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To exploit or to explore? Foraging dilemmas in Indian giant squirrels (*Ratufa indica*)

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The Indian Giant Squirrel (*Ratufa indica*) is one of the largest tree squirrels in the world. Owing to its territorial nature, individuals have access to resources only within territories which they defend from intrusion. However, periodically squirrels do make excursions outside their territories to gain access to scarce and preferred resources that they may lack currently within their own foraging areas. Thus an individual giant squirrel is continually faced with foraging dilemmas such as should it exploit resources fully within its own territory, or should it explore outside this area? Or, should it keep track of resource phenology within its own territory by periodic exploration? How much time should it devote to exploitation of existing resources versus exploration for new resources? This situation is particularly acute for the completely herbivorous giant squirrel that needs to maintain a balanced diet, and feeds on a variety of plant parts from many different tree and liana species. At any given instant, an individual giant squirrel has to decide whether to exploit resources whose quality and location is known, or search for unknown resources, possibly of higher quality. These decisions can be expected to have profound consequences upon foraging success. In this talk we will describe new approaches towards determining

optimal solutions for a foraging squirrel. We use these approaches to predict optimal foraging movements, given explicit data on spatial dynamics of resources as well as on movements of foraging squirrels. We place these approaches in the overall context of optimal foraging and optimal movement theory.