Size AND SHAPE matters! Revisiting negative selection of Quaternary South American Cervidae (Cetartiodactyla: Mammalia)

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South American Cervidae (SAC) originated during ?early/middle Pleistocene, reaching highest richness at late Pleistocene (13 genera). At early Holocene, SAC experienced extinction through unknown causes, and six genera survived. Possibly, extinct SAC was negatively selected due their bigger and more complex antlers, compared to extant taxa. Antlers are composed by the fastest-growing bone among vertebrates, which demands a high energetic cost; the larger and more complex the antler, more energy it takes. Additionally, antlers are used by fully grown males to dispute and/or defend harens in sexual selection. Morphology of adult antlers of SAC were analyzed and five stages of complexity were recognized. The simplest is stage 1, antlers with only main beam. Then, main beam gets one ramification in each following stage, until stage 5, with four ramifications or more. The extant *Pudu*, *Mazama*, *Hippocamelus*, *Ozotoceros* and *Blastocerus* have stages 1-3, and *Odocoileus* has the stage 4. Two Pleistocene morphotypes represent South American *Odocoileus*: a medium-to-large size from Andes, and a medium-size from lowlands. The first went extinct during early Holocene, and the medium-size is the extant one. All extinct SAC, the Andean *Odocoileus*, *Paraceros*, *Charitoceros*, *Agalmaceros, Epieuryceros*, *Morenelaphus* and *Antifer*, share large (beam) antlers. Except for the first two, which might have experienced gigantism, the others were more complex (stages 5) than extant taxa.Probably, energy economy in antler development and age reduction for reproductive effectiveness (including monogamy) were drivers to positive selection of some SAC (extant) with small-sized and less complex antlers (stages 1-4) during early Holocene.