Bugs up Close

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During the early days of the RMS, its (mainly wealthy) gentlemen, since women weren't allowed to attend, would meet regularly, when members would discuss their latest microscopes and share some of their observations, which would most likely be hand-drawn at the time. Obtaining interesting specimens was more of a challenge however, as many of the members had neither the skill nor time to spend mounting slides with suitable materials. The Victorian fashion of examining novel objects was also an influence behind the appearance of professional slide mounters in the mid-1800s who, recognising a potentially large market opportunity, began to prepare slides of a wide variety of objects. These slides, mainly 3 x 1 inches in size following the adoption of the (still widely used today) 'RMS standard', have survived in large numbers and provide a fascinating insight into the early days of 'popular' microscopy, and of the RMS.

We recently received a generous gift of a cabinet of antique slides, which was accompanied by an unusual, folding, Swift microscope, which dates back to the early 20th C.

Figure. 1 Cabinet containing 20 trays of antique microscope slides.

An additional eight boxes of slides were also included. The donor, Nigel Hill, came across them while going through his late father's belongings. He had been given them by "a friend of a friend", who thought that the young Nigel might be interested in biology or botany. Nigel, however, preferred sport and then studied languages before a career in the world of banking. The microscope and slides were thus wrapped up in newspaper and put in the attic. The newspaper was dated 19th May 1967 and was only uncovered in the summer of 2022 – some 55 years later!

There are over 800 slides in all, some dating back to the 1860s and are in several categories: entomology, botany, histology, petrology, and diatoms – the salicaceous (glass) coatings of algae micro-organisms commonly found in water (both fresh and salt). These were collected, cleaned and mounted, often in very artistic arrays and will be described in a future article.

"Wow!" slides

Several slides have a very obvious "wow" factor. These include whole insects, carefully laid out and preserved in resin (usually Canada Balsam) between slide and coverglass.

Figure. 2. Selection of "whole insect" slides from the late 19th to early 20th Century.

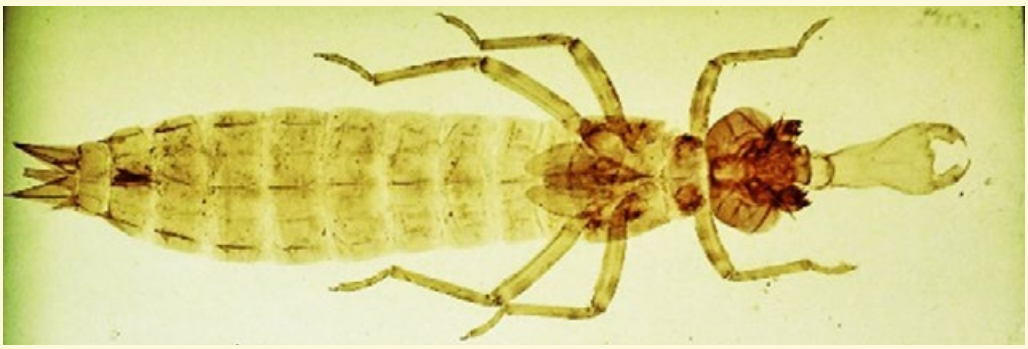

Figure. 3 Dragonfly nymph. Note the extended pincers.

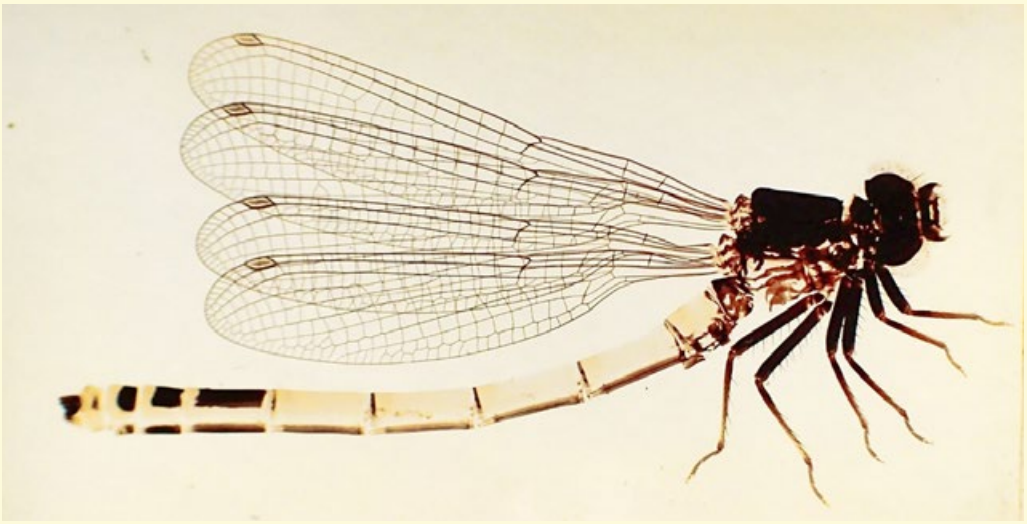

Figure. 4. Mature dragonfly.

The dragonfly nymph, remarkably well preserved here, was a voracious predator in the ponds where it would spend several years before transforming into the free-flying adult insect. Figure 3 clearly shows the formidable pincers, which could be extended – as shown here – to draw the victim back into the nymph's jaws.

A mature dragonfly is shown in Figure 4 for comparison.

Figure. 5. Poster campaign for Colorado beetle crisis.

For many years the Colorado beetle has devastated potato crops in the USA and Canada. Fearful of it attacking British crops, what was then the Ministry

Figure. 6.Colorado beetle larva.

of Agriculture ran a campaign in the 1960s (Figure 5) warning of the dangers of these beetles, and in particular their larvae which would devour the leaves of the potato plants, thereby destroying crops. Another of our "wow" slides (Figure 6) shows one of these larvae, which is only ~ 15 mm in length.

Frederick Enoch, possibly the most famous slide-mounter of his time, was particularly well-known for his 'whole insect' slides, and several in the collection illustrate the superb layouts he created as seen in Figure 7, which shows a cranefly (aka 'daddy long-legs').

The example shown in Figure 8 is a fungus gnat. This slide includes a label confirming the preparer as Enoch and the address allows us to date the slide to 1882, when he lived there.

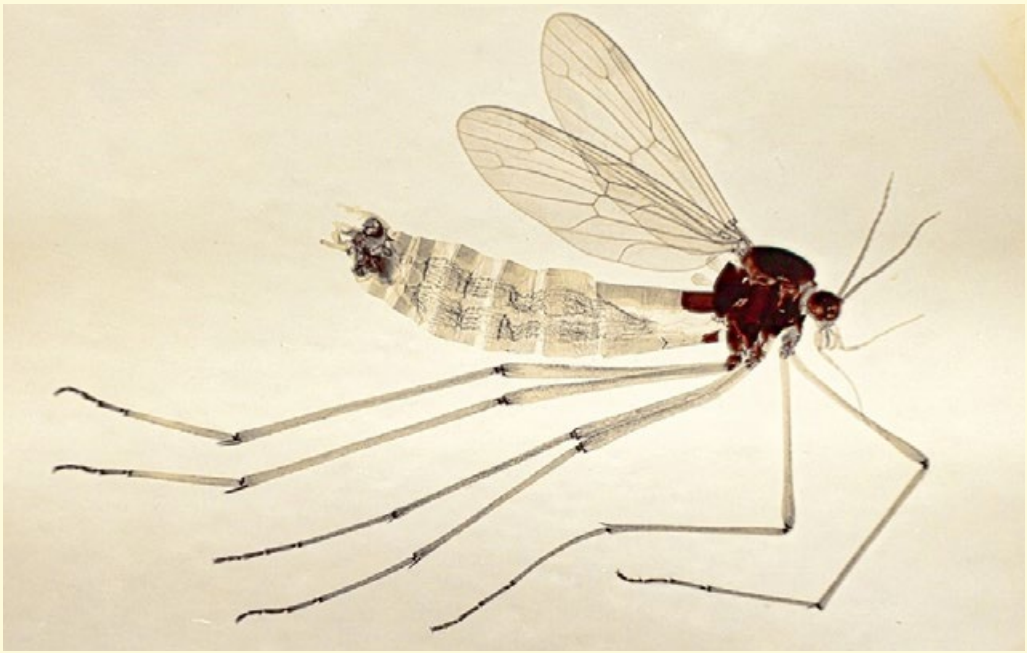

Figure. 7. Cranefly.

The larger, whole insect slides would often have the specimen's soft innards carefully removed by soaking in potassium hydroxide before cleaning

Figure. 8. Fungus gnat.

and drying. The exoskeleton was then laid out in a resin or balsam on a slide before covering and sealing with the cover glass. This was an elaborate procedure and well-mounted examples survive that date back to the late 1800s.

The development of 'closed cell' slides, with a spacer ring and small, glass cover slip was used to mount smaller insects or selected parts in a liquid while preserving their solid shape, as opposed to

Fig. 9. Closed cell mount containing a snipe fly. Note that the embedding medium has discoloured over the years.

the flattened exoskeletons of the 'whole insects' shown above. Many such mounts were sold by the London firm Clarke & Page, including some supplied by other makers such as Enoch. Many of their slides include "prepared without pressure" on their labels and preserve the specimen in great detail. An example of a whole insect in a closed cell is shown in Fig. 9. The snipe fly was named after the snipe, as its proboscis was thought to resemble the downward pointing bill of the bird!

Separate parts of insects were also mounted in large numbers, some of which show astonishing details, such as a blow-fly proboscis, shown in Figures 10 and 11.

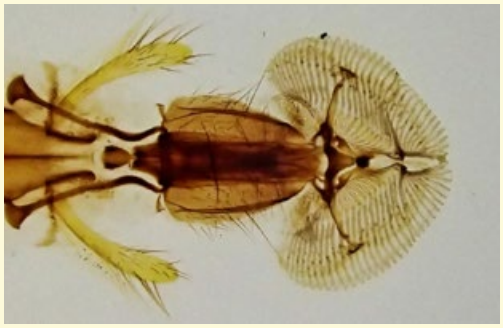

Figure. 10. Blowfly mouth and proboscis

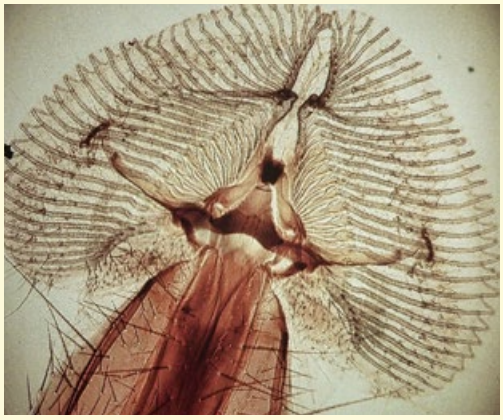

Figure. 11 Details of blowfly proboscis.

Figure. 12 Head of cranefly.

Figure 12 shows a rather startling cranefly's head, contrasting with the whole-insect mount shown in Figure 7.

Figure 13 is an example of a mount with a black background which would highlight an opaque specimen when viewed with incident light. It shows a closed cell containing a diamond beetle, commonly found across Europe. This one is some 7mm in length.

Wings of similar beetles along with butterfly scales and diatoms were also used to make elaborate arrangements, which were popular in the late 1800s

Figure. 13 Diamond beetle in a closed cell mount.

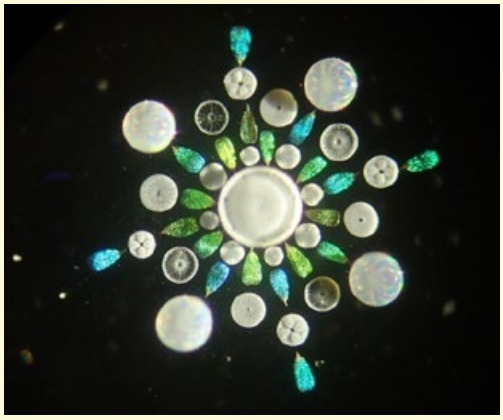

Figure. 14 Arrangement of beetle wings, butterfly scales and diatoms.

and into the early 1900s. Figure 14 is an example, created by William Firth, one of the foremost diatom mounters of his time. His mounts are still keenly sought-after today.

Parasites

These are organisms that feed off a host animal or insect, and in this section several examples will be described.

Blood-sucking ticks are a major problem for any sheep farmer and require the sheep to be immersed in highly toxic fluid to eliminate them. They also carry Lyme's disease, and their bites can cause serious illness in humans. Figures 15, 16 and 17 show an example of this bug, about 5 mm long. The sharp claws at the end of its forelegs (Figure 17) would provide a strong grip on its prey. The monogram "JB" on the paper cover of this slide (Figure 15) indicates that it was produced by John Barnett, a mounter who was active in the 1870s.

Figure. 15. Mount by John Barnett containing a sheep tick. Note the "JB" monogram.

Figure. 16 Whole sheep tick, ~5 mm in size.

Birds are also affected by parasites, and Figure 18 illustrates a blood-sucking louse (anopluran) that was found on a sea eagle. They are a common parasite among large birds of prey.

Figure. 18. Louse from a sea eagle.

Our largest bird, the ostrich, is not above such attacks by these tiny creatures, and Figure 19 shows an ostrich louse ~ 4 mm in length that causes serious problems in these birds. Ostriches are farmed for their meat and their skin is used for leather which, believe it or not, is used in 'designer' handbags (!). Infestations of these lice can not only damage feathers, but produce severe pitting in the leather, rendering it unusable.

Figure. 17. Claws on foreleg of sheep tick.

At the other end of the scale is the bee louse, which attacks honeybees. This tiny, wingless arthropod is only ~ 1mm in size, but can cause havoc when a colony of bees is infested. Figure 20 shows an example. To hitch a ride on their honeybee hosts, these lice need a truly phenomenal grasp. Now a recent study reveals how they manage to walk around on a flying bee while exhibiting what researchers say is the highest attachment force per body weight of any land-based insect ever measured.

Figure. 19 Louse from ostrich. Note the claws on the forelegs.

This force relies on the parasite's highly adapted feet, called 'tarsi', which are equipped with toothed claws. Each foot has a total of 28 teeth, or claw tips, which let the parasite lock onto sparse honeybee hairs during flight.

"The claws are unique, from what we know so far. Usually, insects have claws with one tip only. A few species have two to three tips. But this species possesses comb-like claws with several tips and deep interstices [gaps]," says Thies Büscher, a zoologist at Kiel University.

Figure. 20. Bee louse.

Of course, any discussion of blood-suckers must include fleas, which are widespread throughout the animal kingdom, and we conclude this report with images of these pests in Figures 21 (a) and (b).

No description of flea images could fail to mention Robert Hooke's truly remarkable picture, published in his Micrographia in 1665. This wonderful etching is shown in Figure 22.

Conclusion

This short article aims to provide a fascinating glimpse into the small world that was revealed by microscopy in the late 19th C and early 20th C. Insects would appear to leap out of their balsam cages, tiny bugs appeared in great detail, and people's curiosity for seeing new things led to an upsurge in microscopy (by now not confined only to wealthy gentlemen), particularly as ready-prepared slides or mounts became widely available. Our slide collection

Figure. 21 Examples of fleas from (a) boar and (b) mole.

provides a rich resource for anyone seeking to explore the early days of the RMS and what our early members looked at with their microscopes.

Another of our members, Stuart Clague produced an article for infocus describing some of his own private collection of slides (see issue 48, December 2017). A more scholarly work by the late Brian Bracegirdle, a former Executive Hon. Secretary of the RMS, was published by the Quekett Microscopical Club in 1998. This volume contains details of most of the slide preparers of the Victorian and Edwardian times and shows many examples of their work. A copy of this publication is in the RMS library. There are also numerous collectors' websites which provide more information on antique slides.

I am pleased to reveal that we are planning to bring a selection of these antique slides to the ever-popular Learning Zone at mmc2023, the RMS's flagship event. Visitors will be able to examine them in detail, using a microscope which dates from the same period. If you are planning to attend, please do make time to visit the Learning Zone and take a look!

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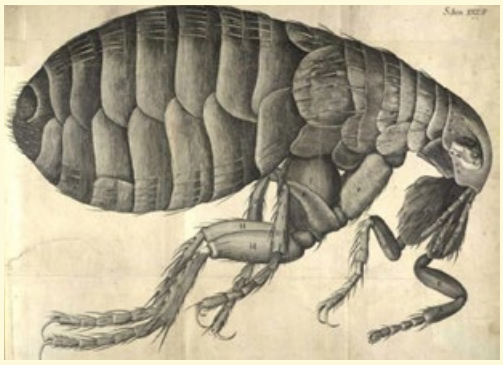

Figure. 22 Robert Hooke's iconic flea etching from 1665.