A wild boar hunting: predation on a bonnet macaque by a wild boar in the Bandipur National Park, southern India

A 'predator' is defined as 'an animal that naturally preys on others'[1]. Wild boars *Sus scrofa* are generally not recorded as natural predators of bonnet macaques, *Macaca radiata*. We report here an adult wild boar hunting and eating an adult bonnet macaque in the Reception area (11.67°N, 76.63°E) of the Bandipur National Park, Karnataka on 5 December 2013.

Around 14:40 h, a bonnet macaque troop of around 40 individuals was foraging in an open grassland, alongside a sounder of wild boars comprising an adult female and four juveniles. There were sudden alarm calls, which sounded typically like those given to leopards, from the bonnet macaques. The entire troop rushed towards the area where an adult female wild boar stood alertly, approximately 5 m away from an adult female macaque, sitting on the ground. The macaque began to move slowly towards an *Eucalyptus* tree, about 2 m away, dragging her left hindleg, which was bleeding profusely. A bystander, an employee of the Karnataka Forest Department, reported the injury to have been due to an attack by the same boar a few minutes earlier. The boar attacked the monkey a second time, aiming at the already injured leg, and ripped it apart, holding down the struggling macaque steadily with one of her front hooves. It then began to feed on the still-alive macaque and consumed her body, barring the head, within a span of approximately 20 min (Figure 1).

Although wild boars are known to feed on carcasses, reports of the species displaying typical predator-like behaviour, such as the one described here, are virtually non-existent. There have, however, been several studies reporting feral pigs predating upon newborn lambs in Australia[2–6]. These feral pigs, representative of different breeds, had either been accidentally or intentionally introduced into the wild during periods of multiple colonizations by humans of diverse ethnic origin[6,7]. Thus, genetically, ecologically and behaviourally, the feral pigs of Australia with predatory behaviour could be considered distinct from their wild counterparts, represented by the wild boars of the Bandipur National Park. Moreover, the Australian feral pigs predated on newborn lambs in lambing enclosures in stark contrast to the free-ranging, wild, adult bonnet macaque, which was predated upon in this case. In all respects, therefore, the unusual predator-like behaviour of a wild boar in its natural habitat appears to be unique.

We propose several hypotheses, which need to be tested in the future, to explain the observed unusual behaviour of the boar.

The opportunistic predator hypothesis: We hypothesize that the prey individual was foraging away from the other troop members and thus, perhaps, increased its chances of being attacked opportunistically by the predatory boar. Although opportunistic predators are not believed to necessarily prefer non-vigilant prey[8], this possibility cannot be easily ruled out in this particular situation.

The habitat complexity hypothesis: This hypothesis argues that a greater structural complexity of the habitat would promote relatively less visibility of a prey species to its predator and vice versa[9]. The Reception area of the Park, where the hunting occurred, is characterized by open, well-maintained grassland with sparsely spaced tall trees. The natural habitat of wild boars in Bandipur, in contrast, is typically forested with fairly dense undergrowth and the contrasting open Reception area may thus have provided better visibility to the boar and induced an incipient predator-like behaviour to express itself.

The intraguild predation hypothesis: A guild is defined as 'a group of species that exploit the same class of environmental resources in similar way'[10]. Intraguild predation refers to situations where two species, competing for shared resources, predate on one another[11]. In this particular case, one of the major food sources for both the bonnet macaques and the wild boars in the Reception area of the Park is provisioning of human-origin food by the visiting tourists. Such an anthropogenic foraging option could have potentially turned the two otherwise non-competing species into competitors and, as a result, a novel case of asymmetric intraguild predation could have emerged in this situation.

Our observation raises several crucial issues pertaining to the behaviour ecology of species that commonly occur in anthropogenic landscapes. There has hardly been, for example, any systematic study on the behaviour of wild boars, which has the potential to uncover flexibility in behavioural traits such as the reported switch from a more species-typical foraging strategy (carrion-feeding) to a more adaptive one (opportunistic predation). Moreover, the possibility of a wild boar predating on a non-traditional prey species such as a bonnet macaque as a result of competition over human-provided food resources, if tenable, has significant implications for their conservation in increasingly prevalent atypical ecological regimes.

Figure 1. The adult female wild boar feeding on the carcass of the adult female bonnet macaque after killing it.

1. Oxford English Dictionary; http://www.oxforddictionaries.com/definition/english/predator (accessed on 3 March 2014).
2. Plant, J. W., Marchant, R., Mitchell, T. D. and Giles, J. R., *Aust. Vet. J.*, 1978, **54**, 426–429.
3. Pavlov, P. M., Kilgour, R. J. and Pederson, H., *Aust. J. Exp. Agric. Anim. Husb.*, 1981, **21**, 570–574.
4. Pavlov, P. M. and Hone, J., *Aust. Wildl. Res.*, 1982, **9**, 101–109.
5. Hone, J., Australian Meat Research Committee, Final Report, Department of Agriculture, New South Wales, Australia, 1983.

6. Mc Gaw, C. C. and Mitchell, J., *Pest Status Review Series – Land Protection*, Department of Natural Resources and Mines, Queensland, Australia, 1998.
7. Pullar, E. M., *Aust. Vet. J.*, 1950, **26**, 99–109.
8. Cresswell, W., Lind, J., Kaby, U., Quinn, J. L. and Jakobsson, S., *Anim. Behav.*, 2003, **66**, 643–648.
9. Schmidt, J. M. and Rypstra, A. L., *Oecologia*, 2010, **164**, 899–910.
10. Root, R., *Ecol. Monogr.*, 1967, **37**, 317–350.
11. Holt, R. D. and Polis, G. A., *Am. Nat.*, 1997, **149**, 745–764.

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SHREEJATA GUPTA[1,*]
ANINDYA SINHA[1,2,3]

[1]*National Institute of Advanced Studies, Indian Institute of Science Campus, Bangalore 560 012, India*
[2]*Nature Conservation Foundation, Mysore 571 126, India*
[3]*Dhole's Den Research Foundation, Bandipur National Park, Chamarajnagar District, India*
**For correspondence.*
e-mail: shreejata@gmail.com

Ant runners: an analysis of running speed of *Leptogenys processionalis* (Hymenoptera: Formicidae: Ponerinae)

Leptogenys processionalis are shiny and slender ants commonly found in India. They nest on ground and feed mainly on termites, cockroaches and other insects. They are nomadic and for these predatory ants, searching for food is an important activity. Coordination and speed could play a key role in hunting prey. Running speed in trail can affect flow of traffic, search distances and thus their foraging efficiency. These ants maximize their foraging efficiency by forming trails such that the area covered to distance travelled ratio is maximum[1]. They actively clear obstacles to form physical paths, more often seen near the nest than away from it[1]. This may increase their foraging efficiency as the paths are used frequently. Like many other trail-forming ants, these ants deposit pheromones along their trail.

The literature on running speed of ants has focused mainly on how temperature, body mass or morphology affects speed[2,3]. What are the other main variables that affect their speed significantly? Here I report the variations in running speed of *L. processionalis* under different natural conditions.

The study was carried out in Bangalore (12.97°N, 77.56°E) during June and July 2013. Data were collected from four different colonies (two in IISc, one each in GKVK and NCBS campus). The distance between the two colonies selected in IISc was at least 150 m apart, and thus they could be considered two distinct colonies. The study sites selected were reasonably faraway from buildings and thus had less human intervention. Time taken to travel 30 cm of a fixed position in the trail was measured for randomly chosen ants, for 30 min. A total of 16 such 30-min readings (16 replicates) were taken from the 4 colonies. For a given colony, the fixed positions of observation in the trail were chosen at different distances from the nest to check whether distance from the nest affects running speed. The speed was not measured where the hunting (for insects) takes place – at the terminal search field (TSF)[1]. TSF is the leading front of a trail where ants fan out from the trail resulting in a triangular field of ants searching for prey[1]. Sometimes these ants form multiple lanes side by side, similar to roads with multiple traffic lanes. For simplicity in observation, all the readings were taken only in cases where the ants formed a single lane. Information about the other possible variables – temperature, direction of ant (towards or away from nest), terrain, slope of the fixed position, whether the ant is laden with food or not, and number of interactions made by the ant under observation with other ants running in opposite direction was collected. Terrain was classified into three categories: soil, leaf litter and grass lawn. Any brief antennal contact or head-on collision between the test ant and another ant was considered to be an interaction. Since there are no morphological differences between foragers and soldiers in *L. processionalis*, the body weight and length of all individuals were assumed to be similar. If an ant was crippled with one or two amputated legs, a note was taken, to avoid any bias in measurements. All the observations were made between 10:00 and 17:00 h.

The data from different replicates were pooled and speed of the ants was calculated for each variable separately. The analysis was done using trial version of StatistiXL and SPSS statistical package.

It was found that the mean ± SD running speed from pooled data ($n = 913$) was 4.24 ± 1.90 cm/s (0.15 ± 0.07 km/h) and median was 4.02 cm/s. Mean speed in the different categories is listed in Table 1. The distribution of speed was non-normal and skewed to the right ($\lambda^2 = 46.98$, $df = 3$, $n = 913$, $P < 0.001$). The mean running speed and median after removing data points from crippled ants (38 out of 913) were 4.28 ± 1.90 cm/s and 4.04 respectively.

According to the literature[2], at 28°C, desert ants like *Cataglyphis bicolor* (13.71 cm/s) and *Ocymyrmex barbiger* (8.81 cm/s) run faster than *L. processionalis* (4.22 cm/s, from my data), whereas ants like *Solenopsis invicta* (1.67 cm/s) and *Pogonomyrmex desertorum* (1.62 cm/s) run slower. These interspecific variations could arise mainly due to differences in body mass, leg allometry, foraging temperature range and lifestyle (e.g. nomadic predatory ants run faster)[2].

As reported in previous studies on different species[2,4], running speed increased