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PROBLEMS ENCOUNTERED BY FIRST TIME ELECTRON MICROSCOPISTS

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Electron microscopy in South Africa has been hampered by a lack of suitably trained staff familiar with basic techniques of the discipline. This discrepancy has long been recognised by the Electron Microscopy Society of Southern Africa and it is mainly through their efforts that the Technikon RSA now offers a course in electron microscopy. However a very large proportion of potential electron microscopists are life and physical science graduates who continue with postgraduate studies which involve the use of the electron microscope during the course of their research. it is unlikely that such students will avail themselves of the Technikon RSA course to acquire expertise in electron microscopy and in general, such candidates are dependant on their project supervisors, electron microscope unit staff and the good will of experienced electron microscopists in their vicinity to learn the techniques of the discipline. Very little is known of the problems which such students encounter, if any, in the course of acquiring the basic techniques of electron microscopy and successfully applying this to the investigation of their research topic. This paper is an attempt to identify the main problems encountered by such first time EM users and to bring these to the attention of project supervisors and novice electron microscopists to offer advice in the hope that these can be avoided in future research.

In order to gather background for this paper the staff of nine EM units at Onderstepoort, the SAIMR, the Universities of Durban-Westville, Rhodes, Medunsa, Cape Town and Natal (both Durban and Pietermaritzburg campuses) were interviewed using open ended discussion. Lecturers who supervised postgraduate student projects involving electron microscopy were also questioned as well as students who had either just completed a postgraduate course in EM or were well into EM-related projects. All were asked to relate specific or general problems which they had encountered either with first time EM users or in their own initial dealings with EM; how their expectations had met up with the realities of the techniques, what they should or should not have done given the knowledge of hindsight and so on.

The outcome of the discussions can be grouped into two, a general group concerned with principles of research unique to electron microscopy, and a specific group dealing with particular preparative techniques or specimen types. This paper will deal with the general group only. Points raised repeatedly during the discussions were

"The supervisor has no idea of the scale of the project"; "Students are landed with totally unknown projects eg. a virus - where there is no idea of its size or shape or even if it is a virus"; "Unprepared"; and so on. In the light of the points aired during the discussions the following summary identifies the main problem areas and proposed solutions to deal with them:

1. Communication and planning:
   * Students and supervisors should have discussions with EM Unit staff or other experienced electron microscopists before starting the project and ask questions regarding the following: Is an electron microscope really necessary or can light microscopy be used? How much time is available for the project and is this enough considering the scale of the work? What preparation techniques (if any) need to be used?
   * At least a month should be spent planning the project, reading up on the topic, talking to others about it.
   * Textbooks on electron microscopy are for recipes and guidelines only so they should not be used as a sole reference source.

2. Specimen preparation:
   * Students should learn the technique of electron microscopy using a simple uncomplicated specimen.
   * Get someone to demonstrate the EM techniques.
   * It is advisable to use the successful routine processing procedure of the laboratory in which the work will be done.
   * Don't skimp, rush or cut down on processing times.
   * Always follow the solution recipes and time schedules exactly.
   * Never use old chemicals lying around in the laboratory.
   * There is no substitute for processing the tissue right the first time around.

3. Safety in the laboratory:
   * Students must be made aware of the safety precautions as regards hazardous solutions.
   * Wear gloves when working with solutions, and don't leave a trail of sticky fingerprints around the laboratory and on the instruments.
   * Work in a fume cupboard.
   * Dispose of chemicals in the approved fashion.

4. EM Units:
   * Ask about rules and regulations of the Unit and keep to them.
   * The staff are to teach and advise the student about techniques but they are not there to do the experimental work for them, nor take on the role of the supervisor.
   * Tell the EM unit staff if something goes wrong with the instrument during your viewing session.
   * Acknowledge EM staff in papers or make them co-authors if their contribution as regards creativity and responsiblity warrants it.