

fertile males. These males originate from normal diploid females with which the pseudogamous females coexist under natural conditions.

This phenomenon of pseudogamy of gynogenesis is in the same manner expressed in several species-complexes both among vertebrates and invertebrates. In Auchenorrhyncha it was discovered recently in the species complexes of *Muellerianella* (DROSOPOULOS, S. 1976. Nature, Lond., 263: 449–500) and *Ribautodelphax* (DEN BIEMAN, C. 1981. Acta Ent. Fenn. 38: 6). In both cases this phenomenon is obscurely expressed only by the excess of females in field samples. In addition, similar situations are noticed also in other Auchenorrhyncha species-complexes (that means two or more very closely related species). It is expected therefore that more cases of pseudogamous females will be found within this group of insects.

After several studies on morphology, ecology, genetics, acoustic and mating behavior in these complexes of species we are in the advance situation of studying the origin of these pseudogamous females and facing the question: are they indeed “reproductive parasites” of normal females, thus natural errors, or do they play a role in speciation.

Concerning the origin of pseudogamy, besides the experimental synthesis of such an organism in *Muellerianella* (DROSOPOULOS, S. 1978. Evolution 32: 916–926), we have in both complexes of species *Muellerianella* and *Ribautodelphax* ecological and biogeographic evidence for hybrid origin. Particularly in *Muellerianella*, pseudogamous females are found in areas where two or three closely related species are sympatric and their food plants are growing often in mixture. Especially in southern Greece where the southernmost limits of distribution of these European planthopper species are well defined, allopatric populations of *Muellerianella* species remain “pure” bisexual, while sympatric populations of *Ribautodelphax* species are in association with pseudogamous females.

According to the above situation hybridization obviously occurs, as at least in shown under laboratory conditions. Fertile F₁ hybrid females, which can be backcrossed with the parental males, would provide obstacles in speciation by allowing gene flow between the parental species. Logically, this is avoided by the triploid pseudogamous females which, once produced, lead the gene flow between the parental species into another canal or dead-track.

The wing coupling-apparatus of the Auchenorrhyncha at the SEM

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Our contribution is based on the observations with the SEM of the wing coupling-apparatus of some Auchenorrhyncha species belonging to 10 families. The fundamental plan of this apparatus shows always a longitudinal gutter-like fold (exceptionally two) on the claval margin of the mesothoracic wings (wing-coupling fold of OSSIANNILSSON, 1950); on the costal margin of the metathoracic wings there is a similar longitudinal fold or a shorter coupling lobe; sometimes on the same costal margin there is a secondary coupling-area.

Metathoracic wings – The main coupling-area (mostly unic), generally situated in the posterior third of the wing, can assume two shapes: A) of a shorter lobe; B) of a longer longitudinal fold, sometimes with microsculptures. A): the lobe is directed upwards and folded innerwards, forming a spiral along a longitudinal axis; it is present in Cicadellidae, Cicadidae, Cercopidae, Membracidae, Derbidae. B): the coupling-area formed by a longitudinal fold is present in Tettigometridae, Dictyopharidae, Cixiidae, Delphacidae, Flatidae. The fold directed upward, is not spiralized; it is very long and similar to the mesothoracic grooves with microsculptures which are bent and directed posteriorly and have the same function of the lobe spiralization of the previous pattern. Besides, sometimes (as in Cercopidae), near the wing base there is a secondary projecting coupling-area, formed by a large, flat and subtriangular lobe with rounded apex, with 4–6 claps on its distal margin which have an apical appendage.

Mesothoracic wings – The coupling-apparatus is formed by 1 or 2 gutterlike folds, ventrally bent, of the claval margin of mesothoracic wings. The distal fold (main coupling-area) is more or less elongated, but never goes beyond the apex of clavo-corial suture, sometimes with microsculptures. The basal fold (if present), corresponding to the secondary coupling-area of metathoracic wings, is constituted by the claval margin that in this point is more thickened in the ventral surface than elsewhere and directed anteriorly; it is always smooth.

Conclusions – The shape of the metathoracic folds aids them to go into the groove of the mesothoracic apparatus at the beginning of the flight and to go out at the end. Their spiralization and the flattened microsculptures of their margins determine a greater adhesion between the anterior and posterior wings during the flight and reduce the risk of not coupling when the fold is moving forward and backward in the groove (OSSIANNILSSON, 1950; SCHNEIDER & SCHILL, 1978). Spines, crests and flattened microsculptures on the fold and on the groove increase the friction between the two surfaces; in all cases the microsculptures stay only on one of the two bent adhesive surfaces: on the dorsal surface of mesothoracic wings and on the ventral surface (bent upwards) of the metathoracic wings. A similar function have some microsculptures near the fold; others, as in *Stictocephala bisonia* KOPP and YONKE, judging by their shape and their number, have probably a sensorial function.

It seems possible to use the morphology of these microstructures (besides to the shape and the size of the fold and of the groove) as systematic characters, at least at genus level, sometimes also at species level. There is no coupling-apparatus in the investigated Issidae, also in species with long posterior wings, because they have evolved as jumping and not as flying species. It is missing also in the species with short wings. There is a close relation between the presence of a coupling-apparatus and wings development, and also the ability to fly, when this ability is an ancient character of all a group of species.

OSSIANNILSSON, F. 1950. *On the wing-coupling apparatus of the Auchenorrhyncha (Hem. Hom.)*. Opuscula Entomologica (Lund) 15 (2): 127–130.

SCHNEIDER, P. VON & SCHILL, R. 1978. *Der Gleitkoppelmechanismus bei vierflügeligen Insekten mit asynchronem Flugmotor*. Zool. Jb. Physiol. Bd. 82: S. 365–382.

Fifth Auchenorrhyncha meeting in Davos, Switzerland August 28-31, 1984

Objektyp: **Appendix**

Zeitschrift: **Mitteilungen der Schweizerischen Entomologischen Gesellschaft =
Bulletin de la Société Entomologique Suisse = Journal of the
Swiss Entomological Society**

Band (Jahr): **57 (1984)**

Heft 4: **Festschrift Prof. P. Bovey**

PDF erstellt am: **18.01.2019**

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Mitteilungen der
Schweizerischen
Entomologischen Gesellschaft

Bulletin de la
Société Entomologique Suisse

Vol. 57 (4), 393–452, 1984