between this model and RDH would be to prevent (for example, by a fence) groups of badgers or foxes exploiting a given food patch within their territories. My model predicts that territory size will remain constant if the experiment is performed in territories having three or more group members whereas group size will decrease in proportion to the ratio P_p/P_t, where P_p = prey productivity of the enclosed patch, and P_t = prey productivity of the entire territory. It is only when this experiment is performed in territories occupied by a single pair that the territory owners will try to expand or abandon their territories. Macdonald's[1,2] model predicts that territory size will increase whereas group size may or may not remain constant (depending on the quality of the new food patch incorporated in the territory).

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1. Macdonald, D. W. *Nature* **301,** 379–384 (1983).
2. Maconald, D. W. in *Proc. Worldwide Furbearer Conf.* Vol. 2 (eds Chapman, J. & Pursely, D.) 918–949 (University of Maryland Press, 1981).
3. Bradbury, J. W. & Vehrencamp, S. L. *Behav Ecol. Sociobiol.* **1,** 337–381; 383–404 (1976).
4. Kruuk, H. *J. Zool.* **184,** 1–19 (1978).
5. Macdonald, D. W. *et al.* in *A Handbook on Biotelemetry and Radio Tracking* (eds Amlaner, C. J. & Macdonald, D. W.) 405–424 (Pergamon, Oxford, 1980).
6. Macdonald, D. W. *Z. Tierpsychol.* **52,** 171–200 (1980).
7. von Schantz, T. *Oikos* **37,** 63–68 (1981).
8. von Schantz, T. *Oikos* **42,** 48–58; 59–65 (1984).
9. von Schantz, T. thesis, Univ. Lund (1981).
10. Lindström, E. thesis, Univ. Stockholm (1982).

MACDONALD REPLIES—Although most easily visualized where only one patch is likely to be fruitful in each territory at a given time (refs 1 and 2; hence Fig. 1 in ref. 3), the resource dispersion hypothesis (RDH) does not require these conditions[4–8]. Rather, the hypothesis identifies conditions of resource dispersion where "the smallest home range with an economically defendable[9] configuration which will reliably support a pair of foxes (on a bad night or a bad year) may sometimes support additional foxes"[3].

In spatially patchy environments, convoluted territorial borders might encompass sufficient fragments of transient patches to yield food for only a pair of residents. RDH proposes that the defence of such ranges may not be economic[9] whereas a less convoluted configuration, perhaps including more resources, could be defendable. On this view, each territory may contain many patches, each being variously fruitful at any one time. Whether group members forage in a patch simultaneously, just as whether they travel and/or forage alone or together, will depend on the nature of the prey and on other selective pressures affecting their sociality[3].

I have suggested[8] that where prey were spatiotemporally uniform in their availability, there the smallest economically defendable range that could sustain a pair would not support additional adults (whether or not, and for how long, it would be advantageous to maintain territories larger than this minimum size would depend on such factors as the magnitude of pressure from intruders and the benefits of increasing group size). von Schantz's formulation concerns an intermediate case where, irrespective of its dispersion, prey is temporally variable. Again, the pattern of prey availability creates conditions where the minimum range which supports a pair (in a poor year) can sometimes support extra adults (in a rich year). The interannual mode[10,11] highlights the question of how social behaviour provides "a buffer to prevent spatial organization altering prematurely in response to ephemeral changes in food availability"[8]. von Schantz's[10] emphasis on the costs of territorial readjustment is compatible with my formulation.

Territory size and shape may sometimes be adapted to 'bottle-neck' periods in the abundance of available prey; it seems no less plausible (nor at variance with the data[4–8] to argue that they are sometimes further constrained by the dispersion of resources. von Schantz is mistaken in thinking that I treated independence of territory and group sizes as corroborating RDH; rather, I showed how this was accommodated by RDH. Experiments like that suggested are vital although the result would depend on which patch was fenced (due to interacting variation among dominance and patch richness and utilization[12]).

von Schantz's hypothesis requires group size to descend to two during the average breeding lifespan. Among species which form "spatial groups"[3], these conditions are probably not met in some carnivore populations[13], although they may be in others[6,10]. The spatiotemporal formulation of RDH is applicable to groups of stable or unstable membership whereas the purely temporal formulation may explain only those unstable groups whose membership periodically decreases to two. Some badger and fox groups reported in refs 4, 5, 8 and 13 have subsequently remained larger than 2 for over 10 yrs (H. Hofer, D. W. M., E. Neal and J. Phillipson, unpublished observations).

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1. Bradbury, J. W. & Vehrencamp, S. L. *Behav Ecol. Sociobiol.* **1,** 383–404 (1976).
2. Clutton-Brock, T. H. *Nature* **250,** 539–542 (1974).
3. Macdonald, D. W. *Nature* **301,** 379–384 (1983).
4. Kruuk, H. *Behav Ecol. Sociobiol.* **4,** 75–89 (1978).
5. Kruuk, H. & Parish, T. J. *J. Zool.* **196,** 31–39 (1982).
6. Mills, M. G. L. *J. Zool.* **198,** 39–51 (1982).
7. Hersteinsson, P. & Macdonald, D. W. *Symp. zool. Soc. Lond.* **49,** 259–289 (1982).
8. Macdonald, D. W. in *Proc. Worldwide Furbearer Conf.* Vol. 2 (eds Chapman, J. & Pursely, D.) 918–949 (University of Maryland Press, 1981).
9. Brown, J. L. *Wilson Bull.* **70,** 160–169 (1964); *J. theor. Biol.* **95,** 793–810 (1982).
10. von Schantz, T. thesis, Univ. Lund (1981); *Oikos* **42,** 48–58; 59–65 (1984).
11. Lindstrom, E. in *The Red Fox* (ed. Zimen, E.) 177–184 (Junk, The Hague, 1980).
12. Macdonald, D. W. *Z. Tierpsychol.* **52,** 171–200 (1980).
13. Neal, E. *Badgers*, 321 (Blandford, Poole, Dorset, 1977).

111-day periodicity of X-ray transient A0535+26

PRIEDHORSKY AND TERRELL have recently argued about some special characteristics of X-ray transient A0535+26 (ref. 1) to justify their speculations: that (1) the optical counterpart HDE245770 of A0535+26 cannot be a BO Ve star; (2) it would be better if the terminal velocity of the stellar wind from HDE245770 were $<1,000\ \mathrm{km\ s^{-1}}$; (3) the B star must be rotating rapidly to lose matter from the equatorial region; (4) the companion HDE245770 must have a mass loss rate of $\sim 10^{-5}\ M_0\ \mathrm{yr^{-1}}$ to power the X-ray luminosity of A0535+26.

Furthermore, they point out that there is a discrepancy between evaluations of the mass loss rate from UV data and their own estimates (see point (4)).

These five points have been discussed elsewhere. Specifically: (1) HDE 245770, optical counterpart of A0535+26 (ref. 2), is an 0.9 IIIe star[3]; (2) the terminal velocity of the stellar wind in HDE245770 is $\sim 630\ \mathrm{km\ s^{-1}}$ (ref. 4); (3) from the broadening of He(II) line (1,640 Å), the rotational velocity of HDE245770 is $v_e \sin i \cong 230\ \mathrm{km\ s^{-1}}$ (ref. 5); (4) the mass loss rate of HDE245770, derived by IR data, is of the order of $10^{-6}\ M\ \mathrm{yr^{-1}}$ (ref. 6); (5) the discrepancy between evaluations of the mass loss rate derived from UV and IR data has been discussed in refs 5,7.

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1. Priedhorsky, W. C. & Terrell, J. *Nature* **303,** 681 (1983).
2. Bartolini, C., Guarnieri, A., Piccioni, A., Giangrande, A. & Giovannelli, F. *IAU Circ.* No. 3167 (1978).
3. Giangrande, A., Giovannelli, F., Bartolini, C., Guarnieri, A. & Piccioni, A. *Astr. Astrophys. Suppl.* **40,** 289 (1980).
4. Giovannelli, F. *et al. Space Sci. Rev.* **30,** 407 (1981).
5. Giovannelli, F. *et al. Proc. 3rd European IUE Conf.* ESA SP-176, 233 (1982).
6. Persi, P. *et al. Mon. Not. R. astr. Soc.* **187,** 293 (1979).
7. Snow, T. P. *Be Stars, Proc. IAU Symp.* No. 98, 509 (1982).

PRIEDHORSKY AND TERRELL REPLY—We thank Giovannelli for pointing out references relevant to our letter, some of which we may have overlooked even if space had permitted their inclusion. We had intended only to present new X-ray observations of A0535+26. It is satisfying that the IR studies cited by Giovannelli support our conclusion that the mean mass loss rate of HDE245770 to its companion A0535+26 is of the order $M \sim 10^{-5} (v_{\mathrm{wind}}/1,000\ \mathrm{km\ s^{-1}})^4 M_\odot\ \mathrm{yr^{-1}}$.

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