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LETTER TO THE EDITOR

Sir,

In a recent article in the *European Mosquito Bulletin* Y-M. Linton, L. Smith & R.E. Harbach [**13**, 9-16 (2002)], provide evidence for the sympatric occurrence of adult female *Anopheles atroparvus* and *An. messeae* in a disused war fortification on the Isle of Grain, Kent, England, collected in the month of January. In winter, adults of *An. messeae* are known to hibernate, and the authors correctly state that at that time of year *An. atroparvus* is in a state of dormancy, while *An. messeae* is in complete diapause, not bloodfeeding between early autumn and spring. There are several points on which I wish to comment.

The authors nowhere mention the extensive work of Swellengrebel *et al*. on *An. atroparvus* and *An. messeae* in The Netherlands. Swellengrebel et al. published on the segregation of both species during the winter in animal stables (An. atroparvus) and uninhabited animal shelters (*An. messeae*) around Amsterdam in the province of North Holland (Swellengrebel *et al*., 1928). Although there is a propensity of *An. atroparvus* to occur in stables, the data show that both species occurred in shelters, with *An. messeae* clearly being the dominant species.

The inference made to *An. messeae* as a vector of malaria in Russia is difficult to claim. Although *An. messeae* has frequently been inferred to be a vector of *Plasmodium vivax* in Sweden, Germany, Hungary and Russia, there are to my knowledge no published references where the parasite has been identified from adult mosquitoes.

Buck *et al.* (1932) demonstrated that *An. messeae* is susceptible to *Plasmodium vivax*, as is *An. atroparvus*, but the authors never found naturally infected An. messeae during many years of study in The Netherlands. Swellengrebel *et al*. (1929) report that this was because of the nearly exclusive zoophilic feeding behaviour of *An. messeae* during the summer and the non-feeding behaviour during autumn and winter. In The Netherlands *An. atroparvus* was the only vector, in spite of the coexistence of *An. messeae* in malaria indigenous areas (Torren, 1935). References to malaria transmission in Germany (Weyer, 1948) and Sweden (Ekblom, 1945) claim transmission by *An. messeae*, but *An. atroparvus* may have been the vector, as in the regions concerned the two species occurred in sympatry.

Should *An. messeae* have been the vector in Central and Eastern Europe, it must have had a different feeding behaviour or a different form of hibernation than *An. messeae* in England and The Netherlands. Our current studies on the behaviour of An. messeae (unpublished data) support Swellengrebel's previous statements of complete hibernation from September. A final comment should be made on the role of *An. atroparvus* as a potential vector under conditions of predicted climate change in western Europe. We have recently shown that the proportion of *An. atroparvus* relative to that of *An. messeae* in the western part of The Netherlands has shifted dramatically in favour of the latter species (Takken *et al*., 2002). We propose that a profound ecological change has occurred, which has made the circumstances for *An. atroparvus* significantly unfavourable compared to half a century ago. We postulate that the shift in construction of farmhouses, removing winter resting and feeding sites for *An. atroparvus* may be the principal reason for this change. Populations of *An. messeae* are, as before, occurring in similar densities and ubiquitous, whereas those of *An. atroparvus* have diminished. We have not been able to establish a correlation between the salinity of the larval habitats and the occurrence of *An. atroparvus*, as was demonstrated by Swellengrebel & de Buck (1938). At present *An. atroparvus* is capable of maintaining itself at low densities among populations of *An. messeae*.

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