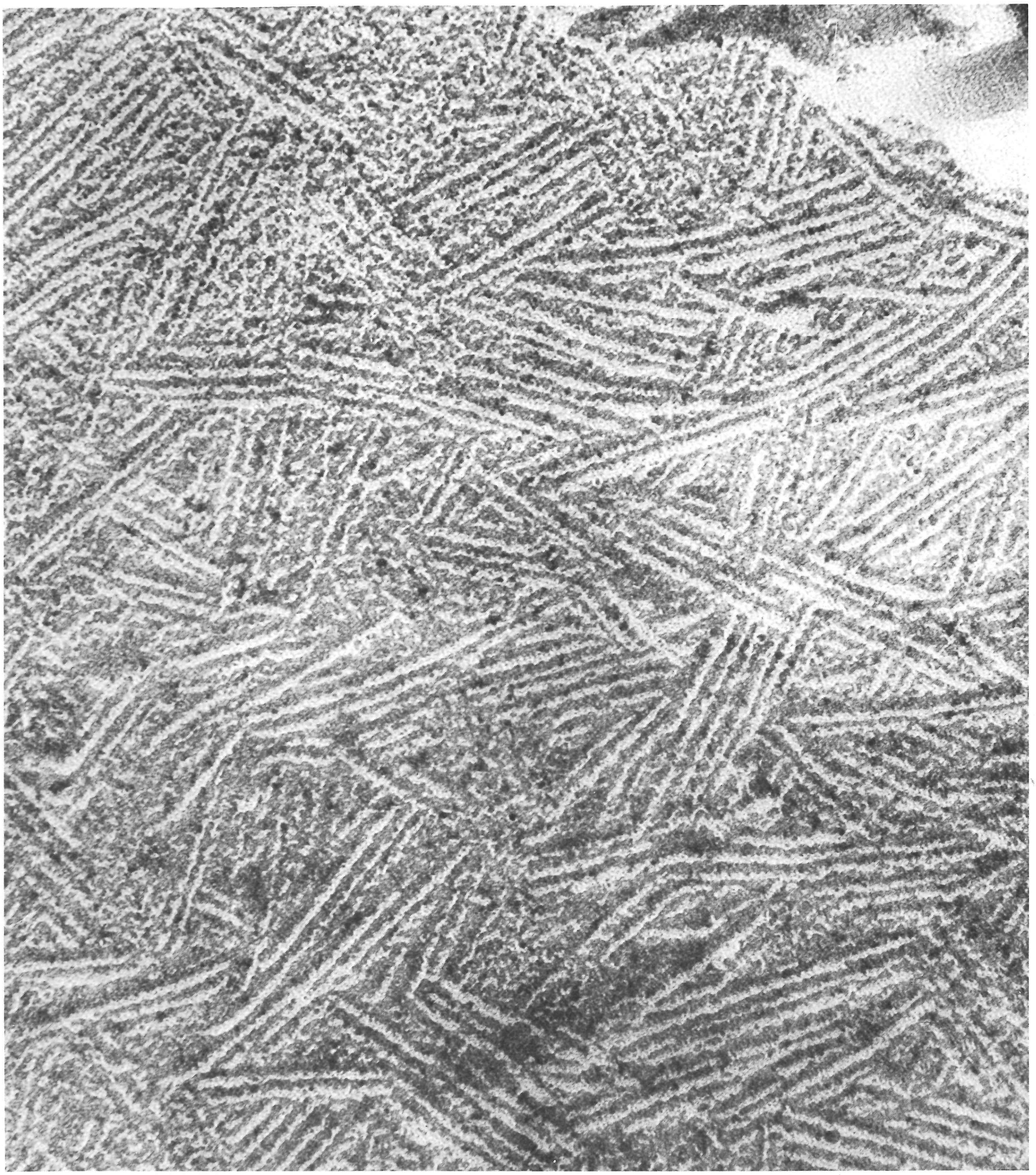
TSEM

Texas Society for Electron Microscopy, Inc.

JOURNAL
VOLUME 21, NUMBER 2, 1990
ISSN 0196-5662



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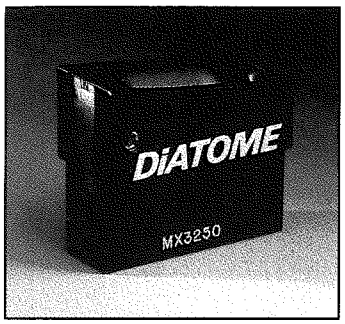
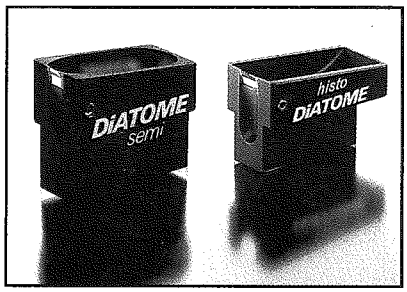


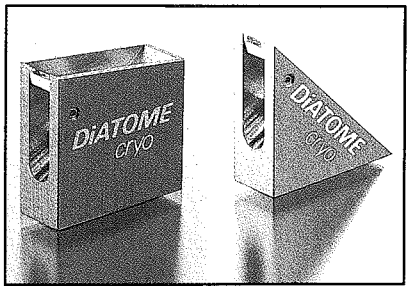
Ultrathin 30-150nm

45° standard



Semi thin 0.1-1µm, Histo 0.2-5 µm

35° for better stuctural preservation



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TEXAS SOCIETY FOR ELECTRON MICROSCOPY, INC.
JOURNAL
VOLUME 21, NUMBER 2, 1990
ISSN 0196-5662

Louis H. Bragg, Editor
Department of Biology, The University of Texas at Arlington, Arlington, TX 76019

Texas Society for Electron Microscopy, Inc.

"For the purpose of dissemination of research with the electron microscope."

ON THE COVER

TEM micrograph of carbon replica showing rodlets on crystals of calcium oxalate in Dougals fir litter from Utah.

Photo — Howard J. Arnott, Department of Biology, The University of Texas at Arlington, Arlington, TX 76019. (Magnification approximately 400,000 X.)

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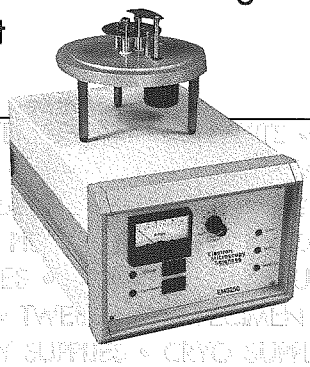
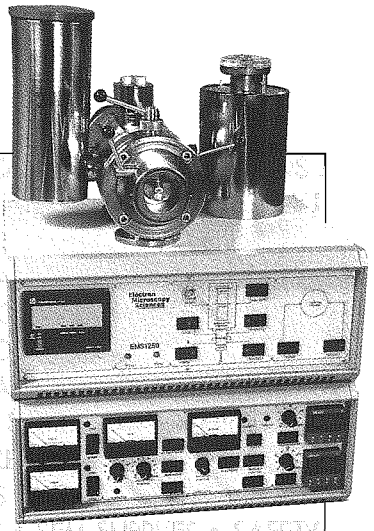


EMS 250-Carbon Coating Attachment



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President's Message

This October, in Galveston, TSEM is celebrating its 25th Anniversary at the Tremont House. I expect this to be a great meeting and anticipate seeing a lot of friends. A tremendous amount of time and effort has been put into planning the meeting, and most of it has been by Lynn Gray, the Program Director. Everyone will want to give her a big thanks.

I am anticipating good attendance at this meeting. We have had over twenty platform and poster abstracts submitted for presentation. This is a very good response. Something that I am especially excited about is a workshop to be conducted by Hal Hawkins, demonstrating the procedure for conjugating proteins to gold beads. There will also be special presentations concerning silver enhancement of gold, use of tissue culture cell lines as experimental models in EM, and the basis of how monoclonal and polyclonal antibodies are produced. In all, it should be a very informative meeting.

The success of TSEM for the last 25 years is due, to a large extent, to the work and enthusiasm of the members of the society. Some of the effort is obvious and is in the form of people accepting the various elected and appointed positions within the executive council. A lot of the effort is not so obvious, however. By this, I mean the effort of the general membership. They are the people that support the society by being active, attending meetings, presenting papers, and submitting articles for the *TSEM Journal.* It does not matter how hard the executive council works, or how good of a meeting is planned if no one attends. It does not matter how hard the *Journal* editor works if no one submits any articles. This last point is one that I have been personally associated with as the *TSEMJ* editor.

I have had the idea that the general membership does not feel it is worth their time and effort to prepare an article for the *Journal.* I do not agree with this. The *Journal* is only as good as the papers and information it contains, and the *TSEMJ* needs to contain more articles. It is interesting to look back through some of the past journals and see names like Charles Mims, Randy Moore, Hilton Mollenhauer, Bruce Mackay, Mannie Steglich and Hal Hawkins. These are people that have supported their society not only by serving on the executive council but by sending in papers to be considered for publication in the *Journal. Not every paper that is sent in makes it into the Journal,* but every one that is sent in is one way in which you are supporting your society.

If we want TSEM to prosper for another 25 years, then each one of us is going to have to support it in some sort of way. Each one of us is going to have to show our interest and enthusiasm in what TSEM represents.

Ronald W. Davis
President, TSEM, Inc.

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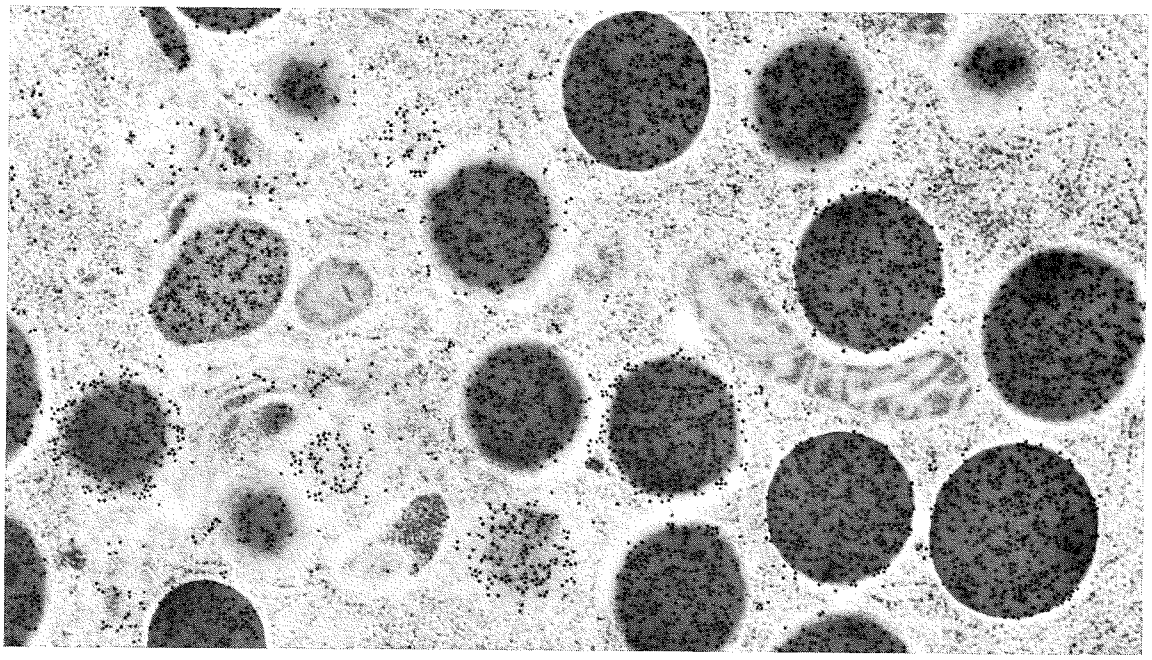

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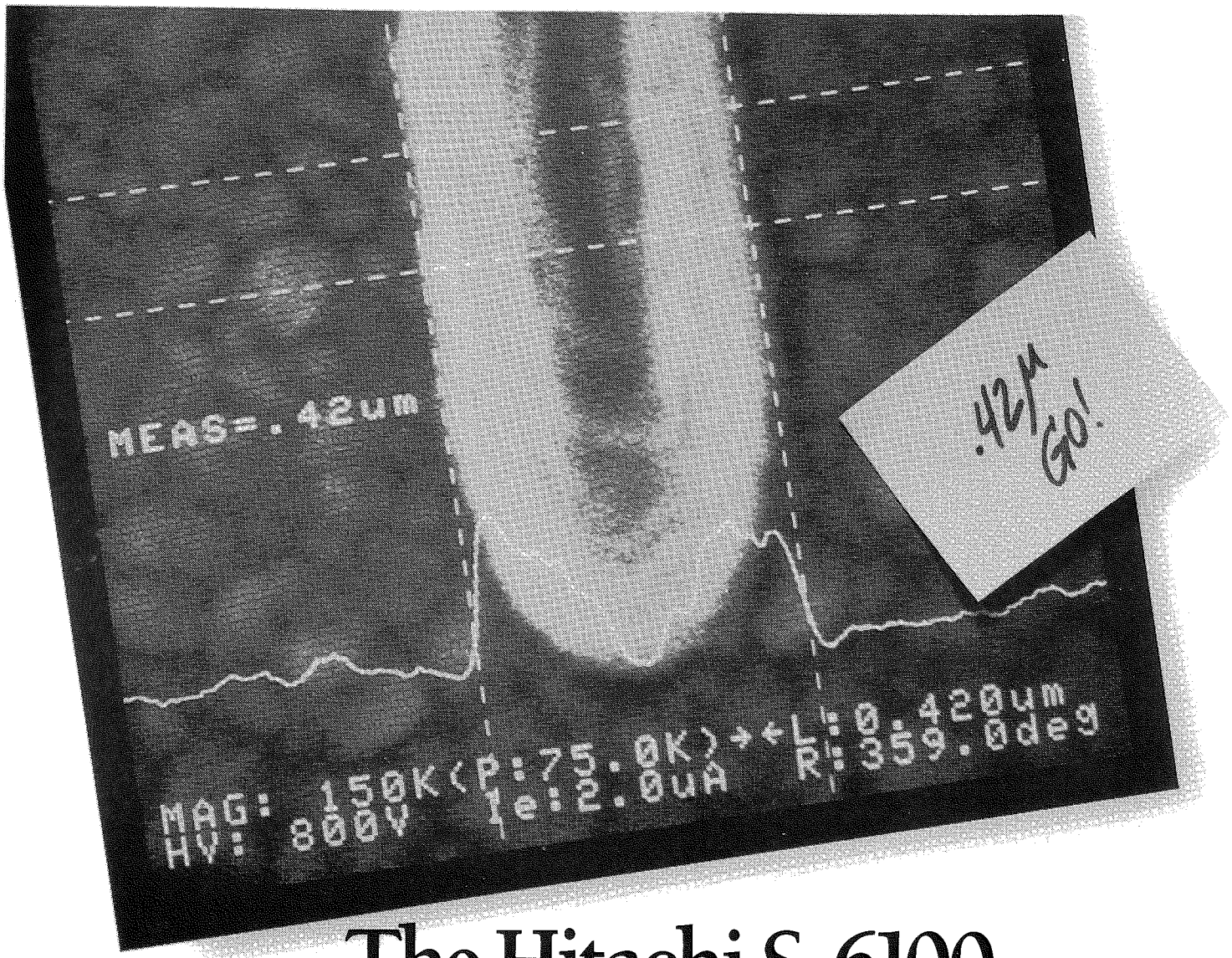
Treasurer's Report

TREASURER'S REPORT
For Period Ending 31 July, 1990

ASSETS ON 1 JANUARY, 1990:		
Certificate of Deposit No. 177576	$3,241.48	
Certificate of Deposit No. 10-0003893	2,492.19	
Checking Account No. 01600041996	1,626.76	$7,360.41
RECEIPTS:		
Arlington Meeting / Exhibitor Fees	$ 65.00	
Dues	2,010.00	
Kerrville Meeting Registration	910.00	
Kerrville Meeting / Exhibitor Fees	1,255.00	
Electron Diffraction Workshop	240.00	
Journal Ad Revenues 20:2	745.00	
Journal Ad Revenues 21:1	2,500.00	
Checking Account Interest	92.24	
Certificate of Deposit Interest	312.36	
Donations	337.23	$8,469.83
EXPENSES:		
Professional Services	$ 100.00	
Kerrville Meeting Expenses	3,180.33	
Student Travel	300.00	
Honorarium — Kerrville Meeting	200.00	
Electron Diffraction Workshop	203.76	
Journal Printing 21:1	2,014.10	
General Mailout / Secretary's Expenses	1,887.05	
Registration Refund	25.00	
Checking Account Service Charge	58.86	$7,969.10
ASSETS AS OF JULY 31, 1990:		
Certificate of Deposit No. 177576	$3,241.48	
Checking Account No. 01600041996	4,619.66	$7,861.14



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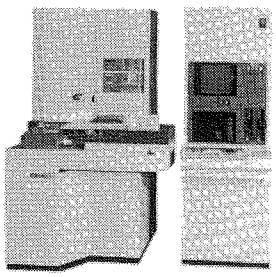

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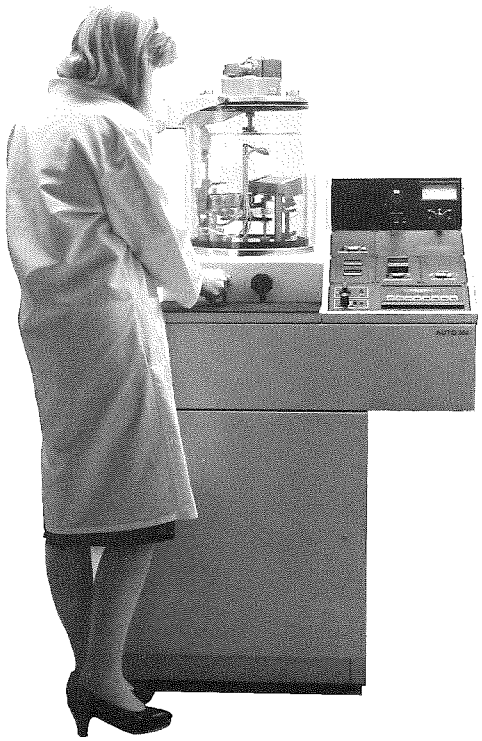
Buyers Guide to EM specimen preparation



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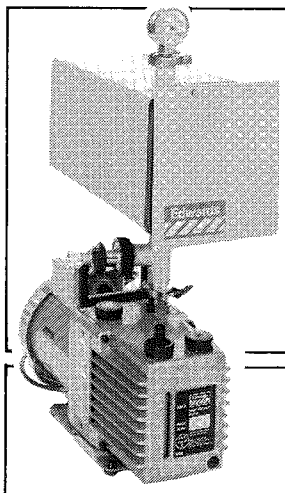

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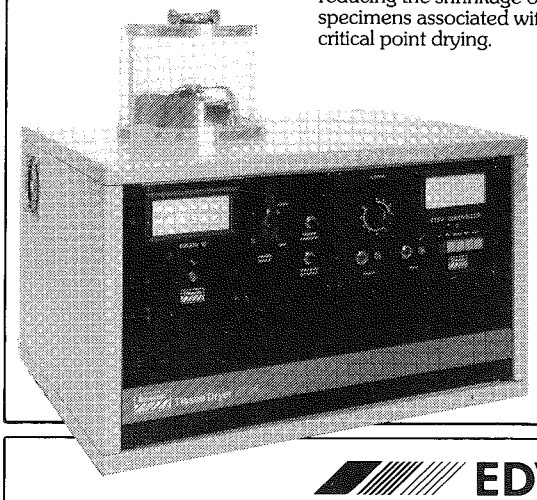

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TSEM By-laws

ARTICLE I - NAME

The name of the Corporation shall be the Texas Society for Electron Microscopy.

ARTICLE II - PURPOSE

This Corporation, henceforth referred to as the Society, is organized exclusively as a scientific and educational organization. The purpose of this Society shall be: (a) to increase and disseminate knowledge concerning the biological and physical applications of electron microscopy and related instrumentation, and (b) to promote free exchange of ideas and information among electron microscopists and interested participants. Not withstanding any other provision of these articles, this Society shall not, except to an insubstantial degree, engage in any activities, or exercise any powers that are not in furtherance of the purposes of this Society. No substantial part of the activities of the Society shall be the carrying on of propaganda, or otherwise attempting to influence legislation; and the Society shall not participate in, or intervene in (including the publishing or distribution of statements) any political campaign on behalf of any candidate for public office.

ARTICLE III - MEMBERSHIP

Membership in the Society shall be open to individuals who share the stated purpose of the Society. The Society shall consist of regular members, student members, corporate members, and honorary members.

An applicant, other than a corporate organization, having an interest in electron microscopy, may be considered for regular membership. An applicant enrolled in an undergraduate or graduate academic program will be considered for student membership. Students wishing to become more involved in the Society may elect to apply for regular membership. Any applying commercial organization having an interest in electron microscopy shall be considered for corporate membership. A corporate membership shall entitle that corporation to designate one representative who shall receive membership benefits as a regular member. Other representatives of the same organization may apply for regular membership to receive Society privileges. Honorary membership shall be restricted to: (a) distinguished scientists who are not members of the Society, but who have made significant contributions to this Society, (b) to Society members for extended and outstanding service to this Society, or (c) members who have completed a term as President of the Society.

Application for regular, student, and corporate membership shall be made to the Secretary who, with the approval of the Executive Council, shall report same at the next business meeting of the Society. A two-thirds vote of the regular members present shall elect applicants to membership.

Nominations for honorary membership may be made by any member of the Society. Nominations shall be made in writing to any member of the Executive Council and must be accompanied by written evidence of the nominee's eligibility. The member of the Executive Council shall present the nomination for consideration at the next meeting of the Executive Council. The Executive Council shall act upon the nomination within one year of its presentation and shall notify the nominator of the final action taken on the nomination.

Only members shall have the right to vote and to serve on committees. The right to hold elective office is restricted to regular members. Corporate members may exhibit at the Society's meetings (additional exhibition charges may be levied by the Executive Council). An honorary member shall be exempt from dues and shall be entitled to all privileges of regular membership. All members shall receive Society mailouts.

Membership dues for regular, student, and corporate members will be set by the Executive Council. Changes in dues shall be made by the Executive Council and notification of such shall be made by announcement at the fall meeting immediately prior to the year they go into effect. Dues shall become payable on January 1 of each year. Members whose dues remain unpaid by the spring meeting will be dropped from membership.

ARTICLE IV - OFFICERS

(A) Elected Officers

The elected officers of the Society shall be President, President-Elect, Immediate Past President, Secretary, Treasurer, Program Chairman, and Program Chairman-Elect. The President-Elect shall serve one year as such, the following year as President, and the following year as Immediate Past President. The Secretary shall be elected in even-numbered years and serve for a two year term. The Treasurer shall be elected in odd-numbered years and serve for a two year term. The Program Chairman-Elect shall serve one year as such, followed by one year as Program Chairman. The installation of incoming officers shall be at the spring meeting. All officers shall arrange for the orderly and timely transition of their offices within 30 days after the installation of officers. However, all officers shall continue until relieved by their successors. The duties of the officers shall be:

(1) PRESIDENT: shall preside at all business meetings of the Society and at meetings of the Executive Council. The President, or his designee may represent the Society at the annual meeting of the Electron Microscopy Society of America. The President shall conduct the business of the Society between Executive Council meetings.

(2) PRESIDENT-ELECT: shall assist the President, and substitute for him in his absence, and perform such duties as assigned by the President.

(3) IMMEDIATE PAST PRESIDENT: shall assist the President and the Executive Council, and shall keep those statistics of the Society as deemed necessary by the Executive Council.

(4) SECRETARY: shall maintain the records of the Society, other and financial, and distribute announcements to the membership.

(5) TREASURER: shall be custodian of the Society funds and shall account for them in accordance with accepted business practice. The Treasurer shall be bonded, and the cost of such shall be borne by the Society. The Treasurer shall have his records examined annually by an internal audit committee chosen by the Executive Council at the fall

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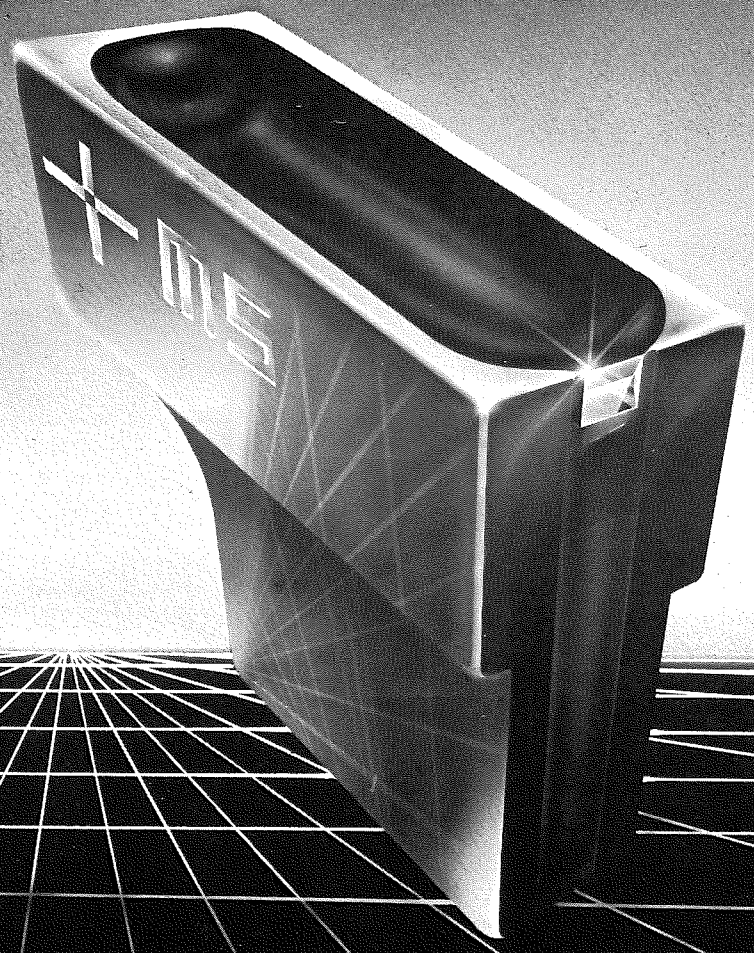

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meeting. A written report of the internal audit shall be presented to the Executive Council at the spring meeting.

(6) PROGRAM CHAIRMAN: shall be responsible for organizing the various scientific activities of the Society with the advice of the President. The Program Chairman shall not commit any funds of the Society unless authorized by the Executive Council or as authorized by the President and Treasurer.

(7) PROGRAM CHAIRMAN-ELECT: shall assist the Program Chairman and substitute for him in his absence and, additionally, extend the planning of programs into his own term of office as Program Chairman.

(B) Appointed Officers

The appointed officers of the Society shall be the Journal Editor, the Student Representative, and the Corporate Representative, who shall be appointed by the Executive Council.

(1) JOURNAL EDITOR: shall publish a Journal twice a year promoting the purpose of the Society, unless otherwise ordered by the Executive Council. The term of appointment shall be for two years and may be renewed.

(2) STUDENT REPRESENTATIVE: shall represent the student membership of the Society on the Executive Council. The term of appointment shall be for one year during which he is a student member in good standing.

(3) CORPORATE REPRESENTATIVE: shall represent the corporate membership of the Society on the Executive Council. The term of appointment shall be for one year.

Additionally, the officers of the Society shall perform the duties prescribed by the bylaws and, as appropriate, by the parliamentary authority adopted by the Society. No part of the net earnings of the Society shall incur to the benefit of, or be distributed to, its members, trustees, officers, or other private persons, except that the Society shall be authorized and empowered to pay reasonable compensation for services rendered and to make payments and distributions in furtherance of the purposes set forth in Article Two hereof.

ARTICLE V - MEETINGS

There shall be two scientific meetings per year: fall and spring, unless otherwise ordered by the Executive Council. Exact times and places of these meetings shall be designated by the Executive Council. A business meeting will be held at each scientific meeting of the Society. Parliamentary procedures to be followed in the business meeting shall be those specified in the current edition of *Robert's Rules of Order Newly Revised*. Ten percent of the regular members, or 35 members, whichever is smaller, shall constitute a quorum at a business meeting. The Secretary shall determine if a quorum exist and inform the President at the meeting, prior to actions requiring a vote. The presence or lack of a quorum shall be noted in the minutes.

ARTICLE VI- EXECUTIVE COUNCIL ✓

The Executive Council shall be responsible for the scientific and administrative obligations of the Society. It shall determine policies for the good of the Society in accordance with these bylaws; it shall plan scientific and business meetings; it shall authorize the expenditure of Society funds; and it shall conduct other duties as required for the benefit of the Society. The Executive Council shall meet prior to the business meeting at each scientific meeting of the Society. Special meetings of the Executive Council can be called by the President, and shall be called upon the written request of three elected members of the Executive Council.

At each fall meeting, the Executive Council shall appoint a Student Representative and a Corporate Representative, who shall represent the student and corporate membership respectively, the following year as voting members. The Executive Council shall also appoint Local Arrangements Chairman for each of the various meetings and in so doing shall duly consider the recommendations of the Program Chairman and the President. Local Arrangements Chairmen are ad-hoc, nonvoting members of the Executive Council.

Any member of the Society may attend the regular meeting of the Executive Council upon prior approval of the President or presiding officer.

The elected and appointed officers shall constitute the Executive Council. The President and three other elected officers, or the President-Elect and three other elected officers, shall constitute a quorum.

ARTICLE VII - FISCAL YEAR

The fiscal year of the Society shall run from January 1 to December 31 of each calendar year.

ARTICLE VIII - COMMITTEES

Standing or special committees shall be appointed by the President as directed by these bylaws, or as the Society, or the Executive Council, shall from time to time deem necessary to carry on the work of the Society. The President may appoint advisory committees at any time without prior consultation with the Executive Council. The President shall be an ex-officio member of committees except the Nominating Committee.

ARTICLE IX - ELECTIONS AND INTERIM VACANCIES

At the spring meeting each year the Executive Council shall appoint three regular members to serve on the Nominating Committee with the newly elected President-Elect and the Secretary. The Secretary shall serve as chairman of the Nominating Committee. The Nominating Committee shall nominate two candidates for each officer position becoming vacant that year. In preparing the slate of nominees, due consideration shall be given to the geographical area and fields of interest represented by the membership of the Society and to the nominee's previous participation in the Society's affairs. The Nominating Committee shall also ascertain the willingness of each nominee to serve if elected. The report of the Nominating Committee shall be announced to the Executive Council at the fall meeting of the Executive Council and then to the membership with the first announcement and call for abstracts for the spring meeting.

Additional nominations may be initiated by the membership by a petition to the Secretary, signed by a minimum of ten members. Such petitions must be received by the Secretary by eleven weeks prior to the spring meeting.

Ballots shall be mailed to members at least seven weeks prior to the spring meeting, and completed ballots shall be accepted by the President until fourteen days prior to the meeting of the Executive Council during the spring meeting. The Secretary and President shall independently count the ballots prior to the Executive Council Meeting, announce the results at the Executive Council Meeting, and at the spring business meeting, and in the next general mailout to the membership. Any member may examine the ballots at the spring business meeting.

The candidate receiving the largest number of votes shall be the winner. In the event of a tie vote, the Executive

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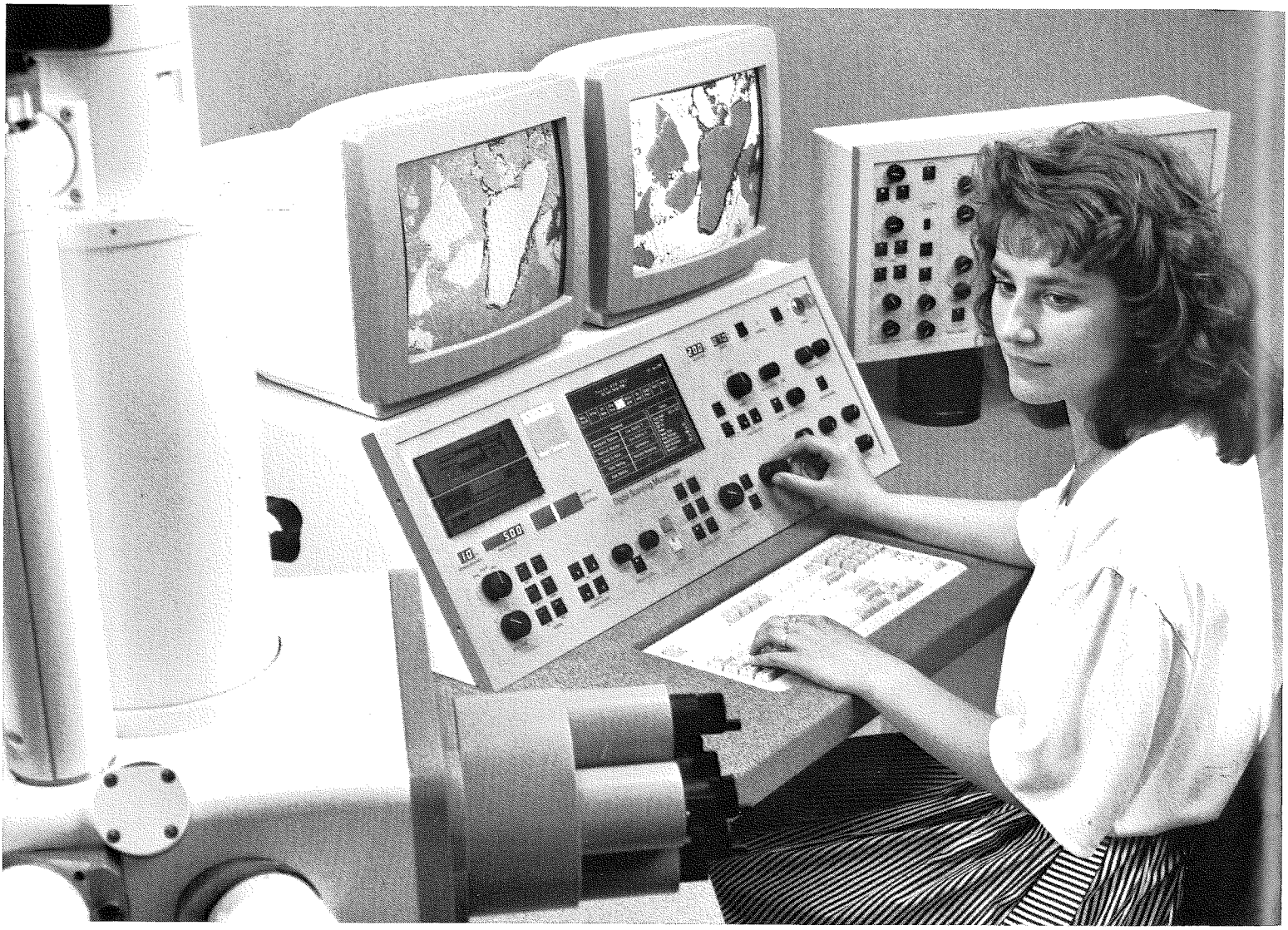

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Council shall decide the winner. The ballots may be examined by the Executive Council at the spring meeting.

A two-thirds vote of the entire membership of the Executive Council shall remove any officer or appointee derelict in their duties. The Executive Council shall accept resignations in good faith.

An interim vacancy in the presidency shall be filled by advancement of the President-Elect, who will go on to serve his anticipated terms as President and Immediate Past President. In the event there is no President-Elect to advance, the Executive Council shall elect one of its members as acting President to serve until the completion of the next regular election. An interim vacancy in the office of Program Chairman shall be filled by the Program Chairman-Elect, who will go on the serve his anticipated term as Program Chairman. If there is no Program Chairman-Elect to advance, the Executive Council shall appoint a Program Chairman to serve until the completion of the next regular election. Interim vacancies in the officers of Secretary or Treasurer shall be filled by appointment by the Executive Council until completion of the next regular election. Interim vacancies in the officers of Journal Editor, Student Representative, or Corporate Representative shall be filled by an appointment made by the Executive Council.

ARTICLE X - DISSOLUTION

Upon the dissolution of the Society, the Executive Council shall, after paying or making provision for payment of all the liabilities of the Society, dispose of all the assets of the Society to an organization exempt from taxes under Internal Revenue Code Section 501 (c) (3) to be used exclusively for the purposes of the Society in such manner, or to the Electron Microscopy Soceity of America. Any such assets, not so disposed, shall be disposed of by the Court of Common Pleas of the county in which the principal office of the Society is then located, exclusively for such purposes, or to such organization, as said court shall determine, which are organized and operated for such purposes.

ARTICLE XI- INDEMNIFICATION BY THE SOCIETY

The Society shall indemnify each member of the Executive Council, director, officer, person who is serving or has served at its request as a director, officer, or employee of another corporation, against expenses, in connection with the defense of any pending or threatened action, suit, proceeding, criminal or civil, to which he is or may be made a party by reason of being or having been such a member of the Executive Council, director, officer, or employee, provided that a determination is made:

(A) That he was not and has not been adjudicated to have been negligent or guilty of misconduct in the performance of his duty to the Society of which he is or was a member of the Executive Council, director, officer or employee;

(B) That he acted in good faith in what he reasonably believed to be in the best interest of the Society; and

(C) That, in any matter the subject of criminal action, suit or proceeding, he had no reasonable cause to believe that his conduct was unlawful.

The determination as to the foregoing matters with respect to each action, suit or proceeding shall be made:

(i) By a majority of the Executive Council of the Society acting at a meeting at which a quorum consisting of officers who are not parties to or threatened with such action, such officers vote; or

(ii) By independent legal counsel in written opinion, if such quorum cannot be obtained to vote on such indemnification, or even if obtainable, the officers qualified to vote so direct.

The termination of any action, suit or proceeding upon a plea of *nolo contendere* or its legal equivalent, shall not, of itself, create a presumption that any member of the Executive Council, director, officer or employee did not act in good faith in what he reasonably believed to be the best interest of the Society or had reasonable cause to believe that his conduct was unlawful. Expenses incurred by any person in defending any action, suit or proceeding may be paid by the Society in advance of the final disposition of such action, suit or proceeding as authorized by the Executive Council in the specific case upon receipt of an undertaking by or on behalf of such person to repay such amount unless it shall ultimately be determined that he is entitled to be indemnified by the Society. The indemnification provided in this Article shall not be deemed exclusive of any rights to which those seeking indemnification may be entitled under any regulation, bylaw, agreement, insurance policy purchased by the Society, vote of the members or otherwise, or of any other indemnification which may be granted to any person who has ceased to be a member of the Executive Council, director, officer or employee of the Society, and shall insure to the benefit of the heirs, executors, successors and administrators of such a person.

ARTICLE XII - AMENDMENTS AND PERIODIC REVIEW

Amendments to these bylaws may be initiated by individual members of the Executive Council, or by petition to the Secretary, signed by ten regular members of the Society. Amendments must be approved by a two-thirds majority of the Executive Council. The Secretary shall then be promptly submitted by mail to the membership for approval, with statements of support and/or opposition by the Executive Council. The ballots shall be accepted by the Executive Council for one month after the date of mailing. The Executive Council shall count the ballots; the amendment(s) shall be ratified if it received a favorable two-thirds majority of the votes cast. Any member may, if he so desires, be present at the counting of the ballots.

These bylaws shall be reviewed for amendment at regular intervals, not to exceed three years, by a committee of voting members of the Executive Council appointed by the President. The date of the latest review and/or amendment shall be stated in the last paragraph.

These bylaws were last reviewed and/or amended by vote of the Executive Council on 12 October, 1989.

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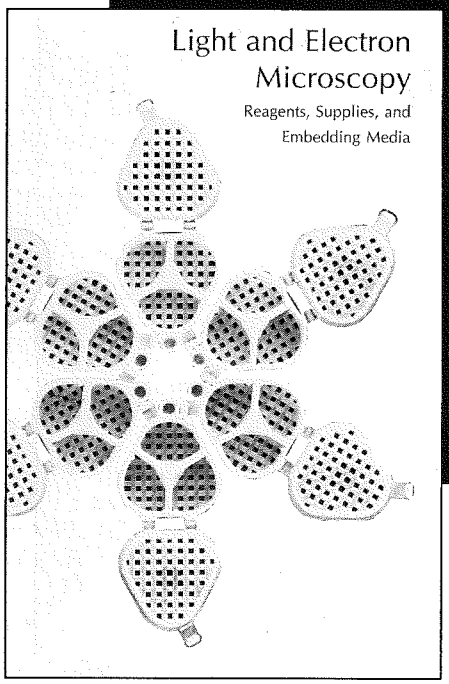

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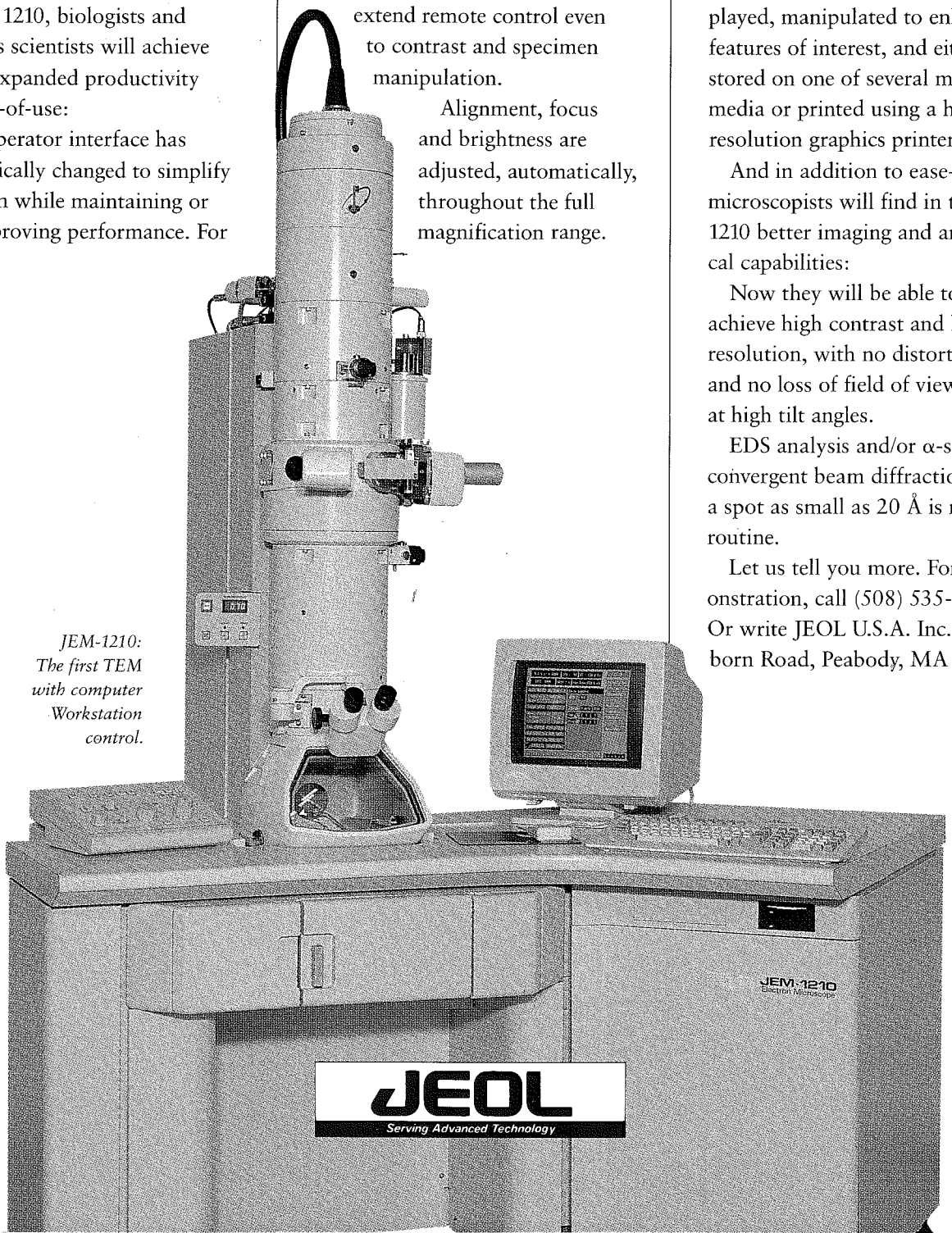

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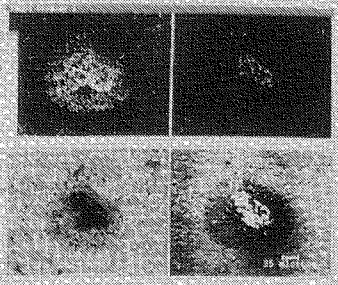

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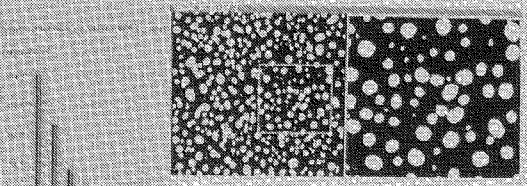

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Micrographs submitted for cover photos should be marked as such. The choice of photographs will be made by the editor. Photograph receipt and/or dispensation will not be acknowledged. Photographs will not be returned. Electron micrographs to be used for cover photos and text fillers are welcome and should be selected with some attention to aesthetic appeal as well as excellence both in technique and in scientific information content.

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News items should be submitted through the regional editor in your area and made to conform to the standard format used by the regional news section. Regional contributions should be sent to the Regional News Editor. Editorial privilege may be executed for the sake of brevity or to preserve the philisophical nature of the TSEM Journal.

The JOB OPPORTUNITIES section will be comprised of a "Jobs Available" and a "Jobs Wanted" sub-section. Anonymity of individuals listing in the Jobs Wanted or Jobs Available sub-sections may be maintained by correspondence routed through the Regional News Editor's office.

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The Technical Section will publish TECHNIQUES PAPERS, HELPFUL HINTS, and JOB OPPORTUNITIES. The TECHNICAL PAPERS will describe new or improved methods for existing techniques and give examples of the results obtained with methods. The format of the Technique Papers will be the same as that used for regular research reports. HELPFUL HINTS will be in the form of a brief report with an accompanying illustration, if required for clarity. Helpful Hints should embody techniques which will improve or expedite processes and/or procedures used in EM.

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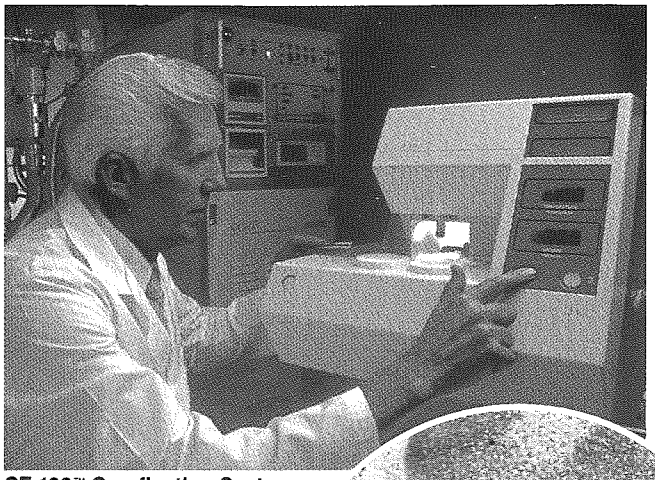

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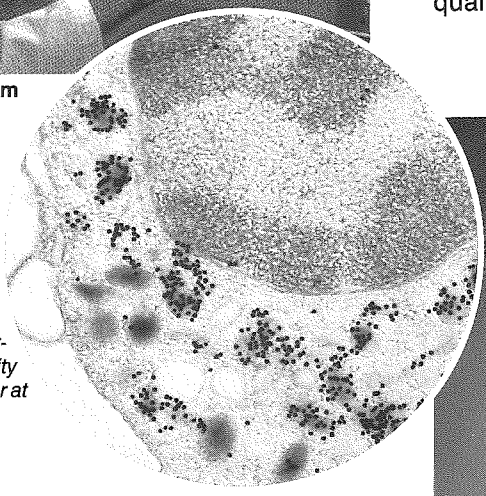

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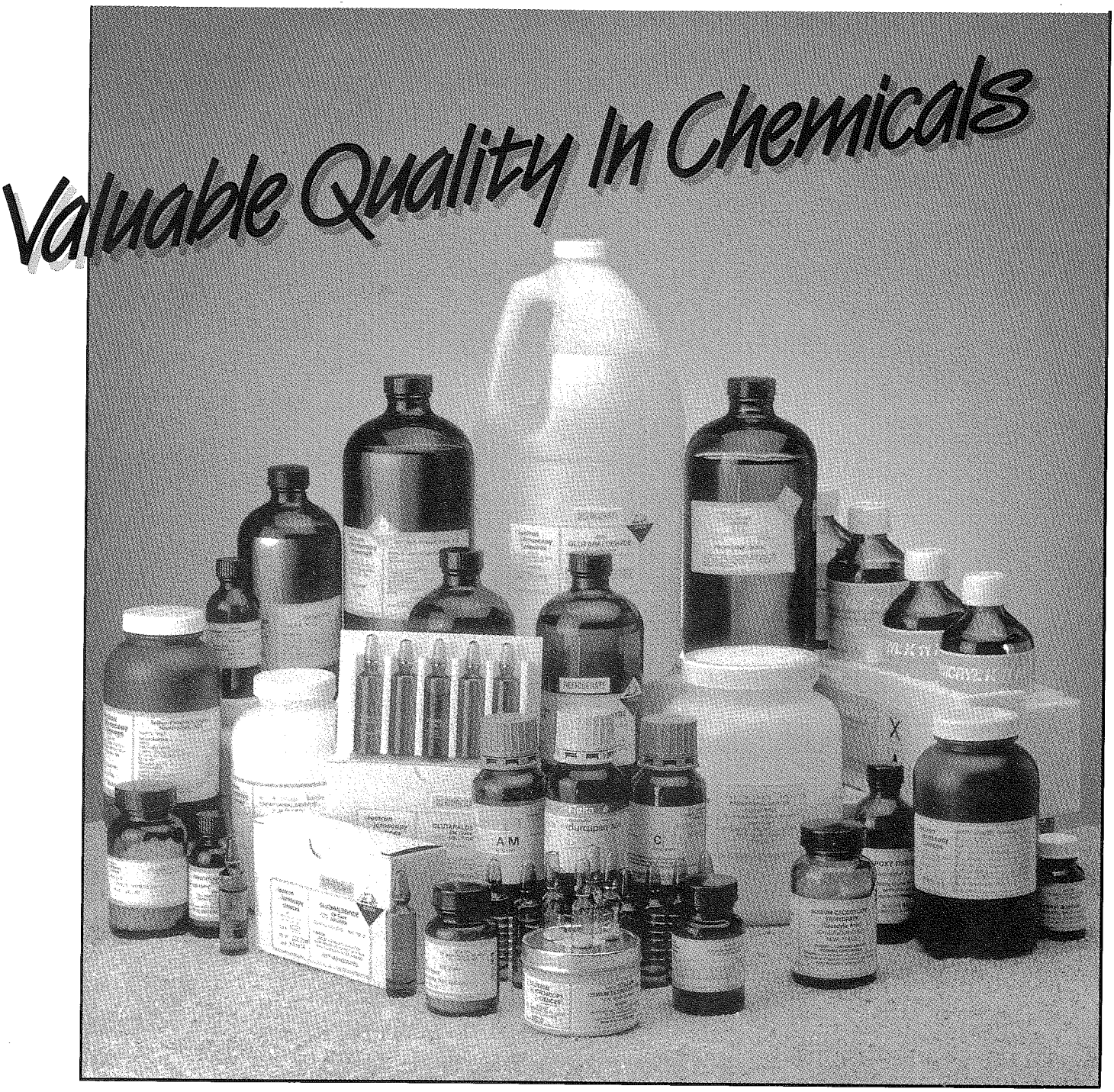

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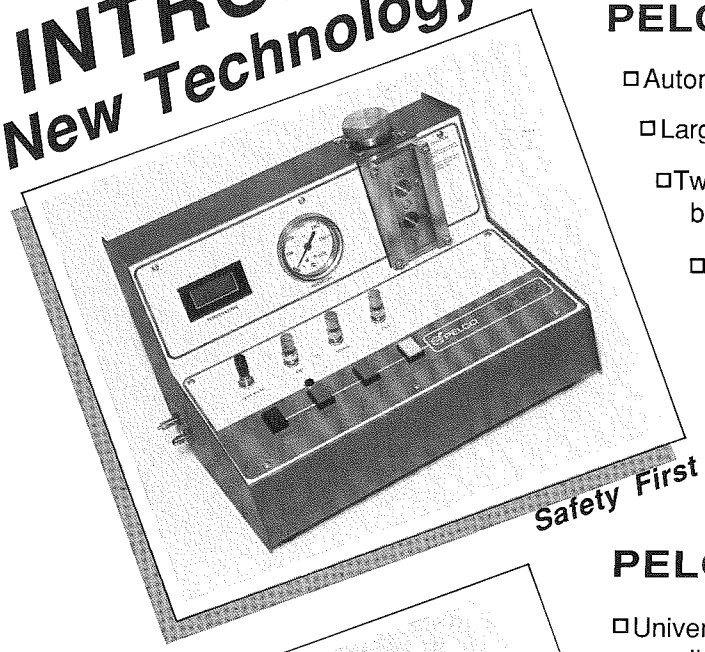

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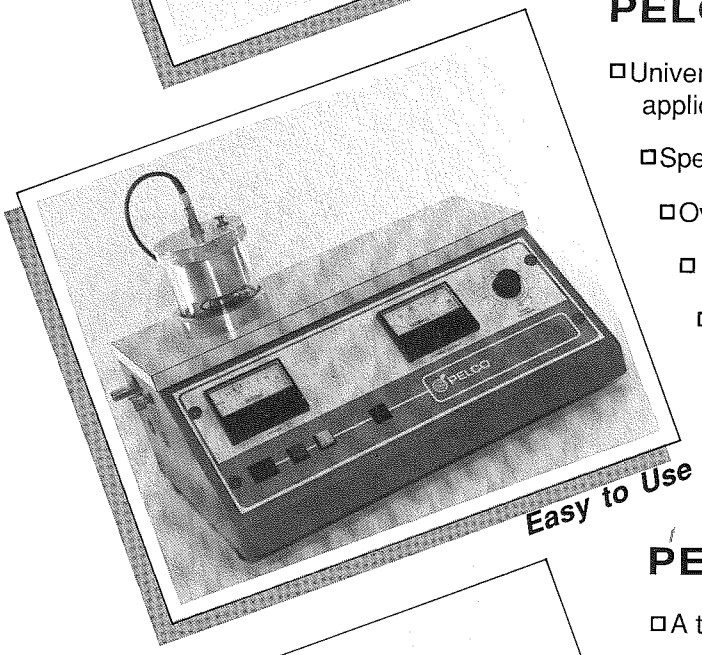

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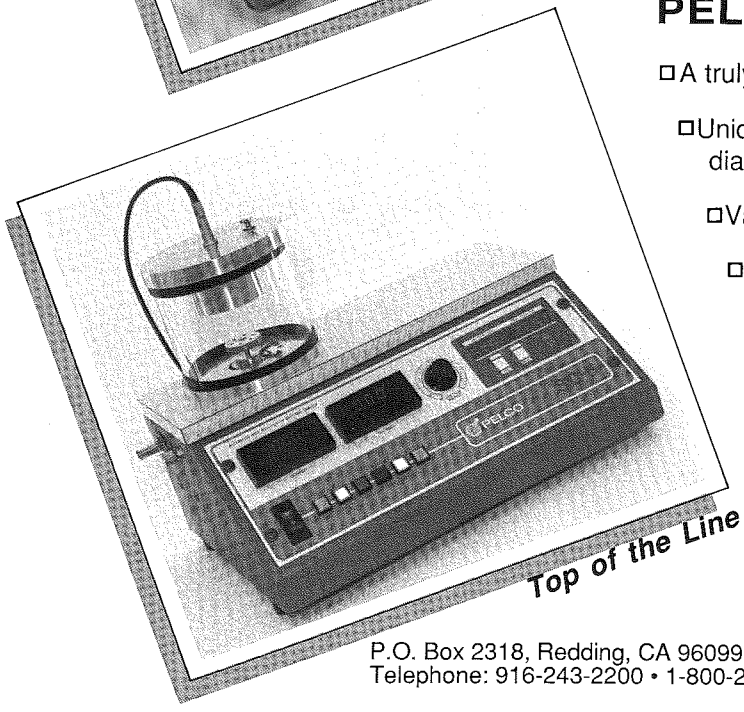

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Abstracts

BIOLOGICAL SCIENCES

PLATFORM PRESENTATION — WINTER 1990

THE CONTRIBUTION OF ELECTRON MICROSCOPY TO DIAGNOSIS OF PITUITARY ADENOMAS. STEVEN C. BAUSERMAN, M.D., Dept. of Pathology, Scott and White Clinic, Texas A & M University, Temple, Texas 76508.

The application of transmission electron microscopy to the study of pituitary adenomas has revolutionized the terminology and clarified many of our concepts regarding these fairly common, usually benign neoplasms. Radioassays for clinical assessment of the various hormones have both clarified and confused the issue of their hormone content. We present selected examples from the files of our clinic and some from the author's prior case material to illustrate the contribution of TEM as well as histochemistry and immunocytochemistry. Subsets of neoplasms including oncocytomas and plurihormonal neoplasms are presented including correlations with clinical and immunocytochemical data. We conclude that all pituitary adenomas should be studied by all of the available techniques in order to continue to develop our growing understanding of these fairly common neoplasms.

AN ELECTRON MICROSCOPIC EXAMINATION OF INTACT, NATIVE AND VORTEX-INDUCED AGGREGATED LOW DENSITY LIPOPROTEINS (LDL) AND ITS POSSIBLE CORRELATION WITH ATHEROSCLEROTIC PLAQUE LIPID. K.F. Klemp, J.R. Guyton, and M.P. Mims, Department of Medicine, Baylor College of Medicine, Houston, TX 77030.

While it has been observed that vortexing of low density lipoproteins (LDL) produced aggregated filamentous structures, the morphology of these aggregates has never been elucidated. The application of tissue techniques for lipid cytochemistry to fixed, agar-embedded aggregates reveals a morphology that bears a striking resemblance to structures observed in atherosclerotic plaques. Separation of these aggregates from the soluble fraction by centrifugation allowed determination of their biochemical composition and correlation with morphology. The four major components of an LDL particle are protein (PR), cholesteryl ester (CE), unesterified cholesterol (UC), and phospholipid (PL). Biochemical assays showed an incorporation of nearly all PR and CE into aggregates. Electron microscopic examination of the pellet showed a predominance of stringy aggregates containing many droplets (CE) and a flocculent material (PR). On the other hand, roughly one-half of all the PL and UC remained in solution. Electron microscopic examination of the concentrated supernatant confirmed our suspicion that phospholipid vesicles (PL + UC) were present. Extracellular lipid deposition in atherosclerosis shows distinct areas of either vesicles or droplets that may occur as a result of LDL perturbation.

STAGES OF FRUIT AND SEED DEVELOPMENT IN OXALIS DILLENII JACQ. Khalil G. Ghanem and Louis H. Bragg, Dept. Biology, University of Texas at Arlington, Arlington, TX 76019.

Electron microscopy was used to observe Oxalis dillenii fruits and seeds in various stages of development. Crystals were not observed in the fruits at any stage during development nor did the epidermal layer of the seeds in the earliest stages of development exhibit crystals. However, later in development crystals did appear in the epidermal layer and an increase in the size of the crystals occurred with the maturation of the seeds. At the latter stages of seed development the outermost portion of the epidermis was "sloughed off" leaving the innermost portion of the epidermis exposed with crystals deposited in each of the epidermal cells. The "sloughing off" of part of the epidermis of the seed coat during maturation has not been previously reported in Oxalis.

FINE STRUCTURAL ANALYSIS OF PECTINE IN THE SCORPION CENTRUROIDES VITTATUS Say. H. L. McCutchen and J. R. Stewart, Department of Biology, Kilgore College, Kilgore, Tx. 75662 and University of Texas at Tyler, Tyler, Tx. 75701

Pectines, unique to scorpions, are paired sensory structures arising from the ventral surface of the third opisthosomal segment. Pectines are equipped with three kinds of sensilla for chemo- and mechanoreception; they are peg sensilla, mechanoreceptive hair sensilla, and chemoreceptive hair sensilla. We describe for the first time the ultrastructure of peg sensilla of Centruroides vittatus and a new pectine chemoreceptive pit. The peg sensilla are cylindrical structures arising from a circular, bulbous base and their distal ends are fan shaped. A mechanoreceptive dendrite terminates with the base of the peg sensillum while several chemoreceptive dendrites are found in a lumenal space found in the shaft of the peg sensillum. The dendrites arise from neurons found within the dentes of the pectine. The chemoreceptive pit is a cuticular opening (pore) which leads to a chamber into which several dendrites extend. Sheath cells with microvilli surround the chamber. This pit resembles the tarsal organ as described on scorpion legs.

ARE CAUDAL LAMELLAE RESPONSIBLE FOR EYE DAMAGE IN ZYGOPTERANS? MELISA L. MOORMAN, Dept. of Biology, University of Texas at Arlington, Arlington, TX 76019.

Damselfly larvae exhibit a range of behavioral responses when faced with an opponent. One characteristic response observed during intraspecific encounters is slashing. A slash is defined as a rapid flex of the abdomen's first few segments causing the opponent to be struck by the subject's lamellae. The function of this behavior may be to displace the opponent, or it may actually cause harm to the opponent. Since the lamellae have spines along the margin and along the tracheal ridge, a slash directed towards a larva's head could result in damage to the large compound eyes. These organisms rely heavily on sight to capture prey and avoid predators.

In order to determine if eye damage occurs during intraspecific encounters, undamaged damselfly larvae were paired in a small chamber and video recorded for two hours to ensure that aggressive encounters had taken place. Following the two hour period the eyes were examined using scanning electron microscopy to observe damage. The caudal lamellae were also examined for broken and missing spines.

MORPHOLOGICAL STUDIES OF THE NYMPHAEACEAE: *BARCLAYA*, A SOUTHEAST ASIAN WATER LILY. PAULA S. WILLIAMSON, LA TITIA TAYLOR ODOMS, AND EDWARD L. SCHNEIDER, Department of Biology, Southwest Texas State University, San Marcos, TX 78666.

Barclaya Wallich is endemic to Southeast Asia. The genus is restricted to small, clear streams in areas of undisturbed rainforest jungles in Burma, Indonesia, Malaysia, and Thailand. The habitats of *Barclaya* are threatened because of the extensive destruction of tropical rainforests due to logging activities, establishment of agricultural plantations, and urban development. Four species are presently recognized: *B. longifolia* Wall., *B. motleyi* Hook. f., *B. kunstleri* (King) Ridley, and *B. rotundifolia* Hotta. Three of the species occur submersed in clear streams; *B. rotundifolia* occurs in muddy, swampy areas, along stream banks and produces aerial leaves. While some systematists include the genus in the water lily family (Nymphaeaceae), others segregate *Barclaya* into a separate family, the Barclayaceae. Several lines of evidence support the inclusion of *Barclaya* in the Nymphaeaceae, including: 1) the presence of foliar astrosclereids, 2) the occurrence of calcium oxalate crystals in the sclereid walls, 3) paired vascular bundles, 4) vascular bundles with protoxylary lacunae, 5) flowers with staminodia, carpellary appendages, and a stigmatic cup, 6) zonasulculate pollen, 7) laminar placentation, and 8) seeds with abundant perisperm.

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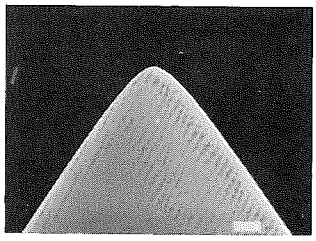
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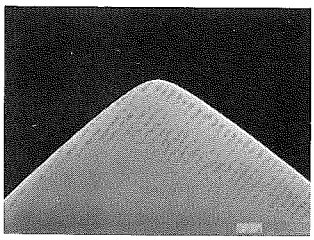
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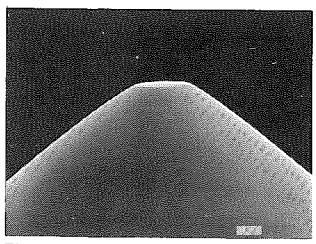
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ULTRASTRUCTURAL ANALYSIS OF SPORULATION MUTANTS OF ASPERGILLUS NIDULANS. T.C. SEWALL[1], C.W. MIMS[1], and W.E. TIMBERLAKE[1,2]. [1]Dept. of Plant Pathology and [2]Dept. of Genetics, University of Georgia, Athens, GA 30602.

Asexual sporulation (conidiogenesis) in the fungus Aspergillus nidulans is regulated by interactions between the brlA, abaA, and wetA genes. Ordered expression of these genes results in the formation of multicellular conidiophores each of which is composed of a foot cell, stalk, vesicle, a layer of metulae, a layer of phialides, and chains of conidia. Because brlA, abaA, and wetA mutants are defective at specific stages of conidiogenesis, it was possible to compare ultrastructurally development in mutant strains to wild-type strains to determine the effects of these genes on conidiophore differentiation. brlA and abaA affected conidiophore formation while wetA affected conidium maturation. brlA mutants produced indeterminate conidiophore stalks rather than vesicles and later structures. Examination of freeze-substituted conidiophores demonstrated that abaA mutants formed extended chains of metulae rather than functional phialides. This indicated abaA was responsible for controlling the pattern of nuclear division and wall deposition required for conidium production by phialides. Initial conidium formation was unaffected by the wetA mutation, however, these conidia underwent autolysis rather than maturation. Cytochemical staining for carbohydrates demonstrated that two crucial wall layers were not formed in wetA mutant conidia.

LOCALIZATION OF EXOGENOUS PROKARYOTIC DNA TAKEN UP BY SKELETAL AND CARDIAC MUSCLE CELLS IN VIVO. Rhoda Hamby, Tim Raabe, Ronald Walter, and Joseph Koke, Dept. Biology, Southwest Texas State University, San Marcos

To investigate the mechanism by which skeletal muscle cells take up and express exogenous prokaryotic nucleic acids, we isolated plasmid DNA pCH110, then denatured and exposed it to biotinamidocaproyl hydrazide in the presence of glutaraldehyde. The biotinylated DNA (bDNA) was retrieved by ethanolic precipitation and centrifugation, and biotinylation verified by gel eletrophoresis and staining of the bands with peroxidase conjugated avidin using diaminobenzidine (DAB) and H_2O_2. The bDNA was then dissolved in H_2O at 1μg/ml for injection into rat quadriceps, with 0.05% methylene blue added as a tracer for later tissue removal. 0.3 ml was injected at 5 locations in the quadriceps of an anesthetized rat; the muscle tissue surrounding and including the injection sites was removed 5, 10, 15, 30, and 60 minutes after injection and fixed in 4% paraformaldehyde. Additionally, rat hearts were hung on a multiple Langendorff apparatus and simultaneously perfused with Krebs-Hanseleit buffer containing 5μg/liter bDNA, then removed and fixed at identical intervals as the skeletal muscle. After fixation, the specimens were vibratome sectioned at 70 μm and the sections then incubated in ferritin-avidin or peroxidase-avidin solutions. Sections treated with peroxidase-avidin were reacted with DAB and H_2O_2 followed by silver intensification. The vibratome sections were then refixed and processed for electron microscopy. Thin sections revealed many electron dense, ferritin positive and peroxidase positive objects in the cytoplasm of myocytes and capillary endothelia, and bound to the surface membranes of myocytes. These objects frequently appeared as electron dense circles with a filamentous interior. Thus, preliminary indications are that both skeletal and cardiac muscle took up the bDNA and that these methods are useful for localization of exogenous DNA in tissue.

DETECTING MOISTURE CONTAMINATED ELECTRON MICROSCOPE FILM. R.E. DROLESKEY AND H.H. MOLLENHAUER, USDA, ARS, Food Animal Protection Research Laboratory, Rt. 5 Box 810, College Station, TX 77840.

Over the past one and a half years our laboratory has encountered two instances of defective transmission electron microscope sheet film. The defect, which was initially interpreted from micrographs as having resulted from a beam damaged section, was manifested as a splotchiness or uneven appearance over the micrograph. In both instances an entire box of film, one hundred sheets, was found to be defective. Samples of film were returned to the manufacturer for analysis. The defect was determined to have been the result of absorption of water by the film's emulsion. Since supplies of unexposed film are usually stored at refrigerated temperatures which increases the chances of moisture contamination upon removal from such temperatures, a method to detect moisture contaminated film was desirable. It was determined that unexposed film could be inspected for moisture contamination by simply exposing film to normal room lights. The splotchiness or unevenness, characteristic of moisture contamination, became visible after a 45-60 min exposure.

HISTOCHEMISTRY OF OXIDASE ACTIVITIES IN RAT MYOCARDIUM DURING ISCHEMIA AND REPERFUSION. Colene Drace, and Joseph R. Koke, Dept. Biology, S.W.T.S.U., San Marcos, 78666.

Rat hearts were subjected to 15 minutes of regional ischemia and up to 3 hours reperfusion, with or without exogenous free radical quenchers, superoxide dismutase (SOD) and catalase (CAT). Histochemical techniques for peroxidases, peroxides, and xanthine oxidase (XO) using diaminobenzidine with silver intensification were applied to vibratome sections of these hearts. Peroxidases were localized in myocyte peroxisomes, and were unaffected by ischemia-reperfusion or SOD & CAT. Peroxides were found most frequently after reperfusion without SOD & CAT, in membranes of the capillary endothelium, the sarcolemma, and the sarcoplasmic reticulum. XO activity was not observed prior to ischemia, but was found after 15 minutes of ischemia and more intensely after 30 minutes of reperfusion in capillary endothelial cells with lesser amounts in the interstitial spaces and myocytes. SOD & CAT had no effect on XO activity apparent after ischemia (without reperfusion), but reduced the activity seen following reperfusion, suggesting intensification of XO activity during reperfusion resulted from radical induced lipid peroxidation. No XO activity was seen in tissue treated with allopurinol. Thus in the rat heart, radical formation and peroxidation occur upon reperfusion after ischemia in the myocytes and capillary endothelia, XO forms during ischemia and contributes to radical formation, and exogenous SOD + CAT quench both intra- and extracellular radicals.

A SURVEY OF CALCIUM OXALATE CRYSTALS ON THE HYPHAE OF LITTER FUNGI. V. L. BLACKMON and H. J. ARNOTT, Department of Biology, The University of Texas at Arlington, Arlington, TX 76019-0498.

This work is part of an investigation designed to study the relationship between the structure of calcium oxalate and its effect on the structure and function of fungi. We will provide an overview of the different kinds of calcium oxalate crystals found at 29 sites in the Southwestern United States. Litter samples were collected under pine and/or juniper trees and examined using both LM and SEM. Crystals which appear to be calcium oxalate were found on the hyphae of fungi at 27 of the 29 sites. The morphology of most crystals fell into two basic types. Elongate, "raphide-like" crystals in 13 cases and multi-interpenetrant twin, "druse-like" crystals in 11 cases. Each collection site seemed to be characterized by one or the other type. Clear examples of mixtures were not found. In addition to fungal hyphae with either the raphide-like or druse-like characteristics, three sites produced "blistered" hyphae and other anomalous structures. Based on comparisons with the illustrations in the literature, the crystals are most likely calcium oxalate dihydrate (weddellite). While the collections examined could be easily classified as raphide-like or druse-like, considerable variation was apparent. Druse-like clusters varied between 0.2 micrometers and 6 micrometers in diameter. Raphide-like structures varied between 0.3 micrometers and 2 micrometers in length and furthermore often varied in their length/width ratios.

EXTRACELLULAR LIPID ACCUMULATION IN THE EARLY STAGES OF ATHEROGENESIS OF HYPERLIPIDEMIC RABBITS. K.F. Klemp and J.R. Guyton, Department of Medicine, Baylor College of Medicine, Houston, TX 77030.

The earliest reported atherosclerotic event in cholesterol-fed, hyperlipidemic rabbits is the accumulation of extracellular vesicle-like structures in the subendothelial space. These uni-lamellar or multi-lamellar structures, referred to as extracellular liposomes (EL) were believed to consist of phospholipid lamella rich in unesterified cholesterol. Circulating beta-very low density lipoproteins (β-VLDL) in the blood that have been transcytosed by the endothelium are thought to be the origin of the EL. β-VLDL particles contain cholesteryl ester (CE) as their most abundant lipid component, but the presence of CE in the EL has not been established previously. Lipid cytochemistry for this neutral lipid using the osmium-tannic acid-paraphenylenediamine (OTAP) technique developed in our laboratory revealed an abundance of CE in these lipid-rich areas. Neutral lipid is found extracellularly within the confines of the irregularly-shaped lamella of the EL, as well as in smooth, round droplets of smaller distinct pockets of lipid reminiscent of human atherosclerotic plaques. The findings confirm the extracellular accumulation of CE as well as unesterified cholesterol in early rabbit atherosclerosis. The notion that β-VLDL are the source of the lipid is supported.

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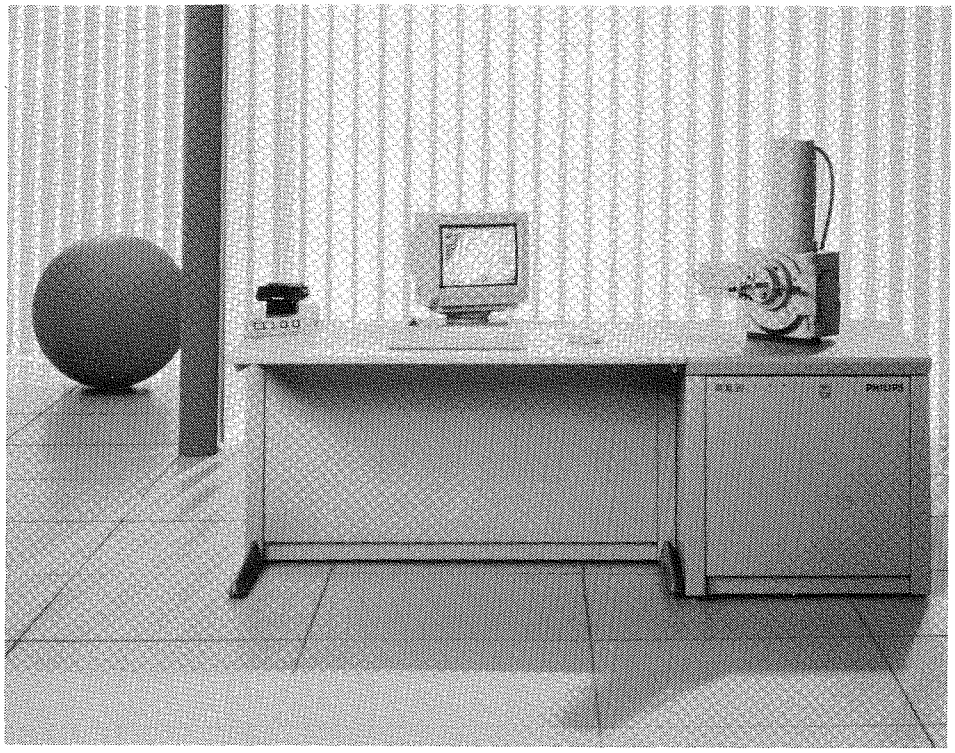

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THE PRESENCE OF BASEMENT MEMBRANE COMPONENTS IN HAMSTER TRACHEAL EPITHELIAL CELL CULTURES. P. C. MOLLER, J.S. BERGMANN, M.J. EVANS, B.W. WEAVER, R.L. GIVENS, T.N. BLANKENSHIP, DEPTS. OF HUMAN BIOLOGICAL CHEM. AND GENETICS, INTERNAL MEDICINE, AND ANATOMY & NEUROSCIENCES, UNIVERSITY OF TEXAS MEDICAL BRANCH AND THE SHRINER'S BURNS INSTITUTE, GALVESTON, TX 77550.

The basal surfaces of most epithelial cells rest upon a specialized portion of the extracellular matrix, the basal lamina or basement membrane. EM examination of 21 and 28 day cultures of enzymatically dissociated hamster tracheal epithelial (HTE) cells grown on collagen coated millipore filters reveals that fragments of basal lamina may be present at the basal plasmalemma. Since basal lamina consists of 3 major components: type IV collagen, laminin & proteoglycans, questions naturally arise concerning the presence of such a structure in this cell culture system. The presence of the basal lamina protein laminin would indicate that HTE cultures, like their in vivo counterparts, may be capable of basal lamina assembly. When immunocytochemical procedures utilizing anti-laminin and PAP techniques are carried out with paraffin sections of HTE cultures at 7, 14, 21 and 28 days in vitro, LM analysis reveals that a thin, dense line of reaction product is present between the basal surface of the HTE cells and the underlying collagen substrate. Immunoblotting evaluation carried out with 7d HTE cultures and HTE cell conditioned media also suggest that laminin is being produced by the tracheal cells. Thus, the presence of basal lamina-like fragments, the immunocytochemical localization of laminin, and immunoblot identification of laminin in hamster tracheal epithelial cell cultures, suggest that, although basal lamina components may be produced by HTE cells, at the time points tested they are not yet being organized into a complete basal lamina. To the best of our knowledge, this represents the first report of laminin production by respiratory tract epithelial cell cultures. (Supported by grant #15876, #15813 and #15853 From The Shriners of North America).

TUMORS OF THE PERIPHERAL NERVE SHEATH. Bruce Mackay and Nelson G. Ordonez. University of Texas M.D. Anderson Cancer Center, Houston, Texas 77030.

In order to confirm that a soft tissue sarcoma is derived from or is showing differentiation towards cells of the peripheral nerve sheath, visual evidence of origin of the tumor from a peripheral nerve is generally deemed necessary, although it may be suspected or inferred if the patient has neurofibromatosis. Light microscopy is helpful when nuclear palisading is well developed, but it is often poorly defined or absent in the malignant tumors and can be seen in some other soft tissue sarcomas, notably leiomyosarcomas. About half of peripheral nerve sheath sarcomas show immunoreactivity for S-100 protein. The focus of this presentation will be on the ultrastructural features of the tumors and the role of transmission electron microscopy in establishing or confirming the diagnosis. Most tumors of the peripheral nerve sheath are of schwann cell derivation and only a small number show perineurial cell differentiation. The fine structure of schwannomas and neurofibromas is consequently extremely useful in defining criteria for the identification of the sarcomas. The most distinctive features are the extremely long cell processes which may contain longitudinally-aligned microtubules, and the formation of mesaxons. Long-spacing collagen is common in the benign tumors but infrequent in sarcomas. Dense-core granules are uncommon. The ultrastructural findings will suggest or confirm the diagnosis in a considerable number of cases that lack specific gross or light microscopic characteristics, and they are useful in excluding from the differential diagnosis other types of soft tissue sarcomas that can not be ruled out by routine light microscopy. The data from electron microscopy in turn helps to define the range of the light microscopic morphology of the tumors.

A COMPARISON OF BLEPHAROPLAST MORPHOLOGY IN TREUBIA TASMANICA AND HAPLOMITRIUM GIBBSIAE (HEPATICAE). Ann E. Rushing and Zane B. Carothers. Department of Biology, Baylor University, Waco, TX 76798-7388 and Department of Plant Biology, University of Illinois, Urbana, IL 61801.

An ultrastructural analysis of blepharoplasts of Treubia tasmanica Schust. et Scott and Haplomitrium gibbsiae (Steph.) Schust. reveals a morphology distinct from all other bryophytes studied thus far. The multilayered structure is similarly constructed in both genera. Both have extremely wide splines, comprising up to as many as 104 microtubules in T. tasmanica and 90 in H. gibbsiae at their widest points. Microtubules are added gradually to both margins from a more narrow anterior. A major distinguishing feature of the Haplomitrium spline is its 2-step, asymmetrical widening. The lamellar strips in both have an elongated, curved drop-shape outline. The spline aperture is open in both and is situated to the left of the spline's mid-line. Both basal bodies also are situated left of the spline's midline, with the posterior basal body following the curved left margin and the anterior basal body situated near the spline aperture. The implications of the findings in these two genera are two-fold. First, although other morphological differences preclude their placement in the same order, their very unusual blepharoplast morphologies support their placement in orders (Treubia in the Treubiales and Haplomitrium in the Calobryales) distinct from other liverworts. Second, present data strongly suggest an affinity between the two genera and their orders.

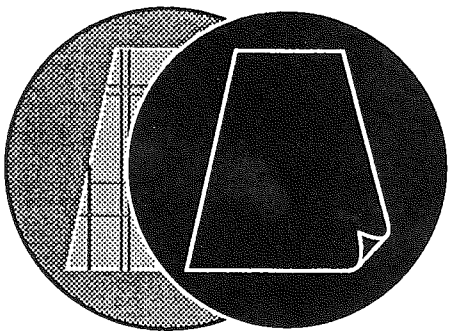
BIOLOGICAL SCIENCES

POSTER PRESENTATION — WINTER 1990

COMPARISON OF EPIDERMAL LANGERHANS CELLS AND LYMPH NODE DENDRITIC CELLS OF C3H MICE AFTER FITC CONTACT SENSITIZATION

Junmin Tang, Corazon D. Bucana, Kenneth Dunner Jr., Patricia Cox and Margaret L. Kripke, Department of Immunology, The University of Texas, M.D. Anderson Cancer Center, Houston, TX, 77030

Langerhans cells (LC) are antigen presenting cells that normally reside in the epidermis. They are dendritic and belong to the macrophage-monocyte series. LC and lymph node dendritic cell (DC) present similar ultrastructural features except for the presence of Birbeck granules in epidermal LC. Exposure of C3H mice to the contact sensitizer, FITC, was characterized by an increase in dendritic cells in the draining lymph node (DLN). Many of these dendritic cells were fluorescent. Thus, it was suggested that fluorescent DC in DLN may be epidermal in origin. The purpose of this investigation is to compare the ultrastructure of epidermal LC and fluorescent DC after contact sensitization. C3H mice were exposed to FITC by painting the shaved abdomen with a solution containing 0.5 % FITC in a solvent composed of equal volumes of acetone and dibutyl phthalate. Skins from the painted area and the DLN were removed 18 hours later. Abdominal skins and lymph nodes from unexposed animals were used as controls. Skins were processed for TEM. Cell suspensions were prepared from DLN and enriched for DC by Ficoll-Hypaque centrifugation. DC were allowed to adhere to poly-L-lysine coated coverslips and processed for TEM. Epidermal LC were found at the basal and suprabasal portion of the epidermis. LC were identified by the presence of Birbeck granules (BG) in the cytoplasm. BG are pentalaminar organelles that exhibit an electron dense lamina sandwiched between two distinct membrane bilayers. The middle lamina often showed periodicity. BG were seen contiguous with the plasma membrane. Occasionally BG assume a tennis racket appearance. 41% of the LC contain BG in normal mice, whereas in FITC painted skin, 58% of the LC contain BG. Very few lymph node DC from normal mice contained BG. DC obtained from FITC sensitized animals also showed rod shaped BG. In addition, many BG-like structures were seen in the cytoplasm. BG-like structures consisted of aggregates of rod and/or curvilinear bilayer sandwich. They differ from BG of epidermal LC in the thickness of the bilayer and the apparent lack of periodicity of the middle lamina. The presence of BG-like structures in the FITC sensitized animals may suggest the epidermal origin of these cells. Ongoing studies are aimed at localizing FITC in lymph node DC.



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MATERIALS SCIENCES

PLATFORM PRESENTATION — WINTER 1990

EFFECT OF UVB-IRRADIATION AND FITC CONTACT SENSITIZATION ON EPIDERMAL LANGERHANS CELLS AND LYMPH NODE DENDRITIC CELLS
Junmin Tang, Corazon D. Bucana, Kenneth Dunner Jr., Patricia Cox and Margaret L. Kripke,Department of Immunology, The University of Texas M.D. Anderson Cancer Center, Houston, TX, 77030

UVB irradiation induces systemic suppression of the contact allergy response. UVB irradiation of shaved mouse skin causes a marked diminution in the number of ATPase positive epidermal Langerhans cells and alters antigen presenting activity of dendritic cells in the DLN. It was shown previously (see separate poster) that FITC contact sensitization increases the number of dendritic cells (DC) in the draining lymph node (DLN) of unirradiated mice. The purpose of this study was to determine the effect of UVB irradiation on the ultrastructure of epidermal LC and lymph node DC with and without FITC sensitization. Four groups of animals were studied: normal unexposed (NR), FITC-sensitized (FITC), UVB-irradiated (UVB), and UVB-irradiated, FITC-sensitized (UVB-FITC). C3H mice were exposed to UVB radiation from a bank of six unfiltered FS40 sunlamps on 4 consecutive days for 60 sec each day. The dose of UVB received by mice during one exposure was 240J/m². Abdominal skins were obtained and epidermal sheets were prepared for immunocytochemistry and routine TEM. DC from DLN were prepared for TEM, immunocytochemistry and flow cytometry. ATPase staining of epidermal sheets showed that UVB radiation decreased the number of epidermal LC from 605+96 to 145+38/mm². FITC contact sensitization (18 hours) increased the number of epidermal LC in both normal and UVB-irradiated groups. This was confirmed by electron microscopy. Very few LC were observed in the UVB-treated groups, and Birbeck granules were rarely seen. In contrast, flow cytometry of DLN suspensions showed an increase in dendritic cells in FITC-painted groups compared to the unsensitized group. Many dendritic cells were fluorescent. Electron microscopy showed that Birbeck granules of LC from DLN of normal and UVB-irradiated animals occurred as "single-rod-shaped" or "tennis-racket-shaped" granules, whereas BG from FITC-painted groups were sometimes seen in clusters. Few BG were present in the dendritic cells from UVB-FITC mice. These results suggest that an alteration in BG may be related to the impaired antigen presenting function of LC and DLN cells following UVB irradiation.

FACTORS AFFECTING THE IMMUNOELECTRON MICROSCOPIC LABELING OF CARBONIC ANHYDRASE IN HUMAN ERYTHROCYTES.
R. CHIOVETTI, G. L. KRANNIG AND S. A. LIVESEY, LIFECELL CORPORATION, 3606-A RESEARCH FOREST DRIVE, THE WOODLANDS, TX 77381

The aim of this study was to investigate the effects of various processing and embedding procedures on the immunolocalization of carbonic anhydrase C in human erythrocytes. Erythrocytes were isolated from normal human blood by centrifugation and prepared by various methods using different fixation and embedding combinations. Cells were either processed by chemical fixation or cryofixed and processed by freeze-substitution or molecular distillation drying. The specimens were embedded in Lowicryl or Spurr resin. Thin sections were labeled using a streptavidin-colloidal gold technique. The concentration of antibodies and reagents were kept constant in all labeling procedures. Labeling intensities (gold particles/μm^2) indicated that cryofixation, drying and vapor stabilization with OsO_4 gave optimal labeling (161.5). Cryofixation and freeze-substitution in acetone/uranyl acetate/OsO_4 yielded labeling (2.1) which was comparable to conventional, room-temperature processing (2.8). Aldehyde fixation and Lowicryl K4M embedding gave intermediate labeling intensity (13.1). Aqueous fixation and organic solvents may induce conformational changes in this water-soluble (hydrophilic) enzyme, thereby rendering it unrecognizable by the specific primary antibody. If erythrocytes are suitably processed by cryofixation, drying, vapor stabilization and embedding, it is possible to localize this hydrophilic enzyme with intensity and specificity, even in sections of a hydrophobic resin such as Spurr.

IMAGING OF $BaCuO_2$ IMPURITY IN SOLUTION-GROWN $YBa_2Cu_3O_{7-\delta}$.
D.C. Dufner, R.A. Mohan Ram,* and A. Clearfield,* Electron Microscopy Center, *Department of Chemistry, Texas A&M University, College Station, Texas 77843.

There has been considerable effort expended to prepare the $YBa_2Cu_3O_{7-\delta}$ (1-2-3) superconductor by low-temperature methods in order to obtain a more homogeneous mixture resulting in products with superior superconducting properties. In this work, TEM was used to characterize the microstructure of these materials as a function of various processing parameters. The precursors for the (1-2-3) superconductors were prepared by precipitating hydroxides of Y, Ba, and Cu and heating the precipitates at various temperatures in the 750-930°C range for 12-60 hours in flowing O_2. Crystals for electron microscopy were crushed, suspended in acetone, and dispersed onto holey carbon grids. TEM characterization was carried out on the Philips 400T operating at 120kV or on the JEOL 2000FX at the Texas Center for Superconductivity at the University of Houston.

In this investigation, one of the impurity phases was observed and identified as $BaCuO_2$. Although $BaCuO_2$ is usually observed as an impurity in the solid state synthesis of the (1-2-3) superconductors, its occurrence as a result of low-temperature precursor preparation is interesting. We present here the identification of this crystalline phase by electron diffraction, high resolution imaging, EDS, and image simulation.

PROBING THE CHEMISTRY AND SPECTROSCOPY OF RADIATION SENSITIVE POLYMERS BY PARALLEL-DETECTION EELS.
E.G. Rightor and G.P. Young, Dow Chemical U.S.A. Freeport, TX 77541

Investigation of neat polymers is often thwarted by their sensitivity to the electron beam, which also limits the usefulness of chemical and spectroscopic information available by electron energy loss spectroscopy (EELS). However, efficient parallel-detection EELS systems allow reduced radiation damage promoting their use for polymer studies. This method will be briefly described and its utility demonstrated for the identification of beam sensitive components in a polymer blend and detailed study of near-edge transitions for homopolymers.

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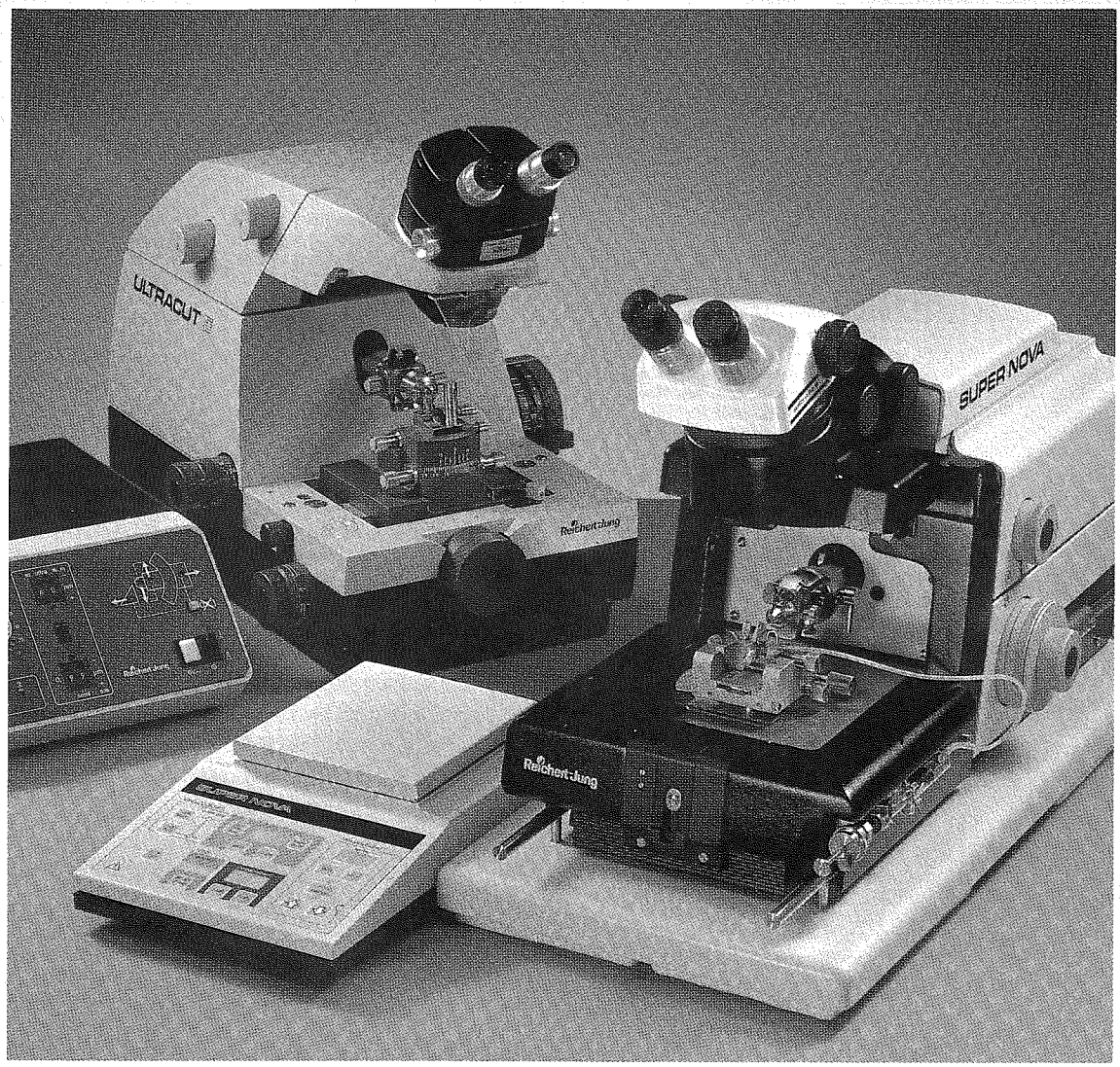

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PEELS AS A COMPLEMENTARY TOOL IN AN ATEM STUDY OF METALS.
R.E. GUERRA AND E.G. RIGHTOR, DOW CHEMICAL USA, FREEPORT TEXAS 77541

Parallel electron energy loss spectroscopy (PEELS) has proved to be a valuable complementary technique to ED and EDS in our study of submicron precipitates in metal alloys. In these studies thin foils of Udimet 520 and HK-25 were characterized by these ATEM techniques in an effort to determine their microstructure. Various precipitates were found in both the grain boundaries and matrices of these alloys. The precipitates of interest were primarily metal carbides, with a carbonitride also being found. The size, location and nature of these precipitates are vital to understanding the physical properties of current and future sophisticated metal alloys. The unique advantages of PEELS (i.e. high efficiency for detection of light, as well as heavy elements) as a complementary tool in this study will be emphasized.

USE OF THE TWO-FILM PREPARATION OF THIN FILMS FOR TEM STUDY OF CHEMICAL REACTIONS IN BINARY ALLOYS. D.C. Dufner, Electron Microscopy Center, Texas A&M University, College Station, Texas 77843.

The general goal of this research is to clarify mechanisms of solid state reactions at the atomic level as a step in the rationalization of macroscopic reaction behavior in solids. A study of chemical reactions occurring as interdiffusion proceeds in thin films can be made by means of high-resolution TEM. In this research, chemical changes occurring near interfaces in solid specimens which are very thin (<20nm) in at least one direction are studied.

Thin film samples were prepared by the two-film method introduced by Shiojiri, et al. (J. Crystal Growth 52, 883 (1981)). In the case of the Pt-Sn system, the preparation consisted of the formation of a few hundred nanometers of Pt by vacuum evaporation onto holey carbon films, thus producing "holey" Pt films. In a separate deposition, Sn films with an average thickness of 20nm were produced by evaporation at rates of 1.5-3.0 nm/sec onto air-cleaved KBr substrates. The Sn films were wet-stripped and collected on the holey Pt films. This combination of Pt and Sn films formed a solid-solid interface through which interdiffusion of Pt and Sn can take place and allowed for structural and compositional changes to be observed in the TEM.

Examples of chemical reactions between Pt and Sn observed by high-resolution TEM will be discussed to illustrate the application of this preparative technique.

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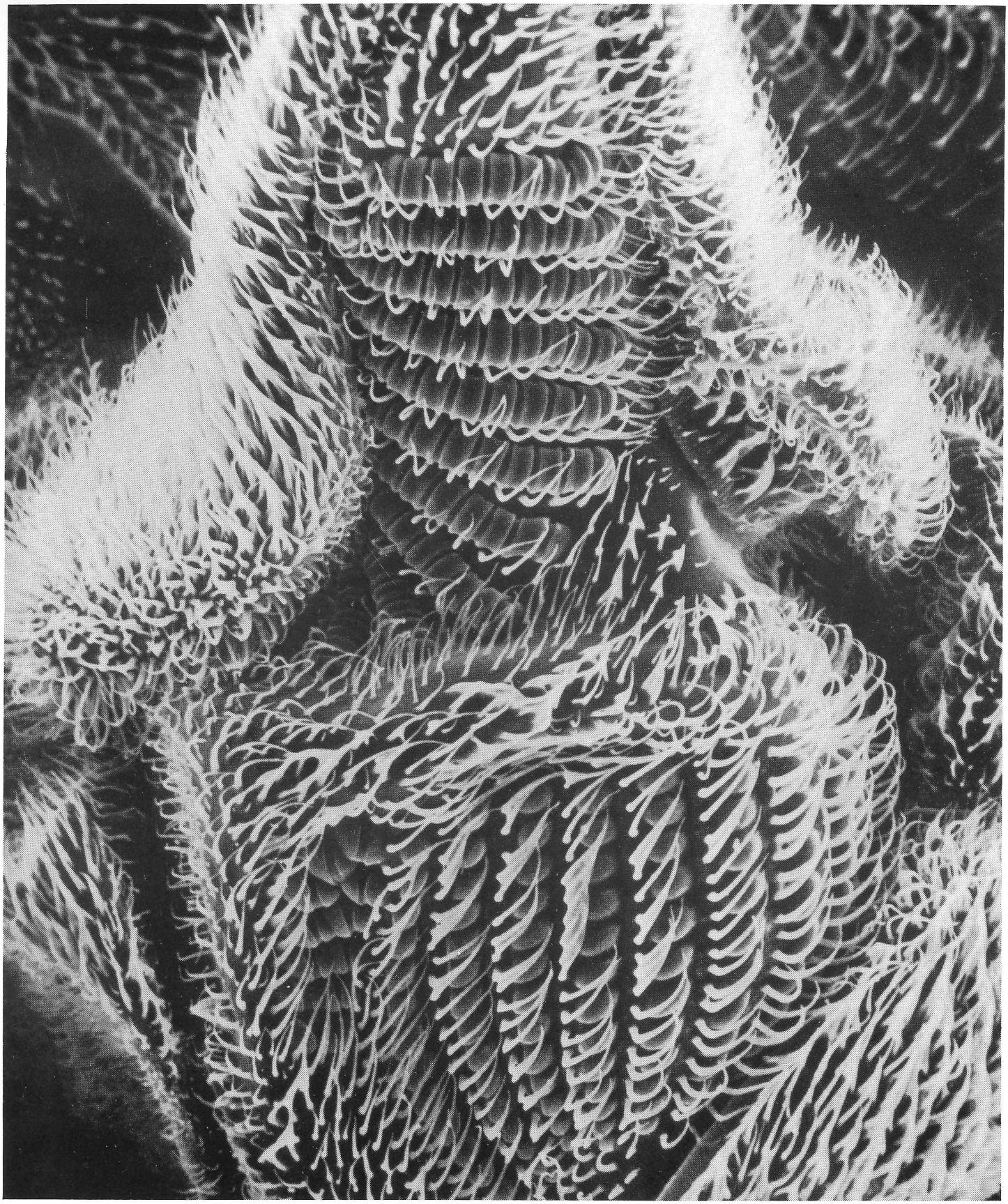

What Is It?

See Answer - Next Page

What Is It?

ANSWER TO WHAT IS IT

These ''What Is It'' show the base of a haltere (sometimes spelled halter) from a house fly. Halteres are club shaped sensory organs found in dipterous insects (the order *Diptera* includes flies and mosquitos). They are modified rear wings and can be found just behind and at the base of the front wings. During flight the halteres beat rapidly and when a change in direction is made, they are bent and torqued in various ways. These changes stimulate tiny sensory hairs at the base of the halteres and elicit a flight response from the insect.

The micrograph on this page shows an entire haltere from a house fly. Notice that the haltere appears to be covered by a cowl. This may protect it from wind effect and allow it to respond only to changes in body movement.

Halteres can be seen on crane flies with the unaided eye. Crane flies, sometimes called mosquito hawks, are the large mosquito-like insects that can be found around your front door in the spring. They are slow and cannot hurt you. Look just behind, and at the base of the front wings and you will see two drumstick-like halteres. Halteres are a characteristic of the order *Diptera*, but can also be found on male scale insects belonging to the order *Homoptera* (cicadas, aphids, scale insects, and others).

Micrograph by Ronald W. Davis, Dept. of Medical Anatomy, Texas A&M University, College Station, TX 77843. (Magnifications unknown, but relatively low).

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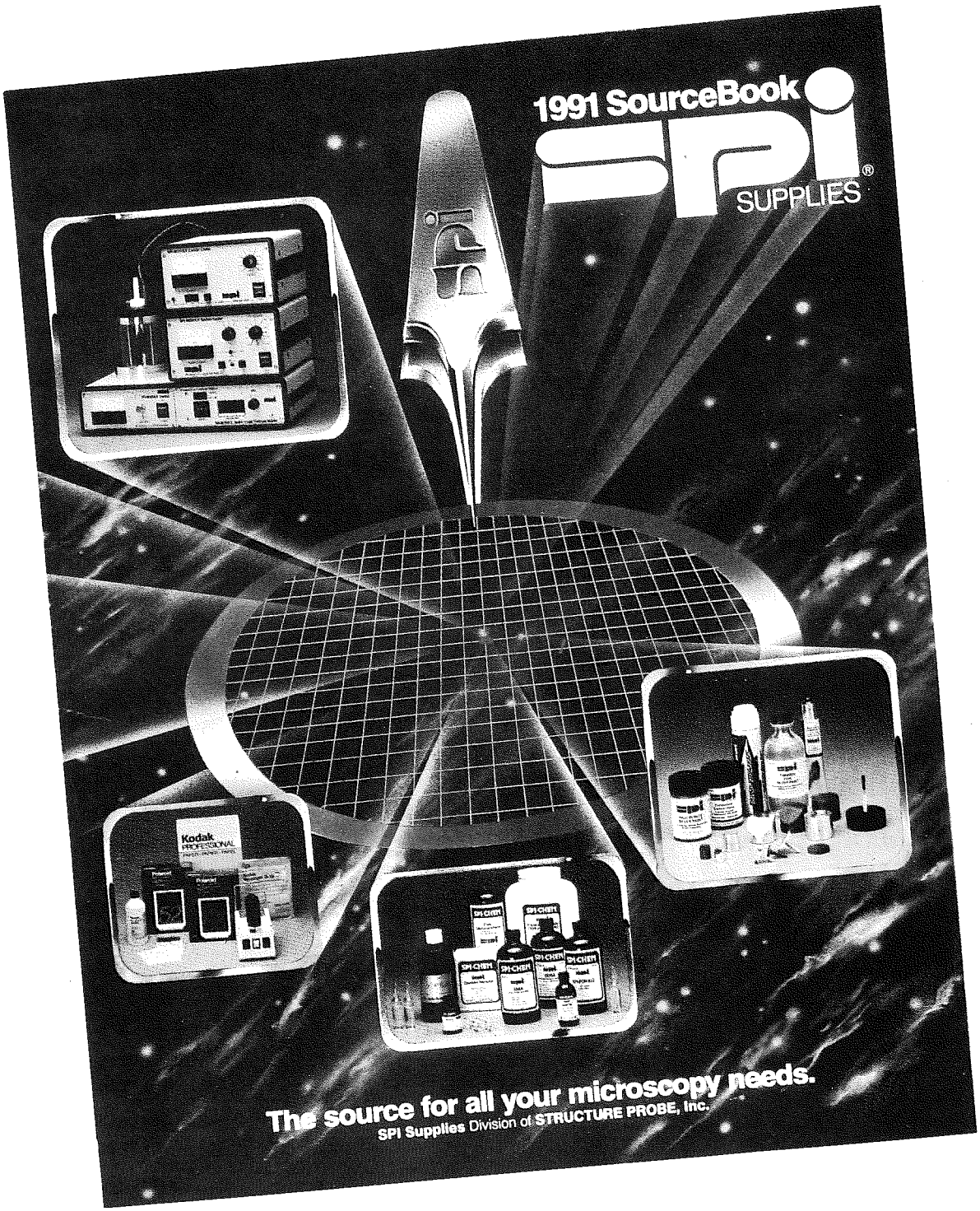

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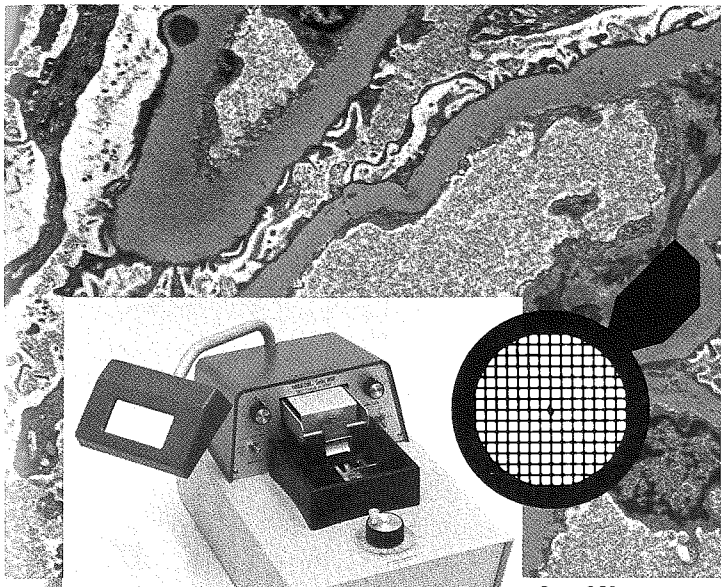

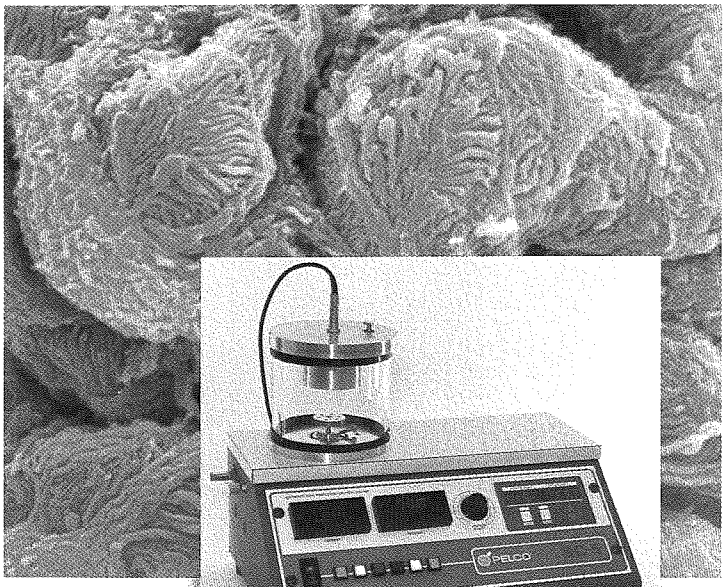

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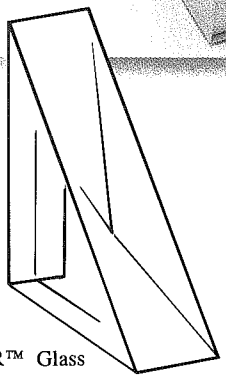

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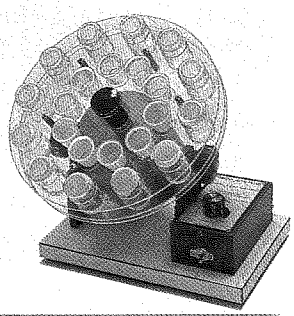

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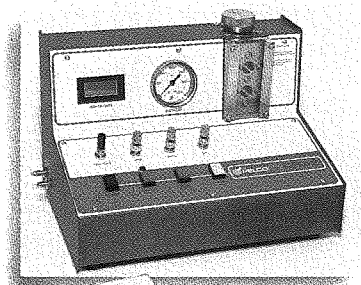

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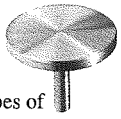

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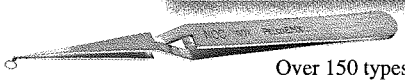

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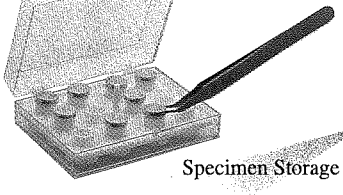

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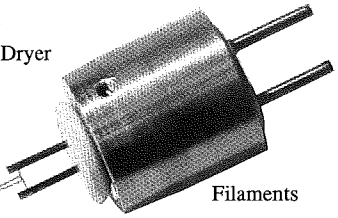

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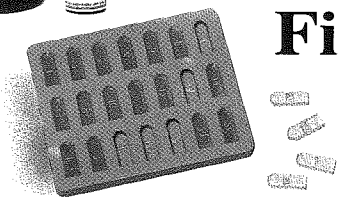

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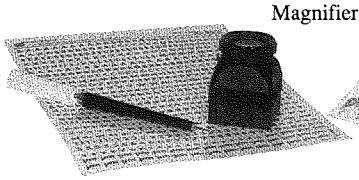

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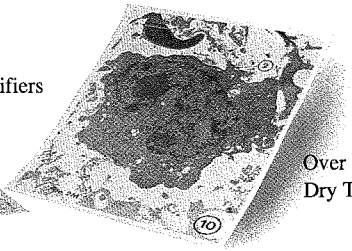

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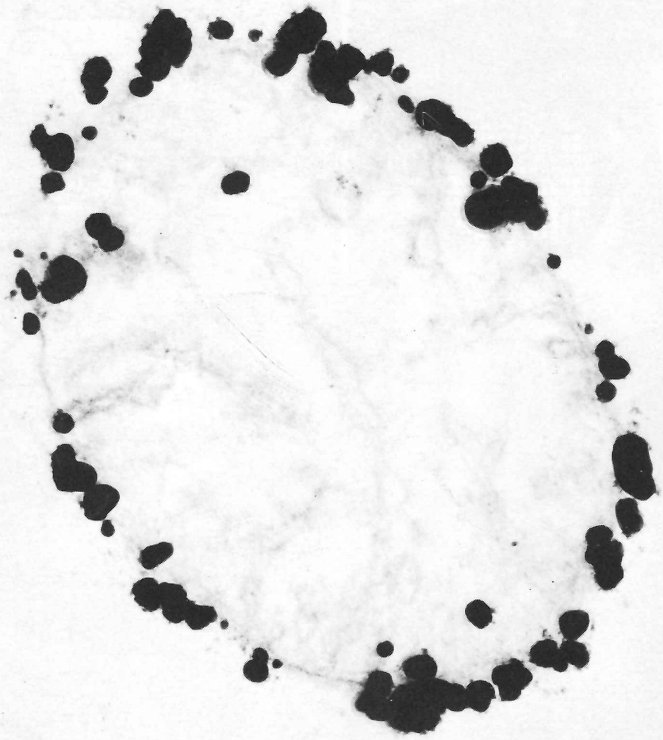

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