

Electron Microscope Unit

BACKGROUND

The installation of a new FEI Tecnai 12 BioTwin Spirit 120kV transmission electron microscope began in October 2007, and after repeated delays provoked by power supply interruptions, was finally commissioned in December 2008.

ACTIVITIES, HIGHLIGHTS AND ACHIEVEMENTS

In the four months of the year that the microscope was operational, viewing time was dedicated to the identification of pathogenic agents in negatively-stained (2% phosphotungstic acid) samples from epidemiological outbreaks and laboratory cell cultures (Figure 1a-c,e,f). Equipment necessary for processing tissue and culture samples for ultramicrotomy, was delivered in November and December, and has been used successfully for the production of micrographs of *Vibrio cholerae* (non-motile, plate-cultured cells isolated from a sample from Mpumalanga, isolate supplied by EDRU) (Figure 1d) and microsporidial spores (identified as the larval pathogen of a colony of *Anopheles gambiae*, larvae supplied by VCRU) (Figure 1g and h)

A five-day course in Eindhoven, The Netherlands, on basic Tecnai TEM alignments, to maximise microscope potential performance, was attended by Monica Birkhead. Course content could be applied once the microscope installation was signed off and the TEM commissioned in December 2008 (Figure 2). The acquisition of a digital camera more appropriate for the photographing of viral particles, is underway, as the current Megaview III camera is limited in resolution due to insufficient pixel numbers.

Future activities not directly related to routine diagnostics, will be directed towards investigations into microsporidial infections (both human and arthropod), mitochondrial ultrastructure of *Pneumocystis* cysts, and ultrastructural confirmation of possible cases of Batten's disease.

CAPACITY BUILDING

The EM Unit has assisted in the registrar training programmes organised by the NICD.

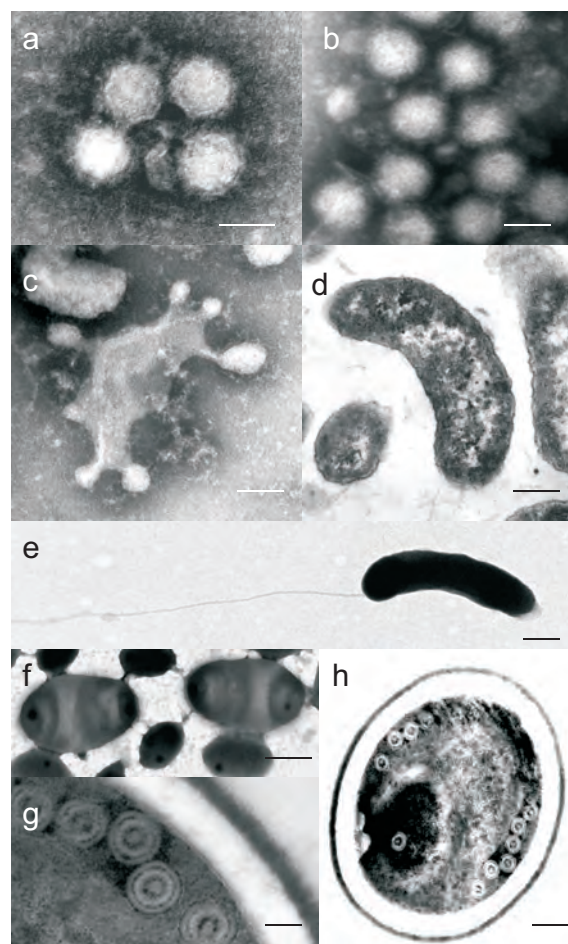


Figure 1: Negatively-stained samples: Togaviridae particles (a), Bunyaviridae particles (b), mycoplasma culture contaminant (c), *Vibrio cholerae* whole mount (e), microsporidial spores (f). Sectioned samples: *Vibrio cholerae* cells (d), gyres of microsporidial polar filament (g) and microsporidial cyst (h).

(Scale bars a=65nm, b=80nm, c= 100nm, d=200nm, e=250nm, f=550nm, g=80nm, h=250nm).

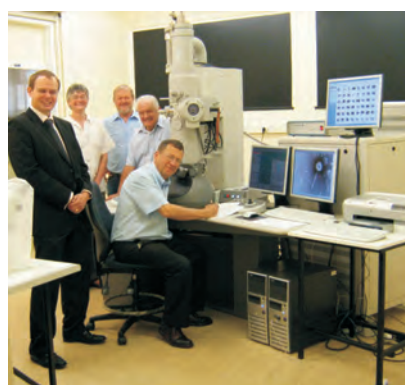


Figure 2: Commissioning of the TEM. From left to right: Alistair Douglas (FEI/Apollo Scientific), Dr Monica Birkhead (NICD), Dave Johnston (EV Optics), Prof Mike Lecatsas (NICD), Prof Barry Schoub (NICD).