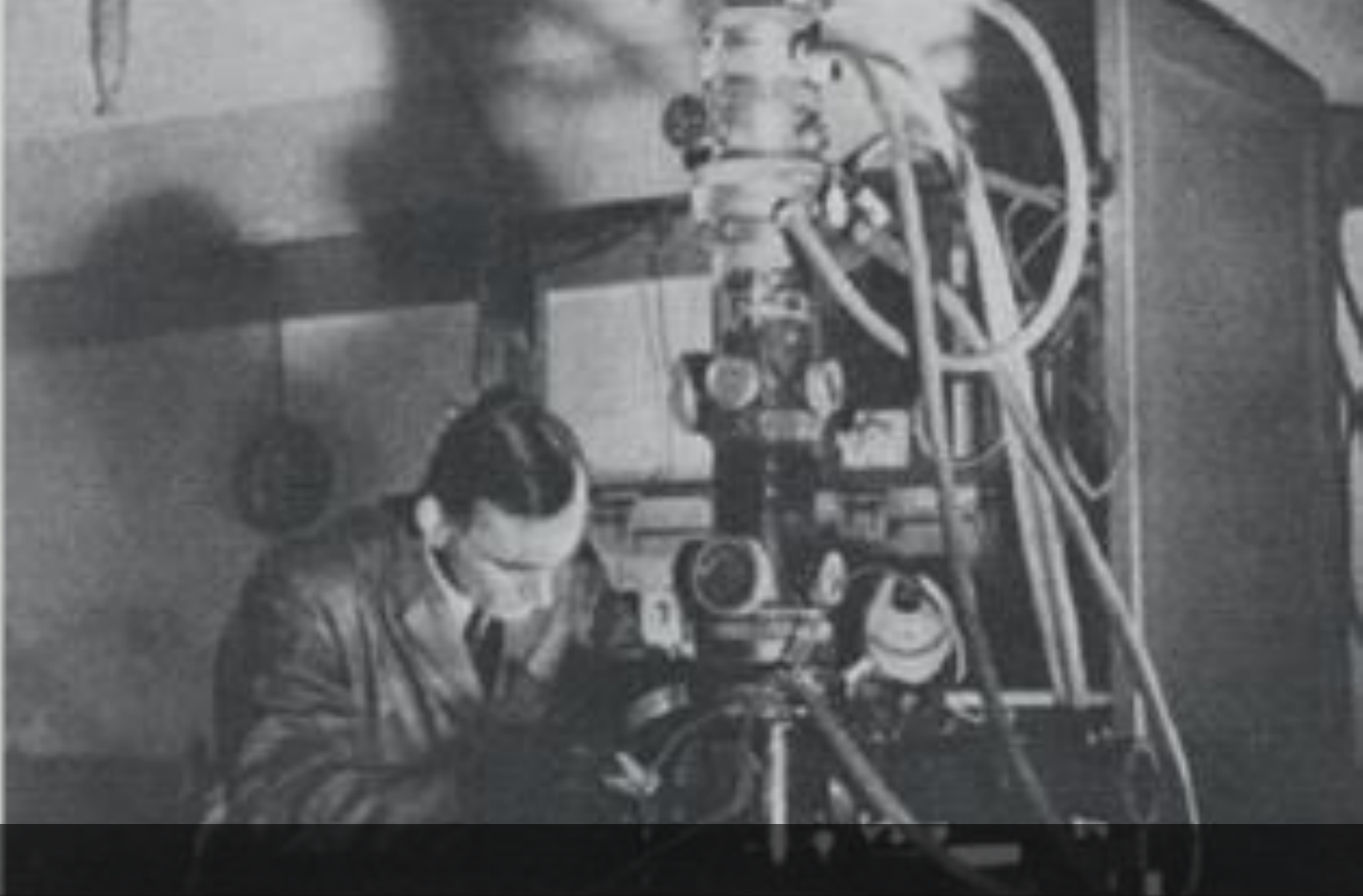
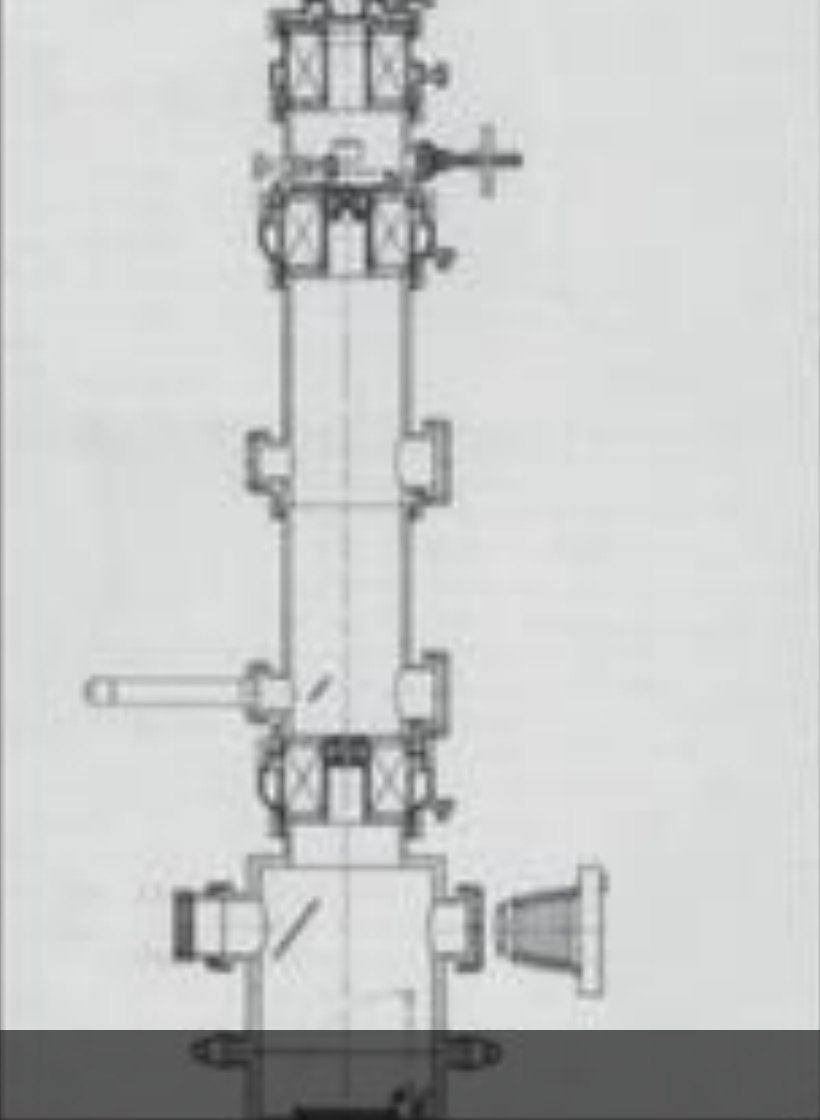




Chapter 19 – The Early Development of Electron Microscope Technology and Techniques in Biology and the Biomedical Sciences

Dr Ray Griffin

“In Commendation of ye Microscope” Henry Power (1661)

Of all th' Inventions none there is Surpasses

Ye noble Florentine's Dioptrick Glasses.

For what a better, fitter, guift Could bee

In this world's Aged Luciosity.

To Helpe our Blindnesse so as to devise

A pair of new & Artificial eyes.

By whose augmenting power wee now see more

Then all the world Has ever downn before.

Much larger than life

1986 saw the dawn of a new era in electron microscopy at Southampton General Hospital; the electron microscope unit (Pathology) was re-equipped with two new electron microscopes.

The purpose built Electron Microscopy Unit is housed in the laboratory and pathology block of the hospital.



Molluscum contagiosum viruses from a skin lesion - magnification x 80,000.

Chemist's RS award

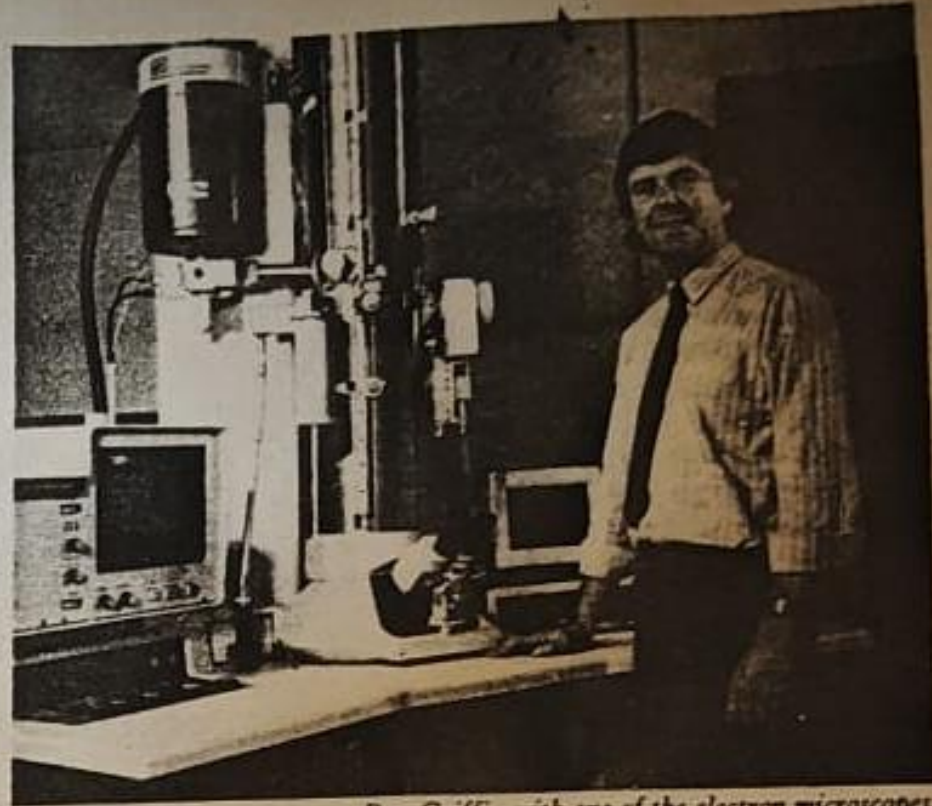
Professor Ken Packer, who is a visiting professor in the Department of Chemistry, has been awarded the Royal Society of Chemistry's 1986 award for Analytical Spectroscopy. This prestigious medal and prize is in recognition of Professor Packer's contributions to nuclear magnetic resonance spectroscopy. Of particular importance is his translation of fundamentals into methods of practical problem

The unit, a joint venture between the National Health Service and Southampton University has now been established for 23 years and has occupied space in 63 University Road, the Tenovus Research Laboratories and finally the current suite of laboratories in the pathology block.

During these years the department has evolved into an E.M. service giving diagnostic and research facilities to the pathology disciplines of morbid anatomy, haematology, microbiology and virology in Southampton Health District and the Wessex Region.

Links have also been formed with university departments and E.M. services provided for the Medical School, biological departments, oceanography, civil engineering and geology.

Over the years, the unit has built up an enviable reputation in the field of electron microscopy, and extensive technical



Ray Griffin with one of the electron microscopes

this SEM is not however mirrored by difficulty in operation, as computer linked controls ensure ease of use.

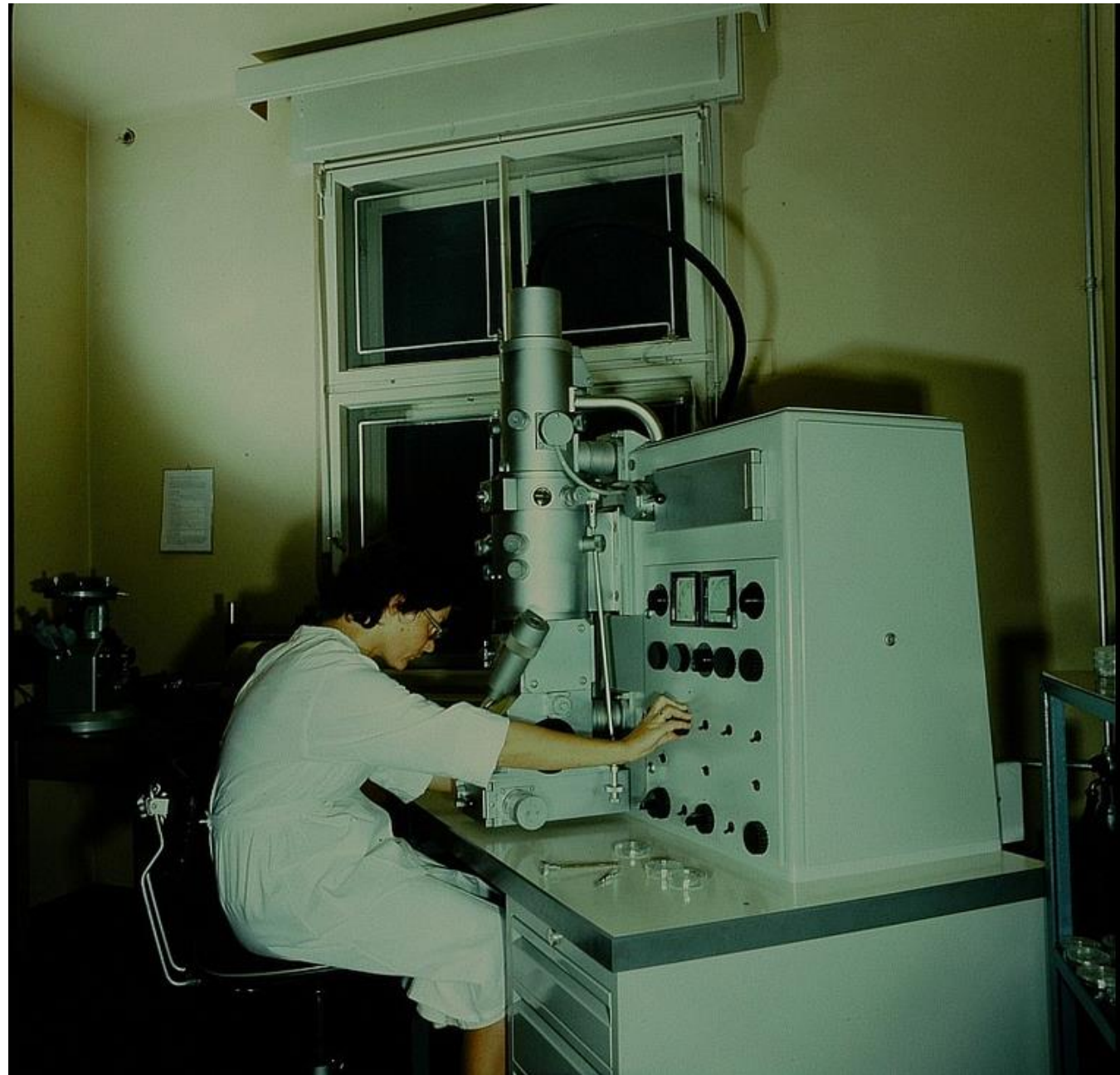
The H-7000 transmission electron microscope is one of the new generation of sophisticated yet flexible computer controlled TEM's which incorporates the latest features in electron optics, vacuum techniques and computer control.

Modern electron optics yield

in operation over a wide range of operating parameters.

Resolving power, or the ability to see fine detail, always a topic of interest in electron microscopes is guaranteed at 0.204 nm in this microscope, which is more than adequate to see the small virus particles searched for by virologists, whilst the choice of accelerating voltages from 25kV to 125kV, coupled with a magnification range from 50x to

Q1. Give at least five design features that enabled the transmission electron microscope to develop into a user-friendly instrument.



- Electronic systems were miniaturized

- Transistors and integrated circuits replaced valves

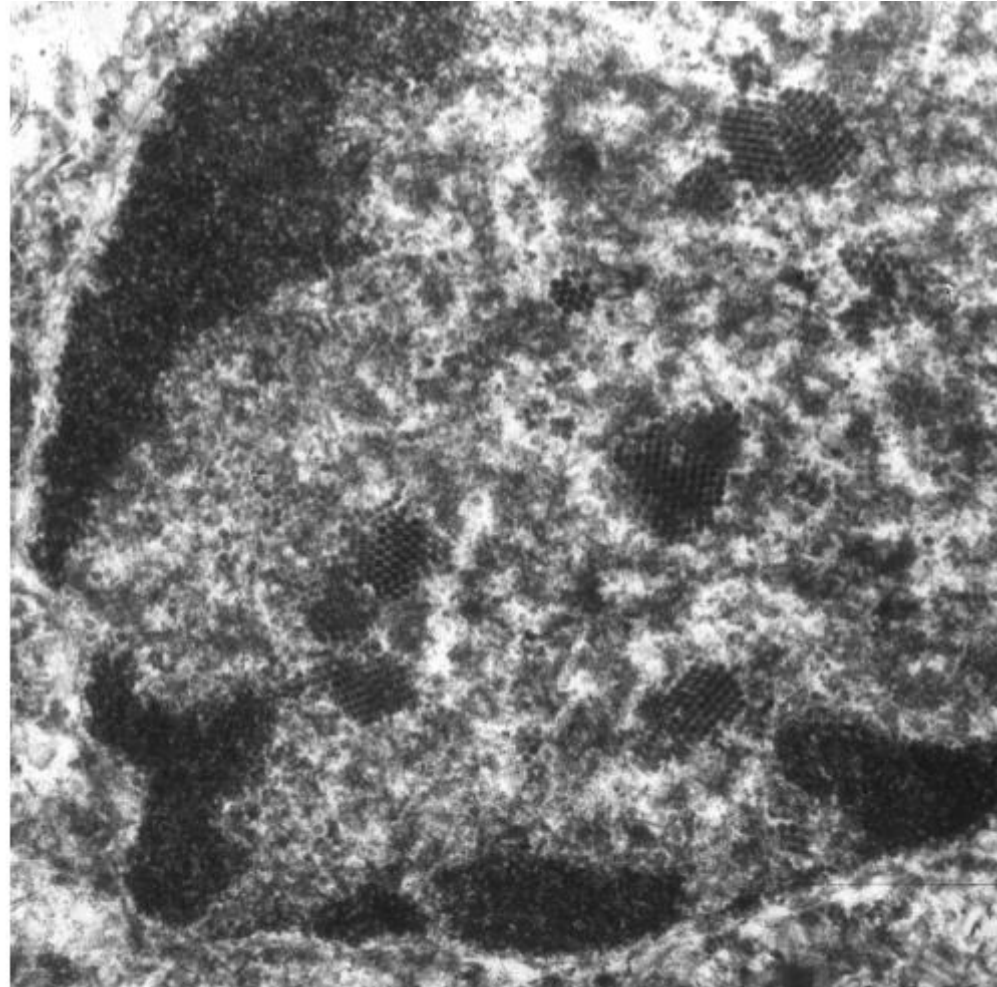


Photography



Q2. Optimal fixation is required to make meaningful comments about normal and altered ultra structure. However, there are circumstances mentioned in this chapter where useful information can be gained, even though the fixation is not optimal. Explain two such situations.

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Q3. A single embedding medium suitable for all tissues to be examined in the TEM, is not available. Give three groups of resins that are used. Which group proved most popular and why?

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- Methyl methacrylate - 1949
- Epoxy
- LR White



Journal of Ultrastructure Research

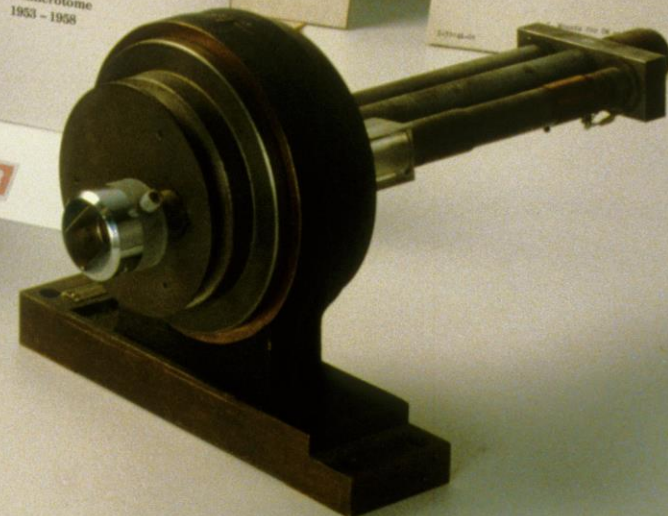
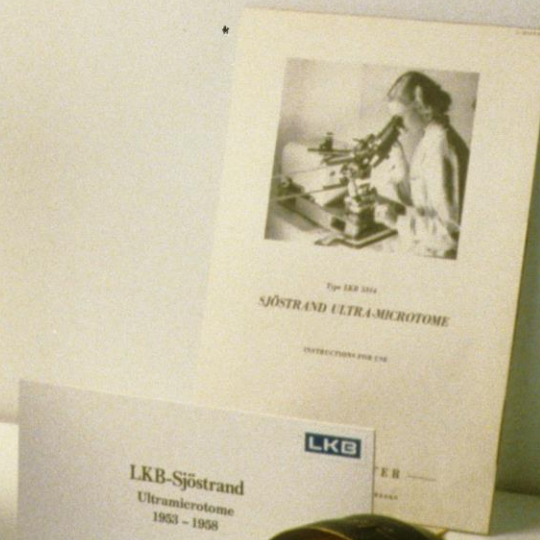
Volume 26, Issues 1–2, January 1969, Pages 31-43

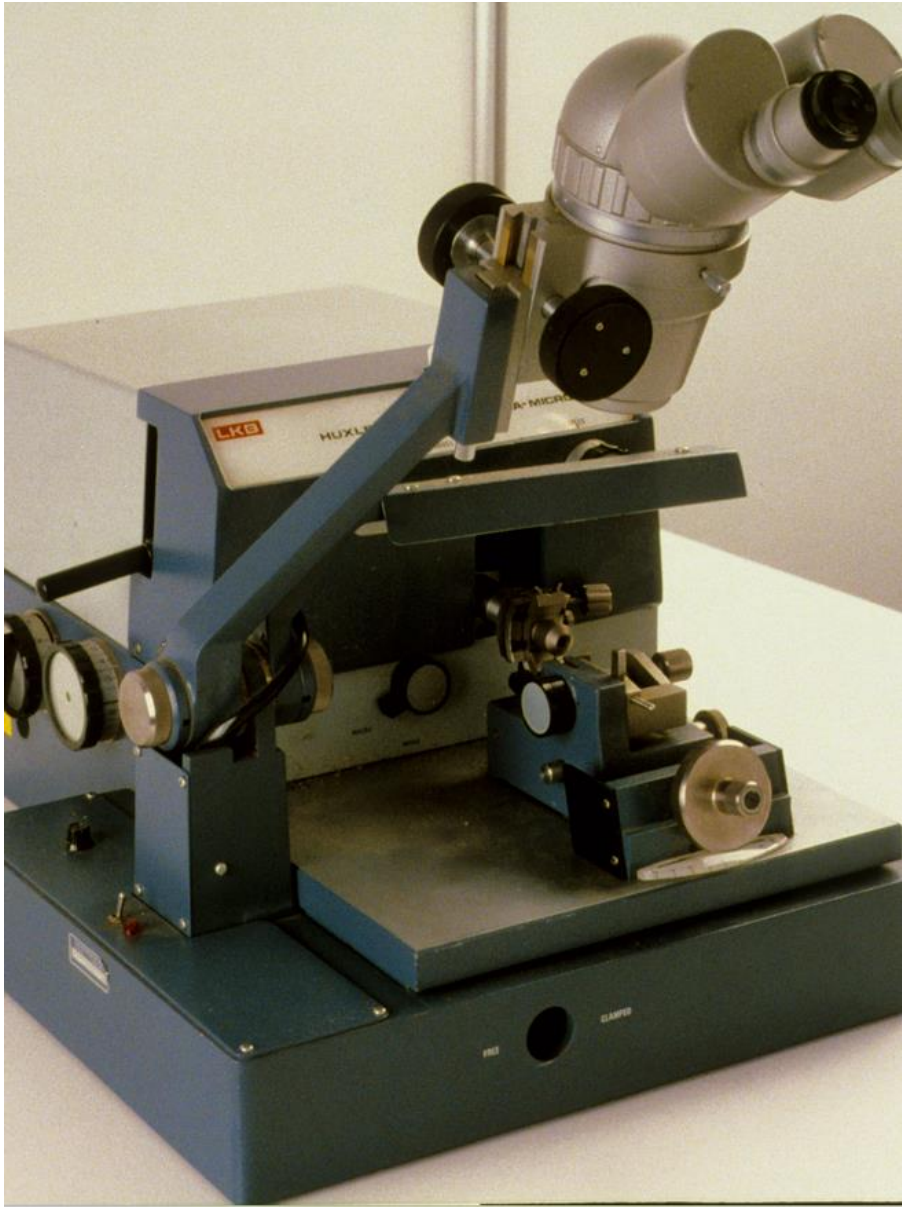
Journal of
Ultrastru...

A low-viscosity epoxy resin embedding medium for electron microscopy

Arthur R. Spurr

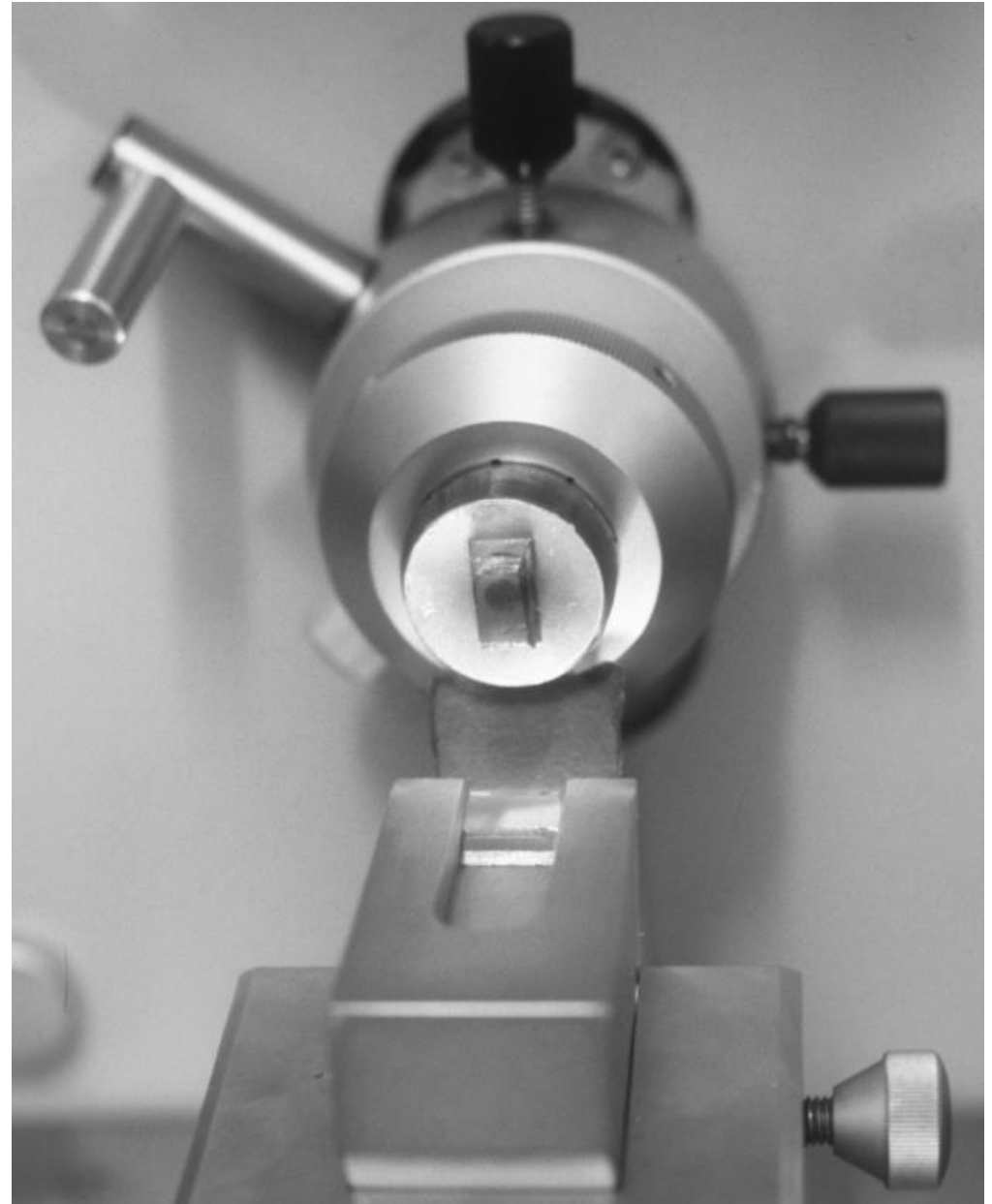
Q4. The advance mechanism for ultramicrotomes developed along two different patterns. What systems were used, and which one became the most popular?





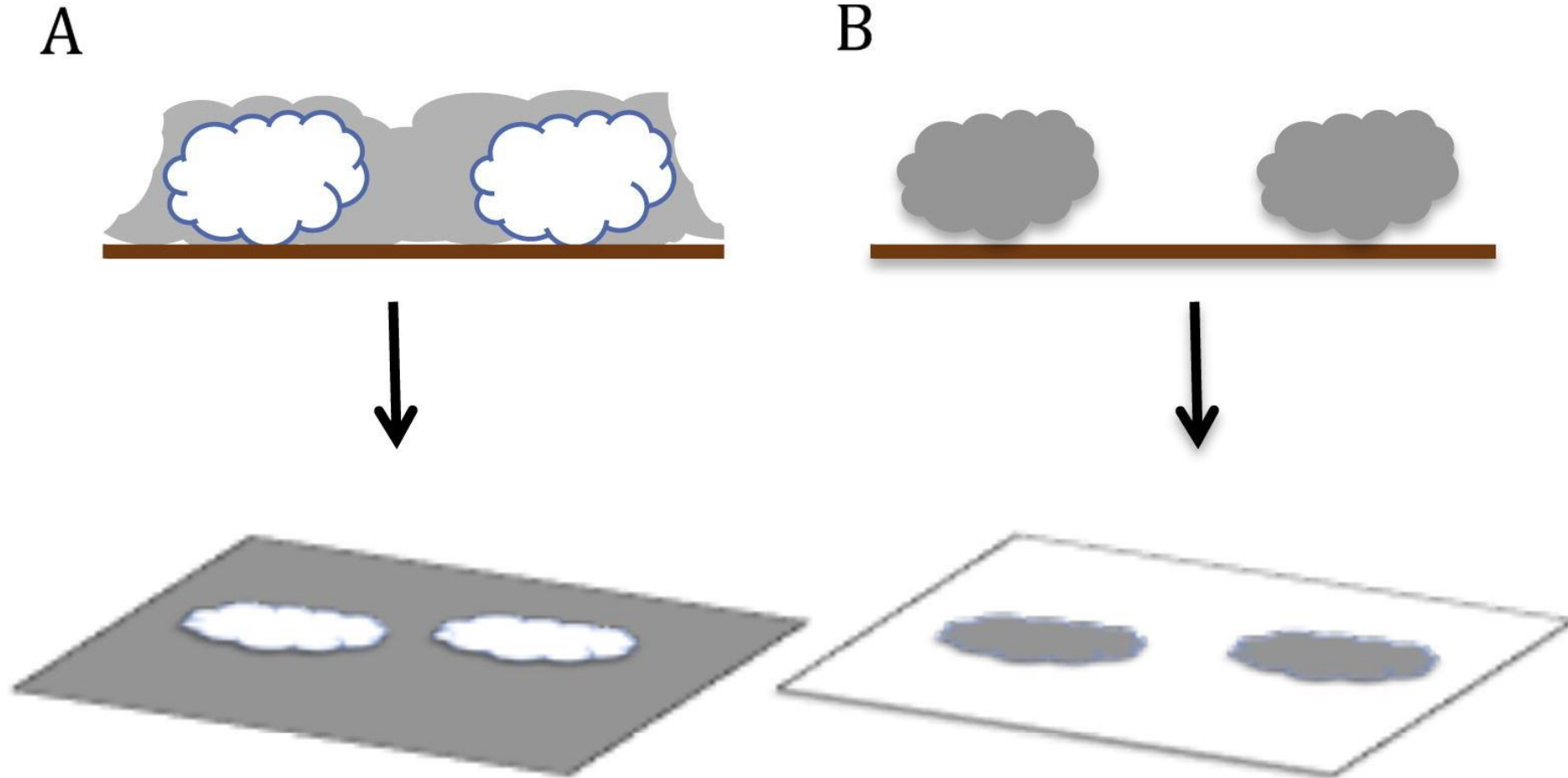
Knives to cut ultrathin sections
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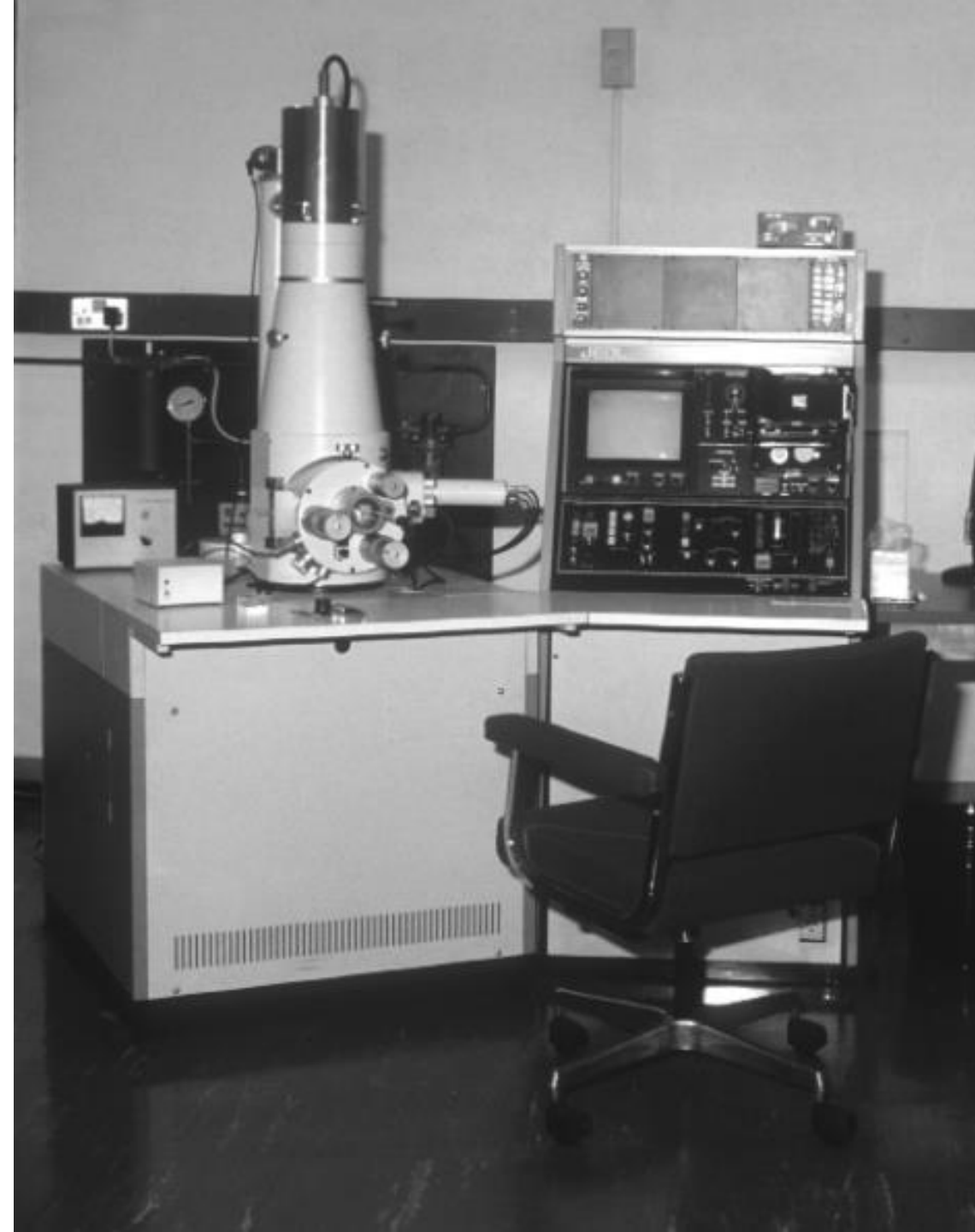


Q5. What is the difference between positive and negative staining for methods for TEM. Name elements commonly used for positive stain and negative stains.

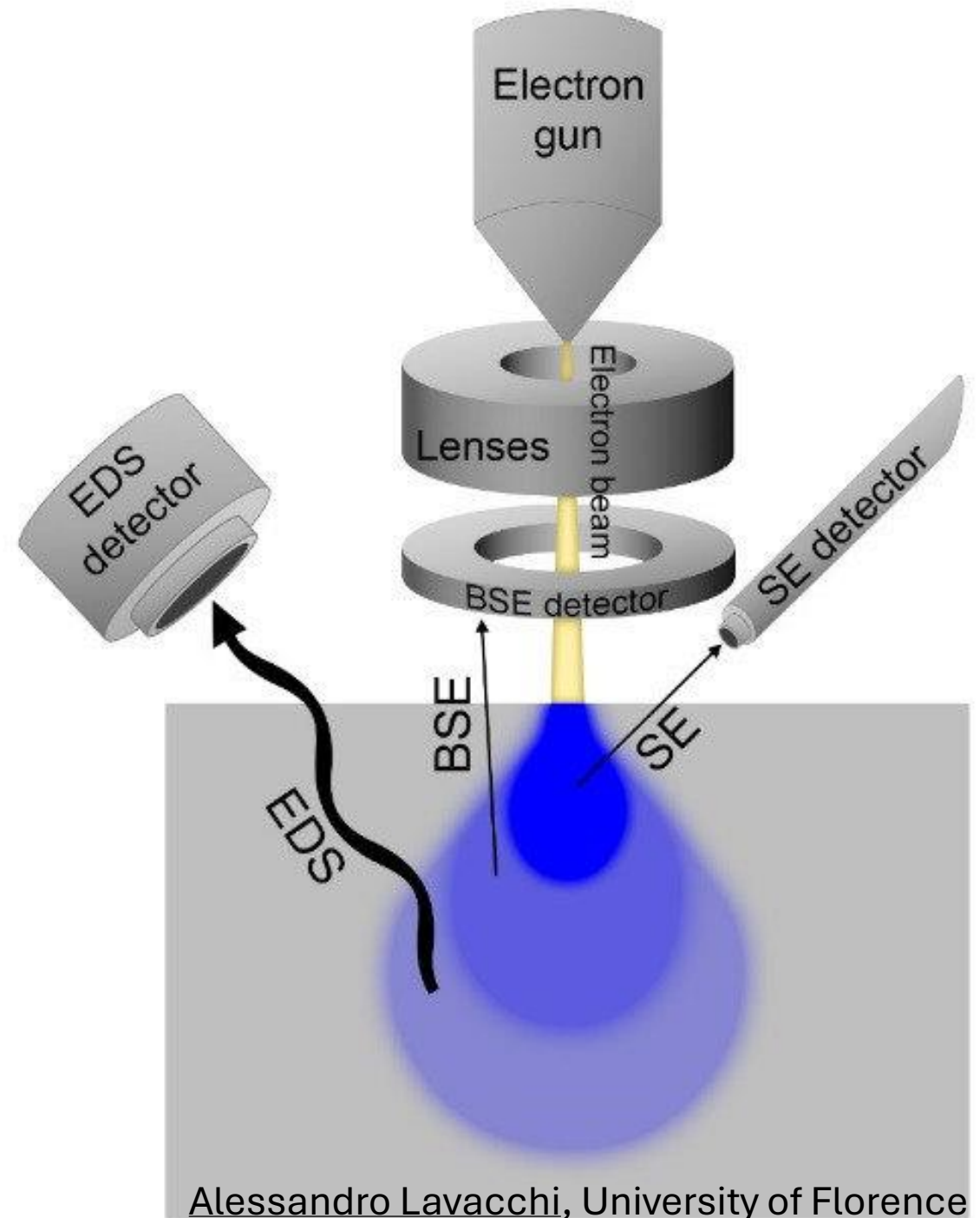
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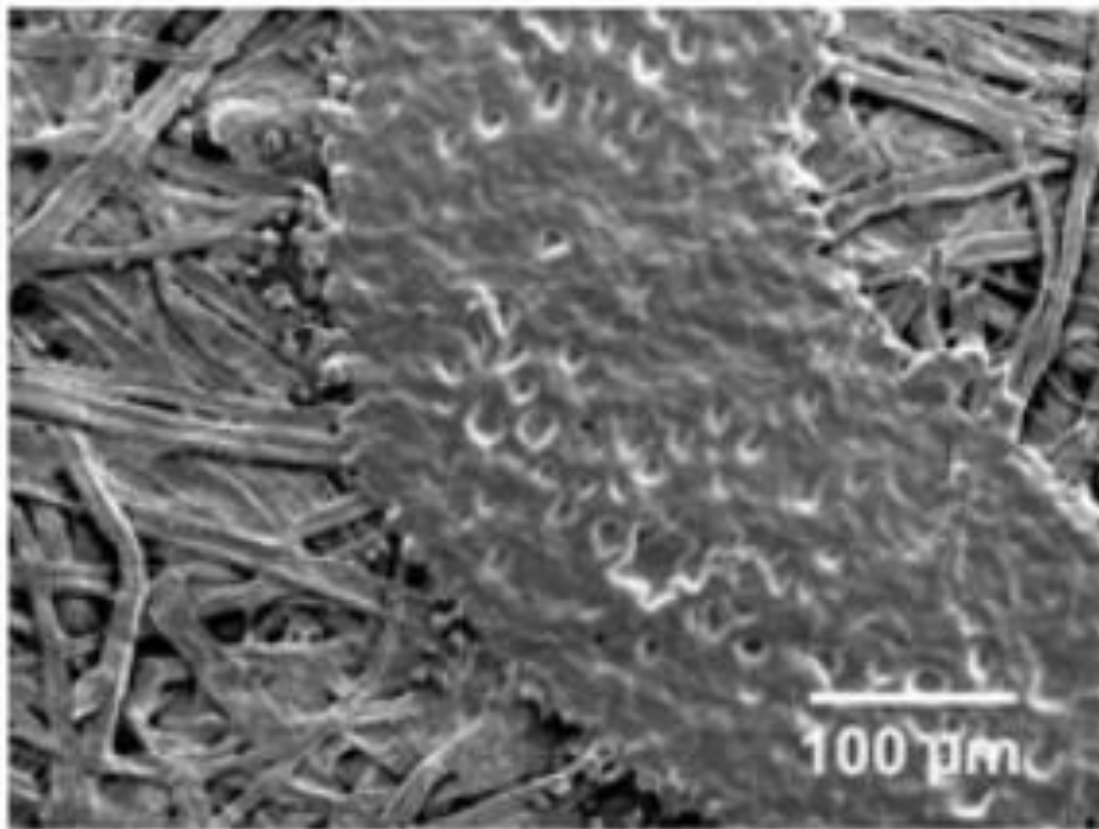


Q6. From early origins, the scanning electron microscope developed into a useful instrument for the examination of cells and tissues. What type of electron detector is necessary to ensure images of surface detail?

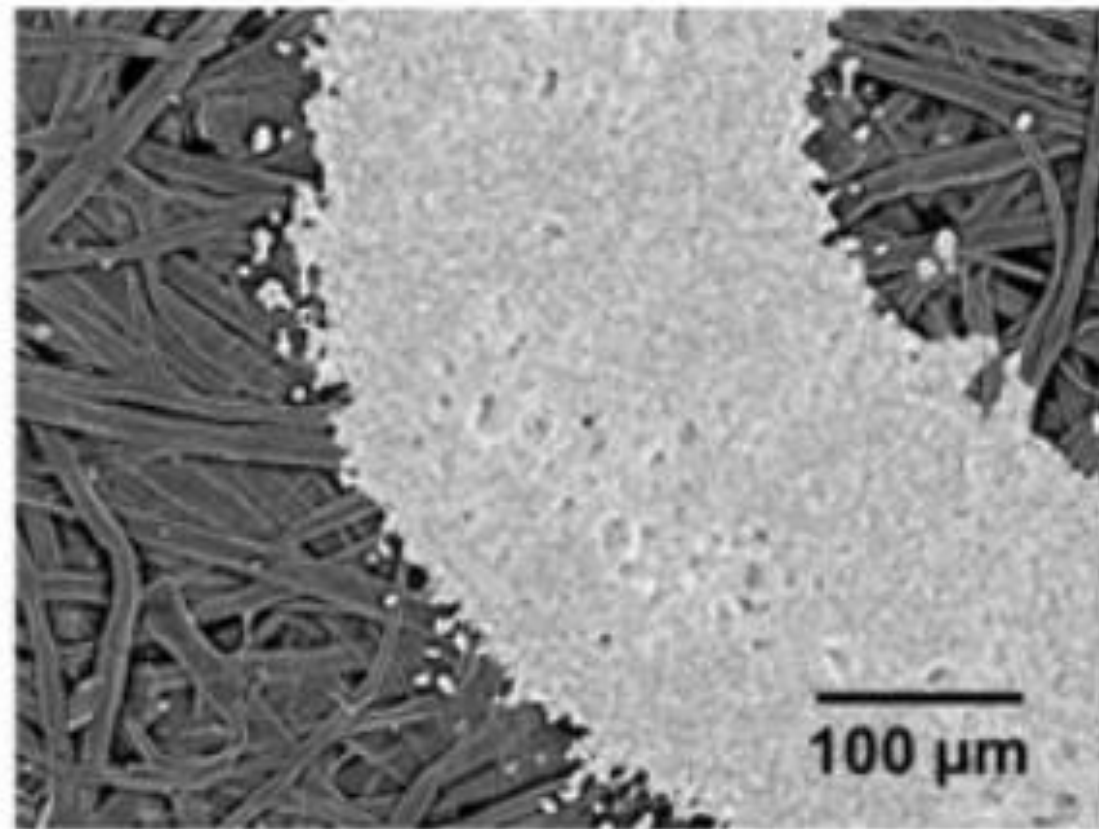


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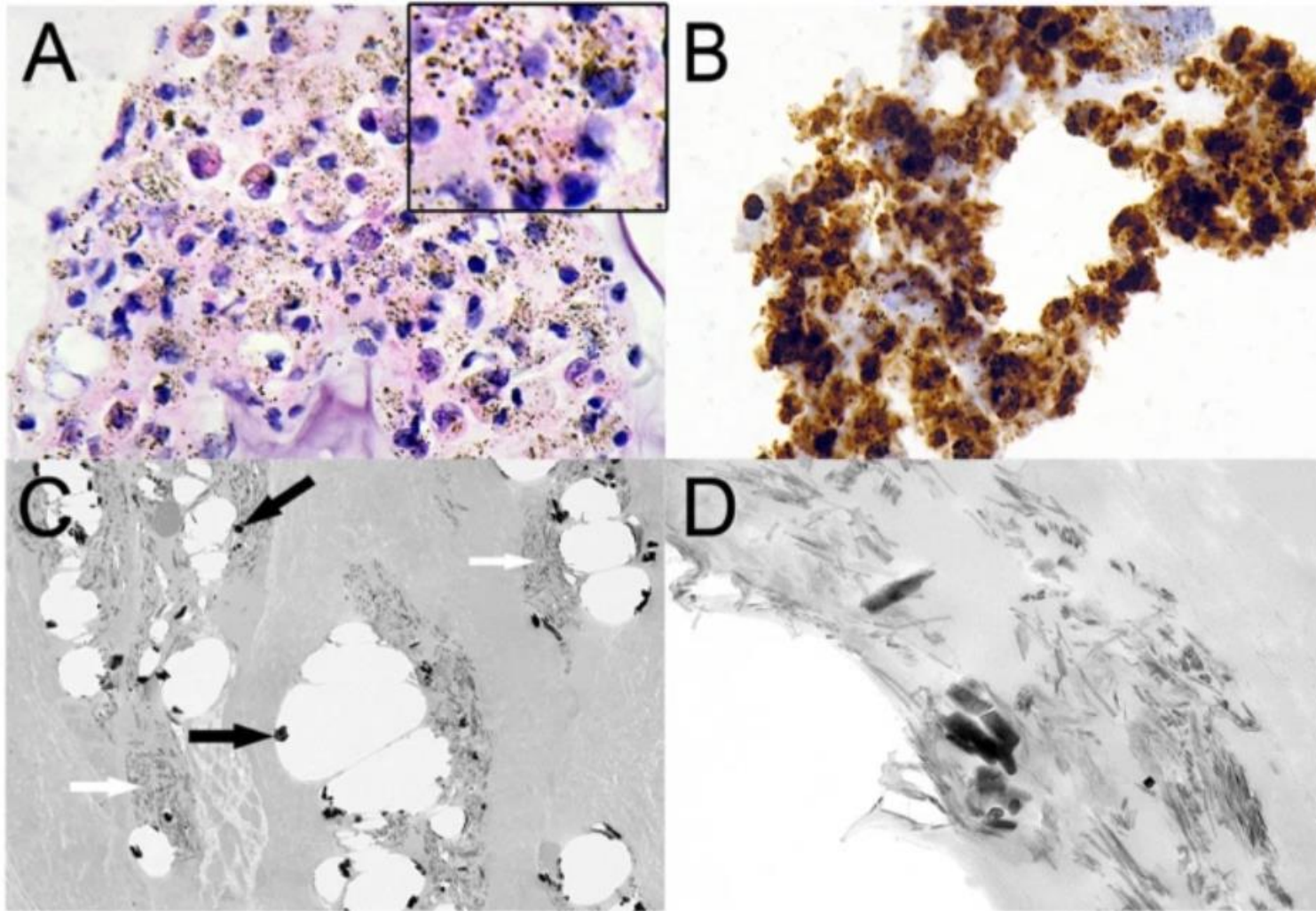


Secondary electron image

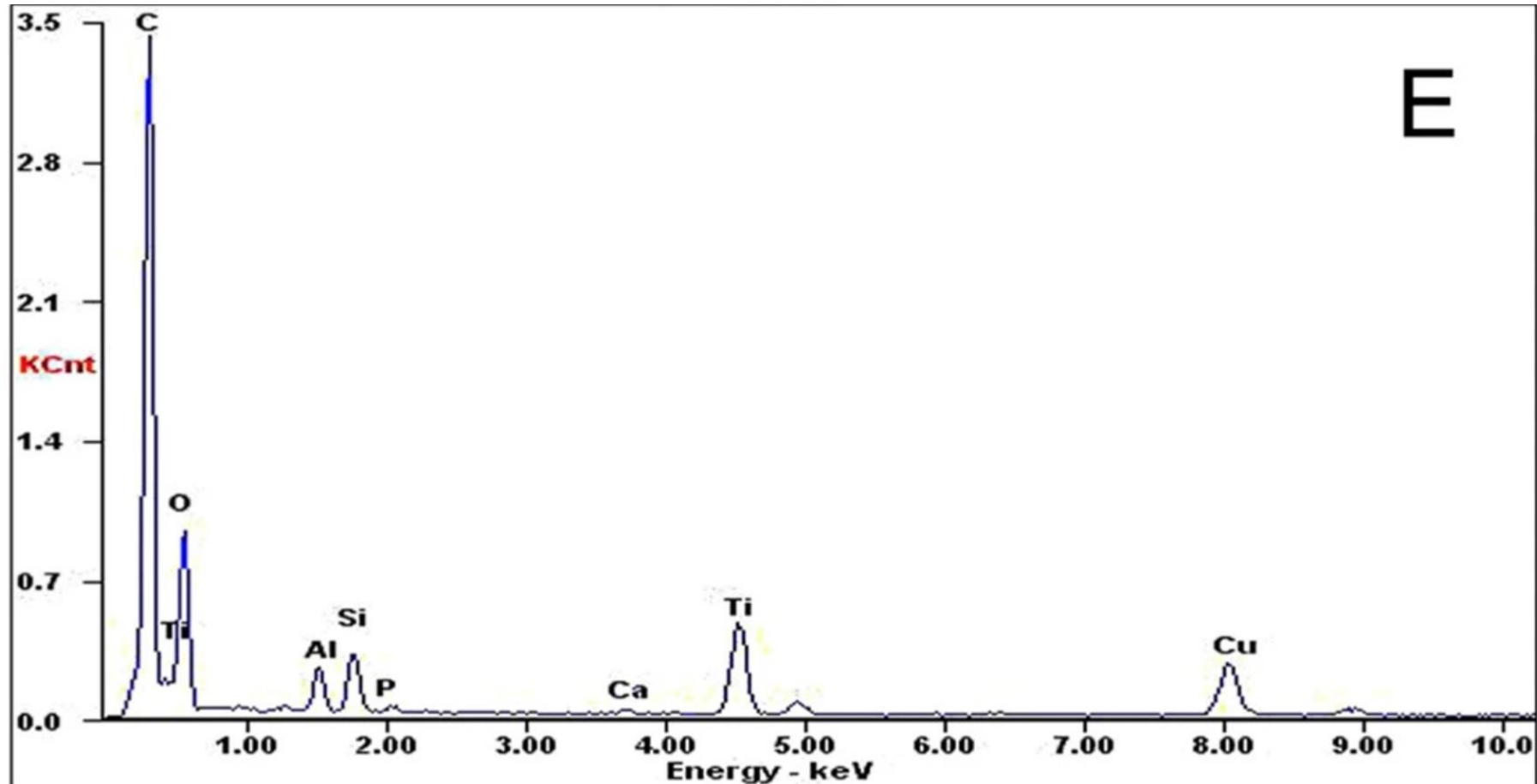


Backscattered electron image

Two main systems for the analysis of elements in the TEM using x-rays developed. What are they and what is the difference between them?



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Occupational Localized Cutaneous Argyria With Pseudo-Ochronosis in a Jeweler

Georgiadou, Nikki BDS Hons, MFDS RCSEd^{*}; Singh, Sarita MBBS, MD, BSC Hons, FRCP^{*}; Wagner, Bart BSc, FIBMS, IBMS Dip Ult Path[†]; Goggin, Patricia BSc, MMedSci[‡]; Katsarma, Effie MD, PhD, FEBOPRAS, FRCS[§]; Singh, Manuraj MBBS Hons, MRCP, PhD, DipRCPath[¶]

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The American Journal of Dermatopathology 43(11):p 822-826, November 2021. | DAD.0000000000001921

CASE REPORTS | JUNE 05 2023

Subconjunctival Ocular Argyrosis following Treatment with Ruthenium 106 Brachytherapy for Choroidal Melanoma

Special Collection: [Karger e-Journal Backfile Collection 2023](#)

Subject Area:  [Oncology](#) ,  [Ophthalmology](#) ,  [Pathology and Cell Biology](#)

Correspondence | Published: 05 June 2019

Self-tattooing of eyeball with inadvertent corneoscleral perforation: the implication of social media

[Jia Yu Ng](#), [Darren Shu Jeng Ting](#)  , [Daniela Vaideanu-Collins](#), [Hardeep Singh Mudhar](#), [Bart Wagner](#), [Patricia Goggin](#), [Andrew Gibson](#) & [Trushar Patel](#)

[Eye](#) 33, 1672–1674 (2019) | [Cite this article](#)

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16.