SEM Diaries - 27

Procrastination is ... ... not a good idea

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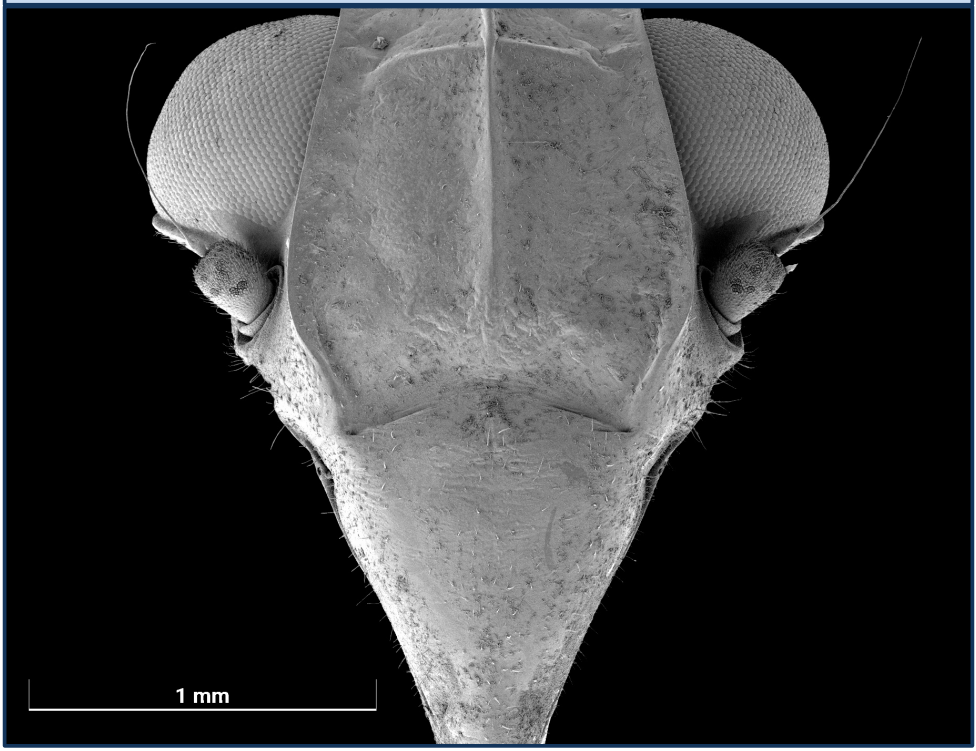


Head of *Issus coleoptratus,* (a froghopper) after post-processing

Of course, the common expression relating to procrastination describes it as being " … the thief of time", but in the context of this edition of SEM Diaries that is a little general. My intention here is to write a reminder to myself (and encouragement to others) to get on with things that need doing, become more organised, not to get diverted, and many other worthy aspirations.

I did approach the subject of self-organisation in an article in Balsam Post 98 [1], in which I recounted the way I tackled organising my tubes of specimens, with the intention of keeping my bench clear of cylindrical objects that could all too easily roll off onto the floor. The substance of that article was the construction of wooden racks to hold the tubes, and this did work quite well until all the spaces in my racks were occupied with, mostly unlabelled, tubes of slowly

deteriorating insects, spiders and marine specimens.

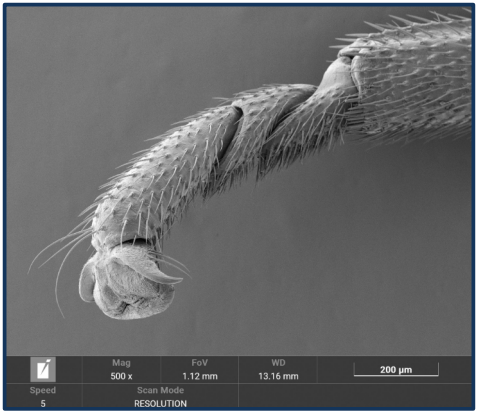
So, what was the trigger that set me going again on the quest of becoming "more organised"? Ironically enough it was my writing in SEM Diaries - 26 that my recent SEM activity seemed to consist of my switching it out of standby mode for a few minutes to refresh the vacuum in the chamber before returning it to standby for a few more days. Having an SEM sitting in a laboratory but seldom being used is a bit like putting a pension lump sum into purchasing a classic car, leaving it in a garage and never taking it for a spin. Basically, I really needed to start using my SEM more!

Here are a few scenarios where a bit of organisation would help:

1. I see a spider (my "specialist subject") on the ceiling of one of the rooms in my house or in my garden and decide to capture it for identification, recording and possibly imaging with the SEM. The first step, to suck it into a pooter, is the easy bit. The pooter I have indoors at home is one of those with two tubes and a collecting pot, and I might well leave the spider in the pot until the following morning, when I would euthanase it, identify it, transfer it to a tube of alcohol and add a label naming the species, and where and when it was found. Well, that is the theory, but in practice it might remain in the pooter for a couple of days before I remember to proceed with the next step. The last step (labelling) might get left for even longer, by which time I would have forgotten where and when I collected it. Even if all steps were completed in short time, the labelled specimen would probably lie on my bench for quite a while until I become really annoyed by its getting in the way of my using my stereo microscope.
2. I have assembled a collection of tubes of specimens I would like to image with the SEM, but just do not get round to dissecting and mounting them. So, I have specimens and an idle SEM but never quite seem to be in the right frame of mind to progress this. I think it is safe to say that I always have tubes of specimens to image, but am far too seldom in the right frame of mind to process them. OK, dissection and mounting does require concentration, but I should be able to put myself in the state of mind to do that at some stage during most days.
3. I have carried out a spider survey at a nature reserve, and have identified and labelled the majority of these, and might even have photographed some, but decide to tackle the difficult identifications at a later date. These difficult identifications tend to be those of the Linyphiidae (the small "money spiders"), and often require not only study of the sexual organs but also seeking out spines and other hairs and recording their number and locations. This process is actually quite hard, and does require significant concentration. Sometimes it can take me an hour or more to arrive at a definitive ID (if I ever do). No wonder it is not my favourite activity and can get put aside.
4. I have made images of various spider species intended for my spider website, but despite having completed this some months before, I still have not prepared the image and HTML files for uploading them.
5. Having criticised the content of *in**focus*** (the journal of the Royal Microscopical Society) I offered to write them an article on mounting specimens for the SEM. I have no specific deadline for this, so the only times I seem to get round to writing any of it seems to be when I am in a hotel with nothing else to distract me.

I must admit that having deadlines by which tasks need to be completed certainly does concentrate the mind, and the converse is also true. One reason I am writing this right now is because I have a Balsam Post deadline approaching! During my working life there were deadlines of one sort or another almost all the time, but retired life, although busy, is not quite so regimented.

So, bearing in mind all the above, two weeks ago (as I write this) I took myself in hand and prepared 30 stubs of a mixture



Leg of froghopper *Issus coleoptratus*

Leg of spider *Lepthyphantes leprosus*

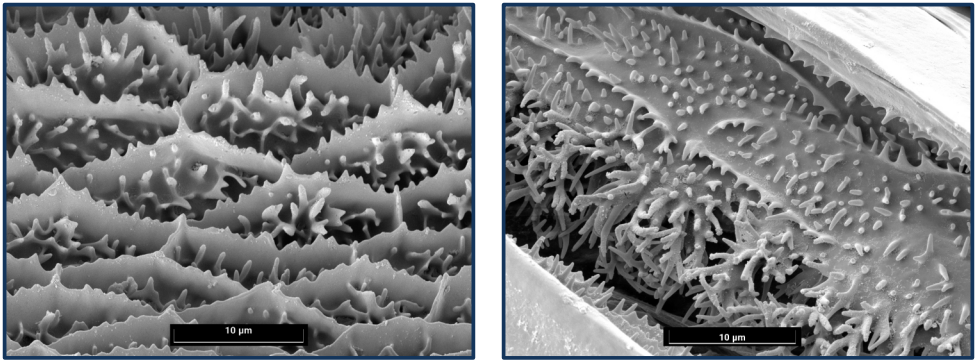
of spiders and bugs. I felt really motivated, and I was quite satisfied with the images of most of the specimens. Furthermore, last week I carried out a spider survey at one of my regular locations and managed to complete all the identifications, including the money spiders, within three days.

The big question is how to maintain this enthusiasm and rate of progress. How long will it be before I resume relaxing in front of my laptop browsing news sites with a cup of coffee nearby, rather than sit on a stool with scalpel and forceps in hand?

So, how did I do with my latest set of stubs? Well, the first thing to say is that although I did image quite a few spider stubs, for adding to my spiders website, I also had stubs of a dissected froghopper, *Issus coleoptratus* (I think) and also of some variegated caper bugs to examine. The caper bugs were provided by a microscopy colleague, for comparison of its key features with those of the green shield bug, which a group of us had studied in significant detail some time back. I do find it fun to look at insect rather than arachnological specimens sometimes, so I was glad to have these particular bugs to image. I have used an image of *Issus coleoptratus* as the frontispiece to this issue of SEM Diaries. This shows a view of the head not normally seen when observing a live specimen. Unless it is actively feeding, this part of the insect is horizontal, with its rostrum (elongated mouthparts) resting against its ventral side. The rostrum extends well below the bottom edge of the image. In fact it is so long that I could not capture the entire head and rostrum on my SEM in its best resolution mode. Rather than use the "Overview" mode I decided to make three separate images at higher magnification and merge them in a vertical "panorama". So far I have not "quite" got round to doing this. (Yet another example of procrastination.)

The two images above illustrate the difference between the legs of a froghopper (left) and a spider. The insect leg has two claws, and also a pad, located between the claws, to assist in its climbing vertical surfaces. The tarsus of the spider also has claws but for this (web-dwelling) species there is a third, hooked, one used for gripping the silk of its web. Some families of spider do have a structure, called a scopula, that bears a superficial similarity to the pad on an insect tarsus, but this resembles the bristles of a brush rather than the more "solid" pad of insects.

The images on the following page show the structure of the tissue seen at the mouths of the "lanceolate openings" on nymphs of the green shield bug and the variegated caper bug. It was satisfying to see that similar openings exist on each species, and to note some similarities in the tissue structure as well as some differences. The fact that there are some differences is not surprising, and these might well have originated from different instars of their respective species. (While the green shield bug was captive bred,



Detail of tissue structure within lanceolate openings on nymph of green shield bug (left) and variegated caper bug (right) to the same scale.

and good records were kept, the variegated caper bug nymph was collected from the wild.) Certainly a structure similar to the straggly seaweed appearance of the middle left section of the right hand image bears a close resemblance to the structure seen in other examples of the same feature in the green shield bug.

In early December I went to a meeting of the "Society for Electron Microscope Technology" at the Natural History Museum in London. This was my first trip to the metropolis since 2019! As I was checking in, the head of the Museum's electron microscopy section told me that he had just been given a copy of my book for the NHM library! It transpired that TESCAN, who had bought 13 copies, had given him one. I am obviously delighted by this, although I am concerned lest some expert on forams (for example) gets in touch to contradict one or more of my "dodgy" identifications!

The meeting comprised lectures, a "Beginners' Competition", sponsored by the Royal Microscopical Society, and trade stands. It was held in the Flett Theatre and Foyer, well known to many of us as the venue of Quekex.

I was most impressed by all five lectures presented by the "Beginners", who were post graduate students at various UK and Irish universities. I was expecting their work to be using standard SEM or TEM equipment to look at specimens prepared or post processed in interesting ways. However two competitors actually described techniques they were working on to modify the characteristics of TEMs. One of these used a laser to enhance the operation of a lanthanum hexaboride electron source to provide reduced chromatic aberration at low acceleration voltages, whilst the other described the construction of an adjustable pole piece for a TEM. The pole piece is normally optimised for one particular application, for example to achieve the highest resolution, or alternatively for using EDX (X-ray analysis) technology. To get round this differing need, some facilities actually have different TEMs optimised for different applications. The presentation described a project to design and build (to very high dimensional accuracy) a pole piece with an adjustable gap.

The other (non-beginners) lectures were also most interesting and even mostly comprehensible. One was by Rob Kesseler, who is actually a lecturer at Central St. Martins University of the Arts, in London. He has been bridging the gap between art and science by colouring electron micrographs of pollen and other botanical material. He has produced a number of books, and I had purchased his book on pollen [2] some time ago to assist me during my own work on pollen.

References

1. Poole, J. Holes Joined together by Bits of Wood. Balsam Post 98 Jan 2013 Page 9.
2. Kesseler, R. Pollen: The Hidden Sexuality of Flowers. Papadakis 2014