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Masticatory Motor Patterns in Six Herbivorous Australian Marsupials
Alfred W. Crompton, Daniel E. Lieberman, Tomasz Owerkowicz, John Skinner

Abstract:

Electromyograms of the adductor muscles of the hairy-nosed wombat (*Lasiorhinus latifrons*), red kangaroo (*Macropus rufus*), Tammar wallaby (*M. eugenii*), koala (*Phascolarctos cinereus*), potoroo (*Potorous tridactylus*) and the brush-tailed possum (*Trichosurus vulpecula*) were analyzed and compared with those of placental herbivores. Marsupials have developed several different and distinct masticatory motor patterns that are all fundamentally different from those of placental herbivores where jaw movements are controlled by a relatively conservative pattern of working and balancing side muscle pairs (Triplet I and II or Diagonals I and II). For example, in the three species of macropods, all regions of the balancing and working side temporalis are active synchronously and the power stroke is divided into two distinct shearing and grinding phases. In addition, force generated by the balancing side muscles exceeds that of the working and is transferred to the working side via a slender mobile unfused mandibular symphysis. In wombats only the working side adductors are active during the power stroke. Koalas have lost the ubiquitous inflected mandibular angle of marsupials and their motor pattern is convergent on that of placental herbivores. In ring-tailed possums the pattern is transitional between the “primitive pattern” of placentals and that of macropods. This greater variety of motor patterns reflects the independent acquisition of mammalian herbivory in Australasia when the continent was isolated during much of the Tertiary.