

# MuseumPests.net

A Product of the Integrated Pest Management Working Group

## ***Tineola bisselliella* at the Natural History Museum, London**

Suzanne Ryder - The Natural History Museum, Cromwell Road, South Kensington, London SW75B

Claire Kelly - The Natural History Museum

Armando Mendez - The Natural History Museum

The Natural History Museum, London (NHM) have had a comprehensive IPM programme and team for some years now, with a dedicated team of about 20 reps from disciplines across the Museum and backing and financial support from higher management. It is evident that these efforts have paid off with the numbers of rodents and beetles reducing within our buildings. We have achieved this by introducing risk zones, where we divided the Museum into zones depending on the vulnerability to pests. Signage and protocols are then in place to ensure behaviour in these areas are in accordance with the zone. We were then able to commission KE Emu to produce a pest module or our collections management system which has been really useful in alerting to emerging infestations and then allowing us to visually present this information and target specific areas. KE software is the company that designed and implemented our collections management system. The NHM, London refer to this system as KE Emu.

Our latest and one of our biggest achievements to date is our new quarantine facility. The official launch took place in September 2013. This is a Museum facility so it is not just for collections use; it is for every department to use. Any specimen/object or material entering the Museum that could pose a pest risk should go through the quarantine facility. It has a large unpacking room to receive specimens and objects. This leads in to the treatment room which contains a large freezer, large enough to take a Rhinoceros. It also has a few small upright and chest freezers for smaller items. It has three drying cabinets for botanical specimens and is also intended for use as part of our disaster plan to dry wet objects. We also have a hot/cold chamber which gives us the flexibility to use it for heat treatments or freezing as needed and we also can use this for anoxic treatments. This then goes out to an acclimatization room or to the exhibitions conservation studio.

However we do have our problems and as with many other institutes in the UK we have seen an alarming increase in *Tineola bisselliella* the clothes moth especially in our public galleries over the past few years. The results from monitoring clearly showed we had a moth problem in the public mammal corridor but we needed to find a way to deal with it. The first response was to freeze the mounted display of infested cats. This was done a few times until the curators in Zoology correctly stated that they were not prepared to let the specimens go back on display until something a little more long term was in place to deal with the moth problem. So for some time the big cats display cases in the mammal corridor remained empty.

One of the IPM reps. from the public engagement team made a huge effort to find the source of the problem. She looked in areas we hadn't looked in before, under floor grates, old exhibition cases and even in the roof voids. What she found was that the old display cases which could not be moved or replaced provided ideal, dark, dirty places for pests to live. She also discovered that we had a few housekeeping issues that needed to be addressed and with some tenacious pestering of Estates she was given access to some very old plans of the Waterhouse building. This revealed that many of the galleries were linked through the floor and ceiling vents. She arranged a deep and high level clean and for the more inaccessible under floor and ceiling ducts we treated these spaces with a desiccant dust.

While this investigation was on going we decided to look at a moth prevention system called Exosect®. We were aware of this system as the Royal Opera house in Covent Garden had used it successfully to control moths in their costume stores and it had been discussed at the UK IPM group. So we invited a representative from Exosect® to assess and quote the areas we had in mind for the trial. Once we received the quote and discussed our options we decided to do trial of this system.

## Method

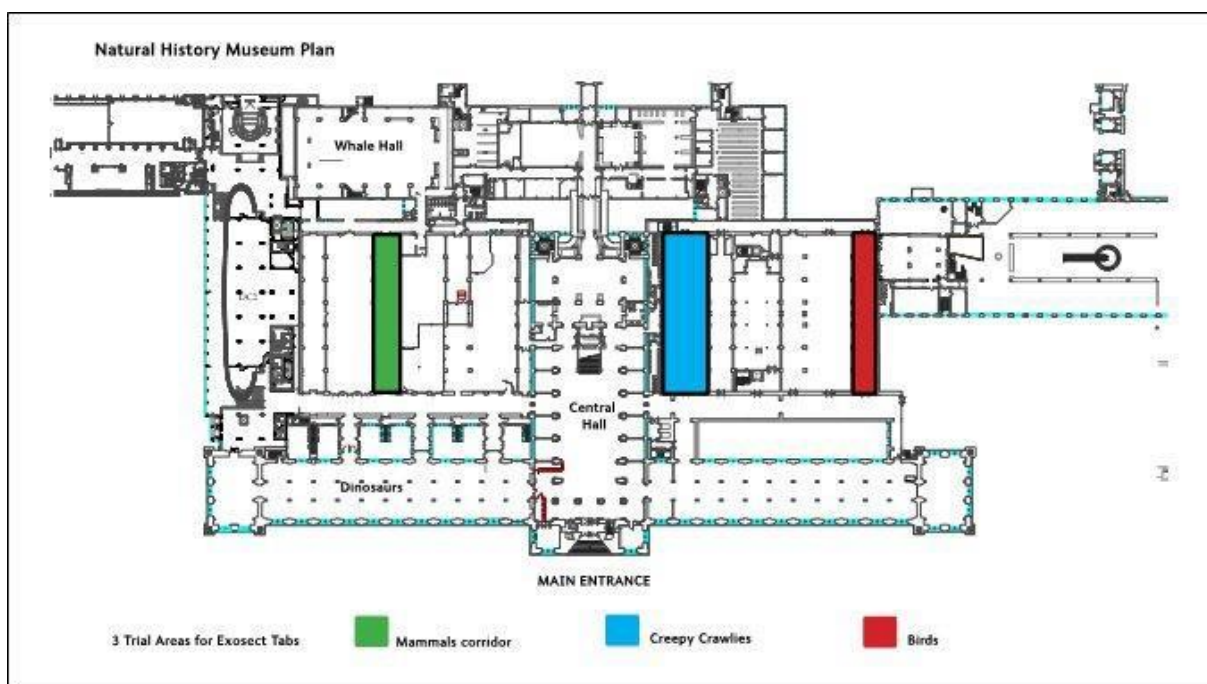
Exosect is a mating confusion system for controlling clothes moths (*Tineola bisseiliella*) without using pesticides. It works by deploying an Entostat powder, which is a natural food grade product, combined with a pheromone specific to the female cloth moths.

The powder is placed inside a bespoke dispenser in a tablet form; these are located around the gallery at approximately 5m intervals. The increased presence of pheromone attracts male moths out into the open. The males are attracted to either a monitoring trap where they provide an idea of overall infestation levels or to the Exosect tab where they pick up the powder and female pheromone. The male carrying the Entostat powder will form a mobile pheromone dispenser producing a false pheromone trail, which attracts more males into the open. As contact between the males continues the Entostat powder is passed on to more and more male moths. Thinking there are only females in the space this causes confusion and a disruption to the mating cycle, hence the number of moths being produced is reduced.

The decision was made to trail three galleries for a period of at least three years. The galleries chosen were:

- The mammal corridor, as this was a problem we needed to find a new solution for.
- The bird gallery, not a gallery with the same history of moth problems with various infestations and a vulnerable collection and a very busy gallery.
- The Creepy crawlies gallery - This gallery had high numbers of moths. You could see them flying in front of your face as you walked through.

These three galleries are linked by underfloor ducting.



**Figure 1** Proximity of galleries in Exosect® trail

The separation of the galleries chosen was also of interest as they are far enough not to be directly affected by the moths from the other chosen trial galleries but as mentioned before all linked by the vents and ducts.

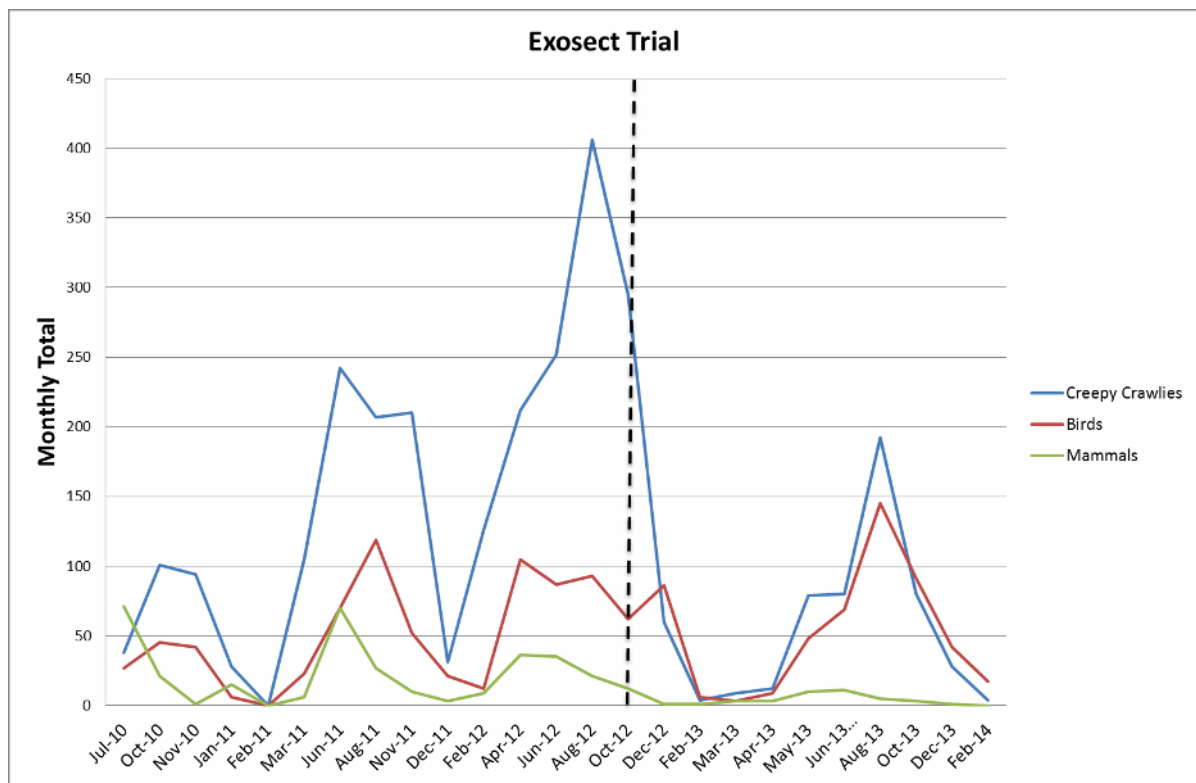
We are still using AF diamond pheromone traps in these areas because;

- We want to maintain consistency, to see if the Exosect® is making a difference
- We looked at using Varroa boards in the AF trap cases but this didn't work as they attracted little to no moths to them although there were still lots on the AF diamond pheromone traps.

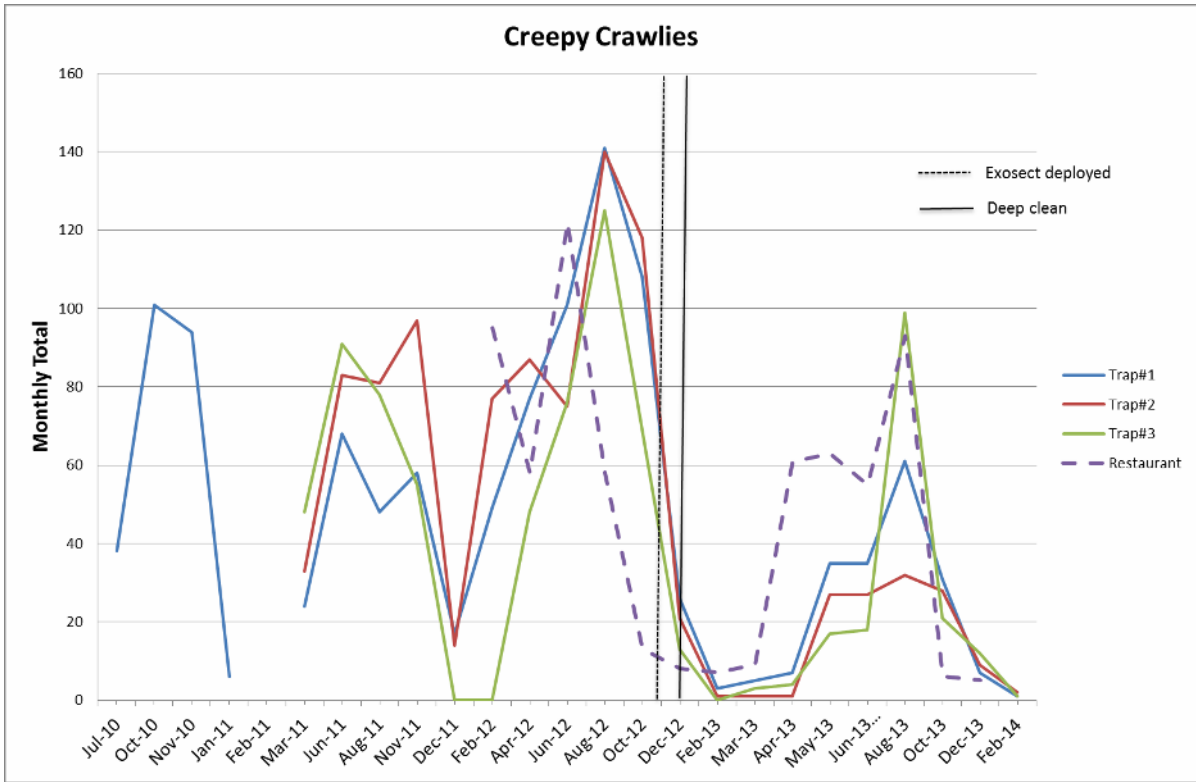
## Results

The line on these graphs indicates the start of the trial but also the deep clean and application of the desiccant dust. So the initial indications are encouraging with a reduction in moth numbers in both the mammal corridor and creepy crawlies. Birds show similar counts but they are better than the surrounding galleries without Exosect®. With a very mild winter the population has not been eradicated completely so with the start of the warmer weather we will continue monitoring. Time will tell us if the Exosect® control system is really working as well as we hope.

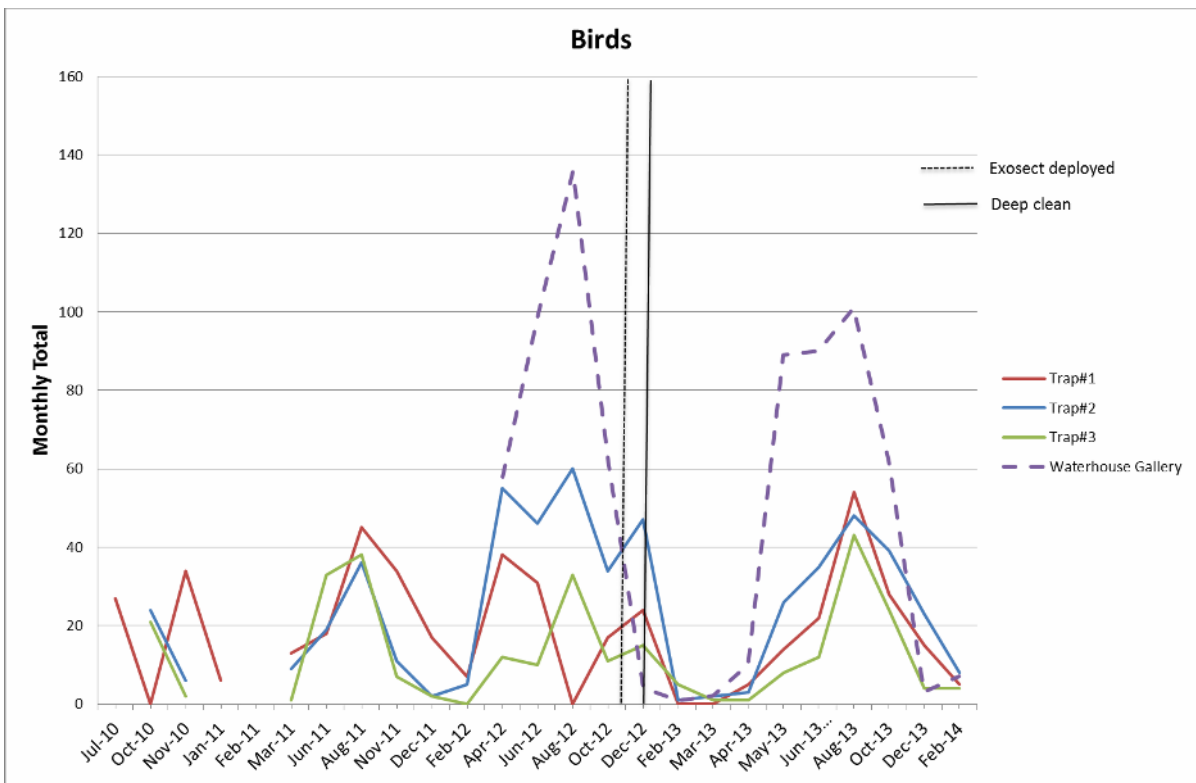
**Figures 2-5** These graphs show the monitoring results for the mammal corridor, the creepy crawlies gallery and the bird gallery.



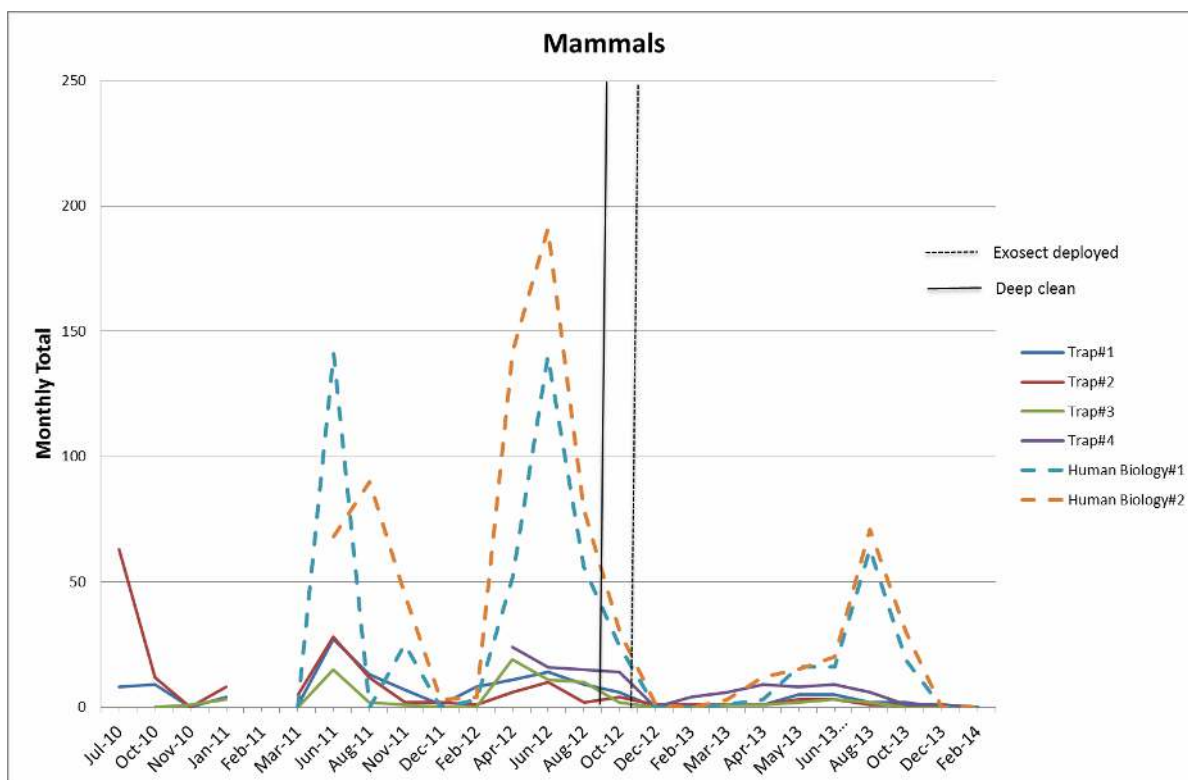
**Figure 2** Total moth count



**Figure 3** Moth count in Creepy crawlies



**Figure 4** Moth count in Bird gallery



**Figure 5** Moth count in the Mammals corridor

We will continue this trial and hopefully publish the results at the end of the three years. However, it is worth mentioning that we will continue to look at other options for control and we are already looking to trail the use of a tiny parasitic wasp *Trichogramma* sp. as a biological control agent.

Different biological agents were reported to control many of our Museum pests. So we are keen to try this. We have an area in the Museum identified as a potential trail site, far enough away from our Exosect trail site not to disrupt results.

### Conclusion

The overall total moth numbers are down to a much more manageable level which is a welcome achievement but the results are far from conclusive as to whether this system is sufficiently controlling the moth population in the NHM. It is worth mentioning that whatever system of control we find to work for us in the long time will always work in line with the basic principles of IPM and none can be expected to replace best work practice, monitoring, identification, housekeeping, training, quarantine, environmental control, facilities design & management and high quality collections storage.