Lethal intergroup aggression in wild crested macaques (*Macaca nigra*)

Laura Martinez-Iñigo[I,IV], Muhammad Agil[II], Antje Engelhardt[III], Malgorzata Pilot[IV], Bonaventura Majolo[I]

I. School of Psychology, University of Lincoln, UK. **II**.Faculty of Veterinary Medicine, Bogor Agricultural University, Indonesia. **III**. School of Natural Sciences & Psychology, Liverpool John Moores University, UK· **IV.** School of Life Sciences, University of Lincoln, UK

Introduction

Warfare, in essence, consists of recurrent coalitions aiming to kill or aggressively dominate members of another group[1]. Intergroup coalitionary lethal violence against weaned individuals has only been consistently reported in two species of primates: common chimpanzees and humans. These two species share two traits, fission-fusion dynamics and raiding parties. These have been suggested to be key factors for the occurrence of lethal intergroup aggression[2].

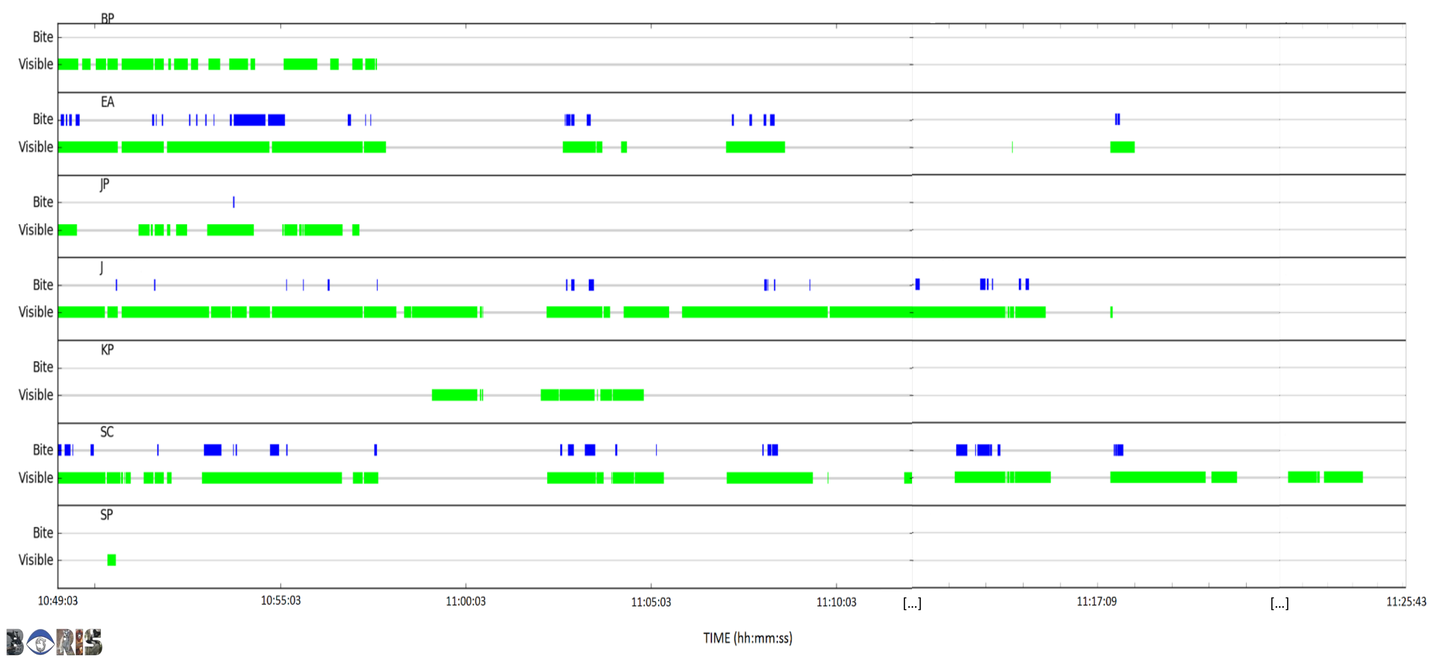
Here we report a case of fatal intergroup coalitionary attack in a wild group of crested macaques in Tangkoko Nature Reserve (North Sulawesi, Indonesia).

Fig. 1. Screen shot of the video recording on the lethal attack observation at 10:53:46, 18th December 2015. Jean (adult female, **2**), Emping (adolescent female, **5**) and Sashimi (old juvenile male, **6**) biting a female from another group (**4**), observed by 2 juveniles (**1** and 3).

Methods

This case of lethal violence was recorded during a 12 month long study on intergroup interactions in crested macaques, between August 2015 and July 2016. The attack was detected the 18th December 2015 at 10:48, when following a habituated group that had been studied regularly since 2006. The attack was recorded with a hand-held camera until the attackers abandoned the area. The videos were coded[3] reporting individual proximity to the attacked animal and occurrences of biting.

Event Description




Bianca (BP)
Adult Female


Emping (EA)
Adolescent Female


Jane (JP)
Adult Female


Juveniles (J)


Kristi (KP)
Adult Female


Sashimi (SC)
Old juvenile male


Stephie (SP)
Adult Female

Fig.2. Event plot generated with BORIS[3]. The graph shows when each individual/age-class was visible in the video (Green bars) and when/if they were biting the victim (Blue bars). The X-axis is time, as in the local time where the observation took place. The observation was recorded in 3 videos due to technical issues with the camera. Gaps between videos are depicted with a "[…]". Each gap is less than 15 seconds long.

The victim was an adult female of a non-habituated group. The observation lasted 35 minutes during which the female passed away. The bitten areas of the body were the groin (23% of the total biting time), limbs (21%), throat (15%) and abdomen (14%).

The wounds seemed superficial when examining the body but no detailed necropsy was performed.

Discussion

Crested macaques live in cohesive multimale multifemale societies where fission-fusion dynamics nor raiding parties have ever been described. This is the first report of a confirmed case of an intergroup coalitionary killing in an anthropoid primate species without these two features. This case, together with those on out-group coalitionary killings reported in mountain gorillas (*Gorilla beringei*) and Temminck's red colobus (*Procolobus badius temminck*) challenge the hypothesis that fission-fusion social organization is required for lethal coalitionary intergroup aggressions to occur. We argue that opportunistic lethal violence between groups may take place in group-living species regardless of their social organisation. If so, the evolutionary roots of human warfare may trace back before the chimpanzee-human most recent common ancestor.

References

1. Crofoot, M. C., & Wrangham, R. W. (2010. In *Mind the gap* (pp. 171-195). Springer Berlin Heidelberg.
2. Wrangham, R. W. (1999). *American Journal of Physical Anthropology*, *110*(s 29), 1-30.
3. Friard, O., & Gamba, M. (2016). *Methods in Ecology and Evolution*, 7 (11): 1325–1330.
4. Rosenbaum, S., Vecellio, V., & Stoinski, T. (2016). *Scientific Reports*, *6*, 37018.
5. Starin, E. D. (1994). *Behaviour*, *130*(3), 253-270.

Acknowledgements

We gratefully acknowledge the permission of the Indonesian State Ministry of Research and Technology (RISTEK), the Directorate General of Forest Protection and Nature Conservation (PHKA) in Jakarta and the Department for the Conservation of Natural Resources (BKSDA) in Manado to conduct this research in the Tangkoko-Batuangus Nature Reserve. We are grateful to Rismayanti, Eka Cahyaningrum and Juliette M. Berthier for their help in data collection and to the other members in the Macaca Nigra Project for support. We are grateful to the crowdfunding contributors that helped to fund this project, particularly: A.Íñigo García, C. Íñigo García and JC. Martinez Lopez