BEVA Trust Travel Scholarship Report
By Annamaria Nagy

I attended the Basic Equine AO Principles course in Oberdorf, Switzerland, 11-13 February 2009. The course was held in a small village, Oberdorf, in the North-Western part of Switzerland, just half an hour away from Bern. Oberdorf plays an important role in the life of the company Synthes and was therefore selected to home the course. Synthes is a leading global medical device company that develops, produces and markets instruments, implants and biomaterials for surgical fixation.

During the 3-day course we learnt about the history of AO and fracture fixation, learnt about the simple application of surgical implants and had the opportunity to practice surgical techniques on plastic limbs. We were fortunate to have a great group of international speakers with specialist expertise in different areas, who did not only gave excellent lectures, but were also very helpful in the practical sessions. The list of speakers included Professor Jorg Auer and Dr. Anthony Furst from the University of Zurich, Professor Cristoph Lischer from the University of Glasgow, Dr. Larry Galuppo from the University of Davis and Dr. Patricia Hogan from Hogan Equine LLC. In addition to the main speakers, Professor von Rechenberg from the University of Zurich talked about bone healing and Dr. Bettschart-Wolfensberger, also from the University of Zurich gave a talk on anaesthetic management of the equine orthopaedic trauma patient.

The schedule of the lectures and practicals was rather tight, with the day starting at 8 am and finishing at 6 or 7 pm in the first 2 days. There was a rather large amount of learning material that had to fit in 3 days. In this report I will summarise selected lectures that are most relevant to my field of interest and studies (orthopaedics).
In the first morning we learnt from Professor Auer about the history and background of AO and fracture fixation. AO stands for the German 'Arbeitsgemenshaft of Osteosynthesefragen' with the English equivalent of ASIF: Association for the Study of Internal Fixation. AO was funded in 1959 by 4 trauma surgeons in Switzerland. AO Vet was funded 10 years later. Animals were an important part of human research and it was felt that they should benefit from the same advancements in fracture treatment as people. The main philosophy of AO/ASIF is: 'Life is movement - movement is life'. The AO/ASIF commissions include: The education, documentation, research, AO international and the technical commissions. The aims of ASIF Foundation are to involve the upcoming generations of human and veterinary surgeons and to serve as an international brain trust to develop working concepts for fracture treatment, encourage constructive criticism and preserve the AO/ASIF philosophy. The 4 basic principles of fracture treatment developed by AO are: anatomic reduction, stable internal fixation, preservation of blood supply and early, active, pain free mobilization.
Professor von Rechenberg gave an interactive lecture on bone healing, where we had to answer questions learnt from the distance learning material that had been sent to us before the course. Professor Auer talked about the functions and application of screws in equine surgery and made us familiar with the basic instruments used in fracture fixation.
In the afternoon we learned about management of simple fractures of the proximal phalanx from Professor Lischer. Short (<30mm) incomplete midsagittal fractures may be challenging to diagnose. It has been suggested that screw fixation (application of 1

lag screw) provides better prognosis for short incomplete mid-sagittal fractures than conservative management. For long (>30mm) incomplete mid-sagittal fractures internal fixation with lag screws is the treatment of choice to reconstruct the proximal articular surface. Acute palmar/plantar process fractures can be stabilised with 2 or 3 3.5 mm cortical screws. Dorsal frontal fractures of the proximal phalanx should be treated with internal fixation using lag screws and if treated appropriately, have a good prognosis.

Dr. Hogan talked about the diagnosis and management of lateral condylar fractures of the third metacarpal/metatarsal bone. She emphasised the importance of matching the clinical signs with the radiographic findings (i.e. a short incomplete fracture in a severely lame horse is very likely to be not the only findings) and to include the entire third metacarpus/metatarsus in the radiographic examination to rule out any spiral component of the fracture. Using a 5.5 mm cortical lag screw as close to the articular surface as possible is recommended with additional 4.5 mm screws more proximally. As each screw hole is a stress concentrator, it is not advisable to use many screws to compress the proximal spike of the proximal aspect of the fracture.

Dr. Galuppo gave a lecture on the pathogenesis and treatment of stress fractures of the third metacarpal bone. These lesions are a result of progressive stress remodelling and most commonly occur in Thoroughbred racehorses but are also seen in racing Quarterhorses. The most common configuration of dorsocortical stress fractures is a short oblique unicortical fracture that extends in a dorsodistal to palmaroproximal direction at a 30° to 40° angle and encompasses 60-70% of the cortex. Although conservative treatment is an option, if the fracture appears unstable it is advisable to apply screw fixation combined with osteostixis, using a 3.5 or 4.5 mm position screw perpendicular to the fracture line. Removal of the screw is necessary prior to returning to training. Smaller or chronic fractures may be best treated with osteostixis alone.

Dr. Hogan summarised the diagnosis and surgical treatment of slab fractures of the third carpal bone. The majority of slab fractures occur in the dorsal plane and may encompass the radial or intermediate facets alone or both. In some cases, when the fragment is comminuted, very thin or of poor quality bone, removal of the fragment(s) may be the preferred approach. Whether removal or screw fixation is the chosen procedure, arthroscopical assistance is necessary. Depending on the fracture configuration, one or two 3.5 or 4.5 mm screws are placed through stab skin incisions.

Professor Auer talked about the function and application of bone plates. He explained the principles of compression, neutralisation, buttress and tension band plating. Compression can be achieved with the dynamic compression plate, with the tension device, through over-bending at the fracture site and through the combination of compression and lag screw insertion through the plate. The basic principles of using plates are: 1. The plates should, whenever possible, be applied to the tension site of the bone. 2. Longer plates are generally preferred. 3. In large animals, all plate holes are filled with screws and across the fracture plane lag screws are used. 4. It is necessary to have good equipment and a wide selection of implants. 5. A solid education in the principles and techniques of fracture management is a prerequisite for successful application of the techniques.

Dr. Galuppo gave a lecture on diagnosis and repair of simple olecranon fractures. Internal fixation is recommended in almost all situations. A narrow 4.5 mm dynamic compression plate (DCP) or locking compression plate (LCP) can be used to stabilise the majority of olecranon fractures in all ages. Dr. Galuppo prefers using LCP plates for all fractures types and configurations. After fracture reduction the plate should be placed so that at least 3 screws can be placed proximal and distal to the fracture plane,

respectively. Interfragmentary compression is achieved by placing one screw distal and one proximal to the fracture in load fashion and by tightening them in an alternating fashion. Once the fracture is adequately compressed, additional screws are placed in the neutral position to fill the remaining plate holes. In young animals (<14 months) it is important to avoid placing screws that engage the radius through the distal aspect of the ulna.

Professor Lischer summarised the indications and presented the surgical technique for proximal interphalangeal (PIP) joint arthrodesis. Indications include osteoarthritis of the PIP joint; luxation and recalcitrant subluxation of the PIP joint, certain fractures of the middle phalanx that do not involve the distal interphalangeal joint and comminuted fractures of the proximal phalanx involving the PIP joint. There are several techniques available but the most preferred technique is application of a 3-hole DCP and 2 transarticular lag screws. A narrow 3 hole 4.5 mm plate is positioned in the dorsal midline with the single hole over the proximal aspect of the middle phalanx. Two transarticular 5.5 mm cortical screws are placed in a lag fashion lateral and medial to the plate. The horse should be recovered in a half limb cast, which should be maintained for 2 weeks after the surgery to support healing of the soft tissues.

Dr. Hogan talked about treatment of angular limb deformities. She has emphasised that surgical correction has taken on a more conservative approach in recent years. It has been realized that frequent clinical review, restricted exercise, corrective hoof trimming and maturity may all have a positive influence on corrective deformity without surgical intervention with the exception of severe deformities. In her presentation she summarised the technique for periosteal transection and transphyseal bridging. Periosteal transaction is the least invasive, least expensive and the easiest technique. It is therefore often the first procedure performed and if no sufficient improvement is seen within 3 weeks, a more aggressive approach is used. Periosteal transaction is performed on the side of the limb that is perceived to be restricted. There are 3 techniques available for transphyseal bridging: screw and wire, a transphyseal screw and a transphyseal staple. The screw and wire technique was presented in detail. Two screws are placed, one in the middle of the epiphysis (halfway between the joint space and the physis) and the second one 2 cm proximal to the physis. A single strand of 18 g stainless steel wire is premolded to be placed in a figure 8 fashion around the screws and is slipped in a subcutaneous tunnel from the distal hole. The free distal ends of the wire are joined and tightened. First the proximal screw is tightened, followed by the wire, and lastly the distal screw is tightened. A single screw technique has become popular due to its simplicity, effectiveness and excellent cosmetic results. However, in the carpus and tarsus, where there is residual growth after implant removal, overcorrection can occur. Dr. Hogan prefers placing the screw in a positional fashion as opposed to the originally described lag fashion. With both techniques it is very important to remove the implants in a timely manner. Foals should be evaluated critically in every 1-2 weeks.

Dr. Furst gave a lecture on splint bone fractures. Treatment choice should be based on the anatomical location, whether the fracture is open/closed, simple/comminuted and whether other structures (third metacarpal/metatarsal bone and/or the suspensory ligament) are also involved. It is generally accepted that no more than the distal two thirds of the splint bone should be removed. In cases in which the distal fragment is larger than the two thirds of the entire splint bone, internal fixation is recommended to maintain axial support. A small plate should be used and the screws can engage only the splint bone or include the near cortex of the third metacarpal/metatarsal bone. If

the screw engages the third metacarpal/metatarsal bone, more stability is provided, but the normal movement within the joint and between the splint bone and the third metacarpal/metatarsal bone is eliminated and persistent lameness is more often seen in these horses

We had 2 practical sessions in the first 2 days and 1 in the last day. The laboratory was extremely well equipped and provided excellent facilities to gain experience in using the basic tools for internal fixation and practice procedures. Following a video demonstration we practiced on plastic limbs under the supervision of the speakers. In our first practical we learned how to handle the equipment and practiced application of lag and position screws. As the first surgical procedure, we performed internal fixation of a long mid-sagittal proximal phalanx fracture using 3 4.5mm cortical screws applied in a lag fashion through stab incisions. Later we performed internal fixation of a lateral condylar fracture of the third metacarpal bone using 4.5 mm cortical screws in a lag fashion and fixation of a slab fracture of the third carpal bone, also using 4.5 mm cortical lag screws. We practiced surgical treatment of third metacarpal stress fractures using a monocortical 3.5 mm screw and osteostixis.

On the second day we repaired a fracture of the corner incisors using cerclage wire. We practiced using a pinless fixateur externa on a unilateral ramus fracture of the mandible in the diastema region.

We performed two techniques for correction of angular limb deformities: growth retardation of the distal radius using tension band wiring and growth retardation of the distal third metacarpal bone using a transphyseal position screw.

We practiced 3 procedures that involve using a plate: repair of a simple olecranon fracture, proximal interphalangeal joint arthrodesis (figure 1) and repair of a proximal fracture of the fourth metatarsal bone.

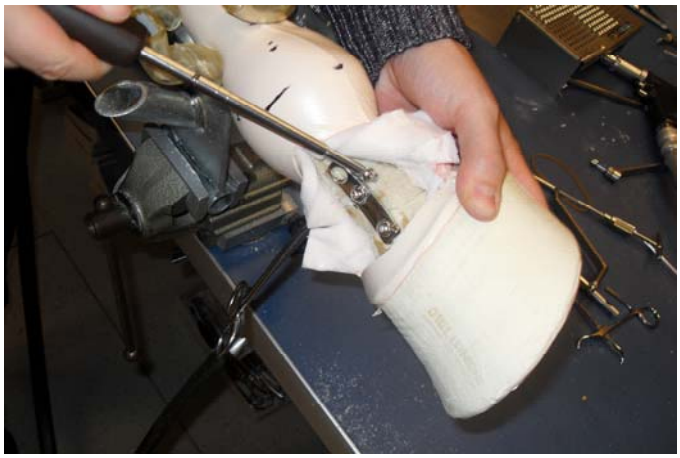

Figure 1
Performing proximal interphalangeal joint arthrodesis in the practical session.

In summary, we had a very intense 3 days, but we all enjoyed it and felt that we had learnt a lot. The course was very informative and also gave good practical training. I feel more comfortable when assessing and treating clinical patients with fractures and also when assisting in surgery. This course provided great education on topics that are important parts of the examination of the Certificate in Equine Surgery (Orthopaedics) and will definitely help me when preparing for the examination.

I am very grateful to the BEVA Trust for providing financial support that made attending this course possible.