUCTURAL DIFFERENCES BETWEEN NORMAL AND ALBINO WATER OAK (*Quercus nigra*) LEAVES

Shea Wilson[1] and Josephine Taylor[2*]

[1]College of Forestry
[2]Department of Biology
Stephen F. Austin State University
Nacogdoches, Texas

KEYWORDS: Ultrastructure, Albino, Oak, Leaves, *Quercus nigra*

ABSTRACT

A water oak germination project yielded 4 albino water oak seedlings out of a total of 3,500. Transmission electron microscopy was used to compare the ultrastructural features of mesophyll cells from normal and albino leaf tissue. Normal cells contained numerous chloroplasts with an extensive system of thylakoid membranes. Plastids in the albino cells were highly vacuolated and lacked distinguishable thylakoids; some contained prolamellar bodies and other abnormal membrane elaborations. All other organelles were comparable in the two tissue types.

INTRODUCTION

Chlorophyll deficiencies commonly segregate in natural populations of cross-pollinated plants (1), and are useful as markers in genetic studies (2). These conditions are caused by mutations that may be of nuclear or cytoplasmic origin (2), are often lethal, and show monogenic recessive inheritance patterns (1, 3). Affected individuals may have striped, variegated, albino, or pale green leaves (1). Plastids in mutant cells may be inhibited in their development (reduced in size and without pigment) or may degenerate after differentiation into mature chloroplasts (undergo loss of pigmentation, breakdown of grana structure, and vacuolization of the stroma) (4). Spectroscopy is often used to identify types of albinism based on levels of remaining pigments (5).

A water oak (*Quercus nigra* L.) germination project conducted during the summer of 1996 yielded four albino seedlings out of a total of 3,500. Since no previous studies of albinism in oaks have been reported in the literature, a research project to compare the ultrastructural features of mesophyll cells in normal and albino water oak leaves was undertaken, with the goal of determining the morphological abnormalities associated with albinism in this species.

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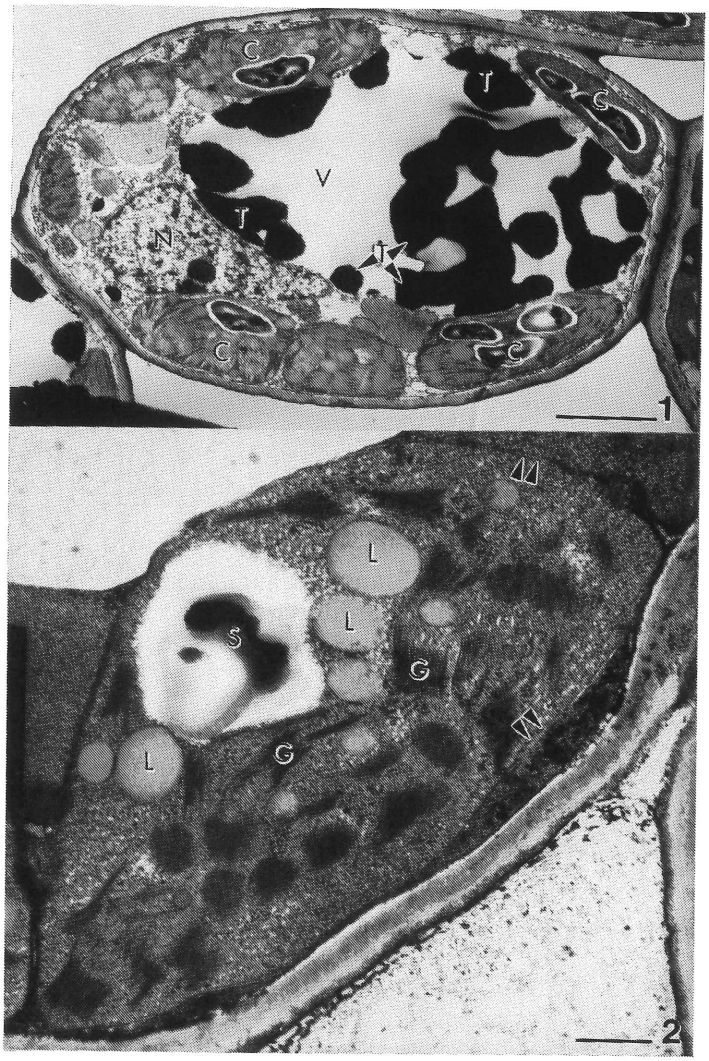
METHODS AND MATERIALS

Leaf pieces were fixed overnight at 4°C in 2.5% glutaraldehyde in 50mM potassium phosphate buffer, pH 6.8 (6). The tissue was then rinsed in buffer and post fixed in 1% osmium tetroxide in 50 mM buffer for 2h at 4°. Following thorough rinsing in distilled water, specimens were stained in 0.5% aqueous uranyl acetate overnight at 4°. After rinsing in water, tissues were dehydrated in a graded ethanol series to 100% ethanol, then transferred to 100% acetone and infiltrated with Spurr's resin (7). Specimens were embedded in Lux contur Permanox (Miles Lab Tech) disposable tissue culture dishes (60 X 15mm) with a 3-4 mm layer of fresh, 100% resin. The resin was polymerized for 24h at 70°C. Ultrathin 80-9Onm sections were cut with a diamond knife on an MTX ultramicrotome (RMC). Sections were collected on formvar covered slot grids (8), post-stained for 3 min each with 4% aqueous uranyl acetate and Reynold's lead citrate (9) and examined with a Hitachi HS- 9 transmission electron microscope.

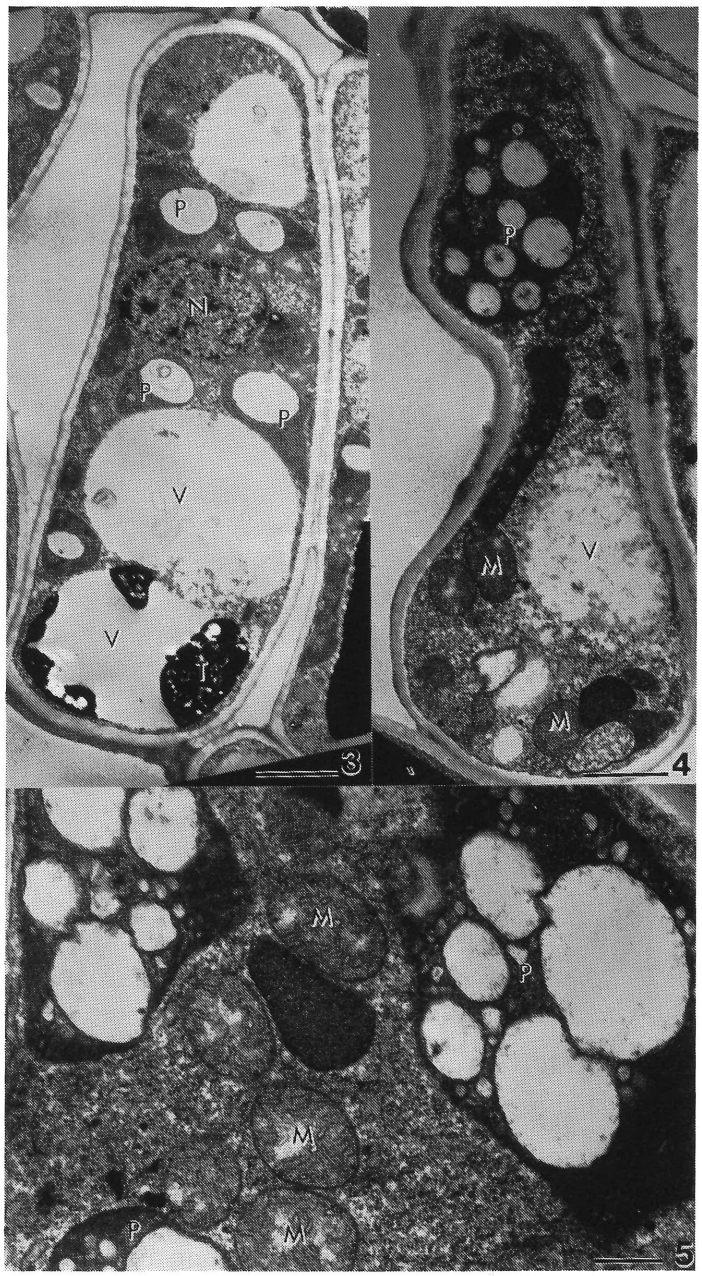
RESULTS

Palisade and spongy parenchyma cells in normal water oak leaves contained the typical complement of plant cell organelles, including mitochondria, a single nucleus, and a large central vacuole that was often filled with electron-dense deposits, identified in the literature as tannins (10) (Fig. 1). Chloroplasts were quite numerous in the normal cells (Fig. 1). One or more starch grains, lipid droplets, well developed grana, and stroma thylakoids were readily distinguishable inside each chloroplast (Fig. 2).

Mesophyll cells from albino leaf tissue were comparable to those from normal leaves in terms of their nuclei, mitochondria, vacuoles (often containing tannins), and other organelles with the exception of their plastids (Fig. 3, 4, 5). Some plastids in palisade and spongy parenchyma cells of the albino seedlings were highly vacuolated (Fig. 5). Others contained membranous elaborations similar to prolamellar bodies described in the literature (11, 12) (Fig. 6). A third plastid type containing a serpentine arrangement of membranes was also found in the albino cells (Fig. 7). Typical chloroplasts



Figures 1 and 2: Transmission electron micrographs of normal water oak leaf tissue. Figure 1: Typical spongy parenchyma cell with a prominent nucleus (N), several chloroplasts (C), and a large central vacuole (V) containing tannin deposits (T). scale bar = 2μm. Figure 2: A chloroplast containing a starch grain (S), lipid droplets (L), and numerous grana (G), and bounded by a double membrane (arrowheads). scale bar = 0.5μm.



Figures 3-5: Transmission electron micrographs of albino water oak leaf tissue. Figures 3 and 4: Palisade parenchyma cells in which a nucleus (N), vacuoles (V) with tannin deposits (T), mitochondria (M), and several highly vacuolated plastids (P) can be observed. scale bar = 2μm. Figure 5: Mitochondria (M) and highly vacuolated plastids (P) within the cytoplasm. scale bar = 0.5μm.

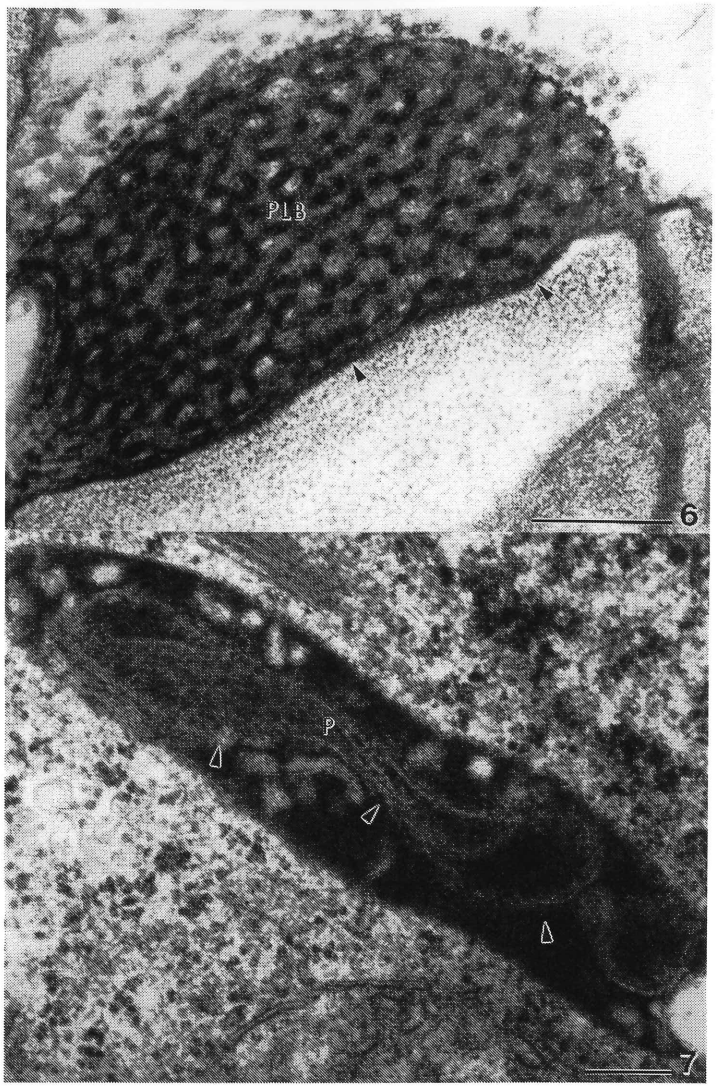
with well developed thylakoid membranes were not observed in any albino cells examined.

Normal and albino seedlings were maintained in a greenhouse and monitored weekly. The albino water oaks showed signs of scorch under full light, but put on new growth when transferred to an area with lower light intensity. Their leaves were pale yellow to white in color.

Spectral analysis for pigment composition was not available during the study period. The albino seedlings seemed to survive solely on the material contained within the acorns, did not respond to informal fertilization treatments, and died at five months.

DISCUSSION

Normal chloroplast development begins when prothylakoid membranes in undifferentiated, colorless proplastids proliferate to form pigment-containing stroma and grana thylakoids upon exposure to light (11, 12, 13). Albino mutants have been shown to possess plastids that were arrested during this light induced development (13). Such seems to be the case in leaves of the albino water oaks examined in this study. Typical chloroplasts were not observed. Most of the plastids found resembled amyloplasts depicted in the literature (11), although starch grains were not evident within their vacuolate spaces. Chloroplasts often pass through a temporary amyloplast state during their development, usually in response to translocation of food reserves into the tissues where development is taking place (14). Starch within the oak plas-



Figures 6 and 7: Transmission electron micrographs of cellular organelles in albino tissue. Figure 6: Prolamellar body (PLB) inside a plastid within an albino mesophyll cell. The double membrane surrounding the plastid is visible (arrowheads). scale bar = 0.5μm. Figure 7: Plastid (P) with irregularly arranged thylakoid membranes (arrowheads). scale bar = 0.2μm.

tids may have been stored there following mobilization of food reserves from the acorns, then was consumed prior to tissue fixation, leaving the prominent vacuoles. Prolamellar bodies (PLBs) are semicrystalline arrays of tubular membrane observed in etioplasts, plastids that develop when seedlings are grown in darkness (11, 12). PLBs have also been found alongside normal thylakoids in chloroplasts of light-grown seedlings (13). It is believed that PLBs form when the developmental state of the cell or external conditions do not allow complete assembly of the photosynthetic membranes, indicating a disturbance in the tightly integrated activities required for normal thylakoid assembly (13). The presence of PLBs in the albino water oaks is consistent with the conclusion that these plants were unable to complete normal chloroplast assembly because of genetic defectiveness.

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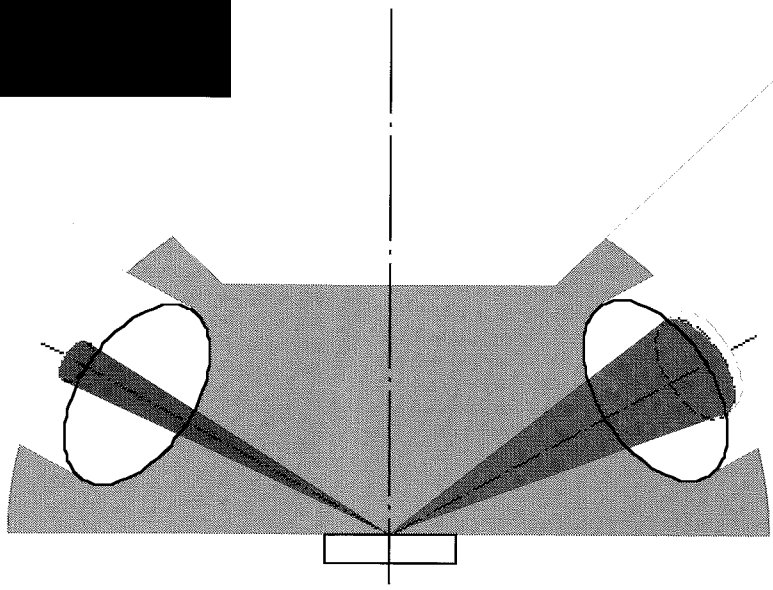

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Abstracts

BIOLOGICAL SCIENCES
PLATFORM PRESENTATION—FALL 1997

BIOFILM FORMATION IN A CONTINUOUS-FLOW CULTURE CHEMOSTAT. R. E. Droleskey, C. Young, D. J. Nisbet, and L. H. Stanker., USDA/ARS/FAPRL, 2881 F&B Rd., College Station, TX 77845.

A preliminary experiment was conducted to determine if biofilms formed in a continuous-flow culture chemostat could be preserved for ultrastructural examination. The chemostat was inoculated with a commercial preparation of bacteria, MS Biosciences CF3™, which has previously been shown to be efficacious in inhibiting the colonization of poultry ceca by *Salmonella*. The preparation of bacteria contains 29 different strains of bacteria which are cultured under anaerobic growth conditions. Bacteria were grown in VL broth with anaerobic conditions maintained by the constant infusion of oxygen-free carbon dioxide. After achieving steady state growth, layers of material, biofilms, were noted to form on parts of the chemostat. After termination of the experiment, samples of biofilm material were preserved for scanning electron microscopic examination. Biofilms were composed of bacteria, of several different morphologies, encased within various supporting matrices which in some areas completely obscured bacteria from view. Without the use of antibodies specific for bacteria comprising the culture we were not able to determine which of the 29 organisms present preferentially contributed to biofilm formation. However, based on results of this study it should be possible to combine the use of monoclonal antibodies specific for bacteria present within CF3™ with sequential removal of surfaces from the chemostat vessel to chronologically follow the deposition of bacteria and the resultant formation of biofilms within a CF3™ inoculated chemostat.

EPICUTICULAR WAXES ON WILDTYPE *ARABIDOPSIS* ORGANS DURING DEVELOPMENT. C.G.-A. MAIER and D. POST-BEITTENMILLER, The Samuel Roberts Noble Foundation, Plant Biology Division, Ardmore, OK 73402

Epicuticular waxes (EW) on aerial organs of *Arabidopsis thaliana* ecotype Landsberg at different stages of development were studied by high resolution SEM. Regarding the presence or absence of crystalline EW structures, *Arabidopsis* organs can be classified in two groups: organs lacking EW crystals and organs with crystalline EW microstructure. Rosette and cauline leaves, floral receptacle, sepal, petal, anther, style and stigma were classified in the first group, while cotyledon, stem, carpel, stamen filament and fruit in the second group. Generally, cauline leaves presented a smooth EW film on their adaxial epidermis, but occasionally, small conical EW crystals could be seen on guard cells only. The EW on stem was previously described as amorphous ground layer on top of which irregularly-shaped flat structures with rounded edged and tube- and needle-shaped structures can be seen. Similar structures were observed on siliques. We found crystalline EW structures on cotyledons and stamen filaments which were not described previously. On top of a visible amorphous ground layer on *Arabidopsis* cotyledons, small scale-like structures were present on the surface of both subsidiary and guard cells. On the surface of filament cells, thin, long needle-like and short, tubular crystals were deposited in patches. No crystalline EW structures were observed on organs classified as lacking EW crystals at any stage in the development. Cotyledons presented EW crystals by the time they were expanded. The EW structures on hypocotyl and epicotyl were similar to those on the adult stem. Carpels started showing mostly flat, irregularly-shaped EW structures at stage 11 (when stigmatic papillae appear) and by stage 13 (bud opens) the crystalline EW structures were similar to those on siliques. On older stems and siliques more tubular and flat structures than the fine pointed needle ones could be seen. This descriptive study of EW structures on wildtype *Arabidopsis* organs along with a complete information on the EW chemical composition by GS/MS will facilitate studies to identify *Arabidopsis* EW mutants.

COMPARISON OF GUARD HAIR CHARACTERISTICS AMONG SELECTED BODY SITES OF THE WHITE-TAILED DEER. C. BOYLES AND H.J. ARNOTT. The Department of Biology and The Center For Electron Microscopy. The University of Texas at Arlington, Arlington, TX 76019

Comparison and analysis of macroscopic and microscopic guard hair features is an essential tool to such fields as Forensics, Wildlife Management and Taxonomy. While past emphasis has been to compare characteristics among mammalian groups, very little has been addressed to the differences that might exist among body areas of a single animal or species. Considering information collected is used as the groundwork for keys and atlases, which in turn form the basis for many criminal and management decisions as well as taxonomic conclusions, the need for thoroughness is apparent. Using hairs taken from 17 body sites on 4 white-tailed deer, the parameters typically included in analyses and comparisons--length, width, color, texture, scale patterns and medullary characteristics-- were examined 1) to determine what variation exists among the chosen body areas, and 2) to provide descriptive information to aid future investigations.

THE MYSTERY REMAINS: WHAT IS *SCHENELLA*? THOMAS W. GAITHER*, Department of Biology and The Center for Electron Microscopy, The University of Texas at Arlington, Arlington, Texas 76019 and HAROLD W. KELLER, University of North Texas Health Science Center, Fort Worth, Texas 76107

The identification of *Schenella simplex* as a myxomycete was so doubtful that T. H. Macbride, who described the species in 1911, omitted it from his 1922 monograph. In the 1934 monograph by Macbride and and G. W. Martin, *Schenella* was again included. After restudy of the type, Martin in 1962 validated the genus and described a second species, *Schenella microspora*. Later, Nannenga-Bremekamp in 1967 used capillitial characteristics to transfer *Schenella* from the Stemonitaceae to its own monogeneric family, the Schenellaceae. Historical uncertainty regarding the affinities of *Schenella* prompted us to obtain and examine the type specimens of both species and a 1990 collection of *S. simplex*. In the type of *S. simplex*, and in the 1990 Mexican collection, SEM revealed columnar units covered with spores attached to threads. Unlike a typical myxomycete, *Schenella* spores do not collapse when dehydrated and they are small, 3.0 - 6.0 µm in diameter. Moreover, spores have a recessed area around which there is a unique wall ornamentation pattern. The recessed area is the point of articulation between the spore and its sporophore. A sporophore consists of flattened, collapsed tube-like structures or sparingly branched tubes that may be septate. Walled individual cylinders enclose sporophores that are closely articulated to form the fruiting body. Cylinder walls are smooth or they contain embedded spore-like bodies. This paper will deal with some general affinities shown by this mysterious taxon. *On leave from the Department of Biology, Slippery Rock University, Slippery Rock, PA 16057.

A LIGHT AND ELECTRON MICROSCOPIC STUDY OF THE CAPITATE STIGMA OF *YUCCA WHIPPLEI*. H. J. ARNOTT. The Department of Biology and The Center for Electron Microscopy, The University of Texas at Arlington, Arlington, TX 76019.

The Quixote plant, *Yucca whipplei Torr.* is a common chaparral plant found in the Southern California and Western Arizona. The plants are monocarpic, flowering only once; their inflorescence is a large panicle (1 to 5 m in height) bearing hundreds of creamy-white flowers. The individual flowers bear 6 tepals, 6 stamens and a single tricarpelate pistil. Each pistil contains 6 rows of ovules, two in each of three locules. At the summit of the pistil, the style and stigma are fused to form a large capitate stigma. The basal third of the stigma is a solid tissue formed by the fusion of the style and stigma. Extending from the stigmatic surface are a series of large single cell hairs which form the remaining 2/3 of the capitate stigma. The individual hairs may reach a length of over 500 µm and a diameter of over 30 µm. Each stigma hair contains a single large nucleus, about 20-30 µm in diameter, usually located near the center of the cell. The flowers used for this study were collected in the mountains near Santa Barbara, California; they were fixed in Formalin Acetic Alcohol (FAA) containing 70% Alcohol. After five days they were transferred to 70% Ethyl Alcohol. Subsequently the materials were dehydrated, critically pointed dried and studied using SEM. Other materials, collected in Southern California and processed for light microscopy in the1950's, were also studied and photographed for this presentation. The stigmatic hairs are especially interesting because they arise from cells on the epidermis of the stigma whose volume is less than one hundredth of the individual hairs. A comparison of the stigmatic surface of other species of *Yucca* with that of *Y. whipplei* will be made for the purpose of showing the unique characteristics of the latter.

CHANGES IN MAMMILLARY CONES DURING INCUBATION OF FERTILIZED EGGS OF *GALLUS DOMESTICUS*. **S. L. WESTMORELAND AND H. J. ARNOTT**. The Department of Biology and The Center for Electron Microscopy, The University of Texas at Arlington, Arlington Texas 76019.

A prior study using scanning electron microscopy has confirmed the basic structure of the avian eggshell. It is comprised of four layers: the external organic cuticle, the calcite portion with a columnar layer and mammillary cone layer, and two interior proteinaceous shell membranes. The current study demonstrates that the eggshell of *Gallus Domesticus* undergoes changes during the incubation of a chick. In this study fertile eggs of the White Leghorn breed were incubated for varying lengths of time and the shells of the eggs were then examined using scanning electron microscopy to determine what changes had occurred. According the Simkiss (1979), during the normal twenty-one day incubation period of the chicken, approximately eighty percent of the calcium for embryo growth is obtained from the eggshell. The chick, however, receives its calcium supply for the first ten days of incubation from the yolk sac. Removal of calcium from the shell begins to occur after day ten of incubation when the chorioallantoic membrane has formed adjacent to the shell membranes. The air space of the egg separates the membranes from the shell and prevents calcite removal in this area. The portion of the shell associated with the air space (usually found at the egg's blunt end) does not contribute calcium to the embryo's growth. Because of the airspace separation, that portion of the eggshell can be used as a "control," an unchanged area which can be compared to the rest of the shell as calcium is withdrawn. Results obtained in this study support this conclusion and advance some of the theories stated above.

INFECTION OF DOGWOOD LEAVES BY THE FUNGAL PATHOGEN *GLOMERELLA CINGULATA*. J. TAYLOR AND P.L. GREGORY, Department of Biology, Stephen F. Austin State University, P.O. Box 13003 SFA Station, Nacogdoches, Texas 75962.

The ascomycete fungus *Glomerella cingulata* was isolated from flowering dogwood (*Cornus florida*) leaves bearing symptoms of leaf scorch in a Nacogdoches county forest. The pathogen was cultured on potato dextrose agar, where it produced both ascospores and conidia of its asexual stage (*Colletotrichum* spp.). A suspension of conidia was inoculated onto healthy dogwood leaves in a greenhouse. Spore germination and infection structure formation were monitored with epifluorescence light microscopy and scanning electron microscopy. Each germinating conidium formed a single, unbranched germ tube that terminated in a penetration structure, the appressorium. Appressoria of this isolate of *G. cingulata* were dark in color due to melanin pigment deposition. Nomarski differential interference contrast light microscopy and transmission electron microscopy were used to examine the host-parasite relationship and the ultrastructural changes associated with host cell death following fungal penetration. Inoculated seedlings developed leaf scorch symptoms similar to those observed in nature within 3 weeks post-inoculation.

A COMPARATIVE STUDY OF MORPHOLOGIC FEATURES OF THE ACCESSORY PENES OF SELECTED DAMSELFLY SPECIES IN *ISCHNURA*. **ALICE M. STACEY, H. J. ARNOTT AND J. V. ROBINSON**. The Department of Biology and The Center for Electron Microscopy, The University of Texas at Arlington, Arlington, TX 76019.

Odonata differ from most winged insects in that their primary genitalia do not meet during copulation. Male damselflies and dragonflies have specialized secondary genitalia located on their second and third abdominal segments which serve to transfer sperm to the female's primary genitalia. Because female insects retain sperm in storage organs and may mate repeatedly before ovipositing, the opportunity exists for post-copulatory competition among males by displacing or removing sperm of a previous mate (Parker, 1970). This ability to remove sperm is associated with micro structures on the accessory penes which correspond in size and shape to the female sperm storage organs and has been demonstrated in a number of genera of Zygoptera. Most male damselflies remain in physical contact with their mates or actively guard the female during oviposition, but these behaviors are the exception in many ischnuran species. Therefore, *Ischnura* may be a key genus to the understanding of sperm competition and its relation to mating system evolution within the Zygoptera. In the present study, the accessory penes of selected species of *Ischnura* were examined using scanning electron microscopy. The accessory penis, or prophallus, is composed of three segments: a chitinous stem, a sclerotized body and a membranous structure known as the glans. The glans region is the site of greatest differentiation and is characterized by paired flagella at the distal end of the glans with varying degrees of microspination. Another morphologic feature of the prophallus is the presence of ventrolateral spines of different lengths and numbers at the intersection of the stem and the body. More detailed comparisons of the penis segment and of the female reproductive morphology in damselflies that displace sperm will be conducted in order to gain data for application of comparative methods to construct a phylogeny for the genus *Ischnura*.

OBSERVATION ON THE EPIDERMAL LAYER OF THE SEED SECTIONS OF TWELVE LEGUMINOUS TREES

Nabarun Ghosh[1], A. Chatterjee[2] and Don W. Smith[1]
[1]Department of Biological Sciences, University of North Texas, Denton, TX 76203. [2]CAS, Department of Botany, University of Calcutta, India.

Seed is a characteristic organ of angiosperm that is least variable in comparison to other plant organs. The use of seed data is rapidly increasing in theoretical and applied aspects of plant science. Many previous workers including ourselves have worked on the topography and the structure of seed coats, but the anatomical features and the characteristic epidermal organization of seeds remains unaddressed. In this study we used seeds of three species of four genera of Leguminosae, *Acacia, Albizia, Cassia* and *Dalbergia*. We cut transverse and longitudinal sections (where possible) from different regions of the seeds; midseed, near the hylum and two distal ends. Under the dissecting scope the detailed cellular pattern of the epidermis was not clear but was visible under SEM. The size, shape and number of tiers of the epidermal and the hypodermal layer, and the outer layer of the endosperm of each and every species differed from the others. The cells were round, columnar, cuboidal or sometimes elliptical. The characteristic presence of "hour glass cells" was noted in the hypodermis of some species of Caesalpiniodae. In *Acacia* all the three species contained our glass cells although the number and orientation of those cells varied. In *Albizia* the epidermal layer was composed of elongated cells. In *Dalbergia* the epidermis was thin, but, the hypodermal layer was broad having characteristic pattern in each species. Our investigation on anatomy of leguminous seeds, especially, on seed epidermis revealed useful diagnostic features for distinct identification and taxonomic interpretation.

MATERIALS SCIENCES
PLATFORM PRESENTATION—FALL 1997

USE OF SCANNING ELECTRON MICROSCOPY - ENERGY DISPERSIVE SPECTROSCOPY TO EXAMINE THE DEALLOYING OF COPPER ALLOYS. **JOHN N. WILLIARD, BetzDearborn Inc., The Woodlands, TX 77380**

The use of scanning electron microscope (SEM) and energy dispersive spectroscopy (EDS) to characterize dealloying of copper alloys (Cu/Zn, Cu/Ni metallurgy) was investigated. Dealloying is a corrosion phenomenon, also known as selective leaching, in which one constituent of an alloy is selectively removed, leaving behind an altered residual structure prone to failure. In this paper, both plug-type and uniform dezincification/denickelification phenomena in various industrial cooling water environments are described. The unique advantages of SEM/EDS to characterize dealloying of copper alloys will be emphasized. The results of this technical review will provide morphological characterization of the copper crystal precipitation process which occurs during dezincification/denickelification. In addition, micro-chemical analysis of the corrosion occurring at dealloying sites in the metal will be presented.

MATERIALS SCIENCES
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OBTAINING TRUE COLOR IMAGES FROM A GRAYSCALE CCD CAMERA. M.A. DAVIS, Department of Anesthesiology and Pain Research, University of Texas at Southwestern Medical Center, Dallas, TX 75235.

Using a 16 bit grayscale CCD (charged-coupled device) camera, filters, and photo-editing software, we report the obscure fact that true color images can be captured with a grayscale camera. By isolating the wavelengths of visible light into red, green, and blue (RGB) regions with filters and capturing a single image for each region, photo-editing computer software can combine the three regions as channels and reproduce a color image from three grayscale images.

There are many caveats to this procedure, including exposure time, light source, filter type, camera stability, noise, and particularly the sensitivity of the CCD array to the red, green, and blue temperatures of visible light. Filters can successfully separate the RGB regions, but most CCDs are red-weighted and some white-balancing must be done after capture.

The ability to capture color images from grayscale CCDs is beneficial in many respects: labs can use grayscale CCDs with larger capture frames and higher resolutions than comparable color CCDs.

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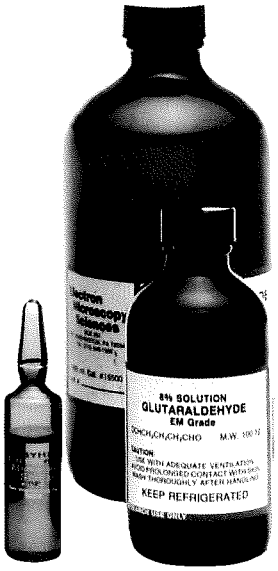

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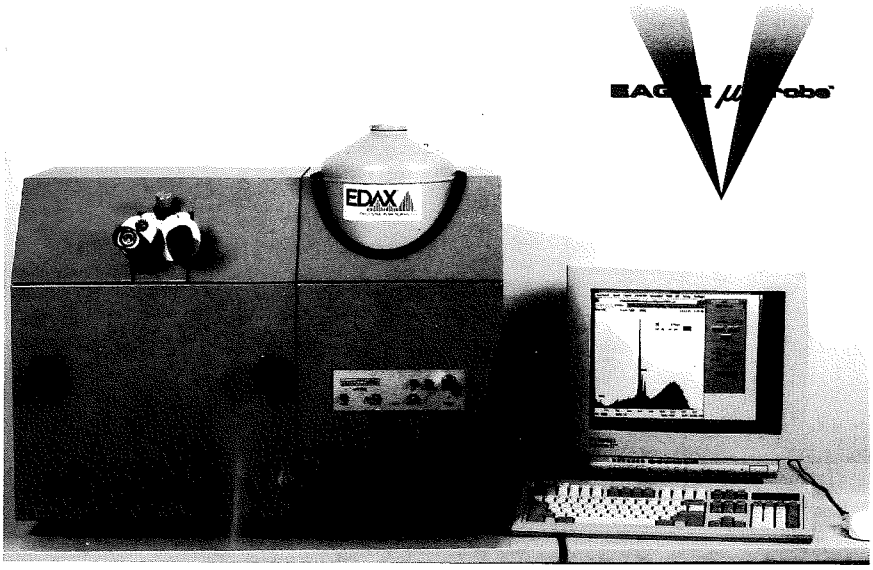

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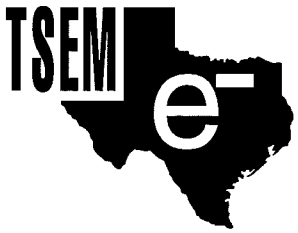

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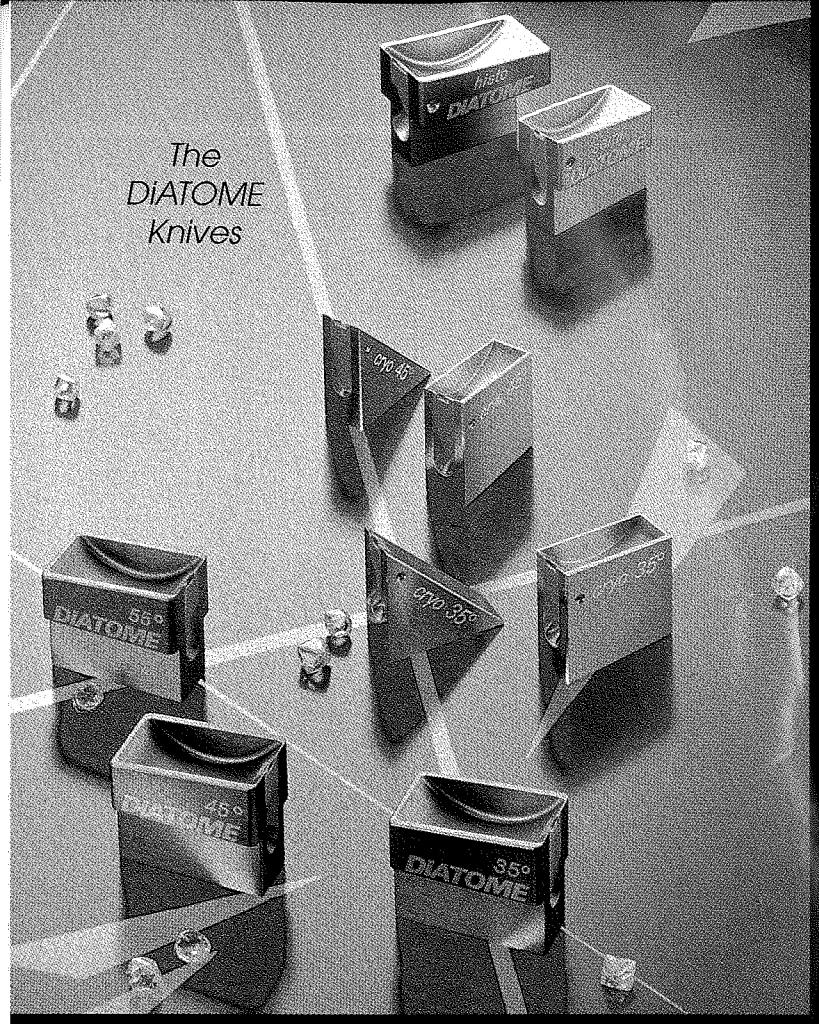

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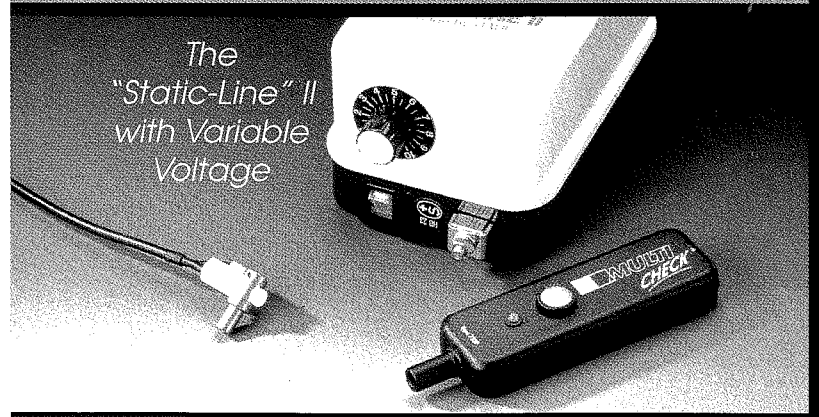

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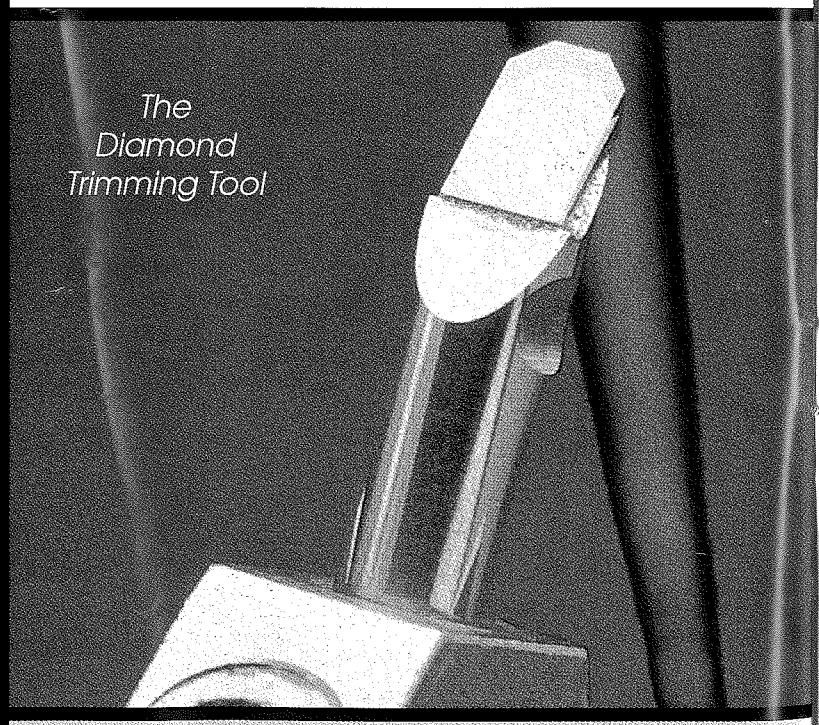
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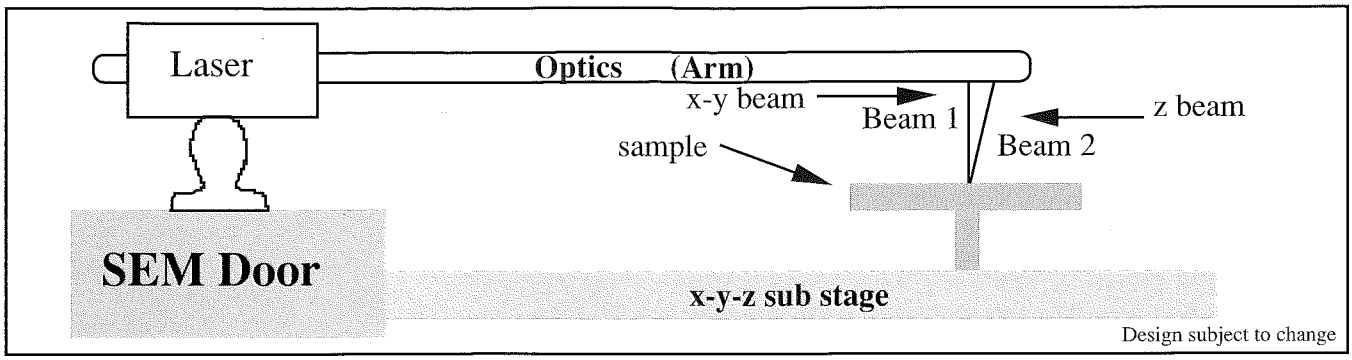

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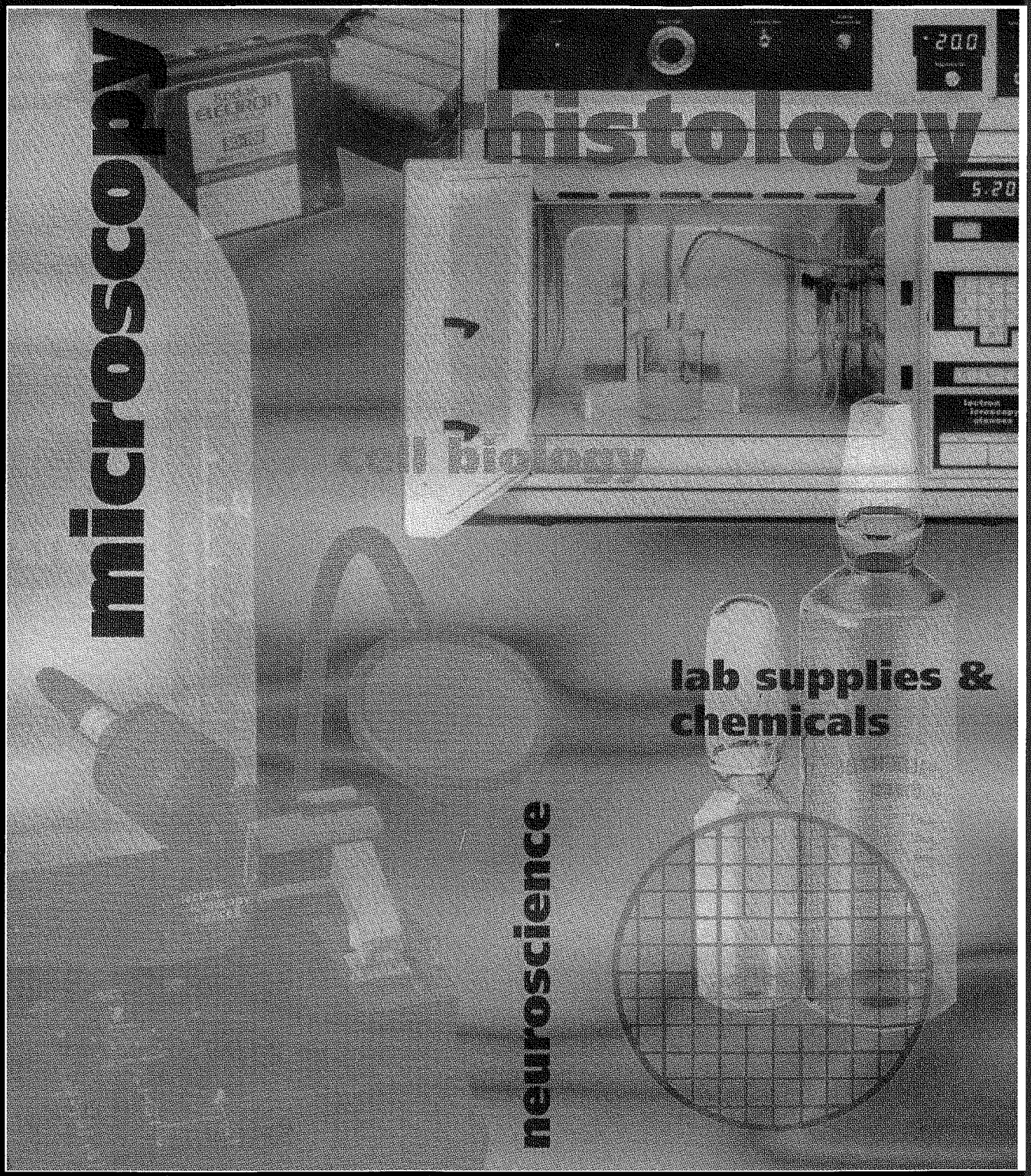

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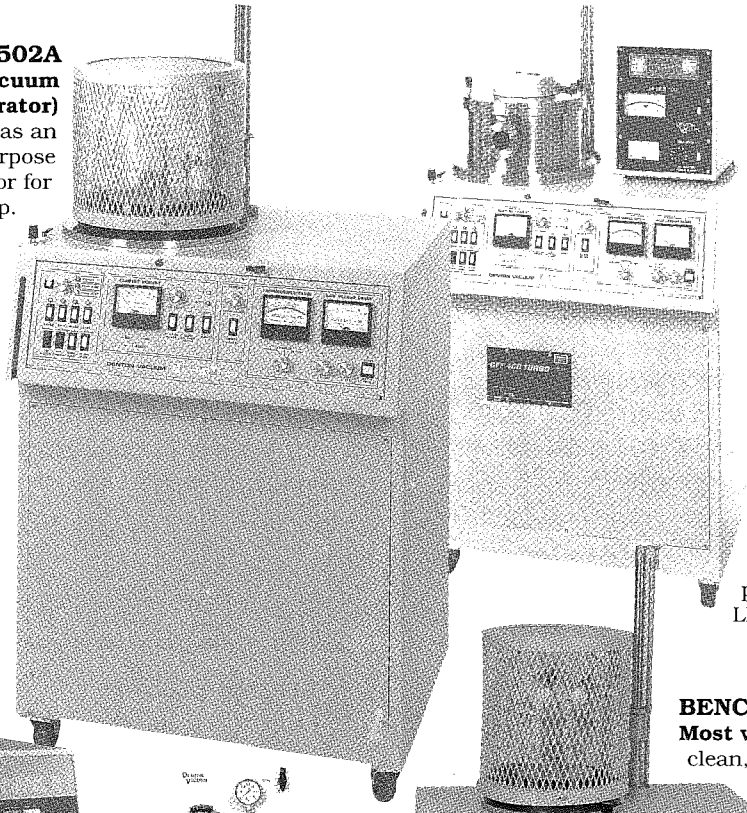

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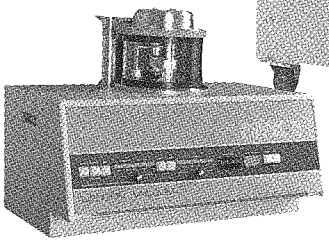

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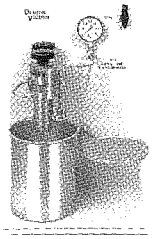

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ANSWER TO "WHAT IS IT"

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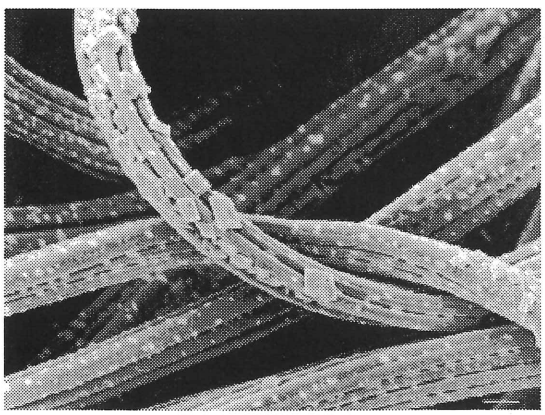
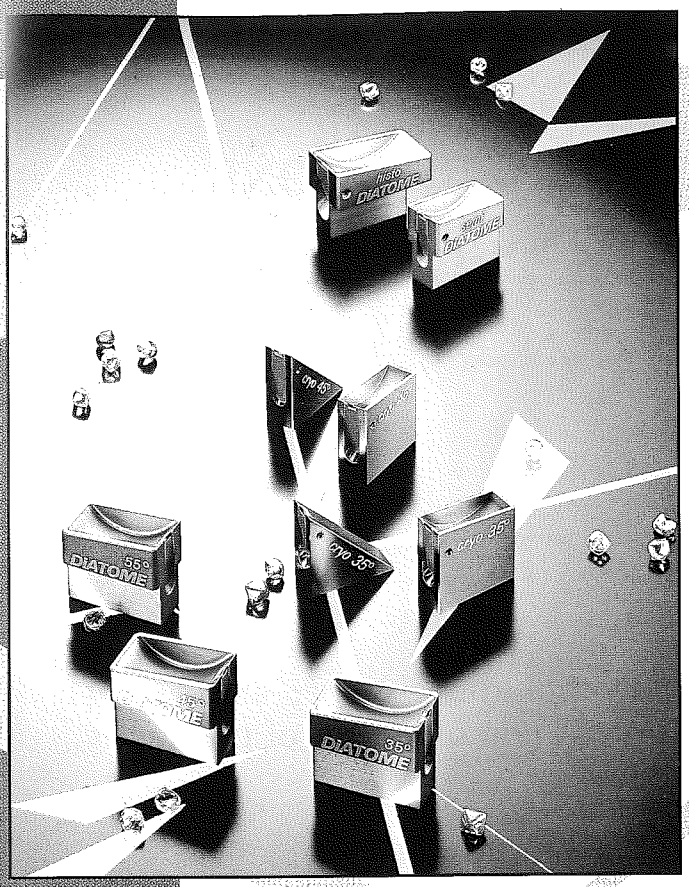


The micrograph on the back cover of Volume 28, Number 1, p 32, 1997, is a scanning electron micrograph of a type of wound dressing called Mesalt dressing. These dressings are used on surface wounds when it is useful to draw fluid out of the wound and into the dressing. The crystals on the surface of the fibers are salt, NaCl. The specimen was made by mounting a small portion of the dressing on a stub and coating it with gold and pallidum. When the crystals were analyzed by energy dispersive x-ray analysis they gave peaks characteristic for Na, Cl, Ag and Pd. The latter two being due to the coating, while the former characterize the crystals as NaCl.
H.J. Arnott, Department of Biology and Center for Electron Microscopy, The University of Texas at Arlington.



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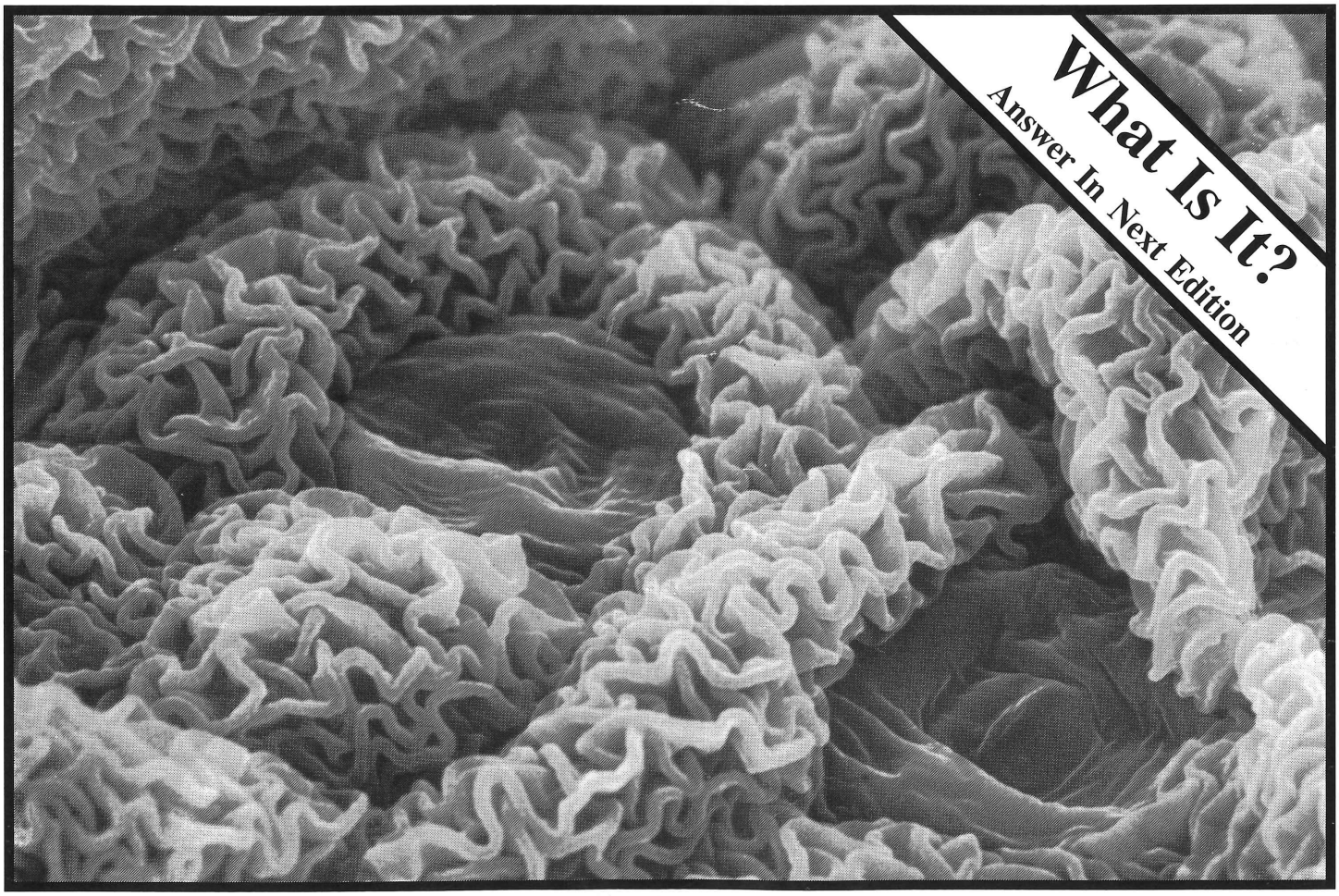

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