Fig. 2. When I disassembled the gauge, it was discolored brown and covered in black particles (Fig.3). As mentioned in the list server thread, there are a few ways to clean the anode. An acceptable cleaning method is to use silicon carbide sand paper and water. One contributor suggested an aqueous cleaning protocol. Another common technique is to utilize glass bead blasting at medium pressure (40 psi) for the aluminum anode, and higher pressure (100 psi) for the stainless steel case. Another suggestion from the list suggested using an air eraser for the anode. I use an inexpensive, tabletop bead blaster for this project. When using bead blasting, avoid entraining glass beads in screw threads by using tape and dummy screws to plug holes. When blasting the aluminum anode, only bead blast as long as required to remove the deposits. Afterwards, I use high-pressure air to blow away any remaining beads from the surfaces. The clean bead blasted parts are shown in Fig. 4. Finally, after either cleaning technique you chose, ultrasonically clean the parts in solvent, dry well, and reassemble with gloves as you would any vacuum part. A number of individuals on the MSA list correctly mentioned that the elements will eventually wear to the point of requiring replacement.

Reinstallation: The Varian cold cathode gauge tube utilized in my laboratory installs with a compression fitting. I carefully inspect the O-ring and mating surfaces of the outer gauge tube for dust that could cause a leak. Since the gauge is mounted in a static position, I do not use vacuum grease on the O-ring. Reinstall the cables, reconnect the controller to power, and begin pumping the vacuum system. After installation, I let the system pump at high vacuum for 15 minutes or more before firing the cold cathode gauge to give it time to outgas the solvents used for cleaning. Finally, I make a note of my service in the logbook. ■

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Zigzag Edges in SEM Micrographs

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Multiple specimen holders make it possible to examine several (up to 7) specimens by SEM without the need to vent the microscope, replace the specimen, and evacuate the microscope again. Using such a holder in a Philips XL-30 ESEM frequently showed zigzagged outlines of bacteria obtained at magnifications higher than 10,000x. The zigzag outlines were not associated with charging artifacts as the filter edges were painted with a silver-based cement prior to gold coating. The severity of the zigzag lines varied from day to day. Sometimes they were barely noticeable whereas at other times they developed during a half-day session.

Checking known sources of vibration brought no solution. At that stage, one of us (A.F.Y.) asked subscribers to the listserver of the Microscopy Society of America for advice. Many suggestions emphasized that good images start with a proper setup of the microscope. Ideally, nothing should make any mechanical contact between the inner zone and the outside environment. The wires and tubes should have loose loops between the attachment to the inner and the outer tables. An EDS detector may add to the problem by mechanical or even acoustic means. If hands are clapped loudly while an image is being scanned, decaying vibrations from the clap will be noticeable if the EDS is susceptible. Vibrations may also arise from AC magnetic fields from various sources. If the cause of the vibrations are magnetic fields, the "sawteeth" will be larger at greater working distances. Changing the beam voltage is another useful test; it is easier to do than changing the working distance. Field problems may be tracked down using an AC magnetic field hand meter. Another possible source is a ground loop where the instrument is hooked up to another piece of equipment with a different ground potential. A solution for this is to decide on a single ground potential to use and to hardwire all other equipment to that ground. One should connect the power supply common connections in a way that would provide as low a resistance path as possible to the chosen "common" power connection. In our case, neither heavy equipment being operated in the building nor trucks driven occasionally nearby could be found responsible for the zigzag outlines.

Then, during one session, the ragged edges became so bad (Fig. 1) that the examination had to be terminated. The microscope was vented and the samples were being removed from the multiple specimen holder when it was noted that the holder was somewhat loose. It was re-tightened, the specimens were returned in place and the microscope was started again. The images had a proper appearance and no ragged edges could be found. An examination of the multiple specimen holder (Fig. 2) and its comparison to the single-specimen holder (Fig. 3) indicated that the former would be more susceptible to loosening while the motor-driven stage was moved in order to examine the next specimen. A new stem for the multiple specimen holder was developed (Fig. 4) and the zigzag, ragged edges in the images of bacteria are a defect of the past. ■

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Information about this defect may be viewed in greater detail on the Internet (http://distans.livstek.lth.se:2080/Zigzag.htm)