Restraint / Anesthesia

Paolo Martelli

Restraint

- Manual



Restraint:
Make it look good





Safety..!,,?





Different interpretations of what is safe

No point being too prescriptive









JOURNAL OF EXPERIMENTAL ZOOLOGY 298A:86–92 (2003)

Comparison of Stress Induced by Manual Restraint and Immobilisation in the Estuarine Crocodile, *Crocodylus porosus*

CRAIG E. FRANKLIN*[1], BERNIE M. DAVIS[2], S.K.J. PEUCKER[2], H. STEPHENSON[2], R. MAYER[2], J. WHITTIER[3], J. LEVER[4], AND G.C. GRIGG[1]







▸ Anim Welf. 2023 Jul 19;32:e49. doi: 10.1017/awf.2023.45

Evaluation of a commercial electrical stunning method for farmed grower saltwater crocodiles (*Crocodylus porosus*) using non-invasive EEG measurements

Alison Small [1,✉], Dominic Niemeyer [1], Leisha Hewitt [2]



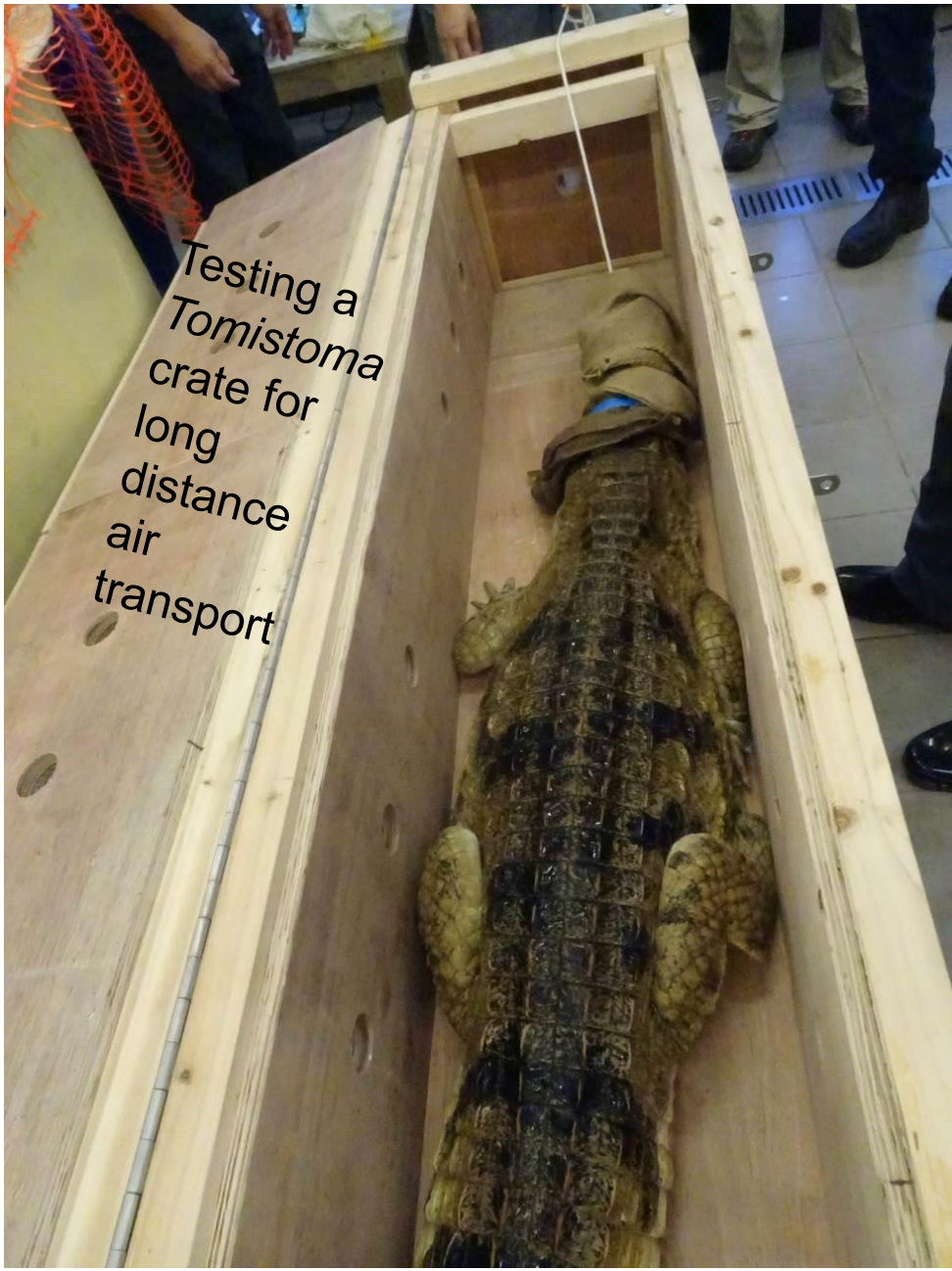




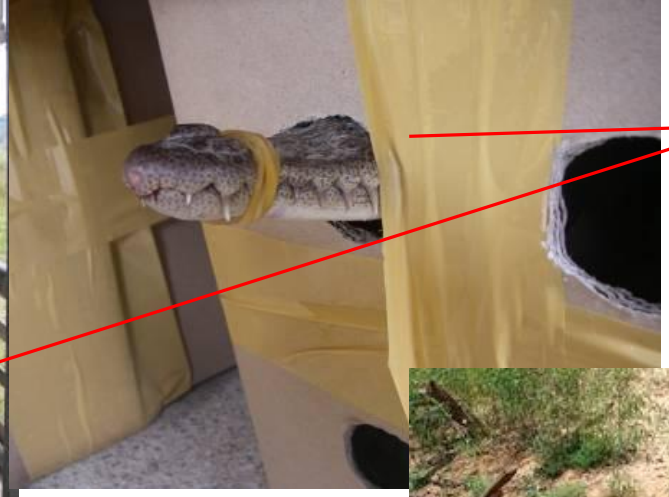


Crates

- Ventilation
- Soft/smooth
- Unable to turn around to avoid getting stuck
- Snug to avoid sliding around
- Inspection hatch
- Weight
- Forklift / handles







< 2kg

C porosus

>2kg…



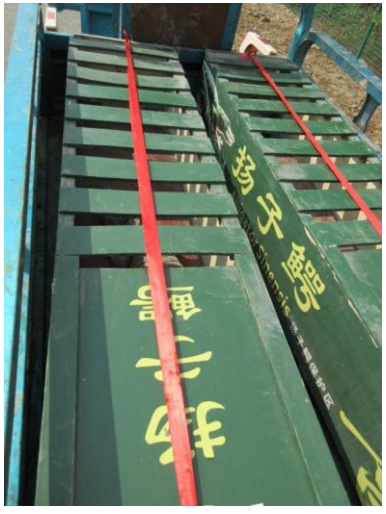
Slide a short distance up a slope



Wood, cardboard, handles etc



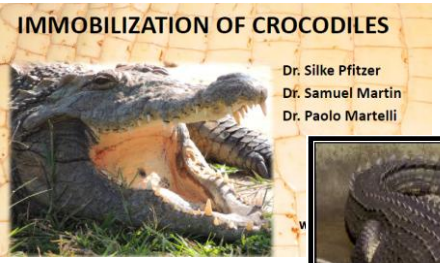
sinensis



Anesthesia of crocodiles

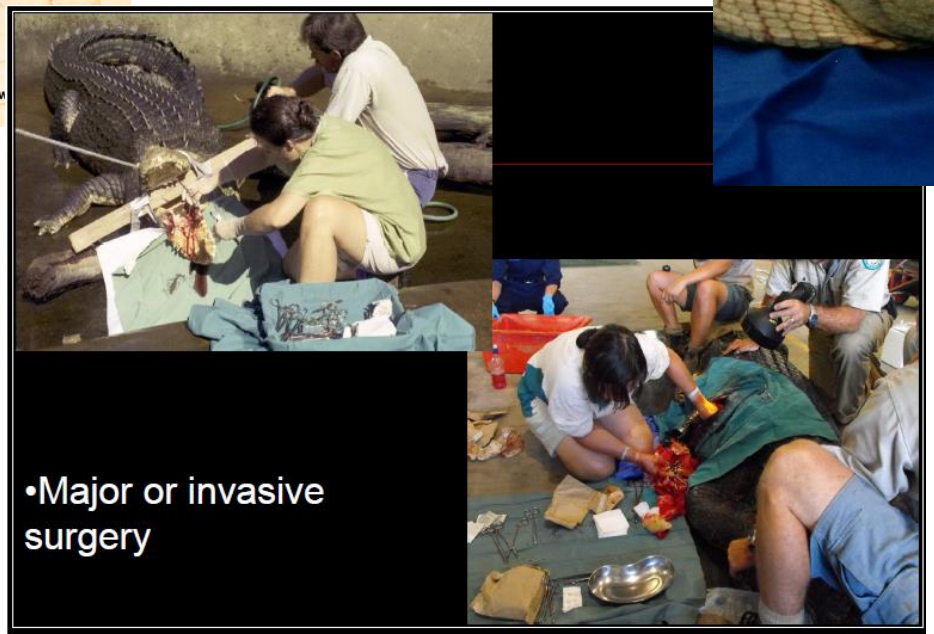
http://www.iucncsg.org/content_images/attachments/Anesthesia%20Literature.pdf

http://www.iucncsg.org/content_images/attachments/Crocodile%20Anaesthesia.pdf









Chemical Immobilization

Preparation for a restraint

- Plan
- Sufficient experienced staff
- Sufficient trainees/others
- Safety briefing

- Common IM sites include limbs and tail but not all sites give ideal results
- Injection using rope or trap restraint and using hand or pole syringe





Progression of immobilisation



- Reflexes and responses disappear from head to tail
- Deep pain response in limbs/tail unreliable
- Ocular reflexes unreliable
- "Poke" response
- Prayer







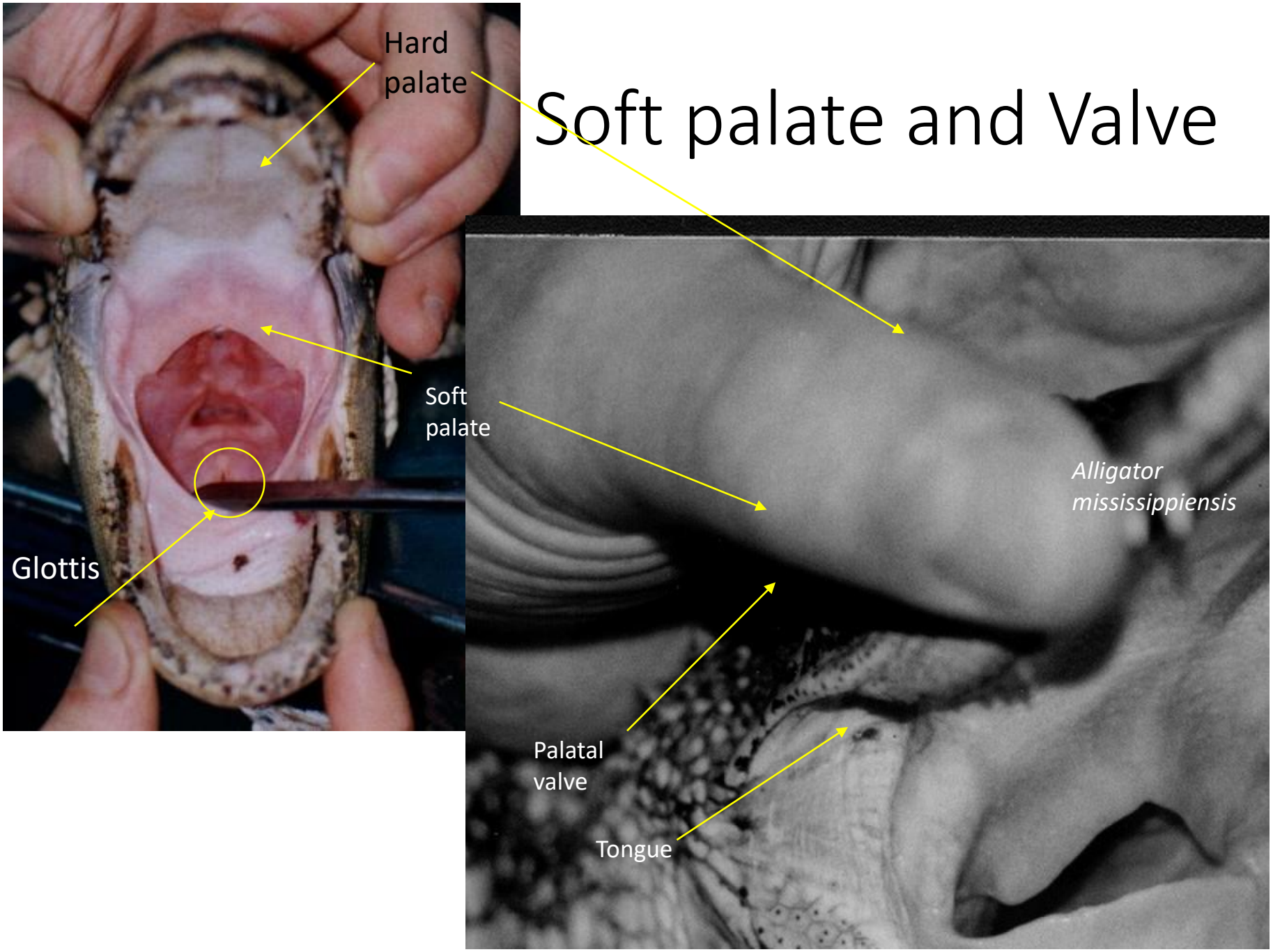
Gallamine dosage: 0.4 – 2 mg/kg

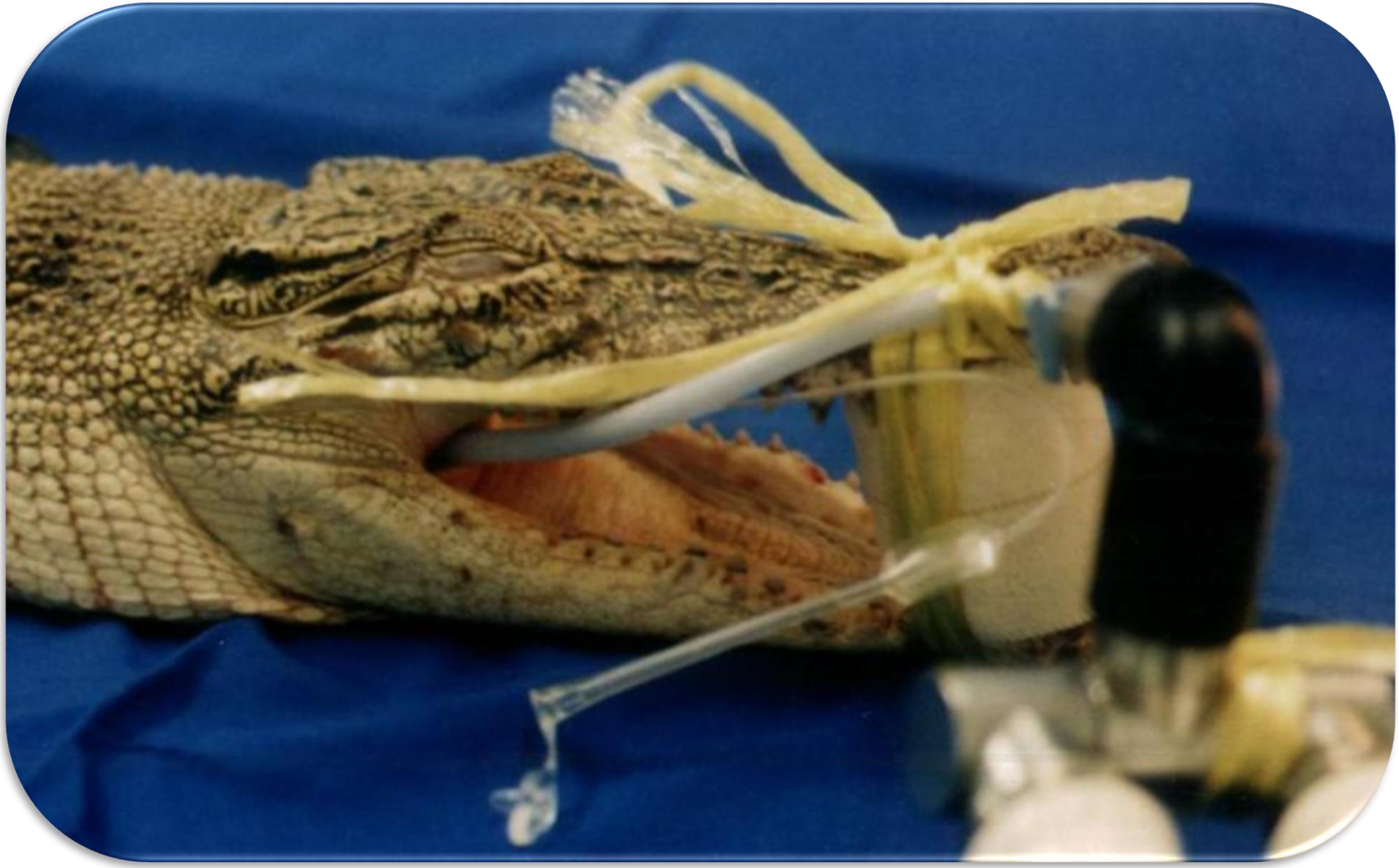
Nile Crocodiles: 40 mg/m

Examples of combinations I use

- Butorphanol 0.3 mg/kg + Medetomidine 0.15 mg/kg +/- ketamine 2-5 mg/kg
- Medetomidine 0.05-0.1mg/kg+ Ketamine 3-5mg/kg
- Xylasine 1mg/kg + Ketamine + 3-5mg/kg
- Alfaxan IV 2 to 4 mg/kg
- Propofol IV 3 to 8 mg/kg
- Intubation, isoflurane, ventilation 2-10/',

Soft palate and Valve







Solar heated; thermoregulation through physiological and behavioural means

Physiological considerations…





- Low metabolic rate reduces oxygen requirement to tissues which enables cessation of respiration for an hour or more while still supplying the brain with sufficient oxygen
- Brief periods of activity cause increased metabolic rate and are usually anaerobic. Elevated lactic acid levels cause the animal to tire easily

Four-chambered heart as in mammals and birds

Right and left aorta present and functional

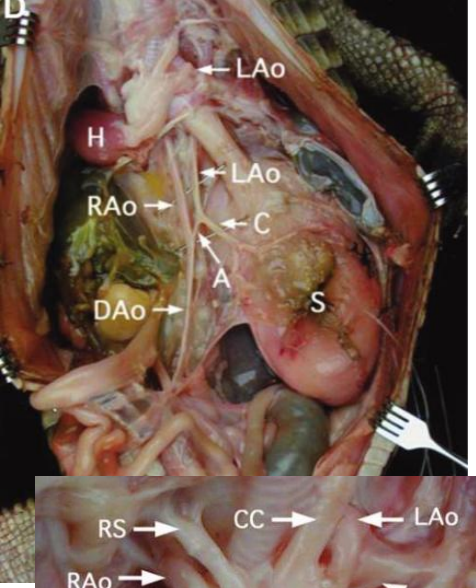
Foramen of Panizza connects right and left atria enabling shunting of blood from right heart to left aorta during periods of hypoxia



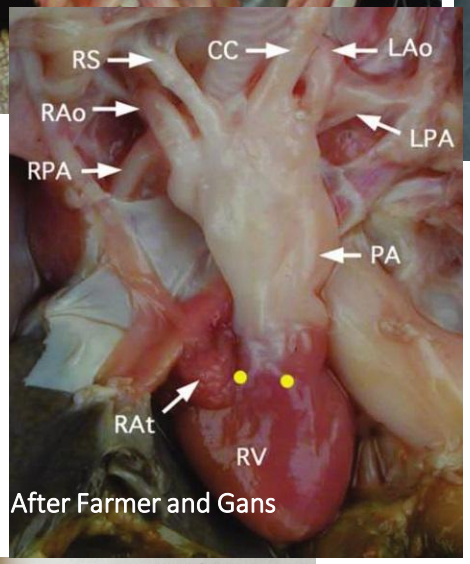
Drug choices for different scenarios

- Sedation- midazolam, diazepam
- Muscle relaxation- medetomidine
- Immobilisation- midazolam/pancuronium
- Maintenance- isoflurane
- IV (smaller)- alfaxan, propofol
- Reversal- atipamezole, flumezanil, neostigmine

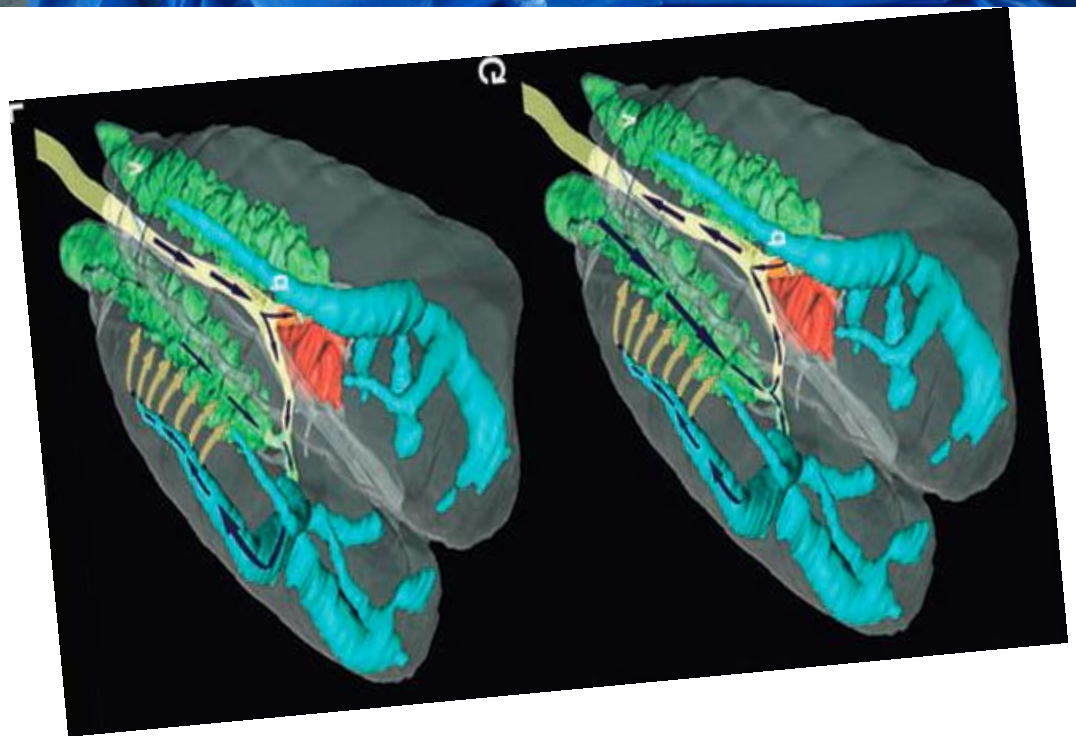
Cardio-vascular and respiratory

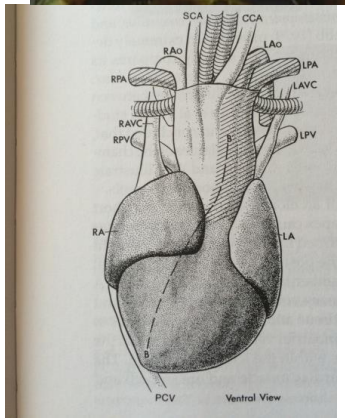






After Farmer and Gans





Anaesthesia monitoring



- ETCO2: CO2(?), spontaneous respiration
- ECG
- SPO2
- Doppler
- Ultrasound of heart, transcutaneous or transesophageal (https://www.sciencedirect.com/science/article/pii/S1095643323001976#f0025)

