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## The identity of *Dysaphis chaerophylli* BÖRNER, 1940 (Homoptera, Aphididae)

by

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BÖRNER (1940) described *Yezabura chaerophylli* as follows: « Weicht von *Y. communis* MORDV. durch lange und feingespitzte Rübo ab. Pleurbo. d. Junglv. a. Mt.-u. Htbr. je 2-3, sonst je 1 Paar. Faltengallen an Apfelblättern u. untere Blattscheiden u. Wurzelstock v. *Chaerophyllum* ».

For the understanding of this kind of diagnosis one first has to find out what BÖRNER understands as *Y. communis* (MORDV.), a problem which is far from easy. In 1931 BÖRNER erects the genus *Dysaphis*, with *Dentatus communis* MORDV. as type. Dr. Shaposhnikov by letter pointed out to me that the material of *communis* MORDV. is a mixture of several species. But as MORDVILKO (1929) stated that the species does not migrate, he considers *communis* MORDV. a synonym of the non-migrating *Aphis devector* WLK., 1849, a very logical conclusion. The real type of *Dysaphis* BÖRNER, 1931 would then be *Aphis devector* WLK.

BÖRNER in BÖRNER & SCHILDER (1931) writes that *Dysaphis communis* migrates from *Pirus malus* to *Anthriscus silvestris* and *Chaerophyllum bulbosum*. In the following paragraph he writes that *D. angelicae* (KOCH) from *Angelica silvestris* differs from *D. communis* (MORDV.) by slightly longer hairs. As the hairlength in *angelicae* is well known, we can estimate what in 1931 BÖRNER understood as *D. communis* (MORDV.). It must have been the insect migrating to *Anthriscus* and not the one going to *Chaerophyllum*, which has much longer hairs. In 1950 BÖRNER gives the name *Dysaphis anthrisci* to the species migrating from apple to *Anthriscus*. The sum total of the diagnostic characters in 1950 is: « Sie ist von *D. radicola* MORDV. und *D. chaerophylli* CB. 1940 sowie von *D. hirsutissima* CB. 1940 durch die relative Länge der Fühler u. Rückenborsten spezifisch unterschieden ». Anyhow we know that BÖRNER writing about *communis* MORDV. in 1940 meant

the species which in 1950 he gave the name *anthrisci* BÖRNER, and not the one which in 1950 he identified with *radicola* MORDV. (= *radicola* MORDV., 1897). This is further confirmed in BÖRNER's 1952 paper.

In BÖRNER (1952) we find no further characters, but as host plants of *chaerophylli* BÖRNER the plants *Chaerophyllum temulum*, *Ch. bulbosum* and *Ch. hirsutum* are mentioned, besides apple as winter host. In BÖRNER & HEINZE (1957) *D. anthrisci* BÖRNER is said to have slightly longer, blunted, dorsal hairs than *D. radicola* (MORDV.). *D. chaerophylli* (BÖRNER) is said to have longer and finely pointed hairs. No further data on the morphology have been published by BÖRNER.

From Switzerland among others 18 samples from apple, spring migrants collected in 1950, 1957 and 1958 are available. Of 6 of these samples also the results of transfer experiments to *Chaerophyllum hirsutum* are present, including alatae of the 4th generation. Of the 91 alatae none has rhinaria on the Vth ant. segment. The embryos inside the alate migrants, as well as inside the apterous exules and the alate exules, have the marginal hairs on abd. tergites II-IV between 0.052 and 0.060 mm long. All the hairs on IIIrd ant. segment are very fine with fine apices and the longest hairs are 0.052-0.075 mm long. Additional pleural hairs on the meso- and metanotum are irregularly present. This material gives the appearance of representing one quite homogeneous species.

After a superficial examination of BÖRNER's type slide it was found that this material varied considerably more than the Swiss material, than British specimens donated by Dr. H.L.G. STROYAN, than Russian material presented by Dr. G.H. SHAPOSHNIKOV and than specimens identified as *D. chaerophylli* by BÖRNER and received from Dr. C. BÖRNER in 1951. The variation was so great that it was necessary to study the problem in more detail.

Prof. Dr. H. SACHTLEBEN most kindly sent me the whole BÖRNER material of *D. chaerophylli*, consisting of 8 slides, including the type slide, and a number of tubes with pickled material, with the consent to make slides from the material in alcohol. Fortunately of nearly all samples from which BÖRNER made slides also alcoholic material was present. All the labels are in BÖRNER's handwriting. The material is the property of the Deutsches Entomologisches Institut, Berlin.

1. The type slide. This contains 4 apterae viviparae, 3 alate viviparae and a number of larvae. It has a red label "*Dysaphis/chaerophylli/CB 1940/Typen*" and a white label "*Chaeroph. temul./Kösen 9.VI.32/Dysaphis/N37 Anuraphis*". The mounting medium is full of lactic acid needles and as the slide was not full of air we may assume that it was made long after 1932, when BÖRNER began using rather satisfactory methods for making permanent mounts.

The hairs on the antennae of the alatae vary in length. In two specimens the hairs on the IIIrd ant. segment are partly blunt and not more than 0.022 mm long, in the third they are up to 0.059 mm

long and very fine. Corresponding variation occurs in the hairs on the tibiae. The apterae are also variable. The longest hairs on IIIrd ant. segment measure about 0.043 mm in one specimen, but 0.059 mm in three others. The larvae consist of a very odd mixture. The largest larva is either *Anuraphis subterranea* (Wlk.) or *A. farfarae* (Koch); the spinules on the siphunculi exclude all doubt. The marginal hairs in larvae I and II vary. In some that have flat-topped marginal tubercles they are about 0.048 mm, in others with more round-topped or conical marginal tubercles they are about 0.035 mm and in a few with more or less round-topped marginal tubercles those hairs and also the hairs on IIIrd ant. segment measure less than 0.009 mm!

It is quite clear from the data given above that the type slide holds material of several species of *Dysaphis* and one species of *Anuraphis*. Therefore I select a lectotype and I choose the alata in the upper right hand corner of the coverslip, with on the IIIrd ant. segment hairs with a maximum length of 0.059 mm as type. This specimen agrees in most characters with the Swiss material of which we know that it hibernates on apple and goes to *Chaerophyllum*, and with the British material, also in the number of its antennal and dorsal hairs. The other alatae and the apterae with medium long hairs might be of *D. anthrisci* BÖRNER.

The contents of a tube with pickled material may contribute to an explanation. This tube holds two labels. On one there is "Sammlung Lutz/Sendung 1932/nr. 85 d. Liste", on the other "*Chaeroph. hirsut.*", with on the reverse "Köse 9.6". It holds typical alate *D. chaerophylli* (BÖRNER), alate (?) *D. anthrisci* BÖRNER and numerous apterae that are almost all *D. chaerophylli*. The interesting matter is the host plant, given as *Chaerophyllum hirsutum*, whereas on the type slide one finds *Ch. temulum*. I have no doubt that the label on the type slide was written several years after that in the tube, and therefore I believe that the aphids were collected from what was thought to be *Chaerophyllum hirsutum* only.

*Chaerophyllum temulum* and *Ch. hirsutum* are so very different that confusion is excluded. But *Chaerophyllum hirsutum* resembles *Anthriscus silvestris* often very strongly. I myself would not have been able to identify plants without flowers where they grew mixed, if Dr. WILDBOLZ had not pointed out to me the scattered hairs on the under sides of the leaves in *Ch. hirsutum*. Though BÖRNER was an excellent botanist, he sometimes made, like myself, serious errors in the identification of his plants (cfr. the confusion about the original host of *Volutaphis centaureae* BÖRNER, 1952, nr. 430) and besides, he did not collect the material.

2. Slide labelled "*Chaeroph. temul./Güssing. Wurzel/Stock 20.7. 1941/Dysaphis*". Contains two alatae and two apterae viviparae. The alatae have the hairs on IIIrd ant. segment not longer than 0.026 mm, and the marginal hairs on an embryo inside one alata are about 0.043 mm. In the apterae the hairs on IIIrd ant. segment measure up to 0.045 mm.

Here also there is a corresponding tube, with the label "*Chaeroph. bulbos./Wurzelstock*", with on the reverse "Gewachst/Güssing 20.7. 1941". There is no doubt that the animals from BÖRNER's slide go with those in the tube. But once more there is a mix-up in the host plants. And again we might suppose that *Anthriscus* was mistaken for *Chaerophyllum bulbosum*. Almost every botanical manual writes that *Ch. bulbosum* resembles *Anthriscus silvestris* strongly, but may easily be recognized by the fruits. But what if there are no fruits? Also in this case I believe that the slide contains *D. anthrisci* BÖRNER.

3. Slide labelled "*Chaerophyll./temulum/Stengelgrund/Juni 1941 Nbg*". The corresponding tube contains a label with the same data. The two apterae are long-haired aphids, with the longest hairs on IIIrd ant. segment about 0.060 mm. But one alata has these hairs about 0.043 mm, the other alata at most 0.026 mm long, although its hairs on IIIrd abd. tergite are up to 0.043 mm, about 30 % shorter than those in the first alata. Three alatae mounted from the tube belong to the type with medium long antennal hairs. The tube contains almost only alatae. That would be unusual for a field sample, and therefore this probably represents a culture, which is also suggested by the small size of the apterae. As nymphs will reach maturity on any host we may still guess from what plant the culture was started. The apterae apparently are *D. chaerophylli* (BÖRNER), the alatae *D. anthrisci* BÖRNER.

4. Slide labelled "*Chaerophyll. bulbos./Kösen. Saalufer/18.6.1947*". "*bulbos.*" is distinctly written over another trivial name, probably *hirsutum*. The corresponding tube has "*Chaeroph. bulbos./Kösen 18.6.1947*" and on the reverse "Wurzelstock/blau bereift". The slide holds 3 alatae, 4 apterae viviparae and a number of larvae. The alatae are typical short-haired specimens, with almost blunt antennal hairs, the longest of which on IIIrd segment are about 0.022 mm. In the apterae these hairs are acute and up to 0.043 mm long. The alatae belong with the apterae; there is a longhaired nymph with wingpads in which the short hairs of the adult are clearly visible. This sample evidently is *D. anthrisci* BÖRNER. The alcohol material contains quite similar alatae and apterae.

5. Slide labelled "Apfel rote/Galle 30.5.23/*angelic* (deleted H.R.L.) ?*chaerophylli*". No corresponding alcohol material was found. The slide was full of air and therefore some Faure-liquid was added so that the terribly damaged specimens, two apterae viviparae, one alata and some larvae could be examined. The apterae are not fundatrices and it is rather rare in *Dysaphis chaerophylli* to find a second generation with apterae on apple (I found one specimen in Switzerland in 1950). The alatae cannot be examined, but the apterae have on the anterior part of the abdomen dorsal hairs of up to 0.074 mm. Therefore there is no doubt about the identity of the apterae. They are *Dysaphis chaerophylli* (BÖRNER).

6. Slide labelled "25.5.35/Neue Welt/Apfel rote Galle/*chaerophylli*?/*communis*". Contains two alatae and a fundatrix in a similar condition as those in slide 5. There is a corresponding tube to this, which has on the back of the label "*Yez. communis*". The alatae on the slide have blunt antennal hairs, on IIIrd segment up to 0.033 mm long. Embryones inside one fundatrix mounted from the tube have marginal hairs of 0.035 mm, about as long as the longest of the few hairs on the IIIrd ant. segment of its mother. Another similar fundatrix has the longest hairs on IIIrd ant. segment up to 0.065 mm and the marginal hairs of its embryones are about 0.052 mm. Clearly this sample was taken from several different galls and it consists of a mixture of two or perhaps three *Dysaphis* spp., of which *D. chaerophylli* (BÖRNER) is not present on BÖRNER'S slide.

7. Slide labelled "Apfel, rote/Faltengallen/Nbg. 25.5.43/*Dysaphis*". I found no parallel alcohol specimens. The slide contains 5 alatae with the longest hairs on the IIIrd ant. segment about 0.016–0.022 mm. The marginal hairs on the embryones inside these alatae are quite blunt and only 0.009 mm long. The species comes near, or is *Dysaphis radicola* (MORDV.).

8. Slide labelled "Bukarest/Knechtel/26.5.1940/Apfel! *chaeroph.* + *crataeg.*". There is a parallel tube, with the label "26.5.1940/*D. chaerophylli*", on the reverse "Knechtel/Valul lui/Trajan". KNECHTEL & MANOLACHE (1941, p. 249–251) published on this sample. The slide holds 3 apterae and one alata, and I mounted two apterae and a nymph from the tube. In view of the preponderance of apterae viviparae and the morphology I believe that this is a non-migrating *Dysaphis*, perhaps *D. devector* (WLK.), but certainly not *D. chaerophylli* (BÖRNER). The siphunculi in apterae are  $1\frac{1}{3}$  times 2nd joint of hind tarsi, the scarce, quite acute hairs on IIIrd ant. segment about 0.026 mm. The alata in BÖRNER'S slide is a *Rhopalosiphum*, probably *insertum* (WLK.) ("*crataeg.*" may be an abbreviation of *crataegellum* THEOB.).

KNECHTEL & MANOLACHE (1941) record *D. chaerophylli* (BÖRNER) also from Toçsani (Putna), 9.VI.1940 from apple. They most kindly sent me part of this sample. It consists of 7 apterae viviparae. Two of these apterae are morphologically comparable to the apterae in the BÖRNER collection from Rumenia, but the other specimens have a strongly developed, blackish sclerotic dorsal pattern quite similar to that figured for apterous gynoparae of *D. devector* by HILLE RIS LAMBERS (1945), plate VII, fig. 4. One of the latter specimens has rhinaria on the IIIrd ant. segment. As the Rumenian authors also state that apple trees suffer badly from these aphids we may assume that their data relate to *Dysaphis devector* (WLK.). The first account of the life history was published in 1944 (HILLE RIS LAMBERS, De Fruitteelt, 34th Year, 8.VI.1944), not in 1945 as generally quoted.

9. Specimens received by me in 1951 from Dr. C. BÖRNER as *Dysaphis chaerophylli*, from *Chaerophyllum temulum*, Naumburg, 14.VI.1945.

I found a corresponding tube with the data "*Chaerophyll. temul./* Schönburg, 14.VI.1945", on the reverse "Grund Stengel u./untere Blattscheiden/Ameisen!".

This sample is another riddle. All the apterae are most typical *D. chaerophylli*, with long and dense hairs and so are the alatae in the tube received by me from Professor SACHTLEBEN. But the alatae in my slides of 1951 have blunt antennal hairs of about 0.022 mm maximum length on IIIrd segment and dorsal hairs of about 0.035 mm, i.e., typical *anthrisci*. I cannot understand what has happened in this case.

10. Specimens from a tube labelled "*Chaerophyll. hirsut./*Saalufer Nbg.", on the reverse "14.8/27.8.30" (or 50?). The year I cannot make out. A sample of numerous alatae with short, blunt antennal hairs and apterae with hairs of about 0.039 mm maximum length on IIIrd ant. segment, in fact typical *anthrisci* BÖRNER.

It should be noted that BÖRNER (1940) in the original description of *D. chaerophylli* writes that the species infests apple and *Chaerophyllum*, and later (1952) that he made transfer tests in 1939 and 1946. Unfortunately we do not know whether he transferred from apple to *Chaerophyllum* or from *Chaerophyllum* to apple. There is no alcohol material and there are no slides from 1939 or 1946 in the BÖRNER collection. There is one tube, with the label "?*Yez. chaerophylli/Nbg.* 22.10.43", with on the reverse "//Apfelblätter/olivgrüne Tiere". This, however, contains an alate gynopara of *D. radicola* (MORDV.) with oviparae of *D. chaerophylli* (BÖRNER), so that it can not be the pickled results of a transfer experiment.

### Summarizing

The material of *Dysaphis chaerophylli* (BÖRNER) in the BÖRNER collection consists of a mixture of several taxons, and even the type slide contains a mixture. By selecting from the type slide a lecto-type, that agrees both with specimens collected in England from *Chaerophyllum temulum*, and with specimens collected on apple and transmitted to *Chaerophyllum hirsutum* in Switzerland, the name *Dysaphis chaerophylli* (BÖRNER) is now restricted to a taxon in which all morphs have hairs on the IIIrd ant. segment of over 0.052 mm long and in which the embryones have on the IIInd-IVth abd. tergite marginal hairs of 0.048 mm or longer.

The reasons why several taxa occur as *D. chaerophylli* in the BÖRNER collection may be two-fold. 1. There may be, besides *chaerophylli*, a second *Dysaphis* with shorter hairs, sometimes blunt in alatae, which also infests *Chaerophyllum* spp. in Central Europe; this might be *D. anthrisci* BÖRNER. 2. Errors may have been made in the identifications of the host plants, so that *Anthriscus silvestris* was mistaken for *Chaerophyllum hirsutum* and for *Ch. bulbosum*.

This, of course, does not explain why on some slides a certain *Chaerophyllum* species is given as host plant which differs from the *Chaerophyllum* species mentioned with the corresponding alcohol material.

The present picture is so complicated that morphological studies on the available material are not sufficient. Very accurate experiments with Central European specimens would seem to be indicated.

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