Fern- und Nahorientierung
geflügelter Gynoparae und Sexualis-Männchen bei Blattläusen
(Homoptera: Aphidinea: Aphididae)

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Early records of secondary rhinaria on the antennae of winged sexualis-dd [Sx-dd], and of membranous scent plaques on the thickened tibiae of the pedes-III [P-III-Ti] of the sexualis-♀♀ [Sx-♀♀], suggests that there exists a pheromonal communication system in the sexual generation of aphids. Analysis and comparison of the results of further morphological studies and physiological experiments show, however, that this alone does not provide a distinctive mark of Sx-♀♀, and that it does not work as a long-distance attractant. – The primary host tree species of a heteroecious aphid species not only acts as a species-specific oviposition site, but also as the specific rendezvous and mating place. Winged gynoparae and Sx-♂♂, starting from secondary hosts, only reach and settle on the primary one after a non-directional long-distance flight guided by an optical two-pigment receptor-system, and after its short-distance discrimination by trial and error with the help of olfactorial, gustatorial and tactile probing. – When running and searching non-directionally on leaf or twig surfaces of the host, a Sx-♂ will casually contact and enter the scent range of a pheromon producing Sx-♀ waiting for copulation. Within such range, the radius of which varies species-specifically ≥ 2 / < 10 cm but being modified by slow air currents, the female pheromon acts as arrestant, attractant and aphrodisiacum: The Sx-♂ is induced to stay within the scent range, is led further on to the Sx-♀ along a concentration gradient, and will become sexually more excited. As the pheromon is not species-specific, the olfactory response to it can be superimposed by further optical orientation. – Visual stimuli such as form and colour of a possible mating partner seem to be species-group-specific, they inhibit a further direct reaction to the odour source but are still enhanced by the latter. In some species, a rhythmical up and down movement of the abdomen and more conspicuously of the P-III can be observed. This is suggested to be (a) a mean of better pheromon spreading, (b) a specific visual signal, and (c) perhaps a mean of courtship pattern and source for sound production. The possible occurrence also of an acoustic communication system in sexuals, confirmed for virgin generations of other species, needs further attention.

Sexual partner finding in aphids is based on a complex orientation process in which long-distance optical as well as short-distance olfactorial, optical and tactile female stimuli and male responses are involved. Due to this complexity, simple methods of attraction and trapping of sexualis-♂♂, as successfully practised with the biological control of other pest insect groups, are not applicable to aphids.

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