ABSTRACT

Phalangeal curvature is often used to infer arboreal locomotion in fossil primate species. This is based off an hypothesis of plasticity linked to a loading model that suggests that, when flexed during grasping, a curved phalanx will experience lower internal strains than a straight phalanx. This dissertation is the first *in vivo* test of this hypothesis. By examining grasping pressures exerted by individual manual and pedal digits during above-branch, below-branch and vertical-branch locomotion, and comparing those pressures to proximal manual and pedal phalangeal curvature, a number of well-accepted but untested hypotheses regarding the relationship between digital form and grasping were tested. 4 adults (2 males, 2 females) each from 4 species of lemur (*Lemur catta*, *Propithecus coquereli*, *Varecia rubra*) were induced to cross an artificial substrate instrumented with a pressure pad at the stated orientations. Digital pressures were then compared to the proximal phalangeal curvature of the same individuals. Findings do not demonstrate any relationship between arboreal grasping at any orientation and digital pressures. This project fails to support previously long-held hypotheses regarding the biological role of phalangeal curvature, and introduces the strong likelihood that a much more complex model of loading is necessary to understand primate phalangeal curvature. Until such a model is devised and tested, using phalangeal curvature to infer arboreal behavior is unsupportable, and should be avoided.