A6.58
Is the Japanese skeleton shrimp *Caprella mutica* a filter feeder? I. Head morphology and kinematics

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An active filter feeding organism strains suspended matter from the surrounding water using a sieving structure. Small marine filter feeders however, have to cope with the physical problems of the high viscosity as indicated by the low Reynolds number. In a highly viscous regime, organisms' appendages are surrounded by a thick boundary layer, which makes movement and filter feeding difficult. In this study, we test whether *Caprella mutica*, a small marine amphipod frequently described as a filter feeder, is indeed capable of filter feeding by using its antennae as sieves. This small crustacean feeds by swaying its body through the water. The forward movement of the head drags along its two pairs of antennae of which the second pair of antennae possesses two rows of long setae. Juvenile *C. mutica*, being up to five times smaller then the adults, need to move their appendages faster to reach a similar critical Reynolds number to make the antennae act like sieves. In addition, in adult *C. mutica* the first two pereonites are elongated, which may influence their filtering movements. Detailed head morphology was studied under a light microscope, while the filtering movements of both juvenile and adult *C. mutica* were recorded using a digital high-speed video camera. The resulting kinematics of antennae, head and body segments showed that the antennae of both juvenile and adult *C. mutica* indeed move through the water at a Reynolds number around three. Alternative methods of gathering food in caprellid amphipods will be discussed.

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A6.59
A new M.Sc. course in biomechanics at Manchester

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Biomechanics is a central area of biology that enables scientists to understand the mechanical design of organisms, but it is also increasingly important as it underpins many of the applied technologies such as biomaterials, tissue engineering and sports science. Unfortunately, progress in biomechanics research has always been limited by the difficulty in attracting research students with the right expertise. Few universities run undergraduate courses in biomechanics, while masters' courses in this area tend to be specialised and applications-led. The aim of the new course at Manchester is to provide truly interdisciplinary training in comparative biomechanics, bringing students from both biological and physical sciences backgrounds to the level at which they undertake research at the cutting edge. The course will have a strong practical component, giving students extensive hands-on experience in biomechanics right across the discipline, including both pure and applied biomechanics.

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A6.60
Kinematics of fast start swimming in a pelagic fish, the mackerel *Scomber scombrus*

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Scombrids are characterized by a relatively narrow streamlined and stiff body, a lunate tail and a thin caudal peduncle. Since such body characteristics participate to drag reduction, scombrids are recognized to be specialized cruisers, suited for pelagic environment. However these features contrast with adaptations for acceleration (such as a deep and flexible body and a large tail). The stiff body of scombrids also limits large amplitude propulsive movements, as well as maneuverability, that are employed during some unsteady swimming behaviours such as fast starts. We investigated the escape response of mackerel (length 34.2 ± 2.9 cm), as an example of scombrids. Experiments were carried out in large circular tank (diameter 4 m) filled with recirculated and filtered seawater set at a temperature of 18.3 ± 0.5 °C. Escape responses were elicited by triggering the fall of a small cylindrical object. Each individual was startled 3 consecutive times with a minimum of 30 min of recovery between successive stimulations. A high speed camera (250 frames s^{-1}) was used to record the escape responses. Locomotor variables, such as cumulative distance, speed and acceleration, were analysed, as well as turning rate and turning radius as indicators of the fish maneuverability. The performance that was found in mackerel will be discussed in relation with their locomotor style (*i.e.* body/caudal fin periodic propulsion), as well as their habitat.

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Measuring muscle power and modeling hydrodynamic power during anuran swimming

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During swimming, anuran feet generate hydrodynamic thrust both by translating backwards and rotating. Proximal muscles translate the foot by extending the hip and knee joints whereas the plantaris muscle extends the ankle, causing foot rotation. Previously, we recorded *in vivo* plantaris cycle power varying over a range between 2.32 to 74.17 W/kg_{muscle}. However, since the ankle only rotates the foot, the plantaris' contribution to hydrodynamic power is unclear. This study explores how the