

Joint TIWG/VIS conference

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The British and Irish Association of Zoos and Aquariums (BIAZA) Terrestrial Invertebrate Working Group (TIWG) Conference, held jointly with the Veterinary Invertebrate Society (VIS), was hosted by Twycross Zoo. The conference was well-attended and deemed to be a great success.



The practical sessions took place on day one. Image: © BIAZA TIWG.

On the first day delegates enjoyed a visit around Twycross Zoo while the BIAZA/TIWG steering group held its meeting.

After an introduction about Twycross Zoo from its chief executive Sharon Redrobe, the VIS hosted the day.

The morning consisted of lectures, starting with an introductory presentation by John E Cooper on the history and background of invertebrate health and medicine.

This was followed by a lecture on the detection and diagnosis of disease in invertebrates, emphasising that they can be examined and diagnostic tests performed to help achieve a diagnosis, as is possible in other species. Chris Palgrave followed with a fascinating lecture entitled "Lessons from honey bees; disease, detection and diagnosis".

Margaret E Cooper then presented on an important topic: “The ins and outs of invertebrate law”. This essential lecture covered a broad range of topics covering international trade, welfare, transportation and issues regarding keeping invertebrates in captivity – both as a private keeper or in a zoological collection.

Prof Cooper (John E) then discussed the pathological and other responses in invertebrates. The morning lecture session was concluded by an enthusiastic David Williams on the topic “The eyes have it”, taking us through an evolutionary journey of invertebrate eyes.

After lunch, an afternoon of practicals was held, with sessions on observations and gross examinations of invertebrates, dissection of preserved specimens, sample taking and laboratory techniques. Delegates were able to make smears, crush preparations and examine specimens under the microscope. Prof Cooper (John E) also demonstrated staining techniques.

Evening entertainment included drinks in the butterfly house and a meal held at the zoo.

TIWG hosted the final day, with interesting presentations on invertebrate management at Berkshire College, dung beetles in the UK and butterfly preference testing. Other presentations included *Partula* snail research and Marwell Zoo’s management of *Mecynorhina* and *Smaragdesthes*. Frances Baines gave a presentation on lighting for invertebrates – highlighting the fact very little is known about the importance of visible and ultraviolet light in the husbandry and welfare of terrestrial invertebrates. Further research is encouraged and will have positive implications on the welfare and husbandry of invertebrate species in the future.

Mark Stidworthy gave a presentation on a retrospective review of histopathological findings in cephalopods submitted to the International Zoo Vet Group (IZVG) pathology, placing diagnoses in simplified categories.



More of the day-one practical sessions. Image: © BIAZA TIWG.



Veterinary Invertebrate Society speakers: David Williams, Margaret E Cooper, Sarah Pellett, Chris Palgrave and John E Cooper. Image: © BIAZA TIWG.



The Terrestrial Invertebrate Working Group steering group committee (from left): Caroline Howard, Frances Baines, Anna Westbury, Mark Bushell, Dave Clarke, Andrew McLeod, Lauren Lane, Tracy Dove, Sarah Pellett and Steve Trim. Image: © BIAZA TIWG.

First aid

A first-aid workshop took place with the aims being for delegates to explore six first-aid options for invertebrates, including: ectoparasite removal, haemolymph loss, dysecdysis, autotomy, wound repair and snail shell repair.

Ectoparasite removal

A problem that may be seen in some captive invertebrates, such as millipedes, is ectoparasite burdens, especially by mites. It is common to see some mites on them and saprophytic mites have beneficial effects. Microscopy to examine the mouthparts of the mites may aid in diagnosing whether they are parasitic. Parasitic mites are more likely to have piercing-type mouthparts for feeding on haemolymph.

For this workstation, delegates removed glitter (representing a high burden of mites) from invertebrate models with soft paint brushes.

Haemolymph loss

Haemolymph loss following trauma in invertebrates can be fatal; however, a number of techniques may be used to stop the loss in a first-aid situation. Delegates were given models of scorpions that had a puncture wound with haemolymph leakage. They had to demonstrate how they would restrain the animal, control haemolymph loss and seal the wound.

Dysecdysis

Dysecdysis is a common problem seen in captive invertebrates causing morbidity and mortality, especially in phasmids, theraphosids or mantids. Dyecdysis is often caused by environmental factors, such as low humidity or too high ambient temperatures, or animals that have fallen during a moult. In some species, such as stick insects, if the vivarium is too low and the phasmids do not have access to height, they show difficulty in moulting. This can be fatal, or may severely damage their quality of life if not rectified quickly.

Delegates learned how to assess the animal and consider whether first aid can be attempted. A plastic stick insect or cricket was suspended from a shelf by placing clear tape to the back two legs covering the moult. This method allows the animal to emerge from its moult.

Autotomy

Damaged limbs can be caused by factors such as trauma from incorrect handling, trapped limbs or dysecdysis. Terrestrial theraphosids have fine hairs on their feet that can be caught on clothing fibres – resulting in autotomy or damage to the limb with loss of haemolymph from the joints. Limb removal at the joint is necessary if haemolymph loss cannot be stopped. It is advisable to keep the animal on a paper towel substrate afterwards, for 24 hours to 48 hours, to monitor any continued leakage of haemolymph.

Delegates learned how to carry out autotomy correctly by demonstrating how they would restrain a spider, hold the damaged limb at the femur with forceps and pull the limb upwards and away from

the body. They then stopped haemolymph leakage from the break point by applying fragrance-free talcum powder to the area with a cotton bud.

Exoskeleton damage

Damage to the exoskeleton can occur from a fall or incorrect handling. Physical trauma and loss of haemolymph is a serious problem in invertebrate species and is seen more commonly in certain species, such as theraphosids or phasmids, due to their use in handling sessions. If a fall does occur then immediate first aid is essential. Delegates made a stencil for the wound on their phasmid and used a spray-on plaster over the wound and away from the spiracles.

Snail shell repair

Snail shell repair for captive terrestrial land snails, such as giant African land snails with damage to the calcareous shell, was discussed. Fracture of the shell does not necessarily cause loss of haemolymph, but due to exposure and desiccation of underlying tissues, may result in dehydration. Small fractures can be covered with an adhesive drape and sealant, providing initial protection and allowing time for regeneration and some healing.

Delegates learned how to assess the severity of injury, cover the deficit with plastic and then apply plaster of Paris to the area of an empty snail shell. Once dry, this was covered with clear nail varnish to make a waterproof covering.

The conference ended with a very positive round table discussion summarising how keepers and vets can work together to advance the knowledge, welfare and health of invertebrates kept in captivity.



Delegates learned how to carry out autotomy on a spider. Image: © BIAZA TIWG.



Plaster of Paris was used to repair a snail shell. Image: © BIAZA TIWG.



A stencil was used to accurately spray plaster on to a wound. Image: © BIAZA TIWG.



Restraint and treatment technique on a model of a scorpion with haemolymph leakage. Image: © BIAZA TIWG.



The first-aid workshop included ectoparasite removal from a model of an invertebrate using a paint brush. Image: © BIAZA TIWG.



In cases of dysecdysis, the use of sticky tape allows the cricket to emerge from its moult. Image: © BIAZA TIWG.

Further Reading

- Cooper JE (1998). Emergency care of invertebrates, *Veterinary Clinics of North America: Exotic Animal Practice* **1**(1): 251-264.
- Dombrowski D and De Voe R (2007). Emergency care of invertebrates, *Veterinary Clinics of North America* **10**(2): 621-645.
- Pellett S and Bushell M (2015). Emergency care and first aid of invertebrates, *Companion Animal* **20**(3): 182-186.