Beih. Ber. Naturhist. Ges., 6, Hannover 1968

Pliocene Aphids from Willershausen (Homoptera: Aphidoidea)

Von OLE E. HEIE*)

Five species of aphids have been found in the Pliocene deposits from Willershausen in Germany. Described as new is *Plioaphis subhercynica* n. g., n. sp., whose relation of family is uncertain. The other species belong to 1.) Thelaxidae : Hormaphidinae (1 alate specimen), 2.) Pemphigidae : Schizoneurinae *(Schizoneura ulmi* L., 1 gall on *Ulmus),* 3.) Aphididae s. str. sensu BÖRNER (1 alate specimen) and 4.) Adelgidae (136 alate specimes). The fossil remnants are all described, but with exception of the first named they do not yield sufficient basis for creating new names. Aphididae s. str. and Adelgidae have not previously been recorded from the past.

Through the courtesy of Dr. A. STRAUS and Professor Dr. K. HEINZE the writer received from the Geologischen-Paläontologischen Institut der Universität in Göttingen a collection of freshwater deposits with fossil aphids for description and identification. The material derives from Willershausen, Kreis Osterode/Harz, Germany, and has been deposited as clay in Upper Pliocene. The deposits are rich in fossil insects and other animal and plant remnants (STRAUS 1966). They are between two and five million years old.

I wish to express my sincere thanks to Dr. A. STRAUS and Professor Dr. K. HEINZE for handing the material over to me and to Dr. E. GERSDORF for information concerning geological data.

The present material consists of 55 single clay pieces and pairs of counterparts with a total of 139 specimens of fossil aphids, all alate individuals, and a leaf of an elm *(Ulmus)* with an assumed aphid gall. The material is divided into five species, belonging to Thelaxidae : Hormaphidinae (1 specimen), Pemphigidae : Schizoneurinae (1 gall), Aphididae (1 specimen), Aphidina viviovipara incertae sedis (1 specimen) and Adelgidae (136 specimens) (family names are in accordance with BÖRNER 1952).

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The leaf with the gall and one specimen placed in Aphidina viviovipara incertae sedis are fairly well preserved. The gall-maker has been identified with the still living species *Schizoneura ulmi* L., and the well-preserved alate specimen though not possible to place in a particular family has been referred to a new species and a new genus, *Plioaphis subhercynica* n. sp. on account of a remarkable character. The aphids in the remaining part of the material are so incomplete with regard to important taxonomic characters that they cannot be referred to particular genera, still less species. The visible characters do not justify erection of new genera and species. Detailed descriptions are nevertheless given so that the material may possibly later be identified with species described in the future on the basis of more complete specimens, also because the material is very interesting in so far as Aphididae s. str. and Adelgidae have not previously been recorded from the past.

Though not possible to place in a particular family *Plioaphis subhercynica* is named because it owns an interesting, presumably primitive kind of wing venation, but I desist from creation of other new specific names which only will be a burden in future because attempts to identify new finds on the basis of types selected from the present material will probably turn out to be very difficult or futile. A name has not even been applied for the species within Adelgidae, though more than a hundred specimens are present, partly because the number of characters visible in the individual specimen is very limited, partly because the variation within the material is so excessive that it may be suggested that actually more than one species are involved.

Family THELAXIDAE

Hormaphidinae sp.

The present material

630—1 (14645)*): Alate specimen viewed from the dorsum. Not well preserved. Few details visible.

Description of the present material

Alate morph (fig. 1, plate 2)

Body 1,2 mm long (but abdomen perhaps shrivelled) and about 0,8 mm wide across mesothorax, the widest part, consequently of a very compact shape.

*) All fossils described here have the numbers of the original catalogue of the Geologic-Palaeontologic Institute of the University of Göttingen, where they are kept. The numbers in ( ) are those in the catalogue of Dr. A. STRAUS, Berlin, when he is the finder. When someone else is the finder the name appears in brackets, too. Dr. STRAUS and Mr. O. KLAGES, Königslutter, Germany, have given their finds to the above-mentioned institute. The editor.

Width of head across eyes 0,46 mm. Head and thorax are black, abdomen light brown, legs pale.

Frons rounded. The compound eye not particularly large, diameter 0,09 mm; indication of a hardly projecting ocular tubercle visible in the left side. Antennae and rostrum not visible. Mesothoracic lobes apparently not developed. Fore wing 1,9—2,0 mm long and 0,78 mm wide; radial sector and media difficult so see; the main vein and the cubitus-branches are dark and distinct; cubitus 1 and 2 leave the main vein at the same point, having a very short (0,03 mm long) common base; pterostigma long and narrow, not particularly dark. Hind wings not distinct. Legs rather short and strong; only one fore leg and part of presumably one hind leg visible; lenghts in mm: fore femur 0,25—0,30, fore tibia about 0,3. Abdomen only 0,5 mm long, but perhaps it has shrivelled; basal width 0,65 mm.

Notes

The venation of the fore wing and the compact shape of the body make it probable that this specimen belongs with Hormaphidinae. Too few details are visible for identification to genus, still less species. With regard to general appearance it somewhat resembles the fossil genus *Antiquaphis* HEIE from Baltic amber, but decisive characters as the venation of the hind wing and the morphology of the antennae cannot be made out.

Family PEMPHIGIDAE

Schizoneura ulmi (LINNÉ, 1758)

The present material

630—2 (5778): Leaf of elm *(Ulmus)* with gall. Well preserved.

Description of the present material

Gall (fig. 2, plate 1)

The leaf at least 7 cm long. The right half has a normal, flat appearance, whereas the left half of the leaf is folded down marginally, apparently curled downward — seeming narrower than the right half, half as wide —, and additionally with undulating surface, the intervals between the middle veins bulging upward. The whole leaf is light brown, being darkest in the right side of the right half. Minor, irregularly delimited, even darker markings do occur here and there, however, for instance on the supposed gall, the surface of which by the way belongs to the palest portion of the leaf.

Notes

The leaf deformity described very much resembles the gall of *Schizoneura ulmi* L. fossilis which lives in Europe today with host alternation between *Ulmus* and roots of *Ribes*. The identification must be given with certain reservations because the gall-maker itself is not available for observation, nor the very curling up of the leaf. In nature it is possible to find leaves of elm, one half of which is slightly folded downward for other reasons, but I agree in the identification, which was made by Professor Dr. K. HEINZE before the material was sent to me.

Family APHIDIDAE

Aphididae sp.

The present material

630—3 (14605 und a): Two counterparts, of which one (a) is the more distinct one. Alate specimen in a lateral view.

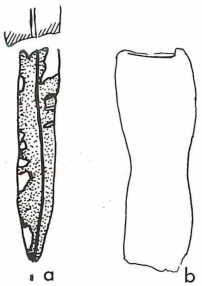
Description of the present material

Alate morph (fig. 3—5, plate 3; fig. 6, plate 2; fig. 7, text)

Body lenght about 2,6 mm. Colour brown or brownish black. The darkest parts are: distal half of femur, knee, distal third or half of tibia, tarsi, antennae, apex of rostrum, head, thorax, siphunculi, pterostigma, and veins of fore wing.

Frons convex, without tubercles, fig. 3. Compound eye large; ocular tubercle not visible. Antennae little shorter than body, both of them being visible, though not in their total length; 1,85 mm is left of one, at best to be studied in 630—3 (fig. 6 a), with Ist and IInd segments visible, and 2,03 mm of the other, at best to be studied in 630—3 (a) (fig. 6 b), with more distinct segment limits visible in the flagellum (IIIrd through VIth segments), though the distal part of this antenna can only be seen in 630—3, apparently broken apically. Judging from the proximal part of one antenna and the distal part of the other the antenna is 6-segmented, the segments having the following lenghts in mm: I 0,08, II 0,06, III 0,58—0,60, IV 0,13, V 0,10, VI a about 0,16, VI b at least 0,92 (broken); diameter of IIIrd segment at base 0,09 mm, diameter of processus terminalis 0,015 mm; rather large, oval or subcircular secondary rhinaria distinctly observable on IIIrd and IVth segments, but the number of them cannot be given, exactly, because fragments of the segments are lacking; the number approximates 20 or 30 on IIIrd segment, and 5 on IVth segment; secondary rhinaria perhaps also occur on Vth segment, but it cannot be decided with certainty; most of the rhinaria of IIIrd segment are situated close together along one side from base to apex, irregularly, not in line, being especially numerous in a broad zone on the basal fourth of the segment (fig. 6); as appearing from fig. 6 they do not have uniform size. Rostrum is relatively long, 2,1 mm, reaching to the middle of

Fig. 7



abdomen; apical segment 0,4 mm long and 0,05 mm wide in the middle (fig. 7 a), consequently of slender shape, much darker than the basal parts of rostrum. Both fore wings curled or folded distally so that it is difficult to find their correct length and the exact shape of their veins; they are at least 0,9 mm long and 0,39 mm wide; radial sector is broken and indistinct, starting either from the middle of pterostigma or from the distal half of pterostigma; media also broken and deformed; on one wing on 630—3 (a) (the upper one in fig. 3) it appears to be unbranched, whereas apparently two veins occur in the place where to expect the radial sector only, but on the counterpart 630—3 one of these last mentioned veins obviously is a branch of media, which consequently must have at least one fork (fig. 4); this fork ist dimly visible on the other fore wing of the insect, where even one fork more seems to be present for which reason the reconstruction drawn of the fore wing (fig. 5) shows two media forks, the last, somewhat dubious, branch only dotted, however; the two cubital branches leave the main vein from separate points and are both relatively straight. Hind wings not visible. Legs long and slender; some lengths in mm: fore femur 0,65, fore tibia 1,37, fore tarsus about 0,14, middle tibia 1,4—1,5; fore femur is about 0,10 mm thick in the middle. It is impossible to examine the abdomen in detail. Two oblong dark spots may be interpreted as 0,39 mm long, nearly black, subcylindrical siphunculi (fig. 7 b), faintly constricted in the middle and a little swollen near apex; diameter at base 0,10 mm, in the middle 0,09, near apex 0,11, at the very apex 0,10; without flange. Cauda not visible.

Notes

The length of processus terminalis and the shape of the secondary rhinaria show that this aphid does not belong with the families Thelaxidae, Pemphigidae, or Lachnidae. The assumed siphunculi in combination with the morphology of the antennae make probable its belonging in Aphididae s. str., which until now have not been established in the fossil state (HEIE 1967).

The strong IIIrd antennal segment, number, appearance and arrangement of the secondary rhinaria, and shape of siphunculi all together are characters

occurring in combination in recent aphids within Pterocommatinae, but the apical segment of rostrum has a shape deviating from the normal one within this subfamily. So do the shape of processus terminalis and the dark colour of the siphunculi. The fossil presumably belongs in another taxon within Aphididae. The specimen may on account of the numerous rhinaria be interpreted as a male, but the few visible details do not permit any decision.

APHIDINA VIVIOVIPARA INCERTAE SEDIS

Plioaphis subhercynica n. gen. et n. sp.

The present material

630—4: Alate specimen in a dorsal view. It originates from the private collection of Mr. Otto KLAGES, Königslutter, Germany, who most kindly has given it to the Göttingen Collection, where it is kept now. Holotype fig. 8 (plate 2).

Description of the genus *Plioaphis*

Frons with a median and probably also a pair of low lateral tubercles. Media in fore wing sometimes with two forks, sometimes with only one fork. Radial sector almost straight and arising from the basal half of pterostigma though near the middle of it. Cubital branches leave the main vein close to each other. Cauda rounded.

Typus generis: *Plioaphis subhercynica* n. sp. (fossil).

Notes: Only one species is known. It is different from any aphid familiar to me with regard to combination of venational characters.

Description of *Plioaphis subhercynica* n. sp.

(named after the locality on the request of the collector, Mr. Otto KLAGES)

Alate morph (the type) (fig. 8)

Body 2,7 mm long, 1,37 mm wide across abdomen, which is the widest part. Width of head across eyes 0,51 mm. Head and body black, antennae and legs brownish. Bristles not visible.

Frons as described above; it is not possible to say with certainty that lateral tubercles are present because parts of the forehead perhaps are lacking. Eyes large; limits indistinct so that it is impossible to decide if ocular tubercles are present or absent. Fragments of rather thick antennae present, only 0,5 mm in one side and 0,7 mm in the other side, presumably broken between IIIrd and IVth segment or in the distal part of the IIIrd segment. Length of Ist segment 0,04 mm, of IInd segment 0,03 mm. Diameter of IIIrd antennal segment about

0,05 mm, this segment with numerous brownish spots or transverse stripes, which may be secondary rhinaria. Rostrum not visible. Fore wing 3,9 mm long, 1,6 mm wide; pterostigma pointed; radial sector leaves its proximal half; media with two forks in the right wing, in the left one only one fork; the proximal part of media is indistinct; the area between the anterior edge of the wing and the main vein is brown like pterostigma; cubitus 1 and 2 leave the main vein almost at the same point. Hind wing not distinctly visible. Fragments of legs are faintly indicated. Abdomen egg-shaped. A couple of lateral, 0,9 mm long, faintly indicated, cylindrical, only 0,06 mm thick appendages apparently arise from the posterior third of the abdomen; they cannot be identified with legs, as both the middle and hind legs are visible in the right side; they may be interpreted as parts of the siphunculi or the main veins of the hind wings. Cauda broadly rounded.

Notes

Only in *Mindarus* KOCH and some extinct aphid genera within Callaphidae (*Siphonophoroides* BUCKTON, *Aphidopsis* SCUDDER) and the Jurassic *Genaphis* HANDLIRSCH the radial sector leaves pterostigma in a more proximal point, probably a very primitive character. *Plioaphis* is not related to *Mindarus*, however, as its pterostigma is not curved. It is not possible to say if *Plioaphis* resembles any extant group within Aphidina viviovipara more than any other group, because antennae, rostrum, legs, abdominal tubercles, and siphunculi are unknown or only little known.

In the venation and shape of the left wing, the body shape, and antennal segment III it shows a superficial similarity to *Schizoneura* and other pemphigids, but the shape of the frons and the venation of the right wing are more alike species within Aphididae s. str. (sensu BÖRNER 1952) or Callaphididae, and this assumption will be further certified if long, slender siphunculi will be found with certainty in the future in additional material.

Family ADELGIDAE

Adelgidae sp.

The present material

A total of 136 alate specimens on 6 pairs of counterparts and 45 single pieces of clay. Most specimens are incompletely preserved, more or less defective, and some of them have even only been identified with adelgids with doubt.

630— 5/630— 13 (3676) : 9 specimens

630— 14/631— 22 (9534 a) : 9

630— 23 (10847) : 1

630— 24 (10857) : 1

630— 25/630— 31 (10926) : 7

630— 32/630— 34 (10963) : 3 (labelled as Adelginae by Dr. K. HEINZE)

630— 35/630— 38 (11701 a) : 4 630—36 = fig. 11: 2nd from left

630— 39/630— 44 (11877) : 6 (only one fore wing present of one of them)

630— 45 (12528) : 1

630— 46/630— 48 (13518) : 3 (all dubious; they are unusually broad; unfortunately they are more or less defective, and only few details are visible)

630— 49/630— 50 (13835) : 2

630— 51/630— 52 (13923) : 2

630— 53/630— 54 (13959/a) : 2 (two counterparts)

630— 55/630— 56 (13987/a) : 2 (two counterparts)

630— 57/630— 62 (14096) : 6

630— 63/630— 64 (14101) : 2

630— 65/630— 66 (14102) : 2

630— 67 (14261) : 1

630— 68/630— 72 (14277) : 5 (only one fore wing present of one of them)

630— 73 (14481/a) : 1 (two counterparts)

630— 74/630— 75 (14488/a) : 2 (two counterparts) fig. 12 (plate 1)

630— 76 (14491) : 1

620— 77 (14492) : 1

630— 78/630— 81 (14537) : 4 (one of them dubious, indeterminable)

630— 82/630— 84 (14589) : 3 fig. 13 (plate 1)

630— 85/630— 86 (14607) : 2

630— 87 (14635) : 1

630— 88 (14637) : 1

630— 89/630— 91 (14638) : 3

630— 92 (14639) : 1 (together with plant remnant, perhaps needle)

630— 93/630— 98 (14640) : 6 (together with plant remnant, e. g. a needle 14642)

630— 99/630—104 (14643) : 6 (dubious)
630—105/630—110 (14644) : 6 (one of them dubious, indeterminable)
630—111/630—112 (14646) : 2
630—113 (14647) : 1
630—114/630—115 (14648) : 2
630—116 (14650) : 1 (dubious)
630—117 (14651) : 1
630—118 (14827/a) : 1 (defective; two counterparts)
630—119 (14851) : 1 (dubious)
630—120 (14854) : 1
630—121 (14855) : 1
630—122/630—123 (14867) (14868) : 2
630—124/630—125 (14876) : 2
630—126 (14877) : 1
630—127/630—131 (15065 a) : 5 (only one fore wing present of one of them; two counterparts)
630—132/630—133 (16853) : 2
630—134/630—136 (KLAGES 1) : 3
630—137 (KLAGES 2) : 1
630—138 (KLAGES 3) : 1
630—139/630—140 (KLAGES 4) : 2

Description of the present material

Alate morph (fig. 9—13)

630—36 (11701 a), specimen no. 2: fig. 11 (plate 1), fig. 9 (plate 3), fig. 10 (plate 2)

This individual aphid is the specimen best preserved in the collection and also it is one of the largest, so it shall be described separately.

Body 2,9 mm long, 1,0 mm wide across thorax and 1,1 mm wide across abdomen. Width of head across eyes 0,63 mm. Colour black or blackish brown.

Compound eye large, diameter in longitudinal direction 0,17 mm, with indication of ocular tubercle (fig. 10, right side). Antenna 0,55 mm long, 5-segmen-

ted, apparently with well defined processus terminalis[1]) with three apical hair-bases; lengths of segments in mm in the right antenna: I 0,07, II 0,06, III 0,11, IV 0,15, V a 0,09, V b 0,07; in the left antenna: I 0,07, II 0,06, III 0,12, IV 0,15, V ?; diameter of V a where it is broadest 0,05, diameter of the supposed processus terminalis (V b) 0,03 mm. Rostrum cannot be studied. Fore wing 3,2 mm long and 1,4 mm wide; venation easy to examine in both wings (fig. 9); only three veins leave the main vein, all unbranched and nearly straight; cubitus 2 curved at base. Hind wing about 2 mm long, with main vein and one indistinct, oblique vein. Legs short and strong, only rudiments left; fore tibia about 0,45 mm long. Abdomen with nearly parallel margins. No siphunculi.

Supplementary information on the basis of the remaining material fig. 12—13.

The body length varies in the main part of the material between 1,6 and 2,7 mm. A few smaller specimens seem to have been shrivelled or lost parts of the body. The usual size of complete individuals is 1,8—2,2 mm. The width of abdomen goes from 0,6 to 1,3 mm, usually about 40% of the length, and thorax is only a little narrower. Width of head between 0,4 and 0,65 mm. Antenna usually about 0,4 mm long, but it is visible in only few specimens. The lengths of the segments of flagellum in one specimen on piece no. 14607 in mm: III 0,09, IV 0,11, V 0,11. Length of fore wing between 2,5 and 3,1 mm, width 1,3—1,4 mm. Hind wings not visible. Venation of fore wing very indistinct in many specimens. Only the main vein is always easy to see, and it is characteristic that the distance between the main vein and the anterior margin of the wing is rather long (up to 0,3 mm in 630—76). In some individuals it is possible to see that abdomen at the posterior end is broad, but tapering.

Notes

Venation and antennal morphology show that these fossils belong in the family Adelgidae. Fossil adelgids have not been recorded before (see HEIE 1967). Compared with modern representatives they are remarkably large, but the size alone does not justify erection of a new taxon, species or genus, as the body length in the present material varies to such a degree that the smallest individuals are smaller than the largest adelgids of present time. The best preserved specimen, 11701 a—no. 2, apparently has a well developed, though short processus terminalis, which, however, seems to be lacking or extremely short in the other individuals just as in modern adelgids. Contrary to recent adelgids the abdomen of the fossil species was very dark-pigmented judging from its dark brown to black colour.

[1]) Possibly only the apical part of Vth segment of a „normal" *Sacchiphantes*-antenna which seems to be narrower than the basal part because the nearly terminal rhinarium cannot be seen in the fossil specimen.

I recede from giving a specific name to this fossil species, because only few characters can be seen, whereas many characters of taxonomic importance are unknown, e. g. characters showing to what genus among those created by splitting of the old Linnean genus „*Chermes*" it belongs or is most related, also because the variation within the sample ranges to such a degree that it may be guessed that more than one species are involved, though separation of morphologically well defined groups of specimens cannot be performed on account of the few distinctly visible characters of the individual specimen.

The family Adelgidae lives exclusively on coniferous trees in the present time, so the fossil adelgids must have fed on coniferous trees, too. Coniferous trees which may have been the hosts really did occur in the neighbourhood of the Pliocene pond judging from the occurrence of cone seeds and needles in the layers where the adelgids have been fossilized so abundantly.

Pliozäne Blattläuse von Willershausen (Homoptera: Aphidoidea)

Es wurden 139 fossile Blattläuse, sämtlich geflügelt, aus der Tongrube von Willershausen (Kr. Osterode/Harz) bearbeitet. Sie befinden sich auf 55 Tonplatten und Paaren von Gegenabdrücken. Dazu kommt ein Ulmenblatt mit einer Blattlaus-Galle. Diese war von Dr. K. HEINZE bereits vor Beginn meiner Untersuchungen als von *Schizoneura ulmi* L. verursacht bestimmt worden.

Die 139 Blattläuse werden beschrieben und eingeordnet. Benannt wird *Plioaphis subhercynica* n. gen., n. spec. Ihre Familienzugehörigkeit ist unsicher. Das auffälligste Merkmal: Der Radialramus entspringt in der proximalen Hälfte des Pterostigmas, weisen in ähnlicher Ausbildung nur noch die rezente Gattung *Mindarus* KOCH und ausgestorbene Gattungen aus dem Jura und dem Tertiär in Europa und Nordamerika auf. Jedoch entspricht das Pterostigma in der Form nicht dem von *Mindarus*, weshalb keine nähere Verwandschaft mit dieser zu vermuten ist. Andere Merkmale von *Plioaphis* erinnern an die Pemphigidae und andere an die Aphididae s. str. (sensu BÖRNER) oder an die Callaphididae. Hinzu kommt, daß manche Körperteile fehlen. Im Hinblick auf die Kombination der Charaktere nimmt diese pliozäne Art sowohl unter den rezenten als auch unter den fossilen einschließlich der anschließend aufgeführten eine so deutliche Sonderstellung ein, daß die Benennung gerechtfertigt ist.

Bei den restlichen Fossilien wird trotz der vorgenommenen Einordnung in das System von der Errichtung neuer Genus- und Species-Bezeichnungen Abstand genommen angesichts des Erhaltungszustandes. Denn dieser läßt es kaum oder gar nicht zu, aus dem Material Typen für weitere Funde heranzuziehen. Folgende Zuordnungen konnten vorgenommen werden:

1. 1 Ex. zu den Thelaxidae: Hormaphidinae. Es steht vielleicht der Gattung *Antiquaphis* HEIE aus dem Baltischen Bernstein nahe.

2. 1 Ex. zu den Aphididae s. str. sensu BÖRNER und gehört vermutlich zu den Aphidinae, obwohl gewisse Merkmale auf die Pterocommatinae deuten.

3. 136 Exemplare zu den Adelgidae, also zu der Familie, die früher nur als eine Gattung: *Chermes* L. angesehen worden war. Das Material läßt jedoch kein zweifelsfreies Urteil darüber zu, ob alle beschriebenen Exemplare nur einer einzigen Art angehören; denn nicht alle lassen alle hierfür heranzuziehenden Merkmale erkennen. Andererseits ist die Variationsbreite innerhalb des Materials so groß, daß das Vorliegen mehrerer Arten nicht ausgeschlossen werden kann.

Fossile Aphididae s. str. und Adelgidae sind bisher nicht bekannt geworden. Bezüglich der Nährpflanzen ergibt sich aus dem Dargelegten ein auffallendes Überwiegen von Nadelholzbewohnern, da nichts dagegen spricht, daß die Adelgidae im Oberpliozän schon ausschließlich auf solchen gelebt haben, wie dies heute der Fall ist. Den einzigen sicheren Nachweis für das Vorkommen von Laubholzbewohnern hat die Ulmen-Blattgalle erbracht.

Fig. 1 (plate 2): Hormaphidinae sp., alate specimen; width of head 0,46 mm, body length about 1,2 mm: no. 630—1 (14645).

Fig. 2 (plate 1): Leaf of *Ulmus* with deformity identified as gall of *Schizoneura ulmi* L. 630—2 (5778), Foto RIEK.

Fig. 3 (plate 3): Aphididae sp., alate specimen; body length about ca. 2,6 mm. The wings are distally curled and folded. 630—3.

Fig. 4 (plate 3): Aphididae sp. Fore wing of counterpart 630—3, corresponding to the upper wing in fig. 3. Apex to the night. Anterior edge down.

Fig. 5 (plate 3): Aphididae sp. Reconstruction of the fore wing.

Fig. 6 (plate 2): The Antennae of Aphididae sp.
a) One antenna of counterpart 630—3 (14605).
b) The other antenna of counterpart 630—3 (14605 a).
c) Reconstruction of antenna on the basis of a) and b), with regard to processus terminalis also of antenna b) of counterpart (14605).

Fig. 7 (in the text): Aphididae sp.
a) Apical segment of rostrum.
b) The supposed siphunculus in a lateral view, apex up.

Fig. 8 (plate 2): *Plioaphis subhercynica* n. g., n. sp. Body length 2,7 mm.

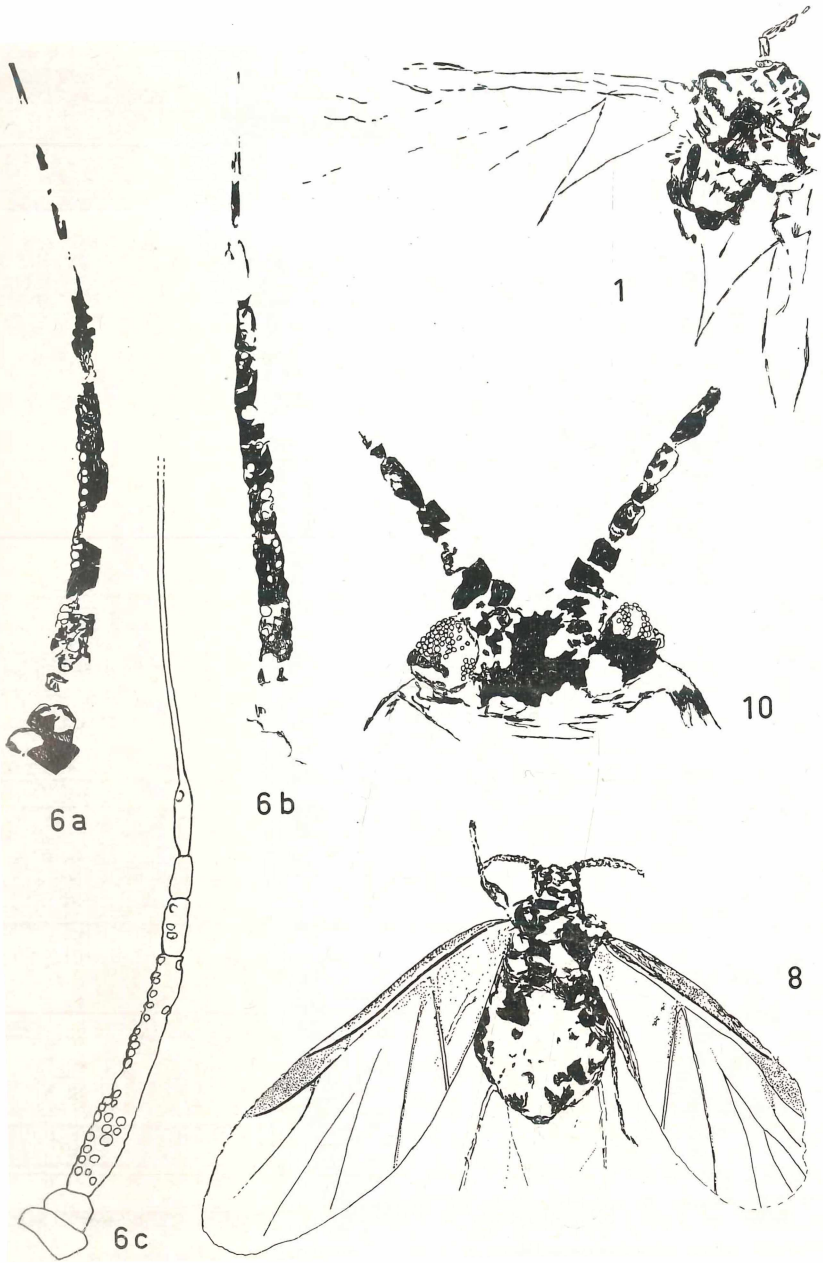
Fig. 9 (plate 3): Adelgidae sp., alate specimen; body length 2,9 mm, 630—36 (11701 a), see fig. 11.

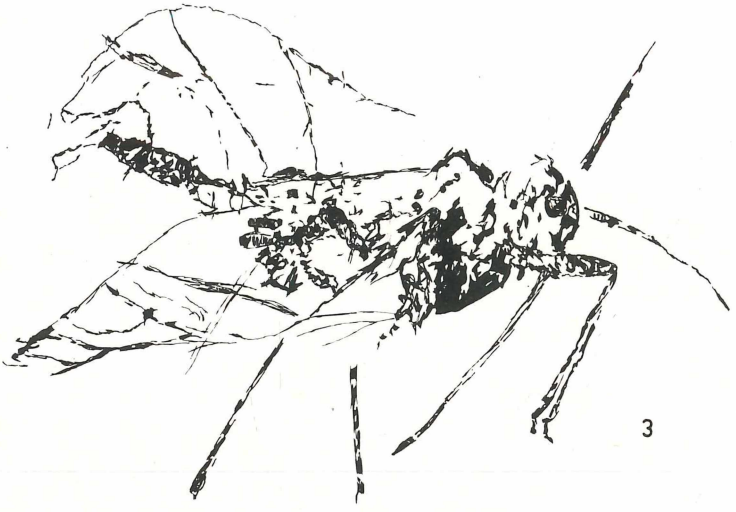
Fig. 10 (plate 2): Adelgidae sp., Head and antennae of specimen 630—36. Width of head across eyes 0,63 mm.

Fig. 11 (plate 1): Adelgidae sp. Piece 630—35 — 630—38 (11701 a) with four specimens. The specimen depicted in fig. 9 and 10 is number two from the left. (A. STRAUS fot., x 2½).

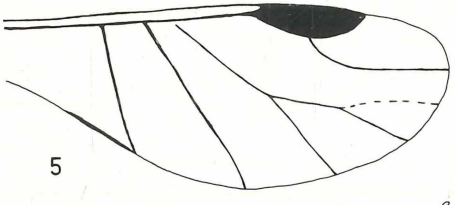
Fig. 12 (plate 1): Adelgidae sp. Two alate specimens on two counterparts (630—74 — 630—75; 14488 and 14488 a) (A. STRAUS fot., x 2½).

Fig. 13 (plate 1): Adelgidae sp. Three alate specimes 630—82 — 630—84 on one piece (14589) (A. STRAUS fot., x 2½).


1
10
6a
6b
6c
8



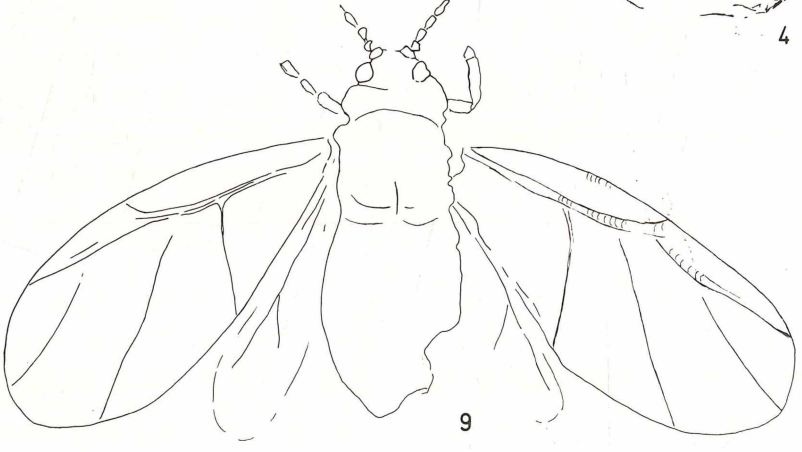
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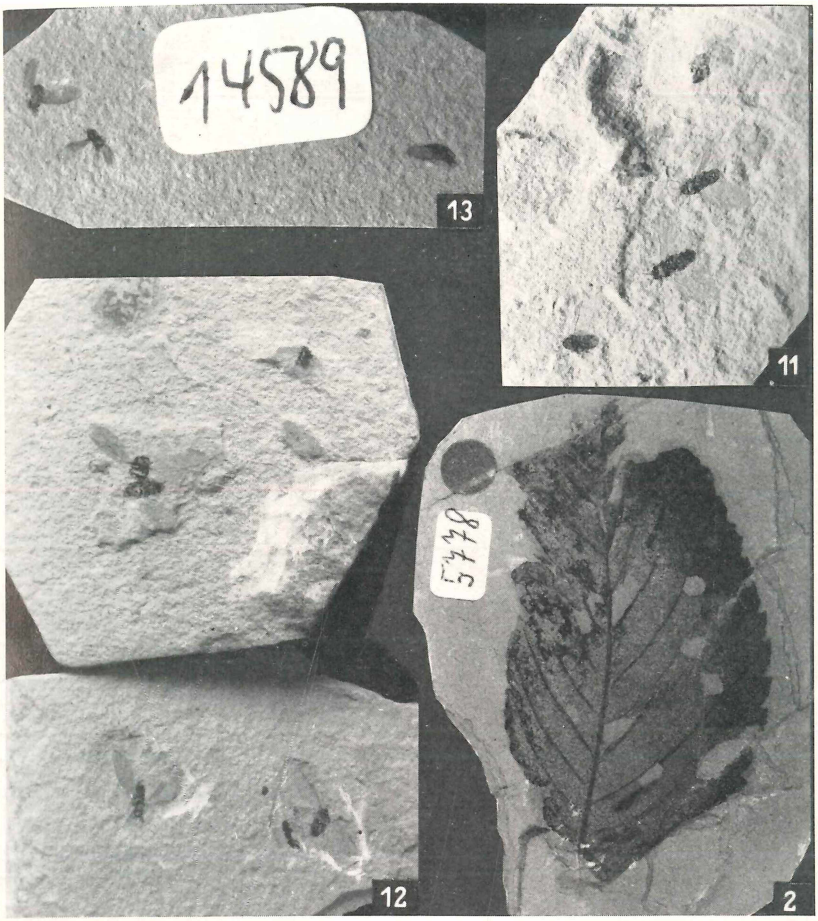
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4



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Zoologisch-Botanische Datenbank/Zoological-Botanical Database

Digitale Literatur/Digital Literature

Zeitschrift/Journal: Berichte der Naturhistorischen Gesellschaft Hannover

Jahr/Year: 1968

Band/Volume: BH_6

Autor(en)/Author(s): Heie Ole E.

Artikel/Article: Pliocene Aphids from Willershausen (Homoptera: Aphidoidea) 25-39