

Let us look instead at the reality of free-ranging dogs on India's streets. At an estimated 59 million, India has the highest population of dogs in the world¹³. At least Rs 2 billion/year is spent in the treatment of dog bite-related cases in India, with an associated loss of 38 million man-hours^{7,14}. Add to that the costs associated with the Animal Birth Control (ABC) programmes countrywide, which are difficult to systematically quantify. The Animal Welfare Board of India alone doles out grants of approximately Rs 35 million every year to a handful of animal welfare organizations for performing ABC (<http://www.awbi.org/?q=node/60>, accessed on 15 April 2014). To be even more complete, we should also add the loss of human lives or the economic costs due to accidents involving street dogs, but these are rarely quantified. Even if one is emotionally ready to agree with the authors that the 'solution to dog-human conflict is not culling, but efficient management of garbage and rabies in the country, and a positive attitude towards the animals that are otherwise known to be man's best friend', we do not see how they have come to the conclusion that the 'general perception of these dogs as a nuisance is quite flawed'¹. To do justice both to science and to the fate of millions of dogs, we wish the authors¹ showed more diligence in conducting their study. Instead of dispelling myths and scientifically contributing to a better understanding of dog-human relationships in India, they, ironically, perpetuate their own inherent biases.

10. Causey, M. K. and Cude, C. A., *J. Wildl. Manage.*, 1980, **44**, 481.
11. Boitani, L. and Ciucci, P., *Ethol., Ecol. Evol.*, 1995, **7**, 49.
12. Spotte, S., *Societies of Wolves and Free-Ranging Dogs*, Cambridge University Press, 2012.
13. Gompper, M. E. (ed.), In *Free-Ranging Dogs and Wildlife Conservation*, Oxford University Press, Oxford, 2014, p. 9.
14. Menezes, R., *Can. Med. Assoc. J.*, 2008, **178**, 564.

ACKNOWLEDGEMENT. We thank J. Lenin for helpful comments on an earlier version of the manuscript.

ABI TAMIM VANAK^{1,2,*}
ANIRUDDHA BELSARE³
MEGHNA UNIYAL⁴
RAUF ALI⁵

¹Centre for Biodiversity and Conservation,
Ashoka Trust for Research in Ecology and the Environment,
Bangalore 560 064, India

²School of Life Sciences,
University of KwaZulu-Natal,
Durban 4000, South Africa

³Department of Fisheries and Wildlife,
University of Missouri,
Columbia, MO 65203, USA

⁴3232, Sector-23,
Gurgaon 122 017, India

⁵Foundation for Ecological Research,
Advocacy & Learning,
170/3 Morattandi Village,
Auroville PO 605 101, India
*e-mail: avanak@atree.org

1. Majumder, S. S., Chatterjee, A. and Bhadra, A., *Curr. Sci.*, 2014, **106**(6), 874–878.
2. WHO/WSPA, Guidelines for dog population management, World Health Organization, Geneva, 1990.
3. Sudarshan, M. *et al.*, *Int. J. Infect. Dis.*, 2007, **11**, 29.
4. Suraweera, W. *et al.*, *PLoS Negl. Trop. Dis.*, 2012, **6**, e1847.
5. Knobel, D. L. *et al.*, *Bull. WHO*, 2005, **83**, 360.
6. Baxter, J. M., *J. Global Health*, 2012, **2**.
7. Sudarshan, M. *et al.*, *J. Commun. Dis.*, 2006, **38**, 32.
8. Ichhpujani, R. *et al.*, *J. Commun. Dis.*, 2008, **40**, 27.
9. Beck, A. M., *The Ecology of Stray Dogs: A Study of Free-Ranging Urban Animals*, York Press, Baltimore, 1973.

Response: Science threatened by subjectivity

The comments on our recently published paper by Vanak *et al.* have left us surprised, disappointed and somewhat amused. Vanak *et al.* state that they felt the need to write their letter because they found major faults with all the sections of our paper, and also because this has 'massive implications for public health, animal welfare and wildlife conservation'. It is heartening to know that our study can have such deep and far reaching implications, and we thank Vanak *et al.* for bringing this to the focus. How-

ever, we would like to discuss some major flaws in their arguments put forth against our results.

Vanak *et al.* have picked a sentence from the introduction of our paper to ask whether we suggest that the 'Indian Native dog' is somehow special in its evolutionary history. A discerning reader would realize that this is a misrepresentation of the paragraph in which we provide a brief introduction to the free-ranging dogs in India, and state that these dogs have lived in close human proximity, but not as pets for centuries in this part of the world. Stating that the Indian native dog has not undergone 'the usual domestication process to become exclusively pets as in most developed countries' does not mean that the Indian free-ranging dogs are 'somehow evolutionarily distinct from other dog types'. We have simply stated that these dogs are not 'exclusively pets', and have no intentions of alluding to the evolutionary process of dogs here.

Vanak *et al.* cite some work on rabies to state that dog bites are a real threat to the Indian population. In trying to establish that we have a bias for dogs, Vanak *et al.* claim, 'they neglect to elaborate that the "part" of the human population that they are referring to is an estimated 17–20 million Indians/year that suffer from dog bites', citing Sudarshan *et al.*¹. We have also referred to this very paper, which states that 'The annual incidence of human rabies was estimated to be 17,137 (95% CI 14,109–20,165). Based on expert group advice, an additional 20% was added to this to include paralytic/atypical forms of rabies, providing an estimate of 20,565 or about 2 per 100,000 population'. Sudarshan *et al.*¹ further state that 'The new estimate of about 20,000 (or 2 per 100,000 population) annual human rabies incidence based on this community survey shows a decline of about 30% from the earlier incidence of 30,000 (3 per 100,000 population) reported during the period 1990–2002'.

It is alarming and at the same time depressing to see such blatant misrepresentation of data. Vanak *et al.* have conveniently converted 17,137 to 17 million, and this increase by three orders of magnitude cannot be a typographical error. Though we acknowledge the fact that rabies is a serious problem in our country, we chose to present our results honestly, and without bias either for or

against the dogs. We would like to cite some other estimates here. Ichhpujani *et al.*² reported a total of 1357 fresh animal bites from six anti-rabies centres across the country, of which 92% were dog bites (1248). However, this number was for a period of 18 months. Menezes³ reported that of all the dog bite cases in India, 60% was by stray dogs and the rest by pets. This shows that stray or free-ranging dogs are not specifically aggressive. This is also substantiated by that data provided by Sudarshan *et al.*¹, that 2 in every 100,000 humans are bitten by dogs every year.

Vanak *et al.* claim to have pointed out 'serious flaws' in the methodology of our study. First, they find it problematic that the study was conducted 'exclusively in the campuses of two educational institutions situated in large metropolises and in a suburban township'. They feel that the dogs on the campuses lead a 'sheltered' life, and cite no data to substantiate this claim. On the other hand, we know from earlier studies that the populations in Kalyani (the suburban township) are comparable in their epidemiological nature with populations in Kolkata⁴. Though Vanak *et al.* feel that the dogs lead a sheltered life on the campuses of IISc, Bangalore and IISER-Kolkata, our yet unpublished data from IISER-Kolkata show that dogs face threats from humans, and pups are often killed by poisoning on the campus (M. Paul *et al.*, unpublished). In IISc too, reports of dog-human conflict are not rare, and there are several instances of people being chased by dogs. This was one of the reasons that led us to choose these two campuses as study sites, and not just the convenience of sampling. In fact, sampling dogs on the IISc campus while being located in Kolkata, is much less convenient than sampling in the city of Kolkata itself, as we have done for other studies. Lastly, we would like to point out that IISER-Kolkata is located in Mohanpur (22°94'N, 88°53'E), as mentioned in our original paper, which is also a suburban area, and the present campus is largely occupied by agricultural fields belonging to BCKV, the agricultural university whose premises have been taken on lease. The Mohanpur campus is also highly porous, with a lot of thoroughfare, and thus does not fit the description 'atypical in density, composition, and socio-economic profile of the human populace, compared to neighbouring

areas immediately adjacent to these campuses' provided by Vanak *et al.*

In our paper, we clearly state that we have estimated time-activity budgets of dogs as a part of a larger ongoing study, and the choice of sampling time was based on 'when both humans and dogs are typically seen on the streets'. We have definitely not claimed that dogs and humans do not walk the streets beyond 1930 h, but we have selected time slots to maximize the possibility of sightings, which is quite acceptable as a sampling strategy in animal behaviour, to the best of our knowledge. Since Vanak *et al.* repeatedly refer to rabies as a major threat posed by the dogs to humans, we would like to point out that published reports on incidence of dog bites suggest a high incidence of dog-human encounters during the daylight hours, rather than late in the night^{5,6}. Hence our sampling period did cover the time of day when dog bites are most likely to occur, a point that we have also made in our original paper. In fact, dogs are not exclusively nocturnal animals, unlike many other canids. Serpell⁷ mentions that one of the factors that could have facilitated the domestication process of dogs is their ability to be active during the daylight hours.

We do not understand why Vanak *et al.* have an issue with our 'choice of roads to sample, potential differences in sampling effort across sites, and even the type of sampling method used', as they do not elaborate on this. We would like to clarify that, as I01 mentioned in the original paper, 'the observer randomly picked a road in the predefined area and started walking along the same, covering all bylanes along the road'. Thus all roads in the area chosen for sampling were covered, and if we had to walk on a stretch of the road more than once, we did not resample on that stretch⁴. These samplings were carried out at different times of the year and on different days in the various locations, and can thus be considered as random behavioural samplings. We can consider all the 1941 samplings, in spite of repeats, because these were obtained using instantaneous scans, and not focal animal observation. Each sighting here is equivalent to an independent data point with respect to behaviour, and the estimate of groups is also provided in our results.

Vanak *et al.* repeatedly state that our 'flawed sampling' has led us to erroneous and misleading conclusions. As they

themselves point out, there are an estimated 58 million dogs in India, spread over an area of 3,287,240 sq. km (ref. 8). Hence, 1941 dogs would be a small percentage of the total population, which explains why we could have missed out a few rare cases of dog-human aggression during our surveys. We would also like to mention that according to a survey conducted in 2004, the dog population was estimated to be approximately 25 million (ref. 9). We are carrying out similar night time samplings of behaviour and hope to report our results in the near future.

Vanak *et al.* not only have problems with our sampling method, but also with our conclusions. They state that, 'As domesticates and commensals of humans, dogs have surrendered their hierarchical status to humans. This makes them submissive'. This claim is not substantiated by any proof, but is based on general qualitative notions about dogs that humans have, many of which are now being found to be contentious. The notion that dogs have surrendered their hierarchical status to humans as alphas is now questioned in the literature through many studies. Leading canid biologist Adam Miklosi has worked extensively on this idea. According to him, 'There has long been the misconception that the dog-human relationship is one of dominance and subordination. Understanding why this is false will help dog owners improve their own relationship with their dog' (<http://video.pbs.org/video/14880-05229/>). Related evidence which suggests that dog-dog and dog-human relationships are not comparable can be found in Rooney *et al.*¹⁰. Pet dogs are thought to develop bonds with their owners due to the process of attachment¹¹, and hence the interactions of free-ranging dogs with humans cannot be expected to be similar to those of pets with their owners and handlers.

The use of the words 'lazy' and 'friendly' in our description of dogs has been criticized by Vanak *et al.* as anthropogenic. We have only used these as simple English words which mean 'unwilling to work or use energy' and 'of affable nature'. We preferred to use these words to describe an animal's general behaviour, as a descriptive term, without any qualitative attributes being added to it, whether positive or negative, a practice that is common in the field of animal behaviour research^{12,13}. We are afraid

that Vanak *et al.* have added an anthropocentric connotation to a simple adjective.

We cannot help but notice the abject lack of objectivity in Vanak *et al.*'s response to our paper. They repeatedly suggest that our love for dogs has prompted us to conduct this study. Even if we accept that all the objections raised by them to our work were true, why do they not provide any constructive criticism instead of just stating the flaws in our study? Such criticism cannot be considered scientific, unless substantiated by data. We would like to reiterate that all our conclusions are based on solid data, and the results have been laid open for the readers to judge. On the other hand, Vanak *et al.* have criticized our work with no data of their own to substantiate their claims. Moreover, they misrepresented published data to make a strong statement against stray dogs. We are interested in understanding the eco-ethology of free-ranging dogs, and our results are the output of our efforts at gathering data from the streets, and not on reviewing the existing literature to piece together a biased write-up. While we accept that the stray dog population on Indian streets needs to be managed, mud-slissing will not help us achieve this goal as a nation.

While Vanak *et al.* claim that we are biased towards the dogs, we are afraid that their commens suggests a strong bias against dogs, and any bias in science leads to loss of objectivity. Though they

continuously harp on the threat that rabies poses to the community, they offer no solution to the problem. While rabies affects 17,137 (95% CI 14,109–20,165) people every year¹, 45,900 annual snake-bite deaths occur nationally (99% CI 40,900 to 50,900)¹⁴. Hence snakes kill more people, in spite of not being in close proximity with humans, than dogs do. Death by snakebite is a bigger threat to the population than rabies, and perhaps a more neglected one. Would Vanak *et al.* suggest that we kill all snakes in the country to eradicate this problem? The point that we would like to drive home is that understanding the behaviour and ecological dynamics of the free-ranging dogs can only be achieved through an extensive and rigorous scientific exercise, involving people who are not averse to working with dogs, and at the same time, are capable of keeping their biases, either for or against dogs, from fogging their sight. Understanding their eco-ethology can help us achieve more efficient and empathic management of our stray dog population, unless this country changes its policy of animal rights and decides to solve the problem more simply by culling all dogs on the streets.

1. Sudarshan, M. *et al.*, *Int. J. Infect. Dis.*, 2007, **11**, 29.
2. Ichhpujani, R. *et al.*, *J. Commun. Dis.*, 2008, **40**, 27.
3. Menezes, R., *CMAJ.*, 2008, **178**(5), 564–566.

4. Majumder, S. S. *et al.*, *Acta Ethol.*, 2014, **17**, 1–8.
5. Bajwa, M. S., Anjum, A. and Manzoor, S., *Prof. Med. J.*, 2012, **19**(5), 700–709.
6. Khokhar, A., Meena, G. S. and Mehra, M., *Indian J. Commun. Med.*, 2003, **XXVIII**, 4.
7. Serpell, J., *The Domestic Dog: Its Evolution, Behaviour and Interactions with People*, Cambridge University Press, Cambridge, 1995.
8. Census of India, 2001.
9. Sudarshan, M. K., Report, Association for Prevention and Control of Rabies, 2004, No. 6.
10. Rooney, N. J., Bradshaw, J. W. S. and Robinson, L. H., *Appl. Anim. Behav. Sci.*, 2000, **66**(3), 235–248.
11. Topál, J., Gácsi, M., Miklósi, A., Virányi, Z., Kubinyi, E. and Csányi, V., *Anim. Behav.*, 2005, **70**(6), 1367–1375.
12. Agrahari, M. and Gadagkar, R., *Insect. Soc.*, 2004, **51**(3), 306–307.
13. Reeve, H. K., *Nature*, 1992, **358**, 147–149.
14. Mohapatra, B. *et al.*, *PLoS Negl. Trop. Dis.*, 2011, **5**(4), e1018; doi:10.1371/journal.pntd.0001018

ANINDITA BHADRA

*Behaviour and Ecology Lab,
Department of Biological Sciences,
Indian Institute of Science Education and
Research – Kolkata
Mohanpur Campus, Mohanpur,
Nadia 741 246, India
e-mail: abhadra@iiserkol.ac.in*