SEM Diaries - 17
One in the Eye

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Fig. 1 (a): Left - *Pardosa sp.* spider with blob of glue on its right median posterior eye
Fig. 1 (b): Right - *Alopecosa sp.* jumping spider with broken left anterior median eye

Last time, I waxed lyrical about the solvent HMDS, which has a very low surface tension, making it suitable for dehydration of specimens. This time I shall mention a solvent with a high surface tension that has caused me to destroy quite a number of specimens.

As readers will know, there are a number of different ways one can fix a specimen onto the aluminium stub that supports it in the chamber of the SEM. One common method is to use double-sided adhesive carbon-based pads. One surface of the pad is stuck onto the stub and the specimen is gently pressed onto the other surface. These work well for some specimens, but for samples with a small surface area in contact with the pad (such as the edge of the skin behind the head of a spider) there is a danger that the specimen can work loose, or else pressing on the specimen to "make it stick" can have the undesired effect of cracking the surface. Other common ways include the use of a silver-based conducting glue, or alternatively a carbon paste.

In SEM Diaries - 7 I mentioned how difficult it is to hold a dehydrated specimen in tweezers without its shooting off into oblivion across the bench. Because of this I have long since given up trying to lower the specimen in its correct orientation directly onto a spot of glue on an aluminium stub. I am particularly wary of doing this with heads and spinnerets. Instead, I tend to get the specimen onto the stub by fair means or foul and then worry about orientating it. I can then place

the spot of glue onto the stub and, having sorted out its orientation, gently guide the specimen onto that patch. The biggest problem with this approach is that as, say, the back of a head, makes contact with the silver paint, the surface tension of the solvent will tug on that side of the specimen and suck it into the "mire". In the process of doing this it is all too easy for parts of the specimen that I want to image becoming covered in glue and rendered unusable. Carbon paste is more forgiving, but the danger of the glue taking control of the specimen remains.

Figure 1 (a) shows one outcome. In this instance I used carbon paste, and the head tipped up (I could almost add "as usual"). In some ways I was lucky, in that the only part of the anatomy that landed on the paste was an eye, resulting in a blob stuck to its outer membrane. Attempting to remove this blob would almost certainly result in damage to the eye. Cloning it out in Photoshop remains a possibility.

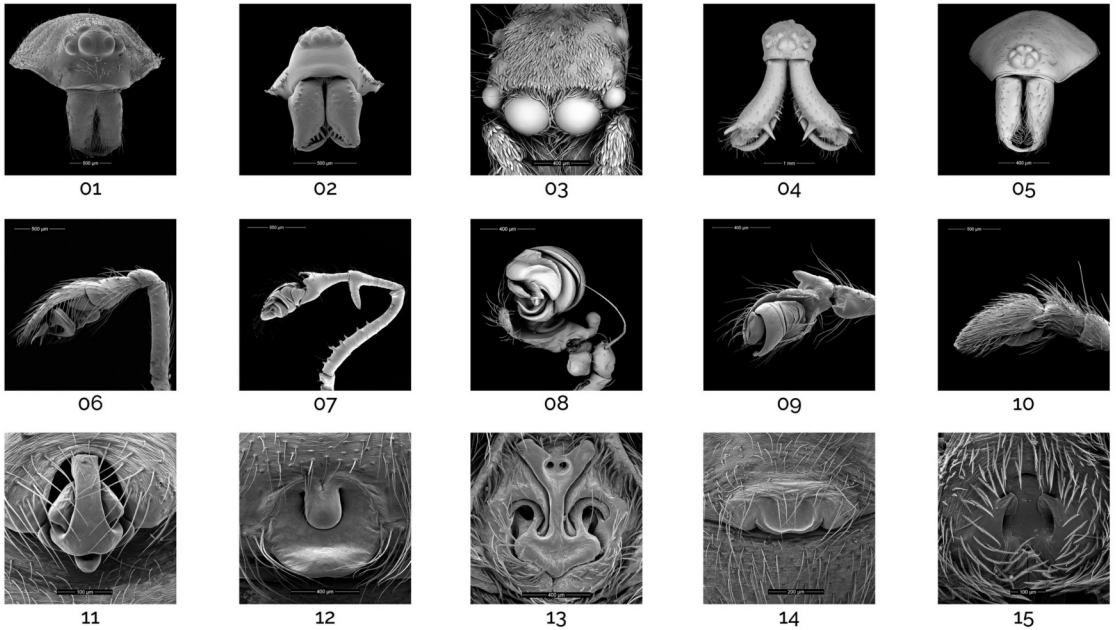
The example of Figure 1 (b) was successfully mounted, but when imaged under the SEM it showed that the large left eye was covered in extraneous material, that was peeling off, presenting a crazed appearance. I took the stub out of the chamber and attempted to remove the crazed material with a small brush, and when that failed I resorted to using my favourite probe - an acupuncture needle on a short handle. All went well until I had removed almost all of the extraneous material. I thought "just one more scrape should do it" and then pierced the eye. The result is clearly visible on the image of that head after re-coating with gold and imaging again in the SEM. I was rather upset by the results with both of these heads, as I have few micrographs of heads with these particular arrangements of eyes, from the Lycosidae and Salticidae respectively.

The presence of extraneous material on dried specimens has been occupying my mind recently. This mostly exhibits itself as powdery material attached to hairs on the scopulae (brushes on the tarsi) or on the mouthparts. Sometimes specimens are really clean, but at other times they are encrusted as though they have just been brought out of their burrows. In fact having dirty specimens to start with could be one cause. Another cause I have considered is that the material, whether powder round hairs or scales on flat surfaces, could be calcium salts from tap water. I preserve my spiders in industrial methylated spirits (IMS), diluted to 70% solution. I have tended just to use tap water for the dilution, but I do live in a hard water area. I have recently purchased 10 litres of pure distilled water and made up some new 70% IMS. Now I am waiting to see if this makes a difference with fresh specimens.

One reason I have been trying to image more spider heads is that I am in the process of putting together a group of 15 micrographs as a body of work to submit for the distinction of "Associate of the Royal Photographic Society" (ARPS). Perhaps this is just because I want to add a few more initials after my name, but I do find having a goal is an excellent way of improving the quality of one's work. I have decided to have a row of five prints of heads of various species, a row of male pedipalps and finally a row of epigynes, making 15 prints in all. Unfortunately I do not have sufficient good material to make the three images of each column to be of the same species. The selected photos and their sequence, in three rows, are illustrated in the hanging plan on the opposite page.

There are a number of categories of ARPS, such as Nature, Fine Art, Travel and so on, and normally an entry "simply" requires the submission of 15 prints and a written "Statement of Intent" of 150 words, describing one's approach and intentions behind the submission. These days, images can alternatively be submitted as digital images for projection.

ARPS
Hanging Plan



The hanging plan of my ARPS submission. The individual photographs require separate identification along with suitable technical details.

I was not sure which category my entry would fall into, so I sent a Statement of Intent and some sample images to the RPS, at their request, and the answer they came up with was "Science". Now, the normal way to obtain an ARPS in Science is as an "imaging scientist". Basically, this is awarded to professionals in the field with a specified educational background and number of years experience, supported by references and evidence of qualifications. I would fall at the first hurdle! However, there is the option of obtaining an ARPS in Science by submission of 15 images, as for the other categories.

The sting in the tail, however, is that I shall have to supply a significant amount of information in addition to the Statement of Intent. The feedback I have received includes phrases such as:

> *"... being an application in the Science Category he must demonstrate his expertise in SEM technique and in identifying his specimens ..."*

and:

> *"... he will need to provide much more written information regarding each image of his specimen and the Scanning Electron Microscopy techniques* [than is included in the Statement of Intent]*..."*

I am not sure if demonstrating my expertise is achieved (or otherwise!) simply by the quality of my prints or if I shall need to provide other evidence that may stray into the imaging scientist criteria. Similarly, I am not sure how I can demonstrate my expertise in identification, other than by correctly identifying my prints! In any event, the species I have selected are among the easier to identify. Now the little brown money spiders present a completely different challenge, but that is for another day.

Anyhow, I shall put together what I think is the required documentation and see what they think. I am due to attend an "advisory day" in July when I shall receive comments on my prints as well as the Statement of Intent and supporting information.

Perhaps I should have entered in the Nature category with photographs of big cats from Africa and America instead! I shall keep you posted!

Now that spring has sprung, spiders have started appearing around the house and garden, so collection and imaging of specimens can start again in earnest. In fact this year I am hoping that I shall receive specimens from other collectors. By the time you read this I shall have attended the annual get-together of the British Arachnological Society, and I have persuaded the committee to allow me five minutes to address the members present on the subject of my spider website. I am hoping that some of those present will be willing to send samples from around the country. Most are much more experienced at collecting and identification than I am. I hope this does bear fruit. There are more than 650 species of British spider and I have images of precisely 20 species on my website as I write this. The URL is:
www.spiders.jeremypoolesem.org.uk