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Comment

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In a recent issue of *Biology Letters*, Schaefer & Rolshausen (2007) report an interesting study on the role of leaf colours in tree–herbivore interactions. According to the authors, aphids do not respond differentially to leaf colour in the tree *Sorbus aucuparia* when landing. Further, the authors observe a positive correlation between fruit production and the numbers of aphids landing on the tree. This is interpreted in terms of a trade-off between reproductive investment by the tree and its defence against herbivores, with the insects responding by reduced landing on well-defended foliage. The investigation is embedded in a rather prolific discussion on the evolution of autumn leaf coloration sparked by Archetti (2000) and Hamilton & Brown (2001). After much effort has been dedicated to theoretical considerations, it is indeed refreshing to see an empirical study. However, there are some points in the methodology of the paper that raise our concerns.

In order to estimate the number of aphids, Schaefer & Rolshausen (2007) applied insect glue to the ‘branches’ (presumably including leaves and twigs) of the trees. Precisely how glue application to plants affects visual and olfactory cues used by flying insects remains to be assessed. However, our main concern is the well-established fact that aphids landing on a part of a tree are not necessarily species for which this plant is a host (Kennedy *et al.* 1959; also see Harrington *et al.* 1986). When assuming that winged aphids trapped on a glued branch are linked to a detrimental effect to the tree later on, Schaefer & Rolshausen (2007) imply that for all trapped aphids, *S. aucuparia* was indeed the host plant. We think that this assumption is unlikely to hold, and therefore differences in the number of trapped aphids on *S. aucuparia* branches as observed by the authors may not reflect differences relevant to this tree species.

Unfortunately, it is not reported whether the aphids trapped after manipulation of the trees were identified. The authors do report that aphids caught on glue-covered branches prior to their experiment belonged to *Dysaphis sorbi* and *Rhopalosiphum insertum*, for both of which *S. aucuparia* is a host (Blackman & Eastop 1994). In our experience, however, when aphids are trapped in glue, identification beyond genus level is extremely difficult because many morphological features are destroyed. This would especially be true for the species-rich genus of

Dysaphis, where reliable identification to species level appears to be impossible without careful microscopic preparation (Heie 1994, p. 57).

Moreover, those aphid species that colonize *S. aucuparia* may not necessarily remain where they land and cause damage to the tree, but may instead reject the host plant entirely (Kring 1972). After landing on a host, aphids will still have many points of decision left before finally settling and starting to reproduce (Klingauf 1975). For instance, an aphid on the leaf will gather visual, olfactory, tactile and gustatory information when walking on the leaf surface or probing the leaf tissue, before moving on to the next step and feeding on the phloem, but at each point it may decide that the plant (or this particular leaf) is not acceptable. Also, aphids staying on the leaf will not always reproduce with equal success. Although we acknowledge that a pre-selection of suitable hosts by winged aphids might be documented by the trapping method employed by Schaefer & Rolshausen (2007), taking the results of this method as a measure for aphids reproducing on the tree implies that the summed effects of post-landing decisions would not be able to alter or counterbalance the selection made during flight.

Finally, the observed correlation between fruit set and aphid numbers may be caused by an independent factor like the position of individual trees. Schaefer & Rolshausen (2007), when choosing which trees were sprayed with which colour did acknowledge the possibility of location bias but do not address this point in the discussion of their results on fruit numbers. We may ask if tree individuals growing at the edge of a group of trees (when compared with trees in the centre) may experience lower competition (which would possibly favour fruit production), and at the same time will be more exposed to aphids in flight.

The foundations for the understanding of host finding in aphids were already laid some decades ago (Moericke 1955; Kring 1972). We suggest that Kennedy *et al.*'s (1959) approach of *observing* the aphids' behaviour in the field, though more laborious than trapping, would help to further improve the understanding of host selection in aphids, although we appreciate—also from our experience—that direct observations of behaviour can be difficult to employ.

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The accompanying reply can be viewed at <http://dx.doi.org/10.1098/rsbl.2007.0027>

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