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DATE OF DISPUTATION: 24^h November 2016

DISSERTATION TITLE: *Niche dynamics and habitat connectivity in the 'sky islands' of eastern Africa*

I sin doktoravhandling viser Chala hvordan klimaendringer og husdyr truer det unike plante- og dyrelivet i de høyeste fjellene i Afrika, de såkalte 'himmel-øyene'. Mens de berømte gigantiske tre-lignende plantene kan dø ut fordi klimaet blir varmere, kan den sjeldne etiopiske villgeita måtte gi tapt for tamgeiter i konkurransen om mat. Chala viser også at fjell som Kilimanjaro og Mt. Kenya var isolerte øyer selv under istiden, når fjellplantene kunne vokse en kilometer lengre ned og hadde åtte ganger så stort habitat tilgjengelig. I Etiopia derimot, smeltet mange 'himmeløyer' sammen under istiden og kunne utveksle arter og gener med hverandre.

In his PhD thesis, Chala provides new insights into long-debated questions concerning the unique plants and animals living on the high mountains of eastern Africa. In particular, he addresses how they are impacted by past and future climate change and increased numbers of domestic animals. These mountains are called 'sky islands', separated from each other by a 'sea' of tropical lowlands. They are inhabited by frost-tolerant plant species of which most do not grow anywhere else in the world. Although the climate is tropical at daytime but freezing at night, suggesting that no trees could survive, the sky islands are renowned for their peculiar woody plant giants. They belong to different plant families, but have developed similar sophisticated stress-tolerance mechanisms. Chala shows that these unique plants may lose most of their suitable habitats as well as genetic diversity due to climate warming, thus facing high risk of extinction.

Chala also addresses how competition for food from domestic animals may threaten the wildlife in the sky islands. By identifying the plants they eat based on DNA remains in their faeces, he shows that the rare and endangered Walia ibex in Ethiopia may be threatened by competition from the increasing herds of domestic goats.

During the coldest climate of the last ice age, some 20 thousand years ago, Chala estimates that the habitat available for mountain plants extended 1000 m further downslope and was eight times larger than today. Whereas mountains such as Kilimanjaro and Mt Kenya still were isolated islands at that time, many of the Ethiopian high mountains merged into a continuous alpine habitat, facilitating plant migration and genetic exchange.