Studies on Four Grass-Inhabiting Species of Schizaphis (Hem. Aphidoidea)

I. Literature review

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1. Introduction

This is the first paper in a suite containing three parts. The second part will treat morphological descriptions and the third ecological, ethological and other investigations.

The work was started during the summer 1966 with studies of Schizaphis dubia Huc. which then was undescribed as species. My teacher, Professor Ossiannilsson, had been aware of the regular occurrence of this species for a few years at Ösbysjön, a small pondlike lake with an unusually rich entomological fauna (Lindroth, 1943) which lies in the town Djursholm north of Stockholm. He suggested that I should start investigations concerning the true status of this taxon. Since then, three more species have been included in the work viz. Schizaphis rufula (Walk.), S. longicaudata H.R.L. and S. arrhenatheri n.sp., the latter is closely related to S. borealis Tambs-Lyche, and, consequently, a new member of what has been called the graminum-complex.

The literature on these species is rather scarce. Contrary to this, the literature on S. graminum (Rond.), the notorious pest on small grains, is extensive.

In this review I have treated the literature available on rufula (Walk.), longicaudata H.R.L. and dubia Huc. as well as selected sections of the literature dealing with graminum (Rond.) and closely related taxa that are either more interesting for comparisons with the species treated or have taxonomical interest.

Specialized literature connected with the investigations will be quoted in Part III.

2. Taxonomic history of the genus

Rondani, the Italian naturalist, in a letter to Professor Bertoloni (Rondani, 1852) described an aphid outbreak so heavy that it darkened the sky and made it difficult for man and cattle to be outdoors. The description may have been exaggerated but apparently the aphids must have been innumerable. The species was previously unknown to science and with its description, under the name of Aphis graminum Rondani (1852), the taxonomical history of the genus Schizaphis was started. In 1860, Passerini transferred this species to the genus Toxoptera, erected by Koch 1856, with Toxoptera aurantiae Koch (syn. aurantii B.d.F.) as type species. Toxoptera Koch differs from the rest of what was then called genus Aphis, by having the media in the forewing branched once.

In 1931 Börner pointed out that some of the species within the genus Toxoptera also differed from the Aphis-group related genera by the position of the marginal tubercle on the VIIth abdominal segment. In this respect these species were closest related to Rhopalosiphum and Börner erected the genus Schizaphis (Börner, 1931) for them. Toxoptera graminum Rondani (sic!) was designated as type species.

The next step in the taxonomy of the genus Schizaphis was taken by Hille Ris Lambers when in 1947 he divided the genus into three subgenera in the following way:

Schizaphis Börner s.str. Hairs on antennae and dorsum short and not very dense. Marginal tubercles present on abdominal segment I and VII, in the fundatrix even on II and VI. Alate animals with few rhinaria on IIIrd antennal segment. Host plants within Gramineae.

Paraschizaphis H.R.L. Type species Toxoptera typhae Laing 1923. Hairs on antennae long and smooth with many transverse bars on each segment. Alate animals with many rhinaria on segment III, IV and sometimes also V. Host plants Cyperaceae, Typhaceae and occasionally Iridaceae.

These characters are directly extracted from Hille Ris Lambers’ original description. Since this division was done, however, species have been described that take intermediate positions between the three subgenera. Among these are some species living on Carex:  S. pilipes  Oss.,  S. variegata  Oss. and  S. wahlgreni  Oss.

I think that, under these circumstances, it is better to keep the wider generic concept  Schizaphis  Börner in its original meaning rather than split it up into smaller subgenera differing by small and difficult characters. Otherwise the situation will soon be the same as in the genus  Aphis  s.lat. where splitting into genera like  Pergandeida, Doralis  etc. has only served one purpose, viz. to cause confusion among the non-experts.

3. Taxonomic history of closely related species

The  Schizaphis  species were compared in a key by Eastop (1961). The species  agrostis  and  holci  described by Hille Ris Lambers 1939 and closely related to  graminum  (Rond.) are then treated as subspecies of this species. Objections to this might be raised as Van der Goot (1915) from Holland recorded  graminum  on  Phalaris canariensis  which would mean that species and subspecies should occur in the same area. It should however be noticed that since Van der Goot no one has recorded  graminum  from Holland furthermore  Phalaris canariensis  which would mean that species and subspecies should occur in the same area. It should however be noticed that since Van der Goot no one has recorded  graminum  from Holland furthermore  Phalaris canariensis  is not recorded as host plant for  graminum  while it is a most suitable host for  S. longicaudata  H.R.L. The morphological character used for separating  graminum  s.str.,  holci  and  agrostis  is the length of the ultimate rostral segment. However, this characteristic, according to investigations by Rochow (1960), has proved to be rather doubtful. In material from three populations of  graminum  collected in different parts of USA he found evident variation regarding this character although it was not possible to find other differences from  graminum  s.str. These aberrations were proved to be genetically fixed because the strains were cultivated and used in virus transmitting experiments.

The existence of  agrostis  and  holci  as separate taxa was confirmed by Hille Ris Lambers in host plant tests. That they cannot be aberrant types of  graminum  s.str. is also supported by the fact that in England, Holland and Sweden no attacks have been observed on small grains, though one or both of  agrostis  and  holci  have been found in these countries. An important difference from  graminum  s.str. is also shown by  holci  because it has apterous males.

S. germanica was described by Börner (1950), however, he later made it a synonym of  holci  H.R.L.

S. graminum  ssp. gigjai from Iceland was described by Stroyan 1960. It differs from  graminum  s.str. by the total absence of marginal tubercles, and by shorter siphunculi and processus terminalis. In Eastop’s key this taxon is treated as a species.

The species  jaroslavi  Mord. which feeds on  Calamagrostis epigejos  is found in East Europe. It was suspected to be a synonym to  graminum  s.str. (Hille Ris Lambers, 1939) but is now regarded as an independant species differing by the length of the siphunculi and the processus terminalis. In Eastop’s key this taxon is treated as a species.

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Another member of the  graminum  -complex exists in Australia (Eastop, 1966); it differs from  graminum  s.str. by a longer processus terminalis. A peculiar form of  graminum  is reported from Texas USA where it is said to survive summer under dry conditions at high altitudes by laying eggs (Daniels, 1956) and