ON SOME WESTERN EUROPEAN APHIDS [1])

by

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1. The genus **Atheroides** Haliday

Of this genus 3 Western European species are known: *A. serrulatus* Hal. (syn. *festucae* Mordv.?), *A. hirtellus* Hal. (syn. *A. junci* Laing) and *A. brevicornis* Laing.

a) *A. serrulatus* Hal. is quite common. It lives on *Poa annua* often, but prefers species of grass with narrow, folded leaves, such as *Festuca ovina, F. rubra, Nardus* etc.

b) *A. hirtellus* Hal. is not rare on *Aira caespitosa*. It seems to live on that plant only.

c) *A. brevicornis* Laing is extremely common along the muddy seashores of the Netherlands. It prefers *Festuca thalassica* and *F. distans,* the two typical species of grass growing there [2]). The alatae have not yet been described and therefore I add a short description. The apterae have been described excellently by Laing, but I redescribe them for comparison.

Atheroides brevicornis Laing

Apterous viviparous female.

Morphological characters. Body very elongated oval, nearly linear. Tergum strongly sclerotic, usually uniformly dark, very coarsely corrugated, covered with clubshaped or inverse-bottleshaped hairs with blunt, sometimes emarginate apex; the bases of the hairs look like perforations of the dark

1) By accident the printing of this paper was delayed and while it was in press some of the species were described by Börner in a paper: Neue Gattungen und Arten der Aphidenfauna, Arb. Phys. u. Angew. Entomologie, vol. VI, no. 1, p. 75—83, 6-III-1939. His descriptions are very short and rather incomplete, so that I think it still useful to publish my original diagnoses with Börners names.

2) Dr Thomas of Bangor, N. Wales has shown me specimens taken from *Festuca rubra genuina* off the Pembrokeshire coast of Wales.

sclerite. Head fused with prothorax, but suture very distinct; mesothorax, metathorax and first abdominal tergite free; abdominal tergite II—VII fused, second sometimes partly free; eighth tergite semicircular, free. Head semicircular; front convex, with one, often normal, spiny hair standing over the base of each antenna; a pair of hairs more towards the middle, inplanted higher than the antennae and a pair near the middle, in line with the antennal bases. Antennae very short, $^1/_7$—$^1/_6$ of the length of the body, usually of 4 segments, with indications of a subdivision on apical $^1/_3$ of the third segment, rarely of 5 segments. First segment about as long as last, processus terminalis not filiform, but stumpy. Antennal hairs very sparse, inconspicuous, about $^1/_3$—$^2/_5$ of diameter of third segment long. Eyes rather flat, normal, with triommatidion inconspicuous, flat. Rostrum reaching to anterior margin of the metathorax or slightly shorter, apical segment as long as second joint of hind tarsi. Prothorax about as long as mesothorax; metathorax about as long as abdominal tergite I, about half as long as mesothorax. Head + thorax + abdominal segment I as long as abdominal segments II—VII. Siphunculi very small, poriform, on anterior margin of fifth segment. Seventh segment with some slightly longer, thick, blunt hairs on posterior angles. Eighth tergite with a number of thick, long, spiny hairs on large bases along margin; the two longest, on posterior apex, stand rather far apart, with two clubshaped or cylindrical blunt hairs between them; the eighth tergite also covered with short clubshaped hairs. Legs normal with normal hairs, first tarsal joints with 3, 3, 2 hairs. Empodial hairs about normal, spiny. Rudimentary gonapophyses absent.

Colour: Pale brown to black. Legs and antennae dark brown.

Measurements of one specimen: Length of the body: 2.10 mm; maximal width: 0.64 mm; antennae: 0.30 mm. Proportion of antennal segments: $\frac{80}{I} : \frac{55}{II} : \frac{100}{III} : \frac{45}{IV} : \frac{(70+30)}{V}$ (left); $\frac{65}{I} : \frac{36}{II} : \frac{100}{III} : \frac{(50+22)}{IV}$ (right).

Alate viviparous female.

Morphological characters. Much as in apterous viviparous females. Tergital hairs slightly thinner, often with blunt apex only, the two hairs standing between the two longest hairs on posterior margin of eighth tergite usually with acuminate apex. Head and thorax sclerotic, dark. Abdomen membraneous, with on each segment paired, very large, usually fused spinal sclerites; pleural sclerites often absent or fused with spinal sclerites; marginal sclerites large, those on fifth segment often fused with a pleuromarginal sclerite bearing the siphunculus. Seventh and eighth tergite uniformly sclerotic. Head as in apterae; central ocellus directed downwards,

lateral ocelli inconspicuous in dorsal view, standing on the sides of a ledge covering the whole vertex. Antennae as in apterae, with 4, rarely 5, often with on one side 4, the other 5 segments. Third segment with 2—4 rhinaria. Wings with a number of abnormalities in the venation, with: a. Media forked once, cubitus forked twice, once near base and the distal branch of first furcation furcated near apex; b. Media forked once, near apex; what ought to be basal branch quite free, looking like a third transverse vein; c. Media forked twice, cubitus forked once, near middle, the two branches nearly parallel; d. Media forked twice, cubitus forked once with the distal branch going to the middle of the basal branch of the first furcation of the media; e. Media forked twice, cubitus forked at its very base, with the distal branch running into the first furcation of media and seemingly continued in the distal branch of this furcation; f. Media forked twice, cubitus normal. Though this latter case was found twice only I think that this has to be looked upon as the normal venation of the wings.

Colour: Black, with the membraneous areas on abdomen yellow to pale brown.

Measurements of one specimen: Length of the body: 1.85 mm; antennae: 0.41 mm. Proportion of antennal segments: $\frac{40}{I} : \frac{33}{II} : \frac{100}{III} : \frac{23}{IV} : \frac{(45+23)}{V}$; $\frac{34}{I} : \frac{26}{II} : \frac{100}{III} : \frac{(42+18)}{IV}$. Rhinaria on third antennal segment: 2 and 3.

Hostplant: *Festuca distans* Kth., *F. thalassica* Kth., *F. rubra genuina* Hackel, *Poa maritima* (Laing).

Geographical distribution: England, Netherlands.

Biology: Lives on the upperside of the leaves of its hostplant. Alatae were rare in the second half of June, more common in the first weeks of July. The plants on which I found them were growing on such a place, that the normal tide could not reach them, but a layer of clay showed that sometimes the plants and probably the lice with them were submerged.

Notes: This species is not rare on meadows along the coast. I found the apterae in thousands in the third week of June, sitting in rows on the very narrow leaves. Coccinellids were very numerous then and some weeks later the number of lice was very much smaller.

It is not possible to confuse this species with the other European species of this genus. The number of hairs and their arrangement on the first tarsal joint would, combined with the number of antennal segments, form a basis for a new genus. But as the differences between the species in this genus are in general of a range, which in other genera has resulted in the formation of many new genera, I see no reason to erect a new genus. If

one wants to do so, one may as well erect a new genus for *Atheroides hirtellus* Haliday because this species has a different type of hairs and a different number of hairs on the tarsi as the genotype.

Type: One apterous viviparous female in the British Museum (Natural History), London.

2. The genus **Sipha** Pass.

Del Guercio has described several European representatives of this genus and Mordvilko added some more from Russia. Several species occur in the Netherlands and will certainly be found in other Western countries as well. All species have apterous males.

a) *Sipha glyceriae* (Kalt.) is very common on a large number of Gramineae including *Poa annua,* on which plant hibernation is common. The males are very different from all the other forms, being dull carbon black.

b) *Sipha littoralis* (Wlk.) is a halophilous parallel of the former species. It occurs nearly only on *Spartina stricta,* growing in such ponds, which are not under direct and regular influence of the tide. I never could find a single specimen on plants growing in the sea. Alatae are apparently very rare though the species is quite common. England, Netherlands.

c) *Sipha agropyrella* nov. spec. lives on *Triticum repens* and its allies exclusively, on which plant it is quite common in the Netherlands, Italy and Germany. It causes a slight rolling of the leaves.

Sipha agropyrella nov. spec.

Apterous viviparous female.

Morphological characters. Body elongated oval, flattened, with long acuminate bristles of varying length. Tergum sclerotic, without spinules. Head trapezoid, rather broad. Antennae of 5 segments, a little more than $^1/_3$ of length of body. Processus terminalis $1^1/_2$—$1^3/_5$ times the base of fifth segment, third segment with 4—6 long and 2—3 short hairs, fourth and fifth with one long hair each. Length of the long hairs 2—$3^1/_2$ times the diameter of third segment. Rostrum reaching to second pair of coxae, ultimate segment acute, triangular, about $^3/_5$ of the second joint of the hind tarsi. Legs normal, first tarsal joints with 5, 5, 5 hairs. Abdomen with narrow, black spots between the segments pleurally; these spots often more or less completely connected by a brownish area around them, so that a paler coloured, spinal stripe is formed. Siphunculi very short, conical, dark brown. Cauda broadly rounded, about $2^1/_2$ times as broad as long.

Colour: Brownish yellow to yellowish brown. The more dark insects with a very distinct paler median line.

Measurements of one specimen: Length of the body: 2.13 mm; antennae: 0.78 mm; cauda: 0.04 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{36}{IV} : \frac{(36 + 55)}{V}$.

Alate viviparous female.

Morphological characters. Antennae nearly half as long as the body, third segment with 4—10 (average 6, 8) secondary rhinaria. Abdomen with spinal sclerites which are more or less separate from the first to about the fifth segment but fused to spinal crossbars on the next two segments. Small pleural sclerites present from the first to about the fifth segment and lateral sclerites from the first to about the sixth segment. From the fourth or fifth segment the spinal crossbars fuse with the pleural sclerites and on the next segment caudad with the lateral sclerites also. The siphunculi stand isolated between these sclerites. Borders of tergites always distinct. Other characters as in apterous viviparous female.

Colour: Head and thorax black, abdomen brownish yellow, with the mentioned sclerites black.

Measurements of one specimen: Length of the body: 1.91 mm; antennae: 0.90 mm; cauda: 0.04 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{35}{IV} : \frac{(35 + 76)}{V}$. Rhinaria on third antennal segment: 4, 5.

Oviparous female.

Whole insect more sclerotic and darker than viviparous form. Hind tibiae swollen with a great number of protruding pseudosensoria.

Apterous male.

Morphological characters. Small, narrow, $2^1/_2$ times as long as broad, heavily sclerotized. Antennae about $^2/_3$ of the length of the body, much thicker than in other forms. Third segment with some 40—60 small rhinaria, fourth with 8—14. Antennal hairs relatively much shorter than in apterous viviparous female. Genitalia strongly developed.

Colour: Black or blackish brown.

Measurements of one specimen: Length of the body: 1.54 mm; antennae: 1.04 mm; cauda: 0.04 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{41}{IV} : \frac{(35 + 72)}{V}$. Rhinaria on third antennal segment: 49, 53; on fourth: 13, 12.

Hostplants: *Triticum repens* L. and its allies [1]).

Geographical distribution: Netherlands (quite common), Italy (Merano), England.

Biology: Lives on the upperside of the leaves in densily crowded colonies. Usually the leaves are more or less rolled upwards. The second generation contains many alatae, which occur also always in the autumn. Sexuales were found in the last weeks of September and in October.

d) *Sipha maydis* Pass. is a polyphagous form. In the Netherlands it never lives on maize, which is not very much cultivated, but it prefers arid localities where various other gramineae are infested. It shows a certain preference for *Bromus mollis* and *Agrostis repens*. The plant reacts by a bright red colour of the infested apices of the leaves, so that the lice are easily detected. I found all forms.

e) *Chaetosiphella berlesei* Del Guercio. This species is considerably rarer than all other Dutch species; it never occurs in large numbers and falls off the plants so quickly that it is no wonder that it escaped notice. Its normal foodplant is *Aira (Deschampsia) flexuosa*, but also on *Festuca ovina*, always on the most arid spots, several captures were made. I made some observations on its biology and give an account of its various forms below.

Chaetosiphella gen. nov.

Body covered with hairs of two types, just as in *Atheroides hirtellus* Haliday. Eighth tergite normal, as in *Sipha*, not covering the cauda, which is broadly rounded. Antennae of 5 segments, with nude primary rhinaria. Eyes nearly without triommatidion. Rostrum with very elongated, very acute apical segment. Siphunculi poriform, very little elevated. Legs normal, empodial hairs distinctly spathulate. Genotype: *Sipha berlesei* Del Guercio.

I separate this genus from *Sipha*, because of the very abnormal shape of the ultimate rostral segment.

Chaetosiphella berlesei (Del Guercio)

Apterous viviparous female.

Morphological characters. Body elongated, narrow, with broader abdomen. Tergite sclerotic with hairs of two types. Very long thick, hollow, pale, thorny hairs on strong tubercular bases are present on all segments, about 12—20 per segment. Beyond these there are large numbers of much smaller hairs of the same structure present. Tergite between the hairs

1) Dr Thomas has shown me specimens from *Arrhenatherum avenaceum* Blanv. collected near Leicester, England.

smooth, pale brown, with dark round intersegmental "Muskelplatten" and dark lines on the borders of the fused segments. Head semicircular, very hairy. Antennae about $^1/_4$—$^2/_7$ of the length of the body, without secondary rhinaria. First segment with two long hairs on the angular inner margin; second also with two long hairs on inner margin; third with 3—5, fourth with 1—2, fifth with 1—2 long hairs on inner side. Processus terminalis always shorter than the base of fifth segment. Apex of rostrum reaching to hind coxae, ultimate segment stiletto shaped, about $1^2/_3$ times as long as third antennal segment or second joint of hind tarsi. Siphunculi mere elevated very narrow pori on anterior margin of fifth tergite. Cauda broadly rounded. Legs short, without spinules; first tarsal joints with one sensilla, which is about $^1/_3$ of the length of the four other hairs.

Colour: Dark lead coloured, very slightly pruinose.

Measurements of one specimen: Length of the body: 1.91 mm; antennae: 0.54 mm; siphunculi (width): 0.02 mm; cauda (length): 0.06 mm. Proportion of antennal segments: $\frac{40}{I} : \frac{33}{II} : \frac{100}{III} : \frac{40}{IV} : \frac{(47+33)}{V}$.

Alate viviparous female.

Morphological characters. Body slightly broader than in apterous form. Sclerotisation of abdomen local: on segment I—IV or V isolated paired spinal-, pleural- and marginal sclerites; from segment IV or V to VII spinal sclerites fused to a transverse sclerotic bar, which on segments V and VI is fused with the pleural sclerites; segment VII and VIII with sclerotic spino-marginal transverse sclerites. Siphunculi fused with the marginal sclerites of fifth segment. Not many "secondary", shorter hairs present. Antennae about $^2/_5$ of the length of the body, processus terminalis approximately equal in length to the base of the fifth segment. Third segment with 4—5 rhinaria. Wings narrow with normal venation.

Colour: As in apterous viviparous female.

Measurements of one specimen: Length of the body: 1.61 mm; antennae: 0.63 mm. Proportion of antennal segments: $\frac{28}{I} : \frac{23}{II} : \frac{100}{III} : \frac{42}{IV} : \frac{(31+31)}{V}$. Rhinaria on third antennal segment: 4 and 5.

Oviparous female.

Morphological characters. Much like apterous viviparous female, but the abdominal tergite is not homogeneously sclerotic, but broken up into broad spinal crossbars, round pleural sclerites and round marginal sclerites on segments I—VI; on segment VII pleural sclerites fused with spinal sclerite, on segment VIII also marginal sclerites fused. Siphunculi free.

Hind tibiae rather thick, with numerous pseudosensoria in the shape of an 8.

Colour: As in apterous viviparous female.

Measurements of one specimen: Length of the body: 1.81 mm; antennae: 0.51 mm; Proportion of antennal segments: $\frac{48}{I} : \frac{36}{II} : \frac{100}{III} : \frac{44}{IV} : \frac{(54+44)}{V}$.

Apterous male.

Morphological characters. Body very small and narrow, nearly linear. Tergite uniformly sclerotic as in apterous viviparous female, but with only one size of hairs, corresponding with the long hairs occurring in the other forms. Antennae rather long, more than half as long as the body. Third antennal segment densely covered with about 30—45 rhinaria, tuberculate and swollen, fourth with 12—22 rhinaria and even the base of the fifth segment often with a few (0—3) secondary rhinaria. Processus terminalis only a little shorter than the base of the fifth segment. Siphunculi, cauda etc. as in other forms. Genitalia rather well developed.

Colour: Very dark to nearly black.

Measurements of one specimen: Length of the body: 1.29 mm; antennae: 0.81 mm. Proportion of antennal segments: $\frac{27}{I} : \frac{21}{II} : \frac{100}{III} : \frac{41}{IV} : \frac{(33+31)}{V}$. Rhinaria on third antennal segment: 35 and 41; on fourth: 19 and 15; on fifth: 0 and 2.

Hostplant: *Aira (Deschampsia) flexuosa* L., *Festuca ovina* L.

Geographical distribution: Italy, Netherlands.

Biology: This curious insect lives on the upperside of the folded leaves of its host, but apparently only on such plants, which grow in the most arid environment. I found it only in dune-like, bare places, never on plants growing in moors. Usually only few insects were present on an infested plant and alatae were rare. The speed with which they can walk along the blades of the grass is remarkable, but on glass they move with very great difficulty and usually turn over. The sexuales were reared on cut grass. Eggs were not deposited. All forms drop immediately off the plant at the slightest disturbance.

Notes: The rostrum is well adapted to the way of feeding. It is inserted in the V-shaped furrow of the upperside of the leaves, while the insects are pressed firmly against the furrow. A study of the larvae, which have the sclerotic integument all broken up in isolated sclerites, reveals, that the long hairs of the mature viviparous and oviparous forms are primary and present in the larvae already, but the short hairs do not appear before the last ecdysis.

f) The Western European *Sipha* species key as follows.

1(2). Ultimate segment of rostrum very elongated and acute, more than $1^1/_2$ times as long as the third antennal segment. On *Aira flexuosa* and *Festuca ovina*. *Chaetosiphella berlesei* (Del Guercio).

2(1). Ultimate segment of rostrum rather short, shorter than the third antennal segment.

3(6). Tergite more or less covered with blunt or acute, minute spinules between the hairs. Cauda constricted or knobbed.

4(5). Processus terminalis just shorter than base of the fifth segment, less than half as long as the third segment. Antennae nearly $^1/_4$ of the length of the body, third segment only at the apex with 1—2 hairs, which are at most as long as the basal diameter of the segment. On *Spartina stricta* and some other halophilous gramineae along the muddy seashore. *S. littoralis* (Wlk.).

5(4). Processus terminalis equal to or longer than the base of the fifth segment, more than half as long as the third segment. Antennae about $^1/_3$ of the length of the body, third segment which 3—4 hairs, which are $1^1/_5$—$1^2/_5$ times as long as the basal diameter of the third segment. On various gramineae. *S. glyceriae* (Kalt.).

6(3). Tergite smooth between the hairs. Cauda broadly rounded.

7(8). Body yellow to yellowish brown, also in macerated apterae. Alatae with isolated sclerites on segments I—IV and sclerotic crossbars from segment V—VIII, which are often interrupted. Siphunculi free, sometimes partly fused with a marginal sclerite. On *Agropyron* spp. *S. agropyrella* nov. spec.

8(7). Tergite black, also in macerated apterae. Alatae with posterior $^2/_3$ of abdomen sclerotic and black. Siphunculi fused with this sclerite, their basal circumference indistinct. On various gramineae. *S. maydis* Pass.

3. The genus **Laingia** Theob.

This genus has one Western European species only, *Laingia psammae* Theob., which is common on *Psamma arenaria, Calamagrostis epigeios* and more rare on *Triticum repens* or *Holcus lanatus,* though it can hibernate on the latter plants. England, Netherlands, Germany.

4. The genus **Caricosipha** Börner

Body, antennae and legs with exceedingly long, black, normal, spiny hairs. Antennae of 5 segments, processus terminalis much longer than base of

fifth antennal segment. Primary rhinaria nude, without hairy fringe. Eyes in mature specimens placed on distinct processi of the head, in alatae with distinct, in apterae with indistinct triommatidion (ocular tubercle). Pronotum fused with head. Wings narrow. Forewings with only very slightly curved radial vein, the media forked once only; hind wings normal. Legs with some minute spines on the very apices of the tibiae. Tarsi with 5, 5, 5 hairs on first joint, without transverse rows of spinules. Empodial hairs broadly spathulate. Siphunculi smooth, short, truncate, with flange. Cauda slightly knobbed. Anal plate faintly bilobed. Rudimentary gonapophyses 4.

Genotypus: *C. paniculatae* Börner.

C. paniculatae Börner

This species, which in the Netherlands was discovered by Miss Herta Schadd some years ago has been under observation ever since. It is not at all rare and one may wonder why nobody noticed it before, because it is one of the most remarkable aphids I have seen. Often very large colonies occurred on nearly every plant of *Carex paniculata* examined. In the Netherlands this species is common, where its foodplant occurs.

Apterous viviparous female.

Morphological characters. Body broadly pearshaped, very flat, with largest diameter on the middle of abdomen, with sclerotic tergum, covered with long, black, spiny hairs in various sizes. Between the hairs very small spinules. Division of tergites as follows: head fused with pronotum; meso- and metathorax free; abdominal tergites I—VII fused; eighth abdominal tergite free. Head broad, front strongly convex, with many very long spines, the longest of which sometimes are longer than the third antennal segment! Antennae of five segments, placed on distinct, short cylindrical processi more or less on the sides of the head; third segment without rhinaria, with 3—5 long spines, fourth with one spine (fifth without), all on inner margin, also some small, normal hairs on third, fourth and fifth segment. Antennae little more than half as long as the body. Eyes on a distinct cylindrical pedestal, which is half as long as its width in the middle. Triommatidion not separated. Rostrum thick and short, reaching past the second pair of coxae, with rather blunt apex. Legs: see generic diagnosis. Abdomen strongly blackish sclerotic with a paler dorsal line, covered with transverse rows of minute spinules and numerous very long, black, spiny hairs, the longest of which, up to 0.375 mm, are on the posterior margin of the body. Siphunculi conical, smooth, with distinct flange. Cauda a little knobbed, very short. Anal plate pygiform.

Colour: Black with pale brownish-yellow legs and antennae.

Measurements of one specimen: Length of the body: 1.86 mm; antennae: 1.09 mm; siphunculi: 0.075 mm; cauda: 0.07 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{64}{IV} : \frac{(40 + 104)}{V}$.

Alate viviparous female.

Morphological characters. Much narrower than the apterous form, hairs shorter and thinner. Antennae as in apterous form, third segment with 9—22 nearly round, rather large rhinaria. Antennal hairs as in apterous form. Eyes as in apterous form, but triommatidion more easily recognisable. Wings with sector radii nearly as narrow as the pterostigma, the media forked once only. Hind wings with two very indistinct veins. Abdomen with a broad sclerotic crossbar on each segment and large lateral sclerites. Siphunculi and cauda as in apterous form.

Colour: Black.

Measurements of one specimen: Length of the body: 1.95 mm; antennae: 1.19 mm; siphunculi: 0.09 mm; cauda: 0.075 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{54}{IV} : \frac{(33 + 89)}{V}$. Rhinaria on third antennal segment: 7 and 15.

Oviparous female.

Morphological characters. Very much like apterous viviparous female, from which they differ only by the presence of 4—8 pseudosensoria on the dorsal side of the not much swollen hind tibiae. These pseudosensoria are usually in the shape of the figure 8 and show a granular surface. Sclerotisation of tergite as in apterous viviparous female.

Apterous male.

Morphological characters. Body much smaller than in the other apterous forms, also narrower, especially the abdomen. Tergite uniformly sclerotic, covered with hairs of the same length as those in other forms, which means that compared to the dimensions of the male's body they are much longer. Antennae $^2/_3$—$^8/_{11}$ of the length of the body, third segment with 22—32 rhinaria, fourth with 6—11. Genitalia strongly developed, claspers small and rather acute. Only the distal margin of the sclerotic part of the tibiae with groups of spinules.

Colour: Black. Legs etc. as in apterous viviparous female.

Measurements of one specimen: Length of the body: 1.41 mm; antennae: 1.06 mm; siphunculi: 0.09 mm; cauda: 0.06 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{54}{IV} : \frac{(29 + 86)}{V}$. Rhinaria on the third antennal segment: 28 and 30; on the fourth: 9 and 8.

Hostplant: *Carex paniculata.*

Geographical distribution: Netherlands (Germany, England [Börner]).

Biology: This species lives on the morphological upperside of the leaves of its host, in often very numerous colonies. Alatae are common in the third generation, but later one rarely finds them. Sexuales were found in the end of September and the beginning of October. All forms are very active and run about quickly if disturbed.

Notes: This species is quite common, wherever its hostplant occurs. When I knew where to look for it I collected it at Wageningen, Bennekom, Swalmen and Zwolle, all in the Netherlands. Rarely this species is accompanied by *Trilobaphis caricis* Theob.

Its enemies have not yet been completely studied, but Coccinellids and Syrphids seem to play a minor rôle compared with certain Staphylinids, which are always present on plants with many of these aphids.

This genus is to be considered belonging to the *Atheroides-Sipha* group of Chaitophorini. That it is a Chaitophorin is certain from the presence of 4 rudimentary gonapophyses, while the fact that in oviparae the tergite is not less sclerotic than in apterae viviparae, moreover the presence of pseudosensoria in the shape of an 8 place it near *Sipha* Pass. It differs from all allied genera by the structure of a) the eyes, b) empodial hairs, c) wings.

5. The genus **Schizaphis** Börner

This genus must be regarded as developed from *Rhopalosiphum* Koch, which is still migrating from Rosaceae to Gramineae. The "dorsal" arrangement of the marginal tubercles, especially on the seventh abdominal tergite and the once forked media are typical features which do occur only in *Rhopalosiphum* and Gramineae-infesting species (consequently also in *Hyalopterus* Koch, *Aresha* Mordv., *Geoktapia* Mordv. etc.). Several species have been described from the whole world, all from Gramineae and Cyperaceae (Typhaceae etc. included).

In Western Europe several species occur, though there is some misunderstanding concerning the identification.

a) *S. jaroslavi* (Mordv.). This species has been described by Van der Goot and possibly also partly by Theobald as *Toxoptera graminum* Rondani. Certainly this is in error, because in *S. graminum* (Rond.) the siphunculi are much longer than Theobald and Van der Goot describe them. The species which Van der Goot describes seems to me *S. jaroslavi* (Mordvilko). Mordvilko characterized this species by the comparative lengths of the siphunculi and cauda and by the presence of apterous males. Though I

found oviparae, it took some years before I detected the apterous males. Now I have found these, I am rather certain, that the species described is *S. jaroslavi* (Mordv.); what remains a puzzle to me are the alate males described by Theobald.

In the Netherlands this species lives on *Poa annua, Phalaris arundinacea,* but especially on both *Holcus mollis* and *H. lanatus,* on which plants I found it to hibernate. V. d. Goot found it on *Phalaris canariense* in Holland once.

b) *S. scirpi* (Pass.). (*T. typhae* Laing). This species too is not rare. It is usually found on both *Typha latifolia* and *angustifolia,* but it occurs regularly on *Carex hirta* and *Scirpus lacustris.* Hibernation was seen on *Typha latifolia,* where very large numbers of eggs were deposited on the leaves and stems.

c) *S. nigerrima* (H. R. L.). This is a very remarkable species in this sense, that when I found it, it occurred in thousands along the Meuse. But though I visited the district regularly and have looked everywhere for this species I never found a single specimen later.

d) *S. geijskesi* nov. spec. This species was first taken as a few apterae by Dr D. C. Geijskes on the uninhabited isle of Griend, on *Agropyron littorale.* Later I succeeded in finding large colonies of this interesting Aphid on *Calamagrostis* in the dunes near Ouddorp, Flakkee, Netherlands. Two alatae were reared at home.

Schizaphis geijskesi nov. spec.

Apterous viviparous female.

Morphological characters. Body elongate; tergum not sclerotic, with few, short hairs. Frontal tubercles slightly higher than median frontal process. Antennae thick, about $^2/_5$—$^3/_7$ of the length of the body, third joint without secondary rhinaria; processus terminalis at most $1\,^1/_3$ times as long as the third segment, about 3 times as long as the base of the sixth segment. (Sometimes segmentation between the third and the fourth segment incomplete, so that one antenna seems to have 5 segments only). Antennal hairs half as long as diameter of the third segment in the middle. Rostrum rather short, reaching to just past middle coxae, apical segment rather long, $1\,^1/_8$—$1\,^1/_6$ times as long as second joint of hind tarsi. Small marginal tubercles usually present on prothorax and abdominal segments I and VII, on abdomen placed approximately dorsally of stigmata. Siphunculi rather short, cylindrical, without constriction, without flange, nearly smooth, about $^1/_{12}$ of the length of the body. Cauda as long as the siphunculi,

cylindrical, elongated, blunt, with 6—9 hairs. Legs normal, first tarsal joints with 3, 3, 2 hairs.

Colour: Pale greenish yellow; siphunculi, cauda and legs with the colour of the body, antennae with segments V and VI darker.

Measurements of one specimen: Length of the body: 2.47 mm; antennae: 1.02 mm; siphunculi: 0.20 mm; cauda: 0.206 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{63}{IV} : \frac{58}{V} : \frac{(43+125)}{VI}$.

Alate viviparous female.

Morphological characters. Much like apterous viviparous female. Abdomen with very indistinct and small marginal sclerites. Antennae approximately half as long as the body, rather homogeneously dark. Third segment with 4—7 rhinaria, fourth with 0—2. Siphunculi thinner than in apterae, but equally little sclerotic. Wings with media furcated once.

Colour: Head, thorax and antennae pale brown, remainder as in apterous viviparous female.

Measurements of one specimen: Length of the body: 1.90 mm; antennae: 0.95 mm; siphunculi: 0.15 mm; cauda: 0.18 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{62}{IV} : \frac{59}{V} : \frac{(34+109)}{VI}$. Rhinaria on the third antennal segment: 5 and 6; on the fourth: 0 and 1.

Hostplants: *Agropyron littorale* Host, *Calamagrostis arenaria* Rtk. [1]).

Geographical distribution: Only known from the island Griend and the dunes of Ouddorp (Island Flakkee).

Biology: Dense colonies of this species were found inside the rolled leaves of *C. arenaria*. The plants reacted by turning yellowish brown under the colonies. Only apterae and a few nymphs were present. The presence of the well hidden aphids was told by numbers of Coccinellids and Syrphidlarvae crawling on and about the infested plants.

Notes: This species resembles *Hyalopterus arundinis* (F.) in shape and habitus but lacks the strong powder excretion of that species.

The species which Mordvilko 1921 describes from *Calamagrostis* sp., *S. jaroslavi,* is apparently different, as Mordvilko says that the siphunculi are $1^1/_4$ times as long as the cauda.

e) *S. longicaudata* nov. spec. This species I know only from a slide dating from the first year of my aphidological studies. I have collected the material either on *Triticum repens* or on the underside of plumleaves.

1) Dr Thomas collected specimens from *C. arenaria* at Aberystwyth, Wales.

As I have not refound this species, I regret to be obliged to leave this point unsettled.

Schizaphis longicaudata nov. spec.

Apterous viviparous female.

Morphological characters. Body elongated oval, not sclerotic, with few short hairs. Frontal tubercles small but distinct, median frontal process rather developed. Antennae slender, about $^2/_3$ of the length of the body, third segment without secondary rhinaria; primary rhinarium on fifth segment placed at considerable distance from the apex of that segment. Antennal hairs short, not blunt, about half as long as basal diameter of the third segment. Rostrum short, reaching to middle coxae, apical segment short, acute, about $^2/_3$ of the length of the second joint of the hind tarsi. Small marginal tubercles usually present on prothorax and abdominal segments I and VII, those on the seventh segment placed more or less between the stigmata, a little caudad. Siphunculi about cylindrical, without apical constriction, without flange, slightly imbricated, about $^1/_{15}$—$^1/_{13}$ of the length of the body. Cauda about $1^1/_2$ times as long as the siphunculi, elongated, more or less cylindrical, very blunt, with 10—13 hairs (one dorsoapical and a number of lateral hairs, irregularly placed). Legs normal, first tarsal joints with 3, 3, 2 hairs.

Colour: Probably pale green or yellowish; siphunculi, cauda and legs with the colour of the body; apices of siphunculi darker to black. Antennae sometimes very dark, with segments I and II and basal $^1/_3$ of the third with the colour of body.

Measurements of one specimen: Length of the body: 2.14 mm; antennae: 1.43 mm; siphunculi: 0.16 mm; cauda: 0.27 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{74}{VI} : \frac{66}{V} : \frac{(34 + 136)}{VI}$.

Alate viviparous female.

Morphological characters. Much like apterous form. Body without any sclerites, only mesothorax and head darker. Third antennal segment with 6—10 rather large rhinaria, mostly on distal $^3/_4$. Siphunculi slightly shorter and thinner than in apterae, $^3/_5$ of the length of the cauda, which is very long. Wings with normal *Schizaphis*-venation, veins faintly and narrowly bordered with black.

Colour: As in apterous viviparous female, but antennae dark, with segment I and II and the part of III which has no rhinaria pale.

Measurements of one specimen: Length of the body: 2.13 mm; antennae:

1.71 mm; siphunculi: 0.14 mm; cauda: 0.24 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{83}{IV} : \frac{70}{V} : \frac{(33 + 156)}{VI}$. Rhinaria on the third antennal segment: 7 and 9.

Hostplant: *Prunus domestica* or *Triticum repens.*

Geographical distribution: Only collected at Lith (N.-Br.), Netherlands.

Biology: Unknown; collected in September, 1929!

Notes: The structure of this species is typically that of a *Schizaphis.* It resembles *S. graminum* (Rond.), but differs by the short siphunculi and the larger number of caudal hairs.

From *S. geijskesi* nov. spec. it differs by the following characters:

S. longicaudata nov. spec.

1. Antennae more than half as long as the body.
2. Ultimate segment of the rostrum much shorter than the second joint of the hind tarsi.
3. Siphunculi about $^2/_3$ of the length of the cauda.
4. Second joint of the tarsi dorsally with one hair only as a rule, placed near apex.

S. geijskesi nov. spec.

1. Antennae less than half as long as the body.
2. Ultimate segment of the rostrum a little longer than the second joint of the hind tarsi.
3. Siphunculi about as long as cauda.
4. Second joint of most of the tarsi dorsally with 2 hairs, one on the first half, one near the apex.

There are some other differences between the two species but I think the list will do.

f) The Western European species of *Schizaphis* key as follows:

1(4). Siphunculi and cauda both completely dark sclerotic.

2(3). Body with very long and fine hairs. Lateral tubercles present on segment I to VII. On *Typha* spp., *Carex hirta* and *Scirpus* spp.
S. scirpi (Pass).

3(2). Body with very short and thick hairs. Lateral tubercles absent or on segment I and VII only. On various gramineae.
S. nigerrima (H. R. L.).

4(1). Siphunculi and cauda both pale.

5(6). Siphunculi only $^2/_2$ of the length of the cauda. Antennae more than half as long as the body. Cauda with 10—13 hairs.
S. longicaudata nov. spec.

6(5). Siphunculi about as long as, or longer than the cauda. Cauda with fewer hairs.

7(8). Siphunculi $^1/_4$—$^1/_3$ longer than the cauda. Antennae $^2/_3$—$^3/_4$ of the length of the body. Ultimate rostral segment shorter than the second joint of the hind tarsi. Second tarsal joints with one apical dorsal hair only. *S. jaroslavi* (Mordv.).

8(7). Siphunculi as long as the cauda or shorter. Antennae $^2/_5$ of the length of the body, in alatae half as long as the body. Ultimate rostral segment longer than the second joint of the hind tarsi. Second tarsal joints dorsally usually with more hairs. *S. geijskesi* nov. sp.

6. The genus **Trilobaphis** Theob.

This genus is quite common on some *Carex* species in Wales and in the Netherlands. I collected and reared the alatae, which have not yet been described. The genus is closely related to *Fullawayella* Del Guercio and *Carolinaia* Wilson, though it differs from these two genera in many regards.

Trilobaphis caricis Theobald

Apterous viviparous female.

Morphological characters. Body broadly spindle-shaped, elongated. Tergite rather strongly sclerotic, corrugated, but not coloured. Head, pro- and mesothorax free; metanotum fused with abdominal tergites I—VII; tergite of eighth abdominal segment free. Hairs on dorsum very short, difficult to find even. Front with indistinct frontal tubercles, but with two mammiform processi with two hairs each, inplanted higher than the base of the antennae; between these processi, but lower, in line with the bases of the antennae, a little larger, more rectangular median process, with two pairs of hairs; a small marginal process on vertex between antennal bases and eyes on each side of the head. Antennae about $^1/_3$—$^3/_8$ of the length of the body, with nearly smooth surface. First segment at apex about twice as broad as the diameter of the second, with the inner margin making an angle of about 80° so that the second segment stands on the outer margin of the first, in an angle of about 75° with the inner margin of the first; third segment about twice as long as the fifth; processus terminalis a little longer than the base of the sixth segment. Antennal hairs of the blunt, *Myzine* type, $^1/_3$ of basal diameter of the third segment. Rostrum nearly reaching to middle coxae, apical segment about $1^1/_5$ times as long as the second joint of the hind tarsi. Siphunculi placed very far caudad, apparently on the sixth segment;

outer margin a little convex, sometimes straight, but inner margin concave near base, then straight, then convex; constricted at apex strongly, with narrow porus and distinct flange; walls very thick; surface covered with thick, blunt, round squamulae, more or less as in *Cavariella,* but coarser; about $^2/_9$ of the length of the body; bases on the margin of the body, but apices nearly touching each other. Eighth tergite constricted at the base, triangular, with sides slightly rounded, apex blunt, slightly elevated, forming more or less a supracaudal process, with two hairs next to it and an other pair farther along the hindmargin. Cauda elongated triangular, constricted once at base, once on distal one-third part, with 4—5 hairs (usually 2 pairs) between the two constrictions (as in *Pentalonia nigronervosa* Cocq), about $^1/_3$ of the length of the siphunculi. Anal plate more or less rounded triangular, in macerated, swollen specimens projecting from under the body to the middle of the cauda, with 4, rarely with more hairs. Legs smooth, rather short; first tarsal joints with 3, 3, 2 hairs.

Colour: Yellowish green; legs, antennae, siphunculi and cauda nearly concolourous with the body.

Measurements of one specimen: Length of the body: 2.09 mm; antennae: 0.75 mm; siphunculi: 0.43 mm; cauda: 0.16 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{60}{IV} : \frac{50}{V} : \frac{(50+60)}{VI}$.

Alate viviparous female.

Morphological characters. Very different from apterous form and hardly resembling it, except for the siphunculi and eighth tergite. Front without any of the processi of the aptera, but with a rather abnormal arrangement of hairs, which indicates the principally similar structure. First antennal segment normal, though rather thick; the third, the fourth (and the fifth also a little) as tubercular as the fructiferous shoots of apple, covered with numerous, slightly oval (transversely) very tubercular rhinaria, third with 25—33, fourth with 8—13, fifth with 4—8. Antennae very much longer than in apterae, about $^2/_3$—$^3/_4$ of the length of the body, slender. Ocelli not circular, but longitudinally narrow oval. Abdomen not sclerotic, only with marginal sclerites and more or less distinct „Muskelplatten". Seventh tergite with an interrupted sclerotic transverse bar, eighth tergite wholly sclerotic, triangular as in apterae, with two pairs of hairs near apex. Siphunculi rather slender, very slightly swollen with constricted apex, strongly black sclerotic, covered with thick, blunt squamulae, $^1/_5$ of the length of the body. Cauda slightly sclerotic, more or less like that of apterae, $^2/_5$ of length of the siphunculi. Wings with media branched twice, rarely once only.

Colour: Head and thorax black, abdomen green with the sclerites black; cauda rather dark greenish brown; siphunculi jet-black, very conspicuous.

Measurements of one specimen: Length of the body: 2.00 mm; antennae: 1.52 mm; siphunculi: 0.40 mm; cauda: 0.14 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{59}{IV} : \frac{46}{V} : \frac{(35+58)}{VI}$. Rhinaria on the third antennal segment: 23 and 27; on the fourth 12 and 10; on the fifth: 6 and 7.

Hostplants: *Carex remota* L. (Theob.), *C. leporina* L., *C. paniculata* L., *C. vulpina* L., *C. muricata* L.

Geographical distribution: England, Netherlands and Germany.

Biology: This species lives during the whole year on its various hosts, usually on the uppersides of the leaves in very small colonies. Alatae seem to occur in June-July only. Only plants growing in very wet spots or over little streams were found with colonies containing apterae. On „dry" plants only colonizing alatae were taken (*C. muricata*).

Notes: This species has been placed near *Cavariella* Del Guercio by Börner very rightly. Only in that genus one meets with such great structural differences between apterae and alatae. In fact, apterae look very much like a *Cavariella* species.

7. The genus **Holcaphis** gen. nov.

Type *Aphis holci* Hardy.

Aphis holci and *Aphis stellariae* Hardy are usually placed in the genus *Brachycolus* Buckton, type *A. stellariae* Hardy. Some *Semiaphis* spp. (*S. heraclei* Takah.) have also been placed in *Brachycolus*. Closer study reveals immediately that the analogy in body form is a result of convergence or parallelism. The nearest ally of *B. stellariae* (Hardy) is *B. cucubali* (Pass.) (syn.: *B. silenea* Ferr., *B. melanocephalus* Buckt.); *Semiaphis* is derived from *Hyadaphis* Kirkaldy and originates from *Lonicera*, though now *Semiaphis*, like *Schizaphis*, is limited to its secondary host.

Holcaphis is meant for a series of grass-inhabiting species, of which *H. holci* (Hardy) and *H. frequens* (Wlk.) occur in Western Europe. The siphunculi in *Holcaphis* gen. nov. are placed on the posterior margin of the sixth tergite, in *Semiaphis* and *Brachycolus* on the fifth tergite.

H. frequens (Wlk.) (syn. *B. korotnewi* Mordv.) was described from *Artemisia maritima*, but it came there probably from the *Agropyron repens litorale* A & G. which generally grows near *A. maritima*. It lives on all sorts of *Agropyron* except apparently *A. junceum* L.

H. holci (Hardy) seems to live on *Holcus* only, especially on *Holcus*

lanatus, which shows a very typical reaction. The leaves remain very short and blunt, like those on the flower stems of carnations.

I give descriptions of both species, which are rather difficult to separate.

Holcaphis frequens (Wlk.)

Apterous viviparous female.

Morphological characters. Body very elongate, about $2^1/_2$ times as long as broad, not sclerotic, except the head, with short, acute hairs. Head sclerotic, front convex in the middle, with a concave part on both sides. Antennae of 6, rarely of 5 segments, without secondary rhinaria, about $^2/_7$—$^1/_3$ of body's length. Third antennal segment always shorter than the fourth and the fifth combined, processus terminalis $1^1/_{20}$—$1^3/_{10}$ (average 1.15) times as long as the base of the sixth segment. Antennal hairs $^1/_2$—$^3/_4$ of the diameter of the third antennal segment. Rostrum short, nearly reaching to the second pair of coxae, ultimate segment about $^2/_3$ of the length of the second joint of the hind tarsi or a little shorter. Pronotal tubercles present, but rather flat and blunt. First tarsal joints with 3, 3, 2 hairs. Abdomen with sclerotic stigmal plates, sclerotic crossbars on the seventh and eighth segment and very rarely a few sclerites on the sixth segment. Siphunculi on posterior half of the sixth segment, very short, curved inwards, shorter than wide, without flange, little sclerotic, $^1/_4$ of the length of the cauda. Cauda normal, sclerotic, with 5—6 hairs.

Colour: green, with dark green head. Antennae, legs and cauda black. Covered with grey waxpowder.

Measurements of one specimen: Length of the body: 1.81 mm; antennae: 0.53 mm; siphunculi: 0.025 mm; cauda: 0.10 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{68}{IV} : \frac{64}{V} : \frac{(71+78)}{VI}$.

Alate viviparous female.

Morphological characters. Antennae of 6 segments, about $^1/_2$—$^5/_9$ of body's length. Third segment sometimes equal to IV + V, processus terminalis up to $1^2/_3$ times the base of the sixth segment. Third segment with 6—8 secondary rhinaria, IV with 0—1 rhinarium. Legs much longer than in the apterous viviparous female. Sclerotisation on the abdomen as in the apterae. Other characters as in apterous viviparous females.

Measurements of one specimen: Length of the body: 1.83 mm; antennae: 1.01 mm; siphunculi: 0.025 mm; cauda: 0.12 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{61}{IV} : \frac{55}{V} : \frac{(45+76)}{VI}$.

Hostplants: *Triticum repens* L., *T. caninum* L. etc.

Geographical distribution: Europe, Russia.

Biology: Fundatrices after hatching try to penetrate between the unrolling leaves at the top. The spreading of the leaves is eventually stopped partly or completely and colonies are formed in the bunch of still enrolled leaves forming the apex of the plant, the growth of which is stopped. Alatae appear in June, apparently in the third generation. Later in summer I never found a single alata. In October sexuales appear, the males being apterous. Eggs are deposited in the rolled leaves, parallel to the length of the leaf. The eggs are green when just laid, but turn black and are covered by a grey waxpowder very soon. Water penetrating into the pseudogall is enveloped in waxpowder and does not wet the insects or the leaf surface.

Note: This very common aphid differs from the much less common *H. holci* Hardy. It occurs everywhere, contrary to *holci,* which seems to have a more southern main area of distribution.

Type: In the British Museum (Natural History) London.

Holcaphis holci (Hardy)

Apterous viviparous female.

Morphological characters. Body very elongate and narrow, more than $2^1/_2$ times as long as broad, not sclerotic (except the head), with rather short, acute hairs. Head sclerotic, front convex in the middle with concavities on both sides. Antennae of 6, rarely of 5 segments, without secondary rhinaria, less than $^1/_3$ of body's length. Third antennal segment always slightly longer than the fourth and fifth together; processus terminalis $1^1/_2$ times the base of the sixth segment. Antennal hairs $^3/_5$—$^3/_4$ of the diameter of the third segment. Rostrum short, nearly reaching to the second pair of coxae, ultimate segment about $^2/_3$ of the length of the second joint of the hind tarsi. Pronotum with small, blunt, not coloured, marginal tubercles. Legs rather short, first tarsal joints with 3, 3, 2 hairs. Abdomen often with sclerotic, coloured pleural „Muskelplatten", with sclerotic stigmal plates, with a sclerotic spinal crossbar or a few isolated sclerites on the sixth segment and sclerotic spinopleural crossbars on the seventh and the eighth segment. Siphunculi on posterior half of the sixth segment, just after the stigmata, very short, as wide as long, without flange, little sclerotic, about $^1/_4$ of the length of the cauda. Cauda rather long, blunt, sclerotic, with 5—6 hairs.

Colour green, with dark green head and extremities, covered with whitish grey waxpowder.

Measurements of one specimen: Length of the body: 1.96 mm; antennae: 0.60 mm; siphunculi: 0.03 mm; cauda: 0.12 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{46}{IV} : \frac{42}{V} : \frac{(50+83)}{VI}$.

Hostplants: *Holcus lanatus* L. and *H. mollis* L.

Geographical distribution: Europe.

Biology: Living during the whole year in the still unfolded leaves. These, as a result of the sucking of the insects, never reach full length, but remain short, which gives the attacked plants a peculiar appearance. The dense colonies inside the folded leaves consist of a mass of exuviae, excrements, waxpowder and alive insects. Alate forms seem to occur in early summer only.

Type in the British Museum (Natural History).

Key to the species of *Holcaphis*.

Apterous viviparous females.

1(2). Third antennal segment slightly longer than the fourth and the fifth. Processus terminalis at least $1^3/_7$ times as long as the base of the sixth segment. Sixth tergite usually with local sclerotic spinal areas. On *Holcus* species. *H. holci* (Hardy)

2(1). Third antennal segment shorter than the fourth and the fifth. Processus terminalis less than $1^1/_3$ times as long as the base of the sixth segment. Sixth tergite usually without local sclerotic areas. On *Agropyron* species. *H. frequens* (Wlk.)

8. The genus **Schizaphidiella** gen. nov.

Generic diagnosis. Frontal tubercles small, as in *Schizaphis* Börner. Antennae of 5 segments, processus terminalis much longer than the base of the last segment. Third segment in apterae without rhinaria. Eyes without triommatidion in apterae. Siphunculi on posterior margin of the fifth abdominal segment, shorter than the cauda. Cauda very elongated (as in *Brachysiphoniella* Takahashi). First tarsal joints with 3, 3, 2 hairs.

Genotypus: *S. quinquarticulata* nov. spec.

Schizaphidiella quinquarticulata nov. spec.

Apterous viviparous female.

Morphological characters. Body oval, rather elongated. Tergite not sclerotic, with extremely short, spiny hairs. Head normal, with small

frontal tubercles as in *Schizaphis* Börner, and front convex in the middle, the convexity lower than frontal tubercles. Antennae of five segments, about $^{9}/_{14}$—$^{10}/_{13}$ of the length of the body, very thin; third segment constantly curved, longer than the fourth and the base of the fifth; processus terminalis about $3^{1}/_{2}$ times as long as the base of the fifth joint, longer than the third segment; primary rhinarium on the fourth joint on about $^{4}/_{5}$ of the length of the segment. Antennal hairs very short, about half as long as the largest diameter of the third segment (i.e. at basal articulation). Eyes very small, with few facets only, triommatidion (ocular tubercle) not separated. Rostrum short, of 3 segments, the basal segments just the longest, ultimate segment as long as the second joint of the hind tarsi. Abdomen with very small marginal tubercles on the seventh segment, placed dorsally, between the stigmata. Siphunculi cylindrical to slightly conical, nearly smooth, about $^{1}/_{18}$—$^{1}/_{16}$ of the length of the body, with indistinct, small flange. Cauda cylindrical, elongated, nearly twice as long as the siphunculi, with 10—14 hairs. Legs rather long, first tarsal joints with 3, 3, 2 hairs.

Colour: Pale yellow, very slightly pruinose; legs, antennae, siphunculi and cauda with the colour of the body or slightly darker.

Measurements of one specimen: Length of the body: 1.36 mm; antennae: 0.98 mm; siphunculi: 0.08 mm; cauda: 0.15 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{59}{IV} : \frac{(33 + 117)}{V}$.

Hostplant: *Brachypodium* spec.

Geographical distribution: Moselvalley near Nievern.

Biology: Lives on the upperside of the leaves of its host, apparently without forming colonies.

Notes: I found eleven apterae of this species on *Brachypodium* growing intermingled with *Festuca gigantea* on a shadowy spot along a road above Nievern. Some of the insects were rather swollen and after maceration a few of them showed the mandibulae of a hymenopterous larva inside.

As Mordvilko says nothing about abnormalities of the eye in his description of *Geoktapia*, I have set this species as type for a new genus. It must be closely related to *Brachysiphoniella* Takahashi too, but that genus has six-segmented antennae. The place of the tubercles on the seventh abdominal segment as well as the structure of the front suggest close affinity to *Schizaphis* Börner. The whole structure of the abdomen and head is very much like that of *Schizaphis longicaudata* nov. spec.

9. The genus **Saltusaphis** Theob.

This genus differs from *Thripsaphis* Gill., but not very much. It shows always broadened empodial hairs, also mushroomshaped brachychaetae and an apically more or less incised eighth tergite. In *Thripsaphis* mushroomshaped hairs are absent, the empodial hairs are normal, spinose and the eighth tergite is distinctly not incised, but terminates in a bluntish tuberclelike structure. Several American *„Saltusaphis"* belong into *Thripsaphis.*

a. **Saltusaphis flava** nov. spec.

Apterous viviparous female.

Morphological characters. Body very elongated, oval, rather flat. Tergum sclerotic, coloured uniformly yellow, without any ornamentation. Tergite with the normal segmentation of this genus, covered with small, more or less blunt spinules, which sometimes appear like small oval pori, except on the margin of the body, where their nature is evident. Hairs on tergum mushroomshaped, present in very large number, distributed rather regularly all over the tergum, their flattened top dentated, usually with a large sector missing, especially on posterior segments. On segment VI just after and under the siphunculi sometimes a fanshaped hair present, though usually absent. A long hair on the margin of seventh tergite, on posterior half. Eighth tergite on each side with 5—6 long marginal hairs, two of which on the posterior lobes, and also along each side 3—4 shorter ones, which are also thinner and placed more ventrally. Antennae about half as long as the body, covered with transverse rows of minute spinules. Third segment not longer than the sixth, much shorter than the fourth + the fifth. Eyes normal. Rostrum short and thick, reaching to anterior margin of mesothorax, apical segment very short and blunt. Siphunculi mere elevated pores, near the margin of the body, on the middle of the sixth tergite. Seventh tergite trapezoid, but hindcorners not angular, but rounded. Eighth tergite nearly semicircular, hind margin with median incision, slightly bilobate. Cauda knobbed, with many hairs. Anal plate not deeply bilobate, the incision a little deeper than that of the eighth tergite. Legs normal, with transverse rows of minute spinules. First tarsal joints with 5 hairs. Empodial hairs very broad. Rudimentary gonapophyses 2.

Colour. Completely dull yellow, except the antennae, which are black from the basal half of the third segment.

Measurements of one specimen: Length of the body: 1.85 mm; maximal width: 0.73 mm; antennae: 0.93 mm; cauda: 0.10 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{65}{IV} : \frac{58}{V} : \frac{(55 + 45)}{VI}$.

Hostplant: *Carex* sp.

Geographical distribution: Dwingelo, Kootwijk (Netherlands); Anglesey (Wales).

Biology: Lives on the leaves, apparently without forming large colonies. Further biology unknown.

Notes: I collected 21 apterae of this species on sedges growing along one of the little lakes near Dwingelo. The insects were not numerous and were found mainly on rather low bushes of *Carex*, growing in the wet *Sphagnum* area, offering an apparently favorite restingplace for vipers. Later I found it at Kootwijk and in bogs on Anglesey and near Bangor, with Dr Thomas. This species is very easily separated from allied species. It has more mushroomshaped hairs than any of the other European species. The blunt tubercles on the tergum might be mistaken for rings or pori, which occur in *S. pallida* nov. spec., but it is easily separated from that species by the rounded seventh tergite and the relative length of the antennal segments.

b. **Saltusaphis intermedia** nov. spec. [1])

Apterous viviparous female.

Morphological characters. Body elongated oval, very flat. Tergum sclerotic, but uncoloured except transverse, dark rows of intersegmental "Muskelplatten" from mesothorax to abdominal segment VIII; on each segment 2 pairs of groups: a spinopleural pair and a marginopleural pair; the marginopleural pair absent between meso- and metathorax and between segments VII and VIII. Tergite covered with minute spinules, placed in irregular transverse rows. Hairs on tergum of two types: both normal, very short spiny hairs and mushroomshaped hairs present, the latter usually with the anterior half of the dentated flat top missing; both types of hairs present in about equal number. On the margin of the body, down from the second abdominal segment 1—2 hairs per segment, these hairs increasing in length towards the cauda. A much longer hair on the margin of the seventh segment, nearly in the middle. Margin of the eighth segment with 1—3 hairs on each side and two hairs on each posterior lobe; these hairs still longer than those of the seventh segment. Antennae about half as long as the body, covered with transverse rows of spinules; third segment about twice as long as the fourth, the fifth a little longer than the fourth, processus terminalis only $^3/_5$—$^2/_3$ of the length of the base

1) This may be *„Thripsaphis" leporinae* Börner, 1939, but his description is far too incomplete for identification.

of the sixth segment. Antennal hairs about $^4/_7$ of the diameter of the third segment at its very base. Eyes normal. Rostrum very short, reaching to anterior margin of mesothorax, apical segment very short, blunt. Siphunculi mere elevated pores on the margin of the body on the middle of the sixth abdominal segment or just after the middle. Seventh segment trapezoid, but sides rounded, not angular, convex, with the long marginal hair standing about in the middle, posterior margin rather concave. Eighth tergite about semicircular, only slightly incised, lobes faint but distinct. Cauda knobbed, knob not round, but trapezoid. Anal plate with rectangular incision. Subgenital plate normal. Legs normal, with transverse rows of spinules. First tarsal joints with 5 hairs. Rudimentary gonapophyses 2.

Colour. Yellowish white, with indistinct dark transverse lines (intersegmental "Muskelplatten"). Legs etc. with the colour of the body. Antennae black, first, second, and basal $^2/_3$—$^3/_4$ of third segment very pale.

Measurements of one specimen: Length of the body: 2.04 mm; maximal width: 0.74 mm; antennae: 1.04 mm; cauda: 0.09 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{50}{IV} : \frac{58}{V} : \frac{(54+34)}{VI}$.

Alate viviparous female (description after one specimen).

Morphological characters. In general much like apterous viviparous female, but head and thorax darkly sclerotic, abdomen with the same type of sclerotisation as described for *S. ornatus,* only the spinopleural spot on the third segment complete and the eighth abdominal segment only partly sclerotic in a circle including the faint posterior lobes on posterior $^2/_3$ of the segment. Front nearly straight. Proportion of antennal segments, hairs etc. as in the apterous viviparous female.

Colour: As in the apterous viviparous female, but sclerotic areas coloured dark brownish.

Measurements of one specimen: Length of the body: 1.75 mm; antennae: 1.04 mm; cauda: 0.10 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{51}{IV} : \frac{58}{V} : \frac{(54+30)}{VI}$. Rhinaria on third antennal segment: 9 and 12.

Hostplant: *Carex hirta* L.

Geographical distribution: Only found near Swalmen, Limburg, Netherlands.

Biology: Lives between the bases of the leaves, where these diverge. It was found on plants growing in the water of a ditch.

Notes: I have given this species its name, because it is the only western European species with normal hairs between the mushroomshaped micro-

chaetae. By this it resembles a *Thripsaphis* species, which is described here also. Examination of antennae and empodial hairs however, show its right place immediately.

Types in the author's collection.

c. **Saltusaphis ornata** Theob.

This species has been described already by Theobald (Aph. Great Britain, vol. III, p. 65) and myself (Stylops IV, p. 115). Later I found it along the Mosel and the Lahn in Germany.

d. **Saltusaphis pallida** nov. spec.

Apterous viviparous female.

Morphological characters. Body very elongated, with nearly parallel sides, flat. Tergum sclerotic but uncoloured except dark rows of intersegmental "Muskelplatten". Tergite with normal segmentation of the genus, covered with transversely oval rings or pori, especially on the disc of the abdomen. Hairs on tergum mushroomshaped, short, the flattened top dentated, with a small sector missing. A longer or short blunt, thick hair with sometimes bifurcate apex on the sides of the sixth tergite; on the posterior corners of the seventh tergite a longer hair, with blunt or knobbed apex; a row of 7—8 long hairs with blunt or knobbed apex along each side of the eighth tergite, two of which on the posterior lobes. Antennae very long and thin, covered with transverse rows of minute spines, about $^2/_3$ of the length of the body. Third antennal segment about as long as the fourth + the fifth; processus terminalis a little shorter than the base of the sixth segment. Eyes normal. Rostrum short and very thick, reaching to the anterior margin of the mesothorax, apical segment very short, rather blunt. Siphunculi mere elevated rings on the posterior half of the sixth tergite, near the margin of the body. Seventh tergite angular, posterior margin about $1^1/_4$ times as long as the anterior margin of the eighth tergite. Eighth tergite semicircular to triangular, with a deep incision on the posterior margin, deeper than the incision of the anal plate. Cauda knobbed, with a number of normal hairs. Subgenital plate normal. Legs normal, covered with transverse rows of minute spines, especially on the tibiae and tarsi. First tarsal joints with 5 hairs. Empodial hairs very broad. Rudimentary gonapophyses 2.

Colour. Pale yellow, antennae and legs about the same as body, but apex of the third, the distal half of the fourth and the whole of the fifth and sixth antennal segment black.

Measurements of one specimen: Length of the body: 2.65 mm; maximal width: 0.78 mm; antennae: 1.77 mm; cauda: 0.15 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{55}{IV} : \frac{46}{V} : \frac{(37 + 30)}{VI}$.

Hostplant: *Carex* sp.

Geographical distribution: Limburg, Netherlands.

Biology: Unknown.

Notes: This seems to be a relatively uncommon species. I collected two apterae while beating *Carex* spp. for *S. ornata* and *S. picta*. Several hundreds of the other species and many *Thripsaphis thripsoides* were taken, but only two apterae and a few larvae of *S. pallida*.

This species differs considerably from the other members of this genus by the absence of spinules on the tergum and the presence of rather large oval rings. In *S. flava* nov. spec. the blunt spinules in optical section also resemble pori, but there they are very small and not elongated transversely oval as sometimes in this species.

Types: Cotypes in the author's collection.

e. **Saltusaphis picta** nov. spec. [1]).

Apterous viviparous female.

Morphological characters. Body very elongated, oval, flat. Tergum sclerotic, little but characteristically coloured. In fresh and cleared insects one sees dark transverse lines, which are intersegmental rows of "Muskelplatten", also longitudinal lines: one short stripe on the spine in the middle of the body, a line to both sides of the spinal line from the head to the posterior corners of the seventh tergite and a dark line following the margin of the body as far as the posterior corner of the seventh tergite. These lines give the insects a markedly checkered appearance, which under the microscope is less distinct. Magnified longitudinal lines prove to be composed of a dusky patch on each segment. Tergite with the typical segmentation of the genus, covered with minute spinules arranged in transverse irregular rows. Between the spinules are numerous only slightly longer mushroom-shaped hairs, with flattened and dentated top, which always has a sector missing, especially on the eighth tergite, where about their anterior $^2/_5$ is absent. There is a normal, rather long hair with blunt or a little knobbed apex on the margin of the sixth segment, a longer hair on the posterior corner of the seventh tergite and 4—5 long hairs on each side of the eighth

1) May be this is Börners *Saltusaphis quadrilineata* but his description is too short and in some regards different.

tergite, 2 of which are on the posterior lobes. Antennae about $^4/_7$ of the length of the body, covered with transverse rows of minute spines. Third segment about as long as the fourth + the fifth, processus terminalis a little shorter than the base of the sixth segment. Eyes normal. Rostrum short and thick, reaching to the anterior margin of the mesothorax, apical segment very short and blunt. Siphunculi little developed, on the posterior half of the sixth tergite, about on the margin of the body. Seventh segment trapezoid, posterior margin slightly sinuated, so that the posterior corners are nearly 90°. Posterior margin of the seventh tergite about $1^1/_2$ times as long as the anterior margin of the eighth. Eighth tergite with sides at base parallel, then curved till they make an angle of 90°, until the outer hair on the posterior lobes, where they are parallel again over a very short distance; posterior margin about parallel with the anterior margin, with an incision in the middle, about half as deep as that of the anal plate. Cauda knobbed, with many normal hairs. Anal plate with a deep rectangular incision. Legs normal, with transverse rows of spinules. First tarsal joints with 5 hairs. Empodial hairs very broad. Rudimentary gonapophyses 2.

Colour. Yellowish white, the lines mentioned under "morphological characters" brown, the whole insect checkered. Legs with the colour of the body, antennae dark, except basal $^1/_3$—$^2/_3$ of the third segment and sometimes the basal $^1/_3$ of the fourth which are pale yellow to brownish yellow.

Measurements of one specimen: Length of the body: 2.56 mm; maximal width: 0.97 mm; antennae: 1.45 mm; cauda: 0.14 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{55}{IV} : \frac{46}{V} : \frac{(38 + 30)}{VI}$.

Alate viviparous female.

Morphological characters. Much like apterous viviparous female, but posterior part of the body more rounded, without the distinct angles which are normal for the apterae. Third antennal segment with 13—16 rhinaria, which are a little transverse. Ornamentation of the abdomen exactly as in apterae. Head, thorax and cauda black. Wings very narrow, normal; hind wings with one transverse vein only; all veins distinct, with dark spots at their apices.

Colour: As in apterous viviparous female, but head and thorax brown to black, cauda dark brown to black, antennae and the part of the head around their base dark brown to black.

Measurements of one specimen: Length of the body: 2.31 mm; antennae: 1.67 mm; cauda: 0.13 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{60}{IV} : \frac{48}{V} : \frac{(38 + 30)}{VI}$. Rhinaria on the third antennal segment: 13 and 15.

Hostplant: *Carex* sp., probably *C. acutiformis.*

Geographical distribution: Limburg, Netherlands.

Biology: This species lives both on the underside of the apices of the leaves, and between the bases of the leaves. Alatae were very common. Further biology unknown.

Notes: The easiest way to recognise this species is by its colour-pattern, which even to the naked eye is very distinct. The microphotograph shows it better than the elaborate description.

f) The Western European species of *Saltusaphis* key as follows.

1(2). Dorsum of abdomen not exclusively with mushroomshaped microchaetae, but also with normal spiny hairs. On *Carex hirta.* *S. intermedia* spec. nov.

2(1). Dorsum of abdomen exclusively with microchaetae in the shape of a mushroom.

3(4). Tergite covered with transversely oval pori or rings. Tergite not coloured. Eighth tergite with in total 12—16 hairs along the sides; on posterior margin more deeply incised than the anal plate. *S. pallida* spec. nov.

4(3). Tergite at most with small blunt spinules, the nature of which is easily recognized in lateral view.

5(6). Eighth tergite with 16—20 marginal hairs of various length. Tergite not ornamented, pale yellow in apterae. Live apterae uniformly yellowish. *S. flava* spec. nov.

6(5). Eighth tergite with 8—12 hairs along its margin. Tergite ornamented.

7(8). Processus terminalis about as long as the base of the sixth antennal segment, third segment at least $^1/_5$ shorter than the fourth + the fifth. On *Carex riparia.* *S. ornata* Theobald.

8(7). Processus terminalis at most $^5/_6$ of the base of the sixth segment. Third segment about as long as the fourth + the fifth. On *Carex pseudocyperus* or *C. acutiformis.* *S. picta* spec. nov.

10. The genus **Thripsaphis** Gill. (*Allaphis* Mordv.)

The genus differs from *Saltusaphis* Theob. in the structure of the apex of the eighth abdominal tergite, which is incised in *Saltusaphis,* but rounded or tubercular in *Thripsaphis.* The empodial hairs in *Thripsaphis* are spiny, but they are spathulate in *Saltusaphis.* In *Thripsaphis,* at least in European forms, the apterae have rhinaria on the third antennal segment, which does not occur in *Saltusaphis.* Two species occur in Western Europe.

a) *Thripsaphis cyperi* (Wlk.) (syn. *Allaphis caricis* Mordv.). This species

is often not very rare on small *Carex* species. It may occur in very large numbers sometimes. The insects look more like Coccids than like Thrips.

b) *Thripsaphis thripsoides* spec. nov. occurs also on *Carex* species, often together with the preceding species. It is however not conspicuous and lives completely hidden between the bases of the leaves. It is much more common than *T. cyperi* (Wlk.), but apparently it escaped notice completely.

Thripsaphis thripsoides nov. spec.

Apterous viviparous female.

Morphological characters. Body very elongated, nearly linear. Tergite sclerotic, coloured to variable extent, either quite pale, or with transverse intersegmental rows of "Muskelplatten" and marginal areas on each segment dusky; or the whole tergite dusky, except the head and a median line along the dorsum to anterior half of the third abdominal segment which are pale, and the margin of each segment and the whole posterior margin of eighth tergite which are very dark. Fusion of tergites as in *T. cyperi* (Wlk.), but divisions between the segments less distinct. Wax secreting pori usually indistinct, and only the "glandular pori" visible as a very fine punctation of the integumentum, apparently only present on the marginal sclerites of all body segments; distinct pori as in *T. cyperi* visible on segment VIII, along the posterior margin. (These areas correspond to the sclerites of the last larval instar!). On the remainder of the body glandular pori absent, or at least invisible. Tergum covered with short, blunt spinules in irregular transverse rows. Dorsum with some very short spiny hairs; longer hairs on the margin of segments (IV) V—VII, often with the apex curved backwards; on the eighth tergite 8—12 hairs; 2 of which are on the elevated apex. Front with broad median process, very convex. Antennae about $^3/_7$—$^1/_2$ of the length of the body, surface with fairly normal sculpture, the third segment with 1—5 rather large round rhinaria on distal $^1/_3$ (antennae with 1 or 5 rhinaria are rare, the average from 34 counts is 2.3). Third segment longer than the fourth + the fifth, sixth segment considerably longer than the fourth, processus terminalis shorter than the base of the sixth antennal segment. Antennal hairs up to as long as diameter of the third joint at its basal articulation (= $^3/_4$ of diameter in the middle), third segment with distinct, spreading hairs. Eyes normal, without triommatidion, protruding. Rostrum short, thick, reaching to anterior $^1/_4$ of mesothorax, apical segment short, triangular. Siphunculi mere circular pores near posterior angle of the sixth segment, near the margin of the body. Seventh segment on the anterior margin about $^4/_7$ times as

broad as the eighth on the anterior margin. Eighth segment almost semicircular, with apex drawn out into a blunt, very short, slightly elevated process, bearing two hairs. Cauda knobbed, usually hidden under the eighth abdominal tergite. Anal plate consisting of two rather short lobes only, always under the eighth abdominal tergite, just behind its middle. Subgenital plate normal. Legs normal, femora with very indistinct circular sensorium-like spots, ventrally with short, indistinct spinules; tibiae with few spinules at the base, more acute and more numerous spinules towards the apex. First tarsal joints with 5 hairs, median hair about $^2/_7$—$^1/_3$ of the length of the others. Empodial hairs normal, fine. Rudimentary gonapophyses 2.

Colour: Yellowish white to pale brownish grey, posterior half fringed with short wax threads. Legs etc. pale, antennae with joint I and II and the basal half of the third segment pale, remainder black.

Measurements of one specimen: Length of the body: 2.01 mm; antennae: 0.87 mm; cauda: 0.08 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{42}{IV} : \frac{44}{V} : \frac{(39+28)}{VI}$. Rhinaria on third antennal segment: 2 and 2.

Alate viviparous female.

Morphological characters. In general like apterae, but head and thorax darkly sclerotic, though head and prothorax paler than meso- and metathorax. Abdomen not sclerotic, with on each segment marginal sclerites and spinopleural sclerotic transverse sclerites, which are fused from segment III—VI, interrupted on I and II, very small on VII and sometimes fused with the marginal sclerites on segments V and VI. Tergite of the eighth segment completely sclerotic, dark, shaped like that of the apterae. Head with very much raised ocelli, which stand quite near the compound eyes. Antennae a little more than half as long as the body, third segment with 10—14 slightly transverse rhinaria, with pale rings around them as in apterae. Cauda and anal plate protruding very distinctly from under the eighth abdominal tergite. Venation of wings normal, hindwings exceptionally with one transverse vein only. Veins slightly bordered with brown.

Colour: Head and thorax black, the sclerotic areas black, remainder ivory white to whitish yellow. Antennae, legs and cauda black.

Measurements of one specimen: Length of the body: 2.01 mm; antennae: 1.17 mm; cauda: 0.09 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{48}{IV} : \frac{42}{V} : \frac{(35+24)}{VI}$. Rhinaria on the third antennal segment: 12 and 13.

Oviparous female.

Morphological characters. Much like apterous viviparous female, but under each siphunculus a very large waxgland with small hexagonal pori, which extends from the middle of the fifth sternite to the middle of the seventh sternite and is a little concave around the sixth and seventh stigma. Hind tibiae rather swollen, with about 50—70 rather tuberculate small round pseudosensoria.

Colour: As in apterous viviparous female.

Measurements of one specimen: Length of the body: 1.98 mm; antennae: 0.95 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{41}{IV} : \frac{37}{V} : \frac{(37+30)}{VI}$. Rhinaria on the third antennal segment: 1 and 2.

Apterous male.

Morphological characters. In many ways much like apterous viviparous female, but much smaller and narrower, usually constricted a little behind the prothorax. Antennae about $^7/_{10}$ of the length of the body, third segment with 5—10 rhinaria over the whole length, fourth with 1—3, fifth with 2—5 and sixth with 1—4 secondary rhinaria. Genitalia well developed.

Colour: Slightly darker than in apterous viviparous females.

Measurements of one specimen: Length of the body: 1.30 mm; antennae: 0.87 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{40}{IV} : \frac{40}{V} : \frac{(38+26)}{VI}$. Rhinaria on the third antennal segment: 7 and 8; on the fourth: 3 and 2; on the fifth: 3 and 4; on the sixth: 2 and 4.

Hostplant: Various species of *Carex*.

Geographical distribution: Netherlands, Germany.

Biology: This species lives between the basis of the leaves of a number of *Carex* species. Alatae are not rare in summer, common in July. Sexuales were found in October and November. Lives throughout the year in its foodplants.

Notes: This curious species, the apterae of which bear a strong resemblance to larvae of thrips, is not easily discovered. They feed on the morphological underside of the leaves, sitting with the dark antennae directed straight forward. Alatae resemble very strongly those of *Saltusaphis ornatus* Theob., but are easily separated by the structure of the posterior margin of the eighth abdominal tergite.

I am not quite sure whether this species is not identical with *Allaphis caricicola* Mordvilko. It differs from his description, which mentions the

absence of hairs on the third antennal segment, an only faint emargination of the analplate, and transverse rows of spinules on the antennae. These characters are certainly not present in my rather extensive collection of specimens.

If Börner were followed, this species would be a *Thripsaphis*, *T. caricis* a *Trichocallis*. But I cannot see any reason for this. The differences between these species seem to me of no more than specific range. The only argument for placing them in different genera would be the slightly different shape of the eighth abdominal tergite, but then the genus *Saltusaphis* Theob., as interpreted here, might be split in a number of genera too, because it shows some variation in the depth of the incision also.

11. The genus **Izyphya** Nevsky

Two representatives of this curious genus occur in Western Europe. They resemble each other more or less, but are easily separated.

a) *I. familiaris* (Wlk.) is generally rare in the Netherlands. It lives on the upperside of the leaves of *Carex arenaria*, but only on such plants as grow in very arid localities. I found it in the Netherlands only on the dunes, along the North Sea coast (Zoutelande, Ouddorp) and on the Veluwe (near the wireless station Kootwijk), always in very small numbers.

b) *I. insessa* (Wlk.). Laing (1928) records this species from *Juncus maritima*, but it is possible that the identification of the foodplant was not quite correct, as it occurs exclusively on *Juncus Gerardi* Loisl. I found it in the Netherlands wherever its foodplant occurred (Goes, Wolfaartsdijk, Schagen, Oostmahorn). The insects are not rare.

12. The genus **Coloradoa** Wilson

In Western Europe 5 species occur, all on Anthemideae. It is difficult to separate some of them, but biological investigations showed that each passes its entire life on its own species of plant. The males are apterous and all of the type described here for *C. achilleae* spec. nov.

a) *C. tanacetina* (Wlk.). This species is quite common on the lower leaves of *Tanacetum vulgare* L. in England, the Netherlands, France and Germany. Though most of foliage-inhabiting aphids suck the veins, this species feeds on the margin of the leaves, in the incisions! Alatae occur nearly exclusively in the 3rd generation. Males and oviparae were taken in October. The males are orange yellow.

b) *C. absinthii* (Lichtenstein) (syn.: *C. lydiae* Börner). This species is common on *Artemisia absinthium*, where it prefers the lower leaves. Alatae

as in the preceding species in the 3rd generation. Apterous orange yellow males and oviparae in October. England, Netherlands, Germany, France.

c) *C. artemisiae* (Del Guercio) lives on *Artemisia vulgaris,* but was found sometimes on *A. absinthium* also, if plants of both species grew near each other. Alatae, sexuales etc. as in the preceding species. England, Netherlands, Germany, France, Italy.

d) *C. rufomaculata* Wilson lives on *Chrysanthemum* only. Its sexuales have not been found; possibly it hibernates in glasshouses exclusively, like *Macrosiphoniella sanborni* (Gill.). Quite common. England, Netherlands, Germany, France, Italy.

e) *C. achilleae* spec. nov. This species occurs on *Achillea* everywhere in Western Europe. It inhabits the radical leaves and can nearly only be found by thrashing the plants. It is much shorter and rounder than the other species.

Coloradoa achilleae sp. nov.

Apterous viviparous female.

Morphological characters. Body broadly oval, rather flat, with corrugated skin and extremely short spathulate hairs. Head broad, with slightly convex front. Antennae about half as long as the body, processus terminalis very slightly longer than the base of the sixth segment. Rostrum with rather blunt apex. Abdomen with some "Muskelplatten", without sclerites. Siphunculi nearly cylindrical, slightly constricted before the apex, imbricated, with dusky apex and small flange, about $^1/_8$ of body's length, $1^1/_3$ to nearly $1^1/_2$ times as long as the cauda. The latter blunt, constricted at the base, with 5 hairs.

Colour: Slightly greyish green.

Measurements of one specimen: Length of the body: 1.35 mm; antennae: 0.67 mm; siphunculi: 0.16 mm; cauda: 0.11 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{64}{IV} : \frac{64}{V} : \frac{(78+87)}{VI}$.

Alate viviparous female.

Morphological characters. Much like apterous viviparous female. Abdomen with small marginal sclerites and narrow antesiphuncular sclerites, apparently without postsiphuncular sclerites. Antennae about $^2/_3$ of the length of the body; processus terminalis little longer than the base of the sixth segment. Third segment with 9—13 rhinaria, fourth with 3—6, fifth with 0—2; rhinaria rather large. Siphunculi, cauda etc. as in apterae. Wings large, with the veins dark and very faintly bordered; radius nearly straight;

sector radii short and narrow; abnormalities in venation very common, as in all species of this genus.

Colour: Head, thorax etc. brownish, remainder as in apterous viviparous female.

Measurements of one specimen: Length of the body: 1.45 mm; antennae: 0.98 mm; siphunculi: 0.15 mm; cauda: 0.11 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{50}{IV} : \frac{50}{V} : \frac{(55+62)}{VI}$. Rhinaria on the third antennal segment: 10 and 10; on the fourth: 4 and 6; on the fifth: 1 and 0.

Oviparous female.

Morphological characters. Very much resembling the apterous viviparous female. Hind tibiae very little swollen, with 5—30 rather large pseudosensoria.

Apterous male.

Morphological characters. Body not broader than the head, resembling that of a larva, very small. Antennae and legs comparatively very long. Antennae as long as or slightly longer than the body, third segment with 17—30 secondary rhinaria, fourth with 13—24, fifth with 7—17, sixth with 0—1. Siphunculi and cauda normal, the latter more triangular and more acute than in the other forms.

Colour orange yellow, with black antennae.

Measurements of one specimen: Length of the body: 0.75 mm; antennae: 0.79 mm; siphunculi: 0.10 mm; cauda: 0.06 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{59}{IV} : \frac{56}{V} : \frac{(56+69)}{VI}$. Rhinaria on the third antennal segment: 18, 21; on the fourth: 15, 17; on the fifth: —, 1.

Foodplant: *Achillea millefolium* L.

Geographical distribution: All over the Netherlands, Italy, Germany, England.

Biology: Lives on the lower leaves of its host, without causing typical malformation. Alatae occur in the 3rd generation only. The sexual forms appear in October. The males are very active, in fact behave so curiously that I did not recognise them as mature aphids at first. They look exactly like larvae of *Macrosiphums*.

f. The Western European species of *Coloradoa* key as follows:

1(2). Processus terminalis about $2^1/_2$ times as long as the base of the sixth antennal segment, more than $1^1/_2$ times as long as the third

antennal segment. Siphunculi distinctly clavate. On *Artemisia absinthium.* *C. absinthii* (Lichtenstein).

2(1). Processus terminalis at most twice as long as the base of the sixth segment, never more than $1^1/_{10}$ times as long as the third antennal segment. Siphunculi cylindrical or swollen, but then just before apex only.

3(4). Processus terminalis only slightly longer than the base of the sixth segment. On *Achillea millefolium.* *C. achilleae* spec. nov.

4(3). Processus terminalis at least $1^1/_2$ times as long as the base of the sixth segment.

5(6). Siphunculi with basal half approximately smooth, towards apex more distinctly imbricated, rather dark. Fifth antennal segment in alatae only rarely with 1—2 rhinaria, usually without. On *Chrysanthemum indicum.* *C. rufomaculata* Wilson.

6(5). Siphunculi with basal part finely imbricated, strongly imbricated towards apex.

7(8). Hairs in front of siphunculi clubshaped. Antennal hairs extremely short. Frontal hairs $^1/_2$—$^3/_5$ of the diameter of the third antennal segment. Fifth antennal segment in alate viviparous female with 2—7 rhinaria. On *Tanacetum vulgare.* *C. tanacetina* (Wlk.).

8(7). Hairs in front of siphunculi shaped like a slightly unfolded fan. Antennal hairs half as long as the diameter of the third antennal segment. Frontal hairs equal to the diameter of the third segment. On *Artemisia vulgaris, A. absinthium* (rarely). *C. artemisiae* (Guercio).

13. **Macrosiphoniella leucanthemi** (Ferrari, 1872).

1872. Ferrari, P. M., Ann. Mus. Civ. Stor. Genova, vol. III, p. 214, *Siphonophora leucanthemi.*

Apterous viviparous female.

Morphological characters. Body rather broadly oval. Body hairs rather long, placed on small, pale scleroites, which are often absent. Antesiphuncular sclerites absent. Frontal tubercles very well developed. Antennae to $1^1/_3$ times as long as the body, third segment with 16—23 rather large tubercular rhinaria on basal half. Antennae pale to blackish sclerotic, but always with the basal $^1/_5$—$^1/_4$ part of the third segment pale. Longest hairs on the third segment $1^1/_3$—$1^1/_2$ times as long as basal diameter of that segment. Rostrum reaching to 3rd coxae, apical segment not very slender, $1^1/_8$ times as long as second joint of hind tarsi. Siphunculi about $^2/_7$ of

the length of the body, thin in the middle, dilated towards base and apex, reticulated on distal $^1/_3$, basal part always pale, remainder dusky to blackish sclerotic. Flange only very slightly developed. Cauda nearly half as long as the siphunculi, about triangular, rather acute, very little sclerotic, with 9—13 hairs. Legs normal; first tarsal joints with 3 hairs.

Colour. Yellowish green, with a darker green to reddish brown bar between the siphunculi, more or less as in *M. tapuskae* (H. & F.). Antennae brown to black with base of segment III pale greenish. Siphunculi dusky to black with pale base. Cauda greenish. Legs with knees and apices of tibiae black.

Measurements of one specimen: Length of the body: 2.68 mm; antennae: 3.61 mm; siphunculi: 0.81 mm; cauda: 0.39 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{98}{IV} : \frac{68}{V} : \frac{(20 + 111)}{VI}$. Rhinaria on the third antennal segment: 19 and 21.

Alate viviparous female.

Morphological characters. Much like the apterous viviparous female, but abdomen with small, little-coloured marginal sclerites and rather narrow antesiphuncular sclerites. Scleroites better visible than in apterae. Antennae more than $1^1/_3$ times as long as the body, third segment with about 50 rhinaria over its whole length! Wings with dark veins, which are very conspicuously bordered with brown, especially the more basal ones.

Colour. As in apterous viviparous female.

Measurements of one specimen: Length of the body: 2.81 mm; antennae: 3.81 mm; siphunculi: 0.84 mm; cauda: 0.39 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{84}{IV} : \frac{64}{V} : \frac{(19 + 108)}{VI}$. Rhinaria on the third antennal segment: 49 and 51.

Hostplant: *Chrysanthemum maximum* D.C., *C. leucanthemum* L.

Geographical distribution: Netherlands, France, Italy.

Biology: This species lives on the underside of the basal leaves of its host, in usually small colonies. It occurs usually in mixed colonies with *M. trimaculata* H.R.L., but though that species forms sexuales in October, I failed to find any sexual forms of this species on *C. maximum*.

Notes: I mistook this species for *M. sejuncta* (Wlk.) when I took two apterae in the garden of the Entomological Laboratory at Paris. Later I collected numbers of it in Holland, but I did not recognise its proper status, until I collected an alate female, the shadowed veins of which showed that it was another species, of which Ferrari gives a very exact

description. It is most closely allied to *M. sejuncta* (Wlk.) and *M. tapuskae* (H. & F.). It shows the colour pattern of the latter species, but the reticulation of the siphunculi is intermediary between the two. Since Ferrari described it, this species apparently has not been refound.

The key in my Monograph of *Macrosiphoniella* (Temminckia III, 1938, p. 8, 9) should be altered as follows:

Apterous viviparous females, p. 7, 8.

29a (29b). Siphunculi more than $^1/_4$ of the length of the body, reticulated on distal $^1/_3$, more than twice as long as the cauda. On *Chrysanthemum maximum, C. leucanthemum. M. leucanthemi* (Ferr.).

29b (29a). Siphunculi less than $^1/_4$ of the length of the body, reticulated on distal $^3/_7$—$^3/_5$, less than twice as long as the cauda.

30 (31). Abdominal hairs etc.

Alate viviparous females, p. 8, 9.

27 (26). Siphunculi with at least the apical $^1/_3$ part reticulated.

27a (27b). Veins of wings conspicuously bordered with black. Siphunculi more than $^1/_4$ of the length of the body. On *Chrysanthemum maximum, C. leucanthemum.* *M. leucanthemi* (Ferr.).

27b (27a). Veins not bordered with black. Siphunculi less than $^1/_4$ of the length of the body.

28 (29). Abdomen with scleroites etc.

Chrysanthemum maximum is not a foodplant of *M. sejuncta* (Wlk.). Confusion with *M. leucanthemi* (Ferr.) made me write this on page 8 [31 (30)] and 9 [28 (29)].

14. **Brachyunguis** Das and **Xerophyllaphis** Nevsky.

B. Das erected his genus for *B. harmalae* Das. This species differs from the species of the genera *Aphis* L. and *Doralis* Leach by the comparatively short processus terminalis, in this case shorter than the base of the ultimate antennal segment. Though I would not always approve of a generic division based on the relative length of the processus terminalis (compare *Cavariella* Del Guercio), it appears that the *Doralis* spp. with relatively short processus terminalis are closer allied to each other, than to normal *Aphis* and *Doralis* spp. After examining *B. harmalae* Das I assign our European *Doralis hartigi* H.R.L. to *Brachyunguis* Das.

Börner supposed that *Xerophyllaphis* Nevsky is a synonym of *Bra-*

chyunguis Das. He founded his opinion on material of some of Nevsky's species, but he did not receive material of the genotype, *X. saxaulica* Nevsky. Undoubtedly many of Nevsky's *Xerophyllaphis* species belong in *Brachyunguis,* but some of the species of his monograph show a feature totally aberrant from *Brachyunguis,* i.e. a strong globular swelling of the clypeus, particularly of the anteclypeus. Nevsky's descriptions and figures record this duly for the genotype and some other species.

Solimans genus *Clypeaphis* is clearly a synonym of *Xerophyllaphis.* Soliman states that his genus is closely allied to *Hyalopterus* Koch, but I cannot agree with that, as *Hyalopterus* belongs to the *Rhopalosiphum*-group, with "dorsally" placed marginal tubercles, whereas *Xerophyllaphis* and *Clypeaphis* have no marginal tubercles at all and ought to be placed in the group of *Hyadaphis* Kirkaldy (*Semiaphis* v. d. Goot, *Lipaphis* Mordv., *Hayhurstia* Del Guercio). Especially *Hayhurstia* is closely allied.

Since 1936 a species of *Xerophyllaphis* has been found repeatedly in my country. It is probably common along all Western-European coasts.

Xerophyllaphis suaedicola spec. nov.

Apterous viviparous female.

Morphological characters. Body elongated oval, rather small, without any local sclerotisation, with few rather short, blunt hairs. Stigmal pori protected partly by the elevated stigmal plate, abdomen seemingly with small marginal tubercles (just as in *Staticobium* Mordv.). Front convex. Antennae about $^1/_2$—$^4/_7$ of the length of the body, processus terminalis at most equal in length to the base of the sixth antennal segment, usually shorter. Antennal hairs $^2/_5$—$^1/_2$ of the diameter of the third segment. Eyes normal, with triommatidion ("ocular tubercle") slightly directed downwards. Clypeus nearly globular, very large, projecting rather far in front of the head. Rostrum just reaching to the hind coxae, apical segment about $^2/_3$ of the length of the long second joint of the hind tarsi. Siphunculi slightly swollen, smooth, constricted just in front of the small flange, about $^1/_{15}$—$^1/_{12}$ of the length of the body, hardly darker than the cauda. Cauda normal, about $1^3/_7$—$1^4/_7$ times as long as the siphunculi, with 6—9 hairs, most of which are remarkably short and stand on the apex of the cauda. Legs rather slender and long, first tarsal joints with 3, 3, 2 hairs.

Colour. Very pale greenish yellow; legs, antennae, clypeus, siphunculi and cauda slightly darker. The whole insect covered with greyish white powder.

Measurements of one specimen: Length of the body: 1.40 mm; antennae:

0.68 mm; siphunculi: 0.10 mm; cauda: 0.15 mm. Proportion of antennal segments: $\frac{100}{III} : \frac{72}{IV} : \frac{76}{V} : \frac{(68+56)}{VI}$.

Hostplant: *Suaeda maritima* L.

Geographical distribution: Netherlands, along the muddy seashore.

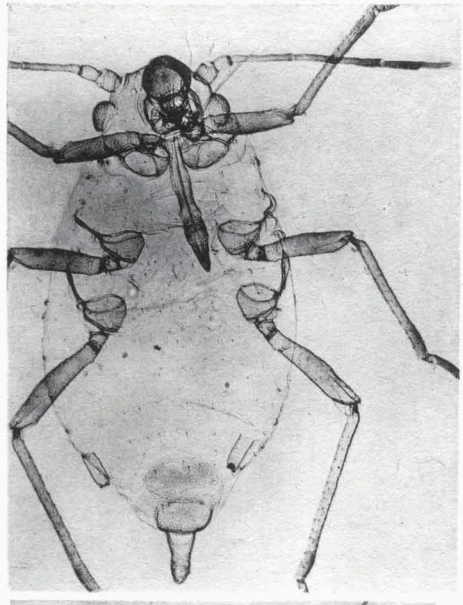
Biology. These aphids are living on the younger stems of their foodplants, very well protected against discovery by the similar colour of their foodplant. They fall off the plants at the slightest disturbance. The colonies found were small. Alatae were not yet seen.

Notes. Clearly this species differ very little from *X. suaedae* (Soliman), which lives on *Suaeda vera* in Egypt. Only the colour and the chaetology of the cauda suggest that our species is different.

Types. The author uses cotypes only. Those of the new species described here are deposited in his collection and in the Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands.

EXPLANATION OF THE PLATE

Fig. 1. *Xerophyllaphis suaedicola* sp. nov., apterous viviparous female, × 50.
Fig. 2. *Caricosipha paniculatae* Börner, apterous viviparous female, × 22.
Fig. 3. *Saltusaphis pallida* sp. nov., apterous viviparous female, × 22.
Fig. 4. *Saltusaphis picta* sp. nov., apterous viviparous female, × 22.
Fig. 5. *Saltusaphis flava* sp. nov., apterous viviparous female, × 22.
Fig. 6. *Schizaphis longicaudata* sp. nov., apterous viviparous female, × 33.



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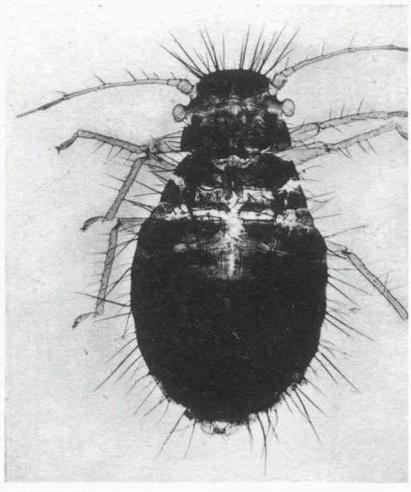

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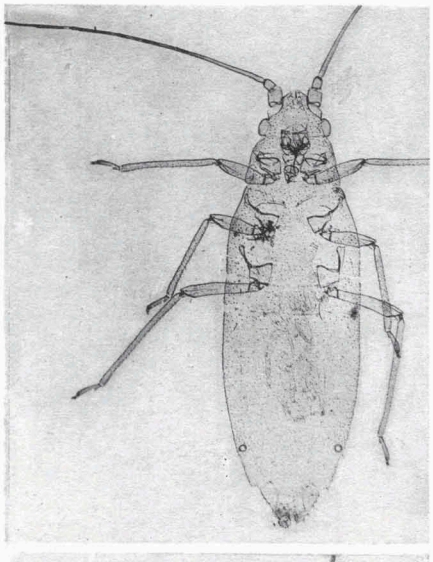

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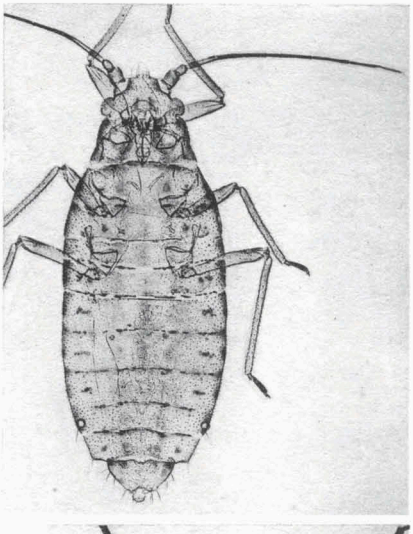

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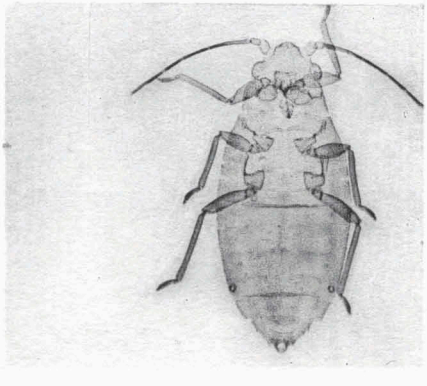

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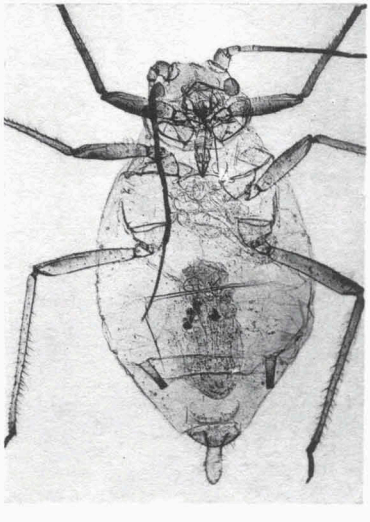

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