

Other issues – stt products

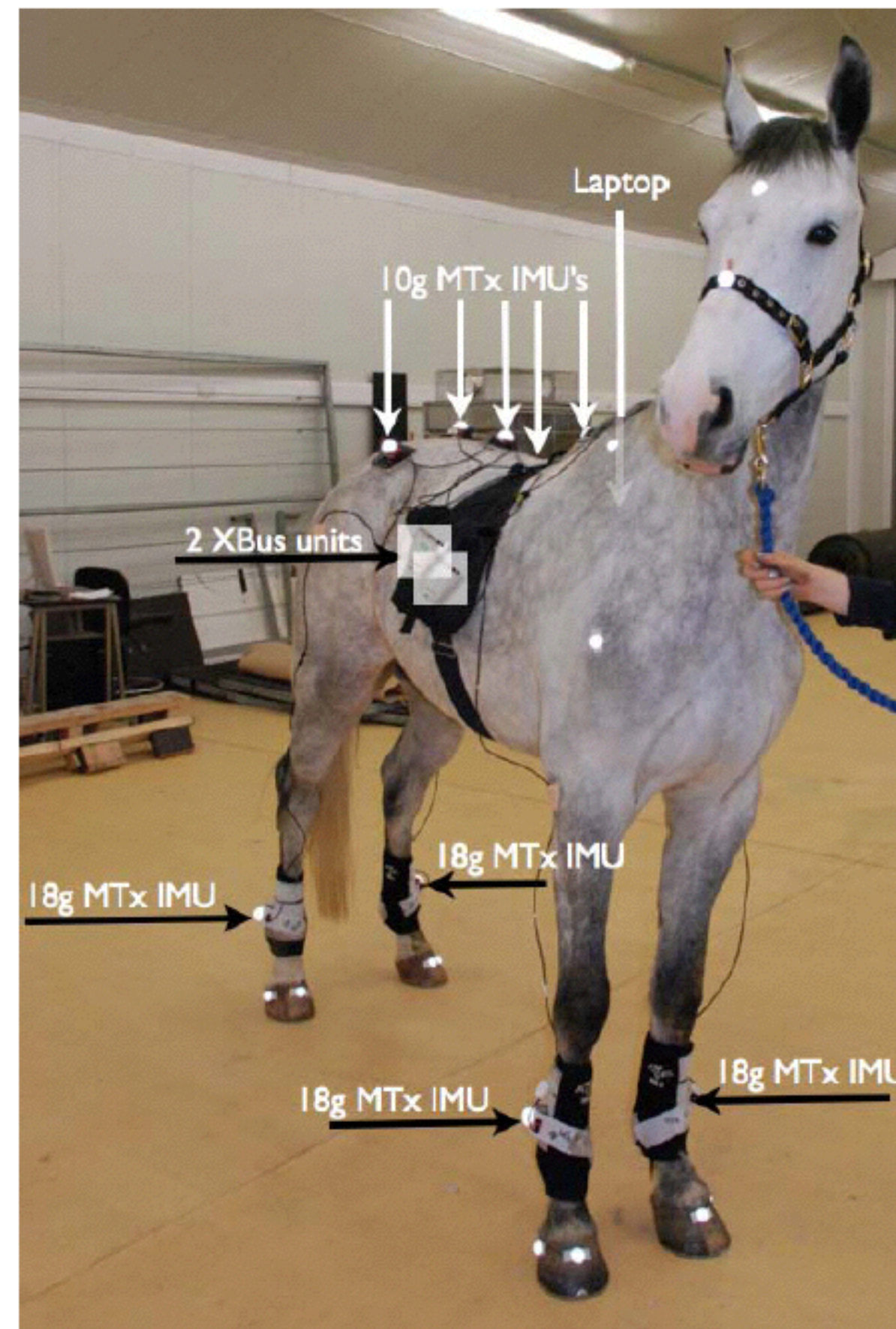
measures

no video

## Other issues

- horse gait analysis;

**Figure 1.** Distal limb mounted IMUs strapped onto a standard protective boot using Velcro. The IMUs are connected in series to two XBus Masters on the right side of the horse. The XBus Masters are plugged into a laptop mounted on the left side of the horse. Reflective markers are placed on the proximal dorsal and lateral hoof of each leg and on each of the IMUs.



# Other issues

– horse gait analysis;

measures



**Fig. 1.** Experimental setup: rider (MVN suit) and horse (acceleration sensor on the cannon bone) with the applied measurement systems: rotation axes of the riders' segments are shown as arrows: red arrows indicating Roll angles and green arrows indicating Pitch angles.

## Other issues

- film industry;



Ted, 2012

## Other issues

- infant trunk posture and arm movement assessment

measures



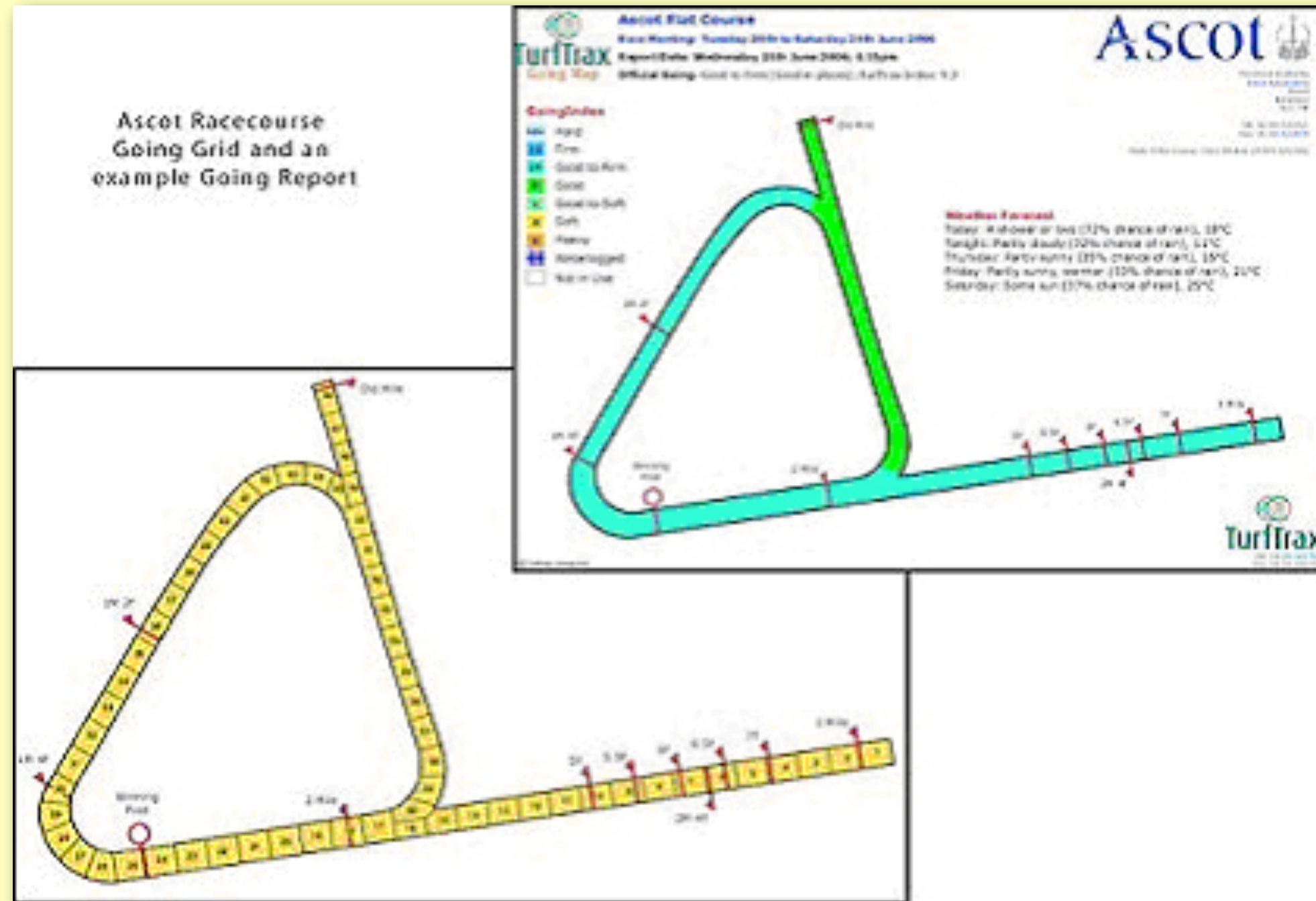
**Figure 1 Experimental setup.** Baby doll is positioned on top of two pressure mattresses, and equipped with five IMU bracelets (red ellipses), positioned one on baby doll's chest, one on each forearm, and one on each upper arm. Ten Optotrak markers (one on baby doll's forehead, one on each cheek, one on the frontal side of lower abdomen, one on the frontal side of each shoulder joint, one on the lateral side of each elbow joint, one on the dorsal side of each hand) serve as reference (white rectangles). Referential Optotrak and IMU coordinate system orientation is indicated in the lower right corner (white arrows).

Riharetal, 2014

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# Other issues

- TurfTrax wireless tracking system;



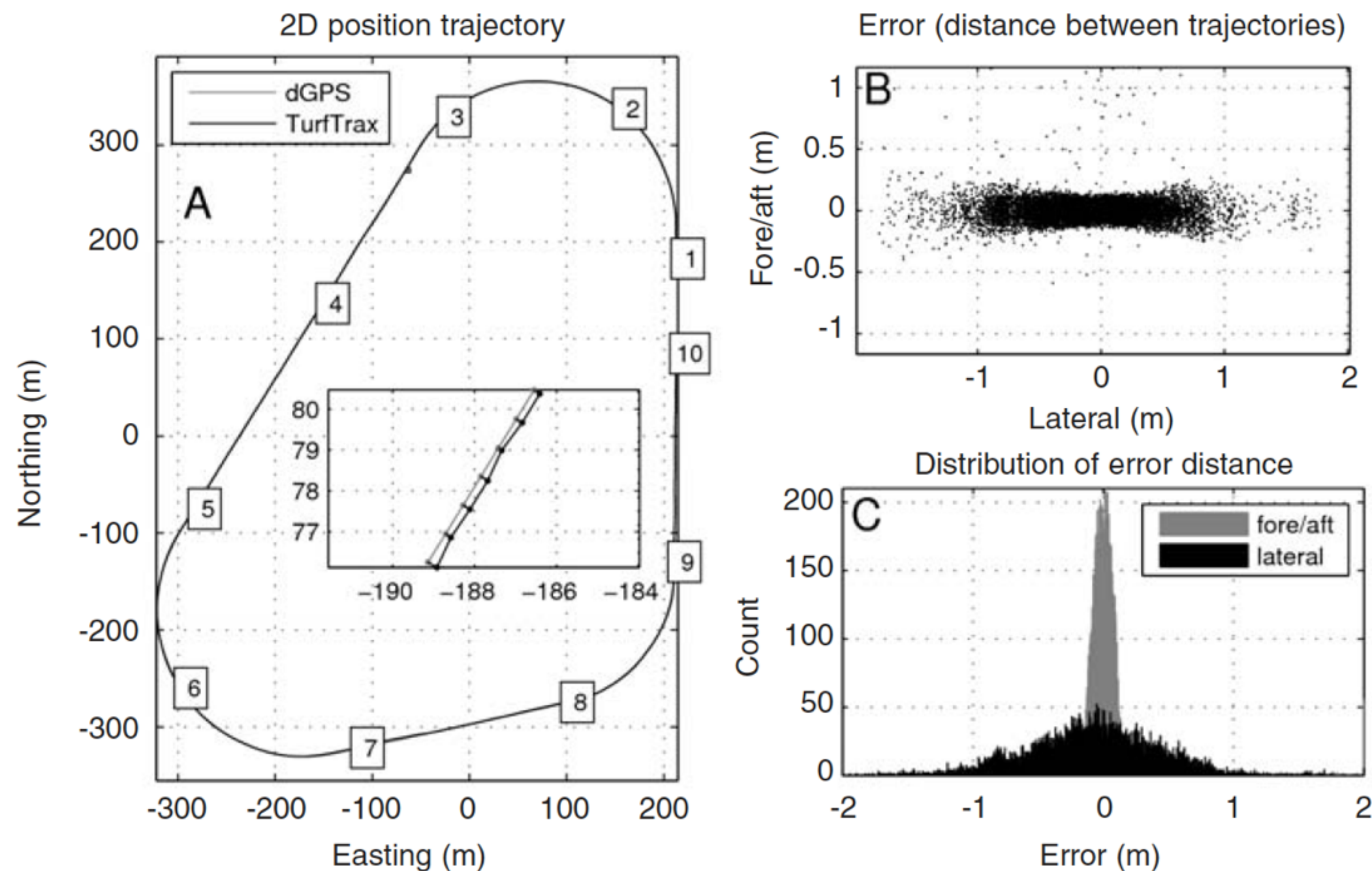
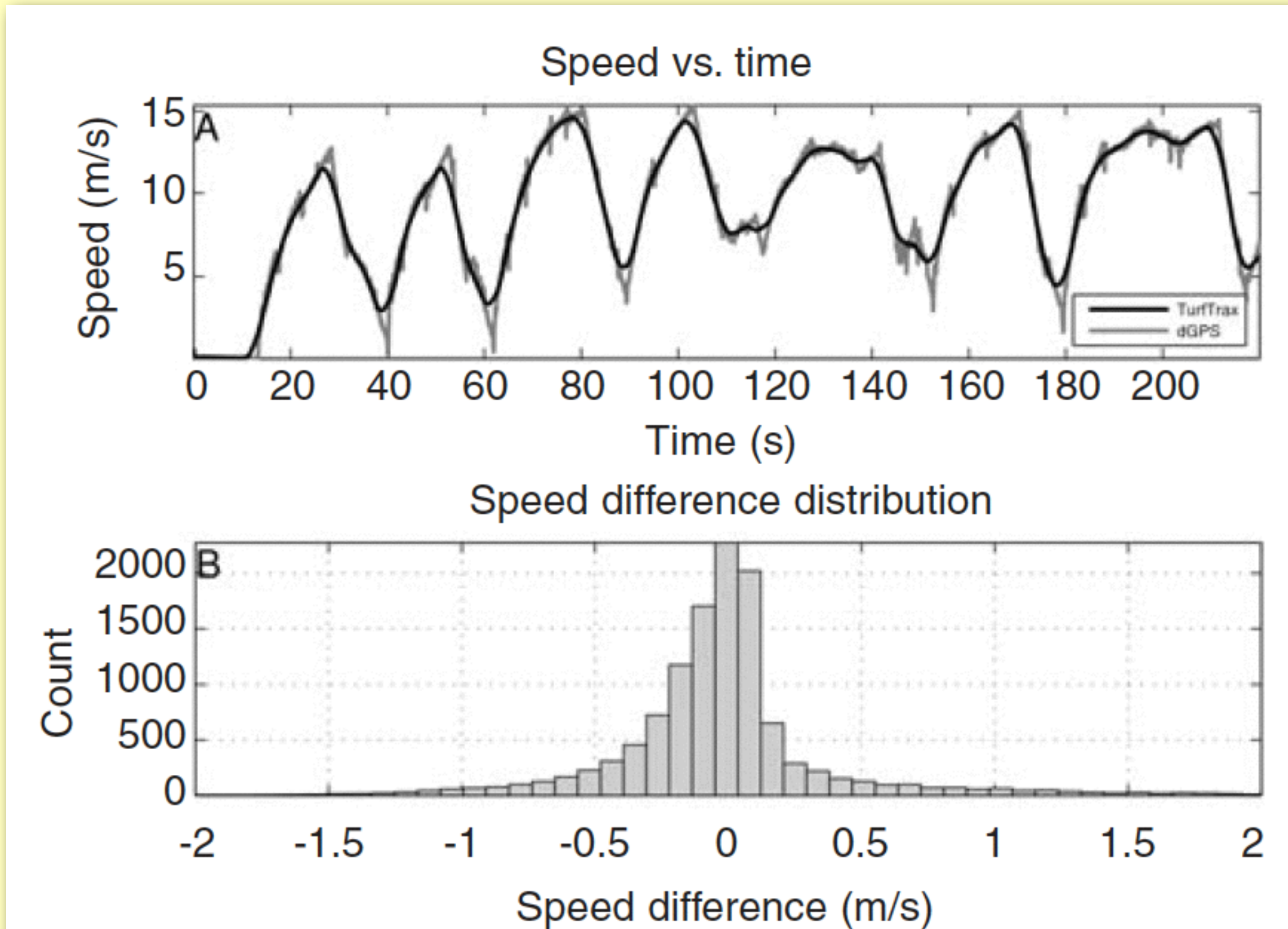


Fig 1: Comparison of position trajectories of the TurfTrax and DGPS systems. An overlay of trajectories provided by both systems for a 2 km run around Lingfield racecourse (A), the distance between the 2 trajectories at each GPS sample point (B), and the distributions of the difference between the trajectories (C). The mean  $\pm$  s.d. difference between the systems was  $2.2 \pm 24$  cm in the direction of travel and  $-8.9 \pm 51$  cm perpendicular to the direction of travel.

# Other issues

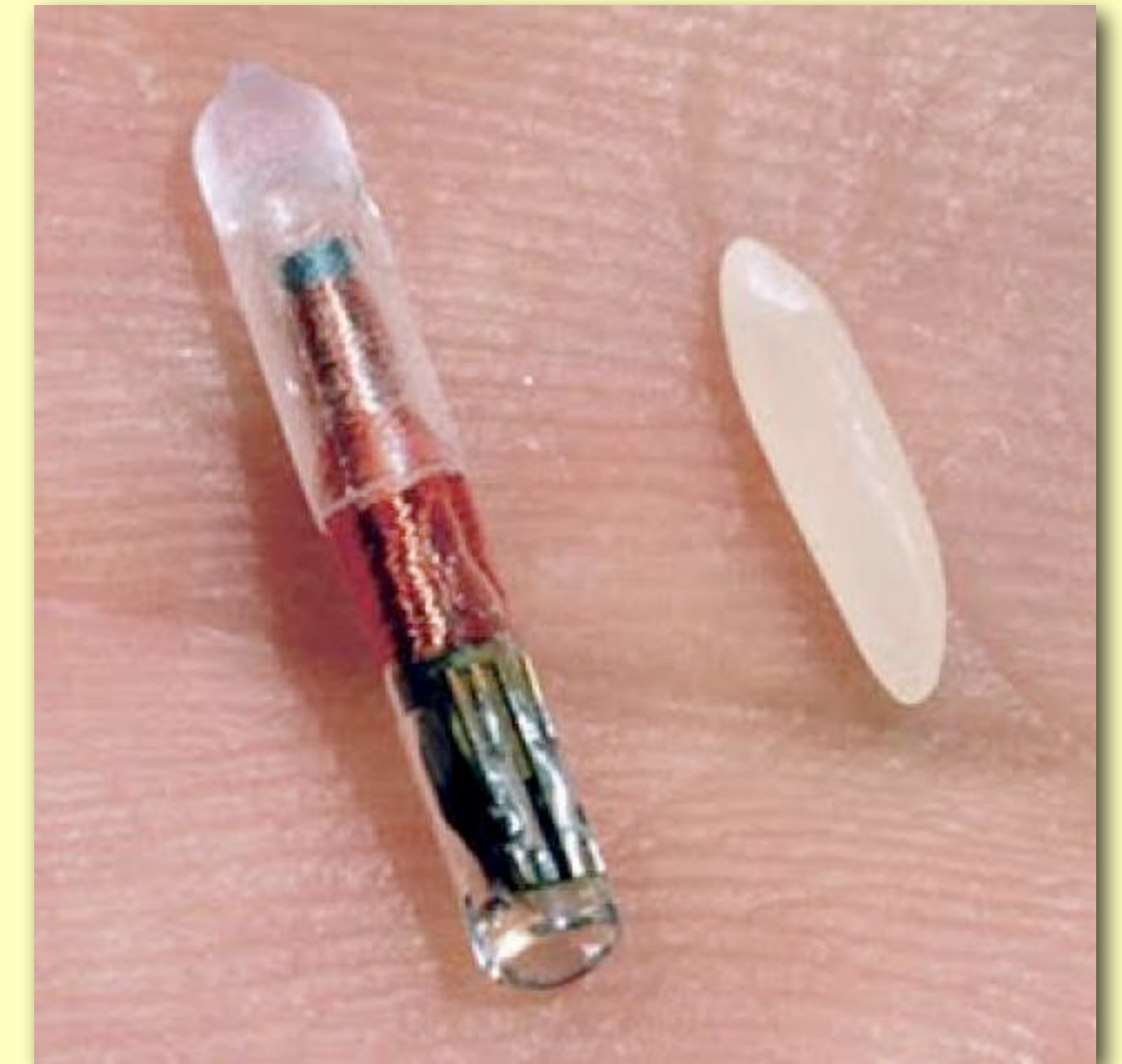
measures



*Fig 2: Comparison of the speed estimates of the TurfTrax and DGPS systems. Overlay of speed vs. time for both systems during run 2 (A), and the distribution of the difference between the speed estimates (B). The systems give very similar estimates of speed, with the TurfTrax system yielding smoother data. The long tails of the difference distribution are due to periods of high acceleration, where the 2 estimates diverge. For periods of low acceleration where the data are similar, the bulk of the data fall within 0.15 m/s of the mean value.*

## Other issues

- radio-frequency identification (RFID) chip;
- RFID is the wireless non-contact use of radio-frequency electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to objects;
- RFID tags contain electronically stored information;
- some tags are powered by and read at short ranges (a few meters) via magnetic fields (electromagnetic induction);
- others use a local power source such as a battery, or else have no battery but collect energy from the interrogating EM field, and then act as a passive transponder to emit microwaves or UHF radio waves (i.e., electromagnetic radiation at high frequencies);
- battery powered tags may operate at hundreds of meters;
- unlike a bar code, the tag does not necessarily need to be within line of sight of the reader, and may be embedded in the tracked object



# Other issues

measures



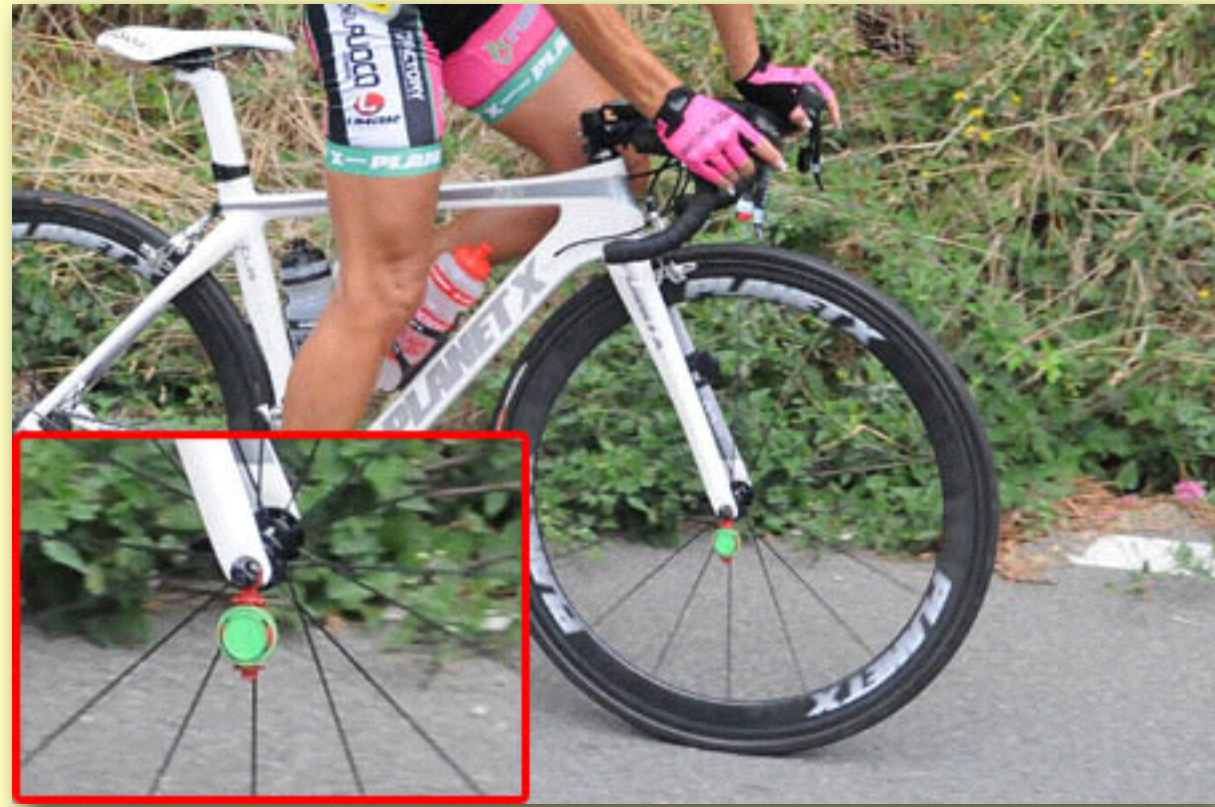
- RFID for timing races;

# Other issues

measures



# Other issues



Road cycling



MTB

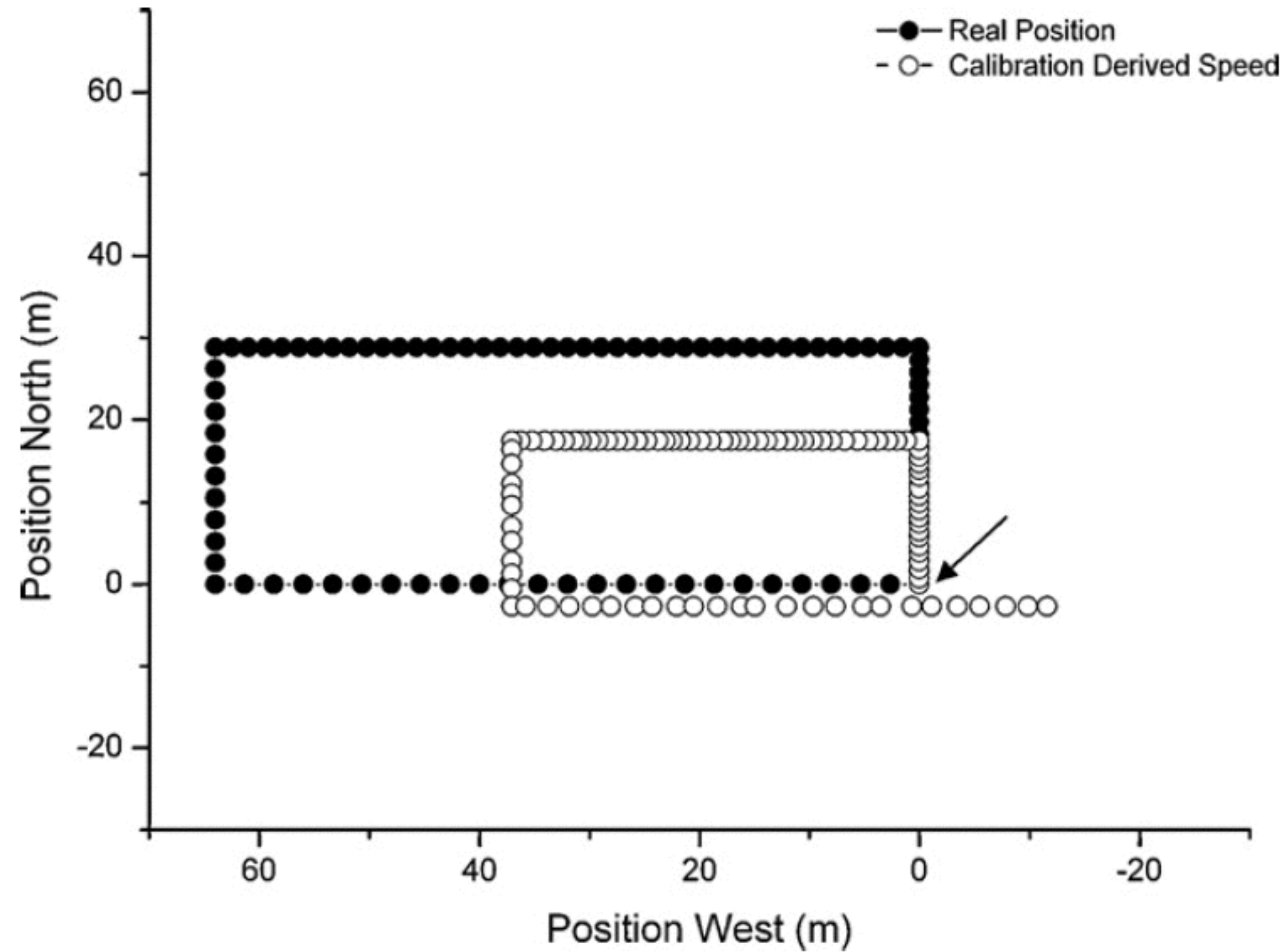


Running

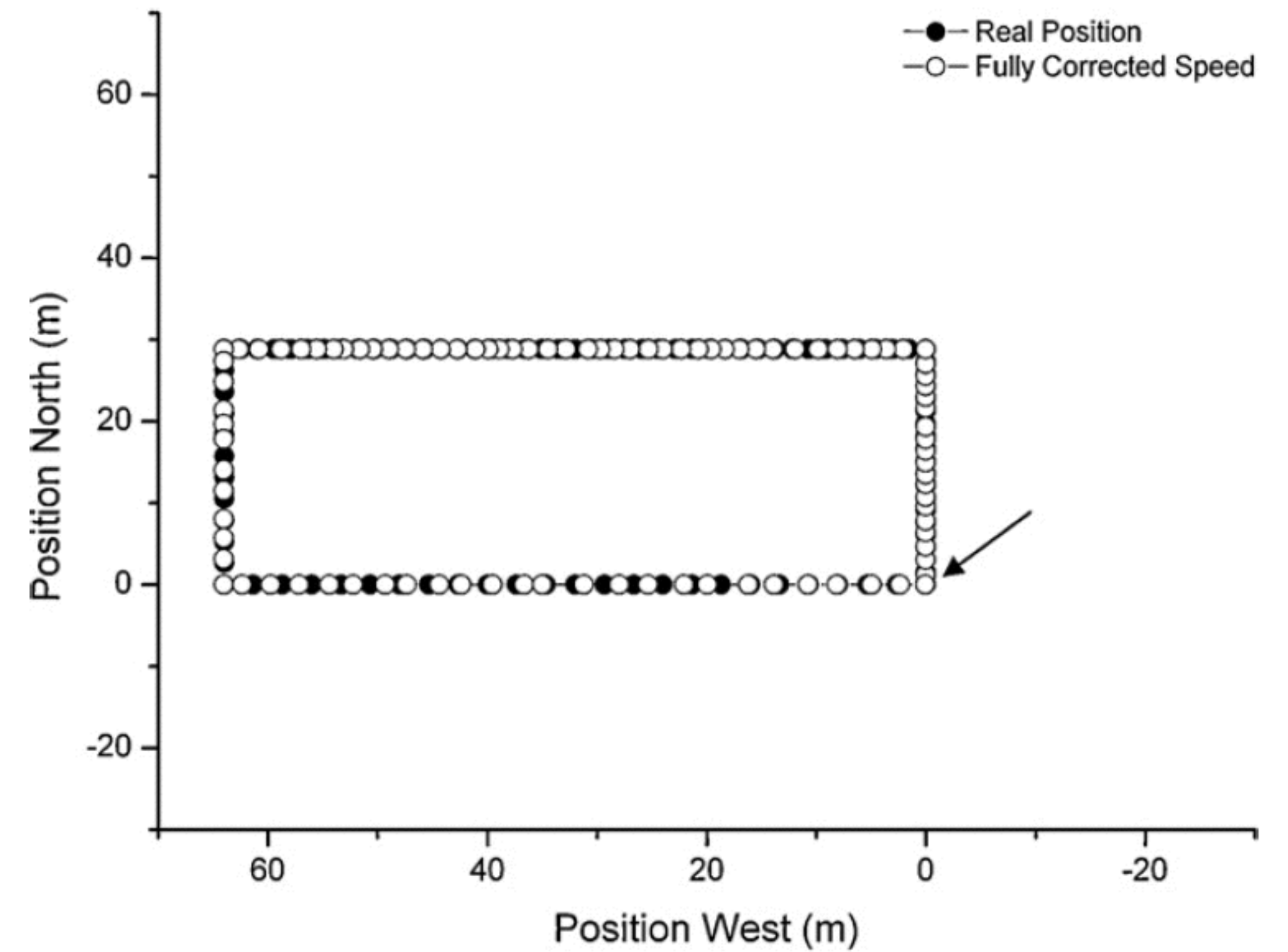
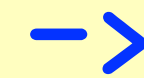


Triathlon

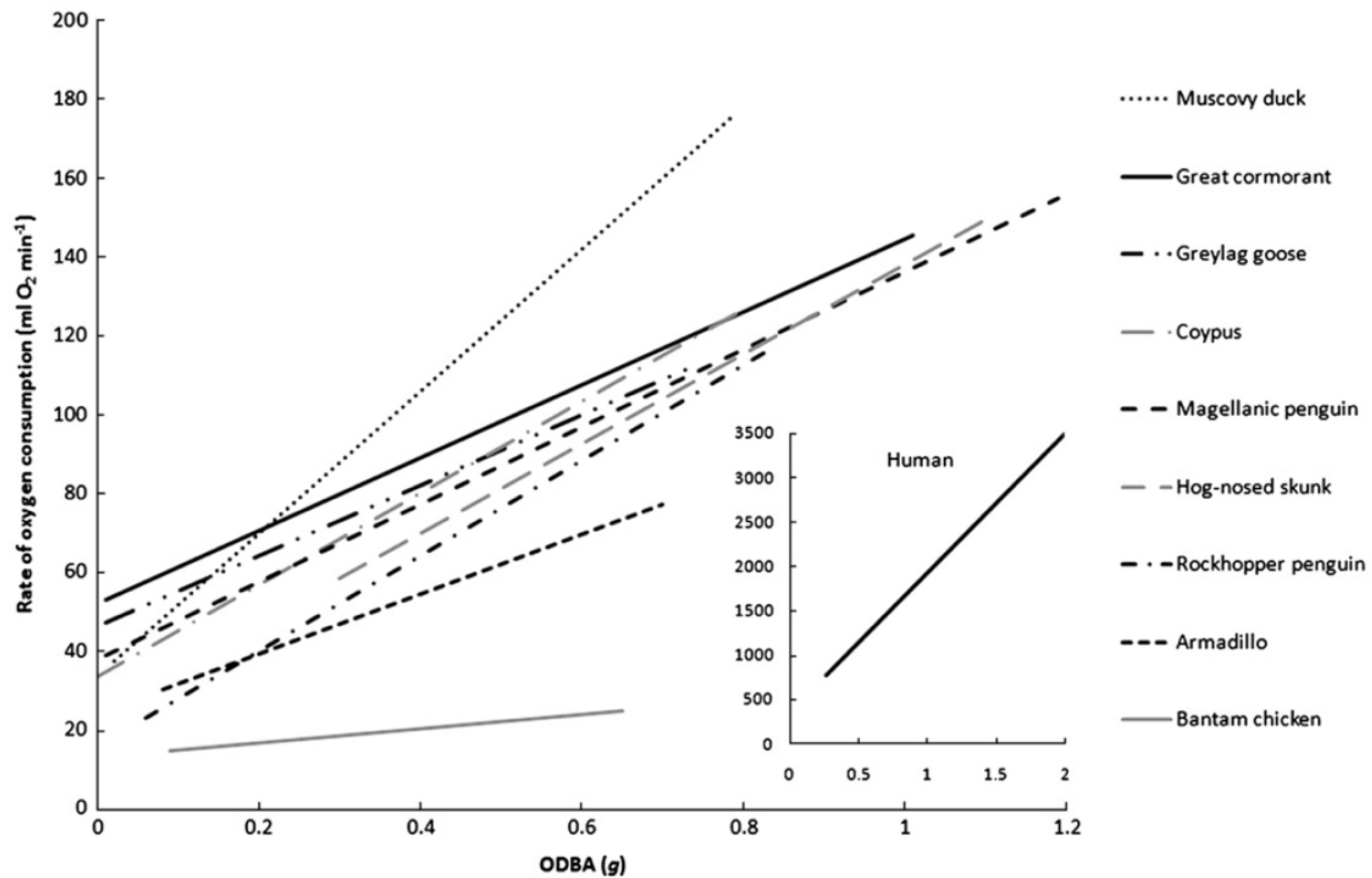
# Other issues



**Fig. 4.** Comparison of dead-reckoned tracks derived from the real position and the calibration-derived speed. The track begins at the point marked by the arrow moving anti-clockwise.



**Fig. 5.** Comparison of dead-reckoned tracks derived from the real position and the fully corrected speed. The track begins at the point marked by the arrow moving anti-clockwise. Initially, the gradient for the regression of speed against ODBA from the treadmill calibration had been 2.3796. After the correction it was set at 3.928 for legs 1 and 2, 3.990 for leg 3, and 3.521 for leg 4.



**Fig. 1.** Best fit linear relationships between rate of oxygen consumption and ODBA for a range of bipedal and quadrupedal species while resting and walking/running on a treadmill. Other behaviours were also displayed. Where data are available for multiple individuals of a species, a common slope is shown, derived from a linear mixed effects model. For clarity, the running order of species on the legend follows the order of slopes on the graph from top to bottom. Data for humans are included in an inset figure because values for rate of oxygen consumption are an order of magnitude greater than that of the other species.

# Other species

measures



Muscovy Duck



Great Cormorant



Greylag Goose



Coypu



Magellanic Penguin



Hog-nosed skunk



Southern Rockhopper Penguin



Big hairy armadillo

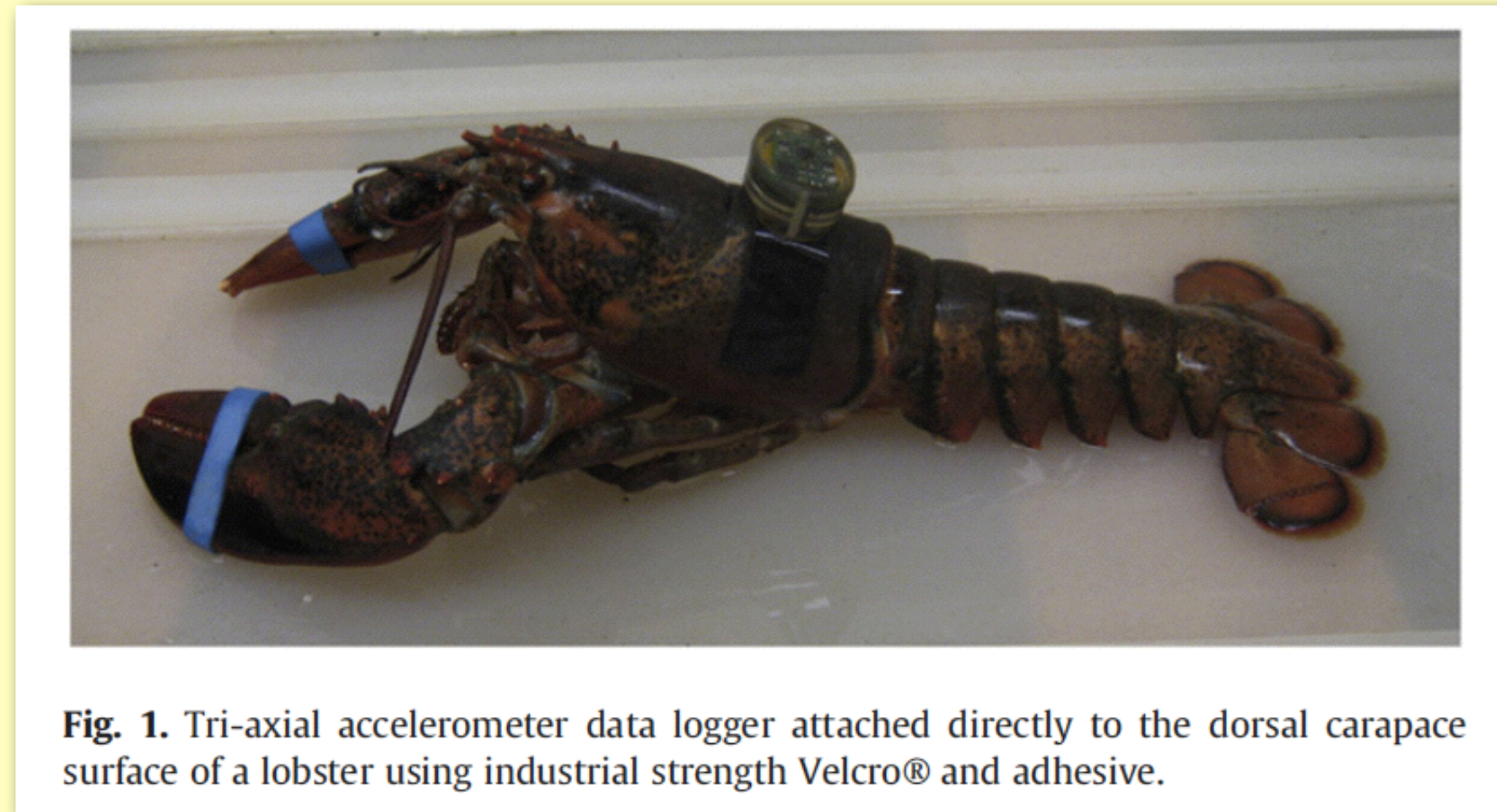


Bantam chicken



Human

# Other issues



Lobster

Lyons et al., 2013

# Other issues

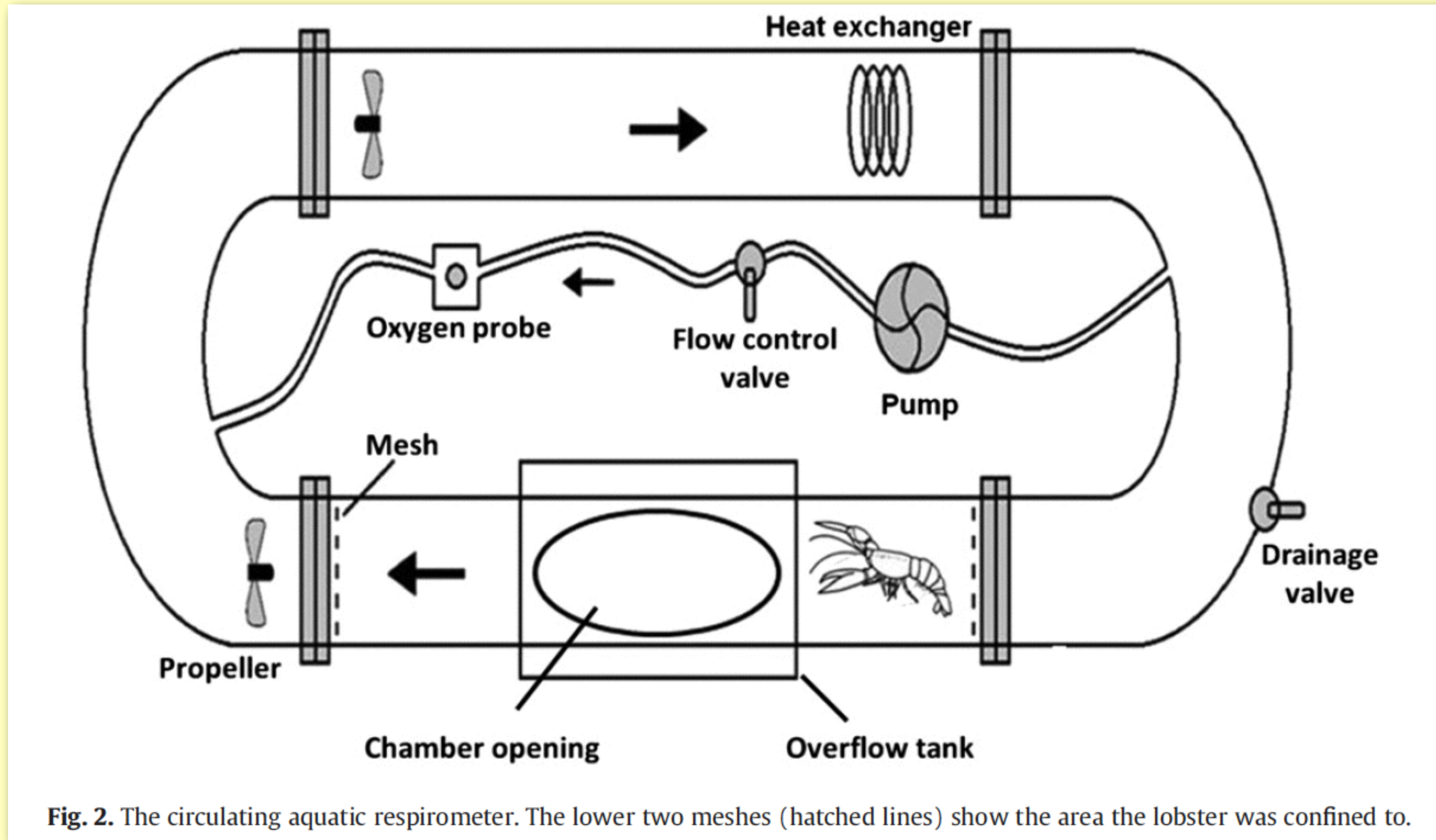
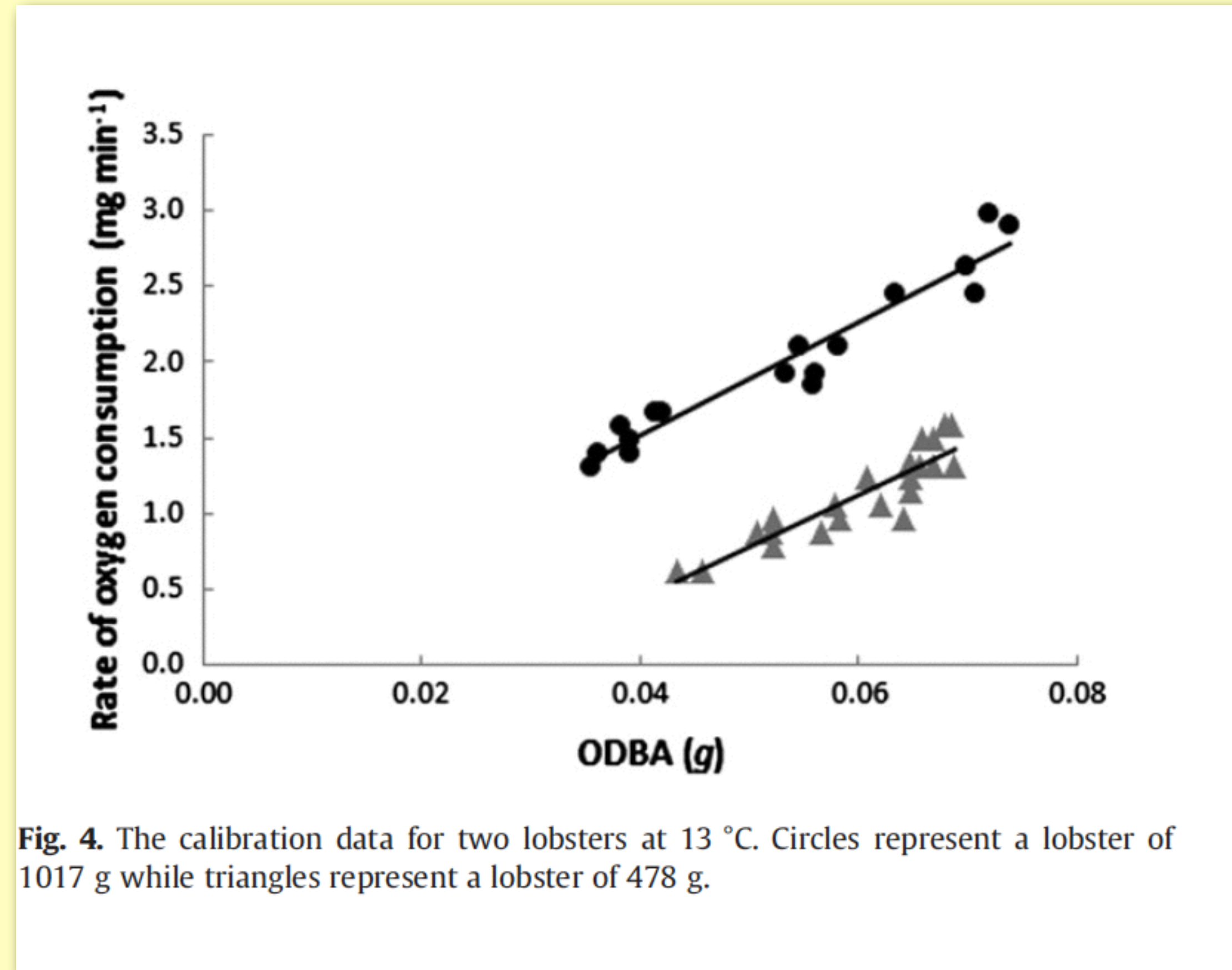


Fig. 2. The circulating aquatic respirometer. The lower two meshes (hatched lines) show the area the lobster was confined to.

Lyons et al., 2013

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Lyons et al., 2013

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# An example

measures

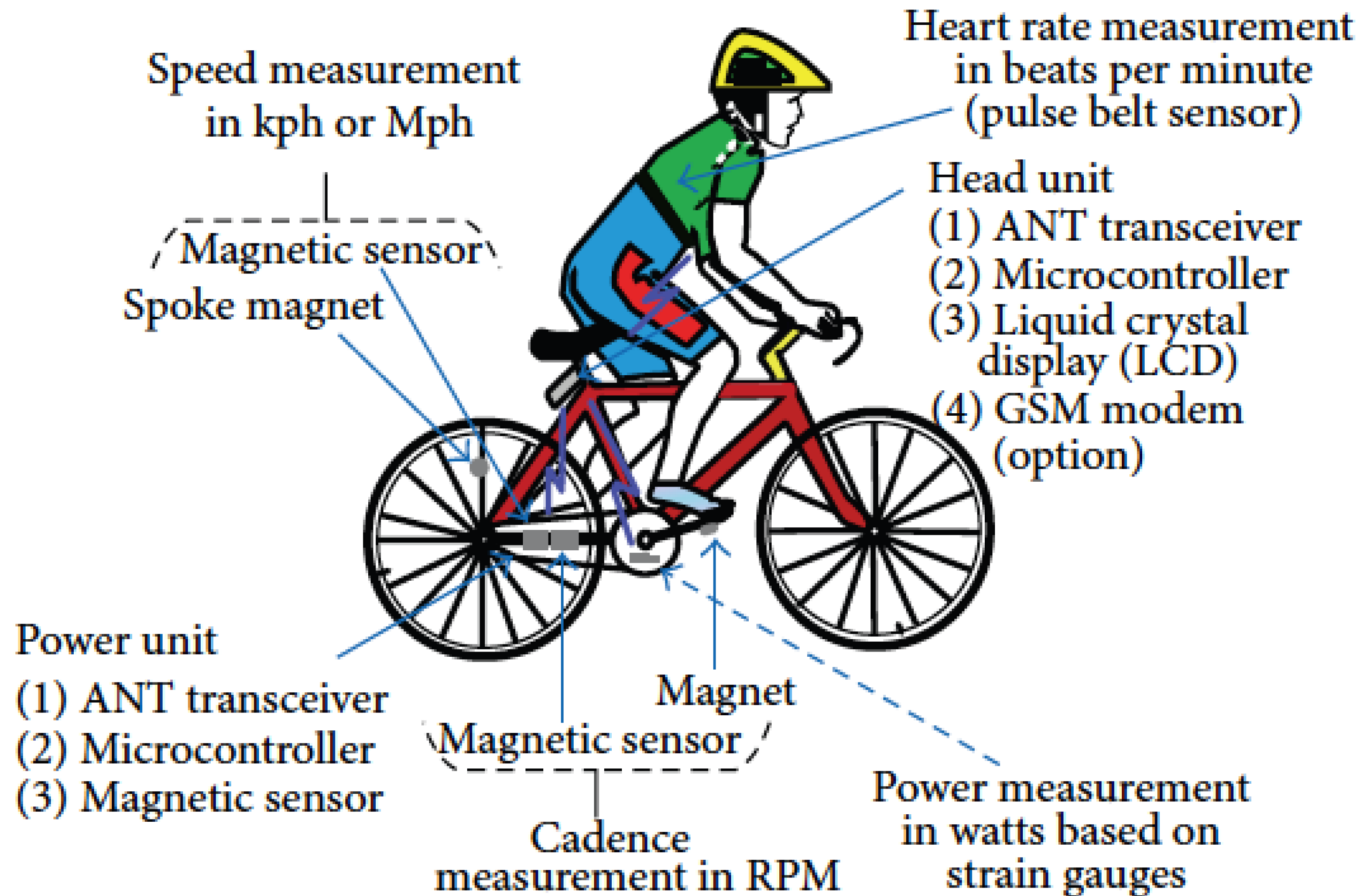


FIGURE 4: An overview of relevant wireless sensors and networks related to a bicycle and cyclist monitoring system.