

**Morphological reduction and dispersal polymorphism
in *Baliothrips dispar* (Haliday, 1836) (Insecta: Thysanoptera:
Thripidae), with a redescription of forma *sibirica***

**Морфологическая редукция и дисперсионный полиморфизм
у *Baliothrips dispar* (Haliday, 1836) (Insecta: Thysanoptera:
Thripidae) с переописанием forma *sibirica***

**M.R. Ulitzka^{1*}, T.G. Evdokarova², A.P. Burnasheva²
М.Р. Улицка^{1*}, Т.Г. Евдокарлова², А.П. Бурнашева²**

¹ Thrips-iD, Straßburger Straße 37A, 77652 Offenburg, Germany.

² Institute for Biological Problems of Cryolithozone SB RAS, Lenin Avenue 41, Yakutsk 677000 Russia.

² Институт биологических проблем криолитозоны СО РАН, пр. Ленина 41, Якутск 677000 Россия.

* Corresponding author

Manfred R. Ulitzka: manfred.ulitzka@thysanoptera.de ORCID: <https://orcid.org/0000-0002-2639-4867>

Taisia G. Evdokarova: evdokarova@mail.ru

Albina P. Burnasheva: a_burnasheva@mail.ru

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КЛЮЧЕВЫЕ СЛОВА: полиморфизм крыльев, сенсиллы, ктенидии, географическая изменчивость.

ABSTRACT. The Holarctic thrips *Baliothrips dispar* (Haliday, 1836) exhibits considerable intraspecific morphological variability that has not been adequately documented. Females assigned to forma *sibirica* differ from European populations by a consistent reduction of wings and associated thoracic structures, including the metascutellum and abdominal tergal ctenidia, complicating identification. Material from Yakutia and Magadan reveals intermediate female forms linking this morphotype with typical European populations. In males, geographic variation is expressed in wing morphology, with exclusively micropterous males in the Palaearctic, whereas hemi- and macropterous males are so far known only from the Nearctic. Variation in the sense cone on antennal segment III, including specimens with a reduced mesal tine of a forked cone, suggests a possible morphological transition between forked and simple states. These observations are interpreted within the framework of dispersal polymorphism and indicate a continuum of dispersal strategies across the species' range, with populations of forma *sibirica* representing the extreme end-point of dispersal reduction.

РЕЗЮМЕ. Голарктический трипс *Baliothrips dispar* (Haliday, 1836) характеризуется значительной внутривидовой морфологической изменчивостью, которая до настоящего времени была недостаточно документирована. Самки forma *sibirica* отличаются

от европейских популяций устойчивой редукцией крыльев и связанных с ними грудных структур, включая метаскутеллум и ктенидии, что затрудняет определение. Материал из Якутии и Магадана выявляет промежуточные формы самок, связывающие этот морфотип с типичными европейскими популяциями. У самцов географическая изменчивость выражается в морфологии крыльев: в Палеарктике самцы исключительно короткокрылые, тогда как в Неарктике встречаются самцы с укороченными крыльями и полнокрылые. Изменчивость сенсилл на III членике усика, включая экземпляры с редуцированной сенсиллой, указывает на возможный морфологический переход между раздвоенным и простым состояниями.

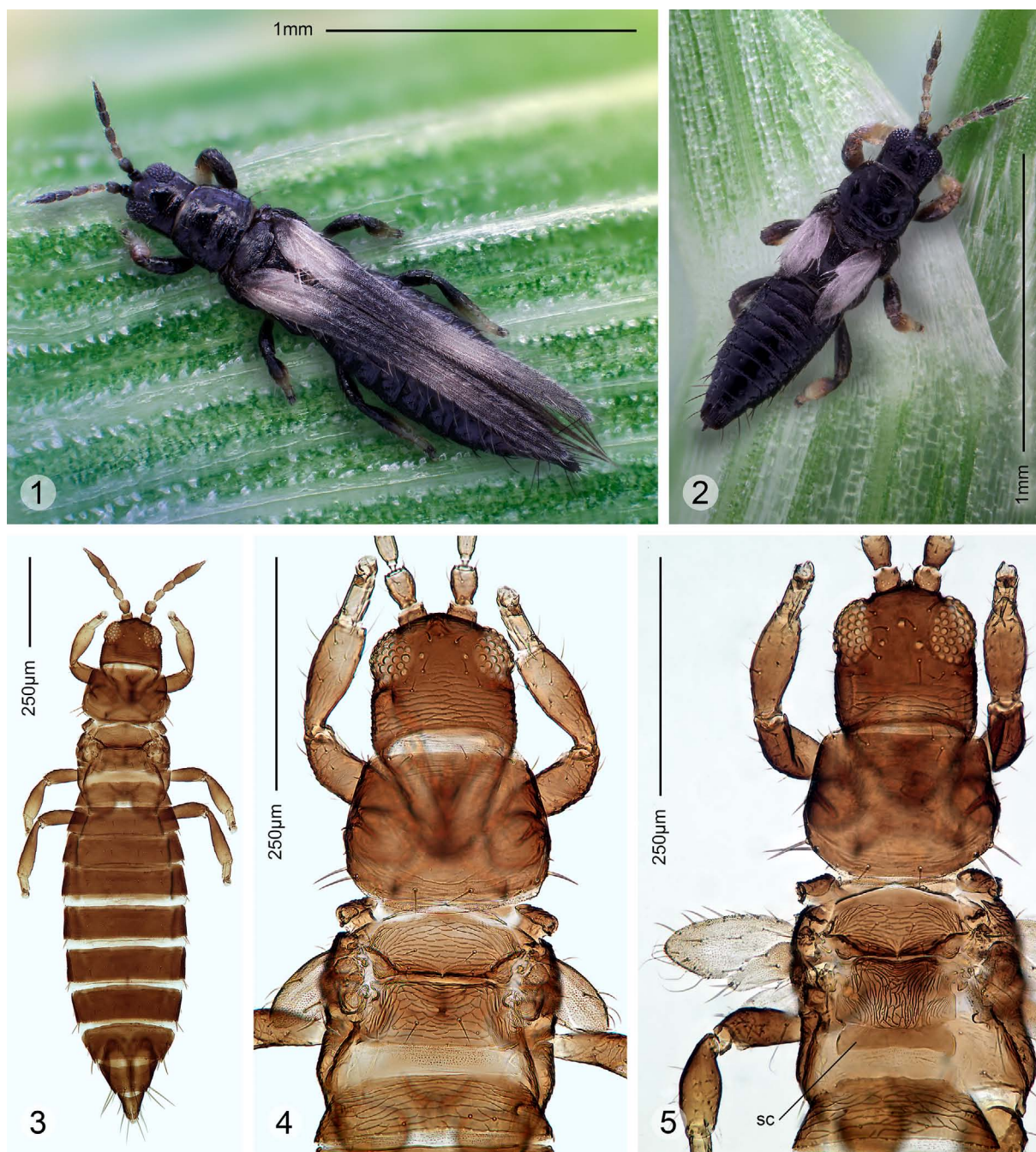
Introduction

The thysanopteran genus *Baliothrips* Uzel, 1895 belongs to the *Thrips* genus-group, a comparatively well-defined lineage within Thripidae [Mound, Palmer, 1981; Masumoto, Okajima, 2013]. In addition to the type species *B. dispar*, *Baliothrips* currently includes two further species [ThripsWiki, 2026]: *B. sunae*, known only from eastern China, and *B. kroli*, recorded from various parts of Europe [Zhang *et al.*, 2018]. The type species *B. dispar* is considerably more widespread, occurring across Europe, Mongolia, and Russia. It has also been consid-

ered introduced into North America and thus now exhibits a Holarctic distribution [Stannard, 1968; Pelikán, 1985; Meshcheryakov, 1986; zur Strassen, 2003; Zhang *et al.*, 2018]. Species of *Baliothrips* are typically associated with wetland habitats and occur mainly on graminoid plants [Bhatti, 1998; Zhang *et al.*, 2020]. *B. dispar*

in particular feeds and breeds on leaves of Poaceae and Cyperaceae and has also been recorded from *Typha* (Typhaceae) [Ulitzka, 1997].

B. dispar was originally described in the genus *Thrips* from females and males collected in Great Britain. The wing condition noted in the original description reflects



Figs 1–5. *Baliothrips dispar* (Haliday, 1836): 1 — female macroptera, European form; 2 — male European form; 3 — forma *sibirica*, female from Yakutia (MU-RU-04/10); 4 — forma *sibirica*, female from Magadan (MU-RU-11/9), head and thorax; 5 — intermediate form, female from Magadan (MU-258), head and thorax, sc — metascutellum.

Рис. 1–5. *Baliothrips dispar* (Haliday, 1836): 1 — самка, полнокрылая, европейская форма; 2 — самец, европейская форма; 3 — forma *sibirica*, самка из Якутии (MU-RU-04/10); 4 — forma *sibirica*, самка из Магадана (MU-RU-11/9), голова и грудь; 5 — промежуточная форма, самка из Магадана (MU-258), голова и грудь; sc — метаскутеллум.

a pattern widely reported across Europe: females occur in hemimacropterous and macropterous forms, whereas males are consistently micropterous [“*Mas.*” ... “*elytrum rudimentis albidis tantum*”, Haliday, 1836: 449] (cf. Figs 1, 2). These wing forms have repeatedly been cited in standard works as typical for the species (e.g. Bhatti, Mound [1980]; Meshcheryakov [1986]; zur Strassen [2003]). Although departures from this pattern — such as fully winged males and micropterous females — have been reported from other regions, these records are either vague (e.g. Priesner [1928]; Richter [1928]; Pelikán [1984]; Stannard [1968]; Bhatti [1998]) or appear only briefly in identification keys without accompanying description (e.g. Dyadechko [1964]).

Beyond variation in wing length, several authors have reported differences in the sense cones on antennal segment III, particularly in females assigned to *B. dispar* forma *sibirica* (Trybom, 1896) (see Priesner [1928]; Pelikán [1984]). Examination of such females from Yakutia and the Magadan region revealed additional structural reductions, including loss of the metascutellum and — most strikingly — the lateral ctenidia on abdominal tergites VI–VIII. This finding was unexpected because the presence and position of these ctenidia are usually highly conserved within the *Thrips* genus-group and constitute an important diagnostic character [Mound, 2002]. As a result, specimens of *B. dispar* forma *sibirica* cannot be identified reliably with modern keys, since the absence of lateral ctenidia prevents them from running to the *Thrips* genus-group. At the same time, *B. dispar* forma *sibirica* is not the only member of this genus-group in which the metascutellum and ctenidia may be reduced or absent. Apterous forms of *Bolacothrips jordani* Uzel, 1895 lack the metascutellum, and in some specimens the ctenidia may be entirely absent [Schliephake, Klimt, 1979: 160], although zur Strassen [2003: 187] reported them as present on tergites VII and VIII. In the first author’s collection, a series of eight females from Sweden (MU-S-10) includes only two specimens in which ctenidia are clearly discernible. Comparable reduction of ctenidia has also been reported in apterous forms of *Frankliniella*, e.g. *F. antarctica* zur Strassen, 1981 and *F. trinidadensis* Hood, 1942 [zur Strassen, 1981; Cavalleri, Mound, 2012].

Taken together, these observations suggest that the morphology of *B. dispar* forma *sibirica* is more appropriately interpreted not as an isolated anomaly, but as part of a broader complex of reductive morphological modifications. The present study therefore does not simply redescribe *B. dispar* forma *sibirica* but interprets the observed morphology as part of a continuous reduction series across the species’ range. By integrating wing polymorphism, reduction of thoracic structures, loss of ctenidia, variation in antennal sense cones, and geographic differences in reproductive mode, *B. dispar* emerges as a rare example within Thripidae in which dispersal polymorphism, structural reduction, and instability of diagnostic characters can be documented within a single species.

Material and Methods

Some specimens of *B. dispar* forma *sibirica* examined in this study originate from northern Yakutia, Russia, and were collected by the third author during summer 2021. Three additional series were collected in 1985 in Magadan Oblast, Russia, by A.A. Meshcheryakov.

All samples were initially preserved in alcohol. For microscopic examination, the specimens were either macerated in 4% KOH and mounted on slides in Canada balsam following Ulitzka [2017] or embedded in Hoyer’s medium. These slides are now housed either in the collection of the first author (serial numbers with the prefix “MU-”) or at the Institute for Biological Problems of the Cryolithozone, Siberian Branch, Russian Academy of Sciences (IBPC SB RAS), Yakutsk.

To assess morphological variation in *B. dispar*, additional specimens from other collections — including the holotype female of *Platythrips badius* John, 1924 — were examined. Details of all material studied are provided below.

Microscopic examination and measurements were carried out using a Zeiss Standard microscope equipped with the following objectives: Zeiss Neofluar 6.3/0.20 160/–, Zeiss Plan 10/0.22 160/–, Zeiss Plan 16/0.35 Ph2 160/0.17, and Zeiss Plan 40/0.65 160/0.17 Ph2. Photomicrographs were taken with a digital camera (Canon EOS 70D) attached to the microscope. Focus stacking was performed using Helicon Focus software, and final colour adjustments and sharpening were carried out in Adobe Photoshop and Topaz Photo AI. Line drawings were prepared using a Zeiss drawing tube attached to the microscope. All images and illustrations were produced by the first author, except Fig. 12, which was produced by Jonah Ulmer (USDA) using a Nikon Eclipse Ni compound microscope with DIC and a mounted Nikon DS-Fi3 camera; image acquisition was performed in NIS-Elements D, and the final image was generated from a Z-stack in Helicon Focus.

Taxonomy

Order THYSANOPTERA

Suborder TEREBRANTIA

Family THIRIPIDAE

Genus *Baliothrips* Uzel, 1895

Baliothrips dispar (Haliday, 1836)

SYNONYMY. *Thrips brevicornis* Haliday, 1836; *Thrips dispar* Haliday, 1836; *Thrips sibirica* Trybom, 1896; *Baliothrips basalis* Shull, 1909; *Bagnallia agnessae* Bagnall, 1911; *Bagnallia halidayi* Bagnall, 1911; *Baliothrips ustulatus* Priesner, 1919; *Platythrips badius* John, 1924; *Baliothrips petzi* Priesner, 1925; *Baliothrips sibiricus* Priesner, 1925; *Baliothrips exilis* Bagnall, 1928.

Described from: England (*T. brevicornis*, *T. dispar*, *B. agnessae*, *B. halidayi*, *B. exilis*); Michigan, USA (*B. basalis*); Steyr, Austria (*B. petzi*); Russia (*T. sibirica*, *P. badius*, *B. sibiricus*); Albania (*B. ustulatus*) [Mound, 1968; Jacot-Guillarmod, 1974; ThripsWiki, 2026].

A comprehensive description of both sexes of the European form of *B. dispar* can be found in Mound *et al.* [2018].

Redescription of *Baliothrips dispar* forma *sibirica* (Trybom, 1896)

Figs 3–7, 10.

Female microptera (MU-RU-04/1). Body uniformly brown; distal half of tibiae, tarsi and antennal segment III yellowish brown. Wing weakly shaded. Major body and wing setae brown.

Head wider than long, widest basally (Fig. 3); cheeks straight, diverging posteriorly, rounded inwards at base. Fore ocellus absent; hind ocelli close to compound eyes, distinctly smaller than ommatidia. Ocellar setae s1 absent; s2 far anterior; s3 anterior to hind ocelli and closer together than the distance between the hind ocelli, subequal in length to s2. Four pairs of postocular setae, shorter than ocellar setae. Vertex transversely

reticulate; frons sculptured with faint transverse lines; ocellar area smooth. Antenna 7-segmented (Fig. 10); segment III with basal pedicel; V and VI broadly joined. Sense cone simple on III, forked on IV. Mouth cone short, rounded; maxillary palps 2-segmented, distal segment about twice as long as basal.

Pronotum rectangular (Figs 3, 4), wider than long; transverse sculpture present near anterior and posterior margins,



Figs 6–9. *Baliothrips dispar* (Haliday, 1836): 6 — female (MU-RU-04/10) forma *sibirica*, tergites VII–VIII without ctenidia; 7 — female (MU-RU-11/4) forma *sibirica*, tergites VII–VIII with ctenidia (=ct); 8 — male macroptera (UASM #27562) from Canada; 9 — male hemimacroptera from Canada.

Рис. 6–9. *Baliothrips dispar* (Haliday, 1836): 6 — самка (MU-RU-04/10), форма *sibirica*, VII–VIII тергиты без ктений; 7 — самка (MU-RU-11/4), форма *sibirica*, VII–VIII тергиты с ктениями (=ct); 8 — самец, полнокрылый (UASM №27562) из Канады; 9 — самец с укороченными крыльями из Канады.

surface smooth medially and laterally. Anterior margin with 5 pairs of short setae. Two pairs of long posteroangular setae, subequal. Posteromarginal setae in 3 pairs, s1 much longer than s2 and s3 (s3 absent on left side). One pair of discal setae present. Intermediate small seta between posteroangular setae absent. Lateral margin with 4–5 pairs of setae, penultimate pair inserted slightly inwards and distinctly longer than others. Sternal ferna continuous.

Mesonotum transversely sculptured with weak reticulation; anteromedian campaniform sensilla absent (Fig. 4). Metascutum short, much wider than long (Figs 3, 4); sculpture similar to mesonotum; median setae stout, arising well behind anterior margin and widely separated; campaniform sensilla present laterally near posterior margin; metascutellum absent (Figs 3, 4). Wings micropterous; fore wing very short (Fig. 4); first vein with 3 setae; clavus rudimentary, with 1 discal and 1 marginal seta, retinaculum absent; fringes absent. Hind wing concealed beneath fore wing. Meso- and metasternum without spinula. Hind tibia without long setae.

Abdominal tergites transversely striate. Tergite I with 1 pair of small median setae and lateral microtrichia, microtrichia absent on other tergites. Tergites II–VIII with setae s1 and s2 stout and subequal; s3 on VI–VII minute. Tergite VIII without posteromarginal comb, but with broadly based microtrichia laterally (Fig. 6). Tergite IX with setae s1–s3 stout, not extending beyond apex of X; 1 pair of campaniform sensilla present. Lateral ctenidia absent on VI–VIII (Fig. 6). Pleurotergites without accessory setae. Sternite II with 3 (4) minute setae near each hind coxa. Sternites III–VII with 3 pairs of marginal setae, s1 situated anterior to posterior margin. Sternites without accessory setae.

Measurements (female MU-RU-04/1 in μm). Body length 1500. Head, length 150; width across eyes 175, maximum width 190; ocellar setae s2 and s3, length 25. Pronotum, length 155, width 240; posteroangular setae 45; posteromarginal setae s1 25, s2 and s3 15; anteromarginal setae about 20; longest lateral setae 25; discal setae 20. Metanotum, length 60; largest width 185; median setae 30, distance from anterior margin 30, 60 apart. Fore wing, length 95. Abdominal tergite IX, setae s1 85, s2 85, s3 100. Antennal length 245.

Comments: Two females from northern Yakutia, Kazach'e from H. Priesner's collection (labelled '*Baliothrips sibiricus*') as well as the holotype female of *P. badius* agree in all respects with the description given above. The same applies to the specimens of series MU-RU-11 collected in Magadan Oblast, except for the head (Fig. 4), which is longer than wide, has the cheeks more parallel and exhibits a structure that might be interpreted as a weak rudiment of a fore ocellus, and—in some specimens—abdominal tergite VIII, which bears more irregular microtrichia laterally along the posterior margin. Notably, one of these females (MU-RU-11/4) has the ctenidia developed on abdominal tergites VII and VIII (Fig. 7), as does a female from Yakutia (MU-RU-04/4), which has a rudimentary comb only on the right side of tergite VIII. Two additional specimens from Magadan (MU-98 and MU-258) are particularly noteworthy, as they exhibit character states intermediate between *B. dispar* forma *sibirica* and the European form (Fig. 5). Both are micropterous, but their wings possess a clearly defined clavus bearing a retinaculum. The metanotum of these specimens is longer and sculptured with longitudinal reticulations behind the median setae, and the metascutellum is present—resembling the condition observed in hemimacropterous and macropterous European specimens (from Germany and Norway; see details below). Moreover, the ctenidia on abdominal tergites VI–VIII are well developed, the fore ocellus is present (Fig. 5), and—at least in MU-98 (not assessable

in MU-258)—antennal segments III and IV each bear forked sense cones (cf. Fig. 11).

MATERIAL STUDIED. *B. dispar* forma *sibirica*. 10 ♀♀ (MU-RU-04/1–10), Russia, Yakutia, mouth of the Enumchuveem River, 70°44.0'N 159°22.0'E, tundra, on *Eriophorum* and *Carex* (Cyperaceae), 8.VIII.2021, leg. Burnasheva A.P., det. Ulitzka M.R., coll. Ulitzka; 2 ♀♀ (706-I, 706-II) Russia, Yakutia, near the village of Cherskij, on grasses, 31.VII.2021, leg. Burnasheva A.P., det. Evdokarova T.G., coll. IBPC SB RAS; 2 ♀♀ (707-I, 707-II), Russia, Yakutia, Chukoch'ya River, tundra, on *Eriophorum* and *Carex* (Cyperaceae), 03.VIII.2021, leg. Burnasheva A.P., det. Evdokarova T.G., coll. IBPC SB RAS; holotype ♀ of *P. badius*, Russia, northern Yakutia, Kazach'e, Yana River, 3.VI.1915, leg. Tschagin C.L., coll. Zoological Institute, Russian Academy of Sciences, St. Petersburg; 2 ♀♀ (no collection numbers), most likely paratypes of *P. badius*, same data as the holotype, det. Priesner H., coll. Senckenberg Museum, Frankfurt; 26 ♀♀ (MU-RU-11/1–12 and a further 14 specimens preserved in alcohol), Russia, Magadan Oblast, middle reaches of the Paren' River, on flowering *Geranium pratense* (Geraniaceae), 21.VII.1985, leg. Meshcheryakov A.A., det. Ulitzka M.R., coll. Ulitzka; 2 ♀♀ (no. 276), same data, det. Evdokarova T.G., coll. IBPC SB RAS.

Intermediate forms. 1 ♀ (MU-98), Russia, Magadan Oblast, near the village of Verhnij Paren', on grasses (Poaceae), 26.VII.1985, leg. Meshcheryakov A.A., det. Evdokarova T.G., coll. Ulitzka and 1 ♀ (MU-258), same data, collected on 01.VIII.1985.

B. dispar from Europe: 2 ♀♀ hemimacroptera (MU-330, 331), Germany, Baden-Württemberg, Blaubeuren-Pappelau, in leaf sheath of *Typha latifolia* (Typhaceae), 1.IX.1995, leg. et det. Ulitzka M.R., coll. Ulitzka; 1 ♀ hemimacroptera (Eing. Nr. 125, 1929), Germany, Schleswig-Holstein, Escheburg, Hansing-Park, from low vegetation along a stream, 7.IX.1929, leg. et det. E. Titschack, coll. Senckenberg Museum, Frankfurt; 4 ♀♀ macroptera (MU-D-20/20–23), Germany, Baden-Württemberg, Reichenbach, damp forest meadow, from grasses (Poaceae), 14.VI.2012, leg. et det. Ulitzka M.R., coll. Ulitzka; 2 ♀♀ macroptera (MU-D-35/3–4), Germany, Baden-Württemberg, Käfersberg, forest meadow, from grasses (Poaceae), 23.VII.2012, leg. et det. Ulitzka M.R., coll. Ulitzka; 2 ♀♀ macroptera (MU-D-403/1–2), Germany, Thuringia, Stein-Rachelsberg Nature Reserve, Alte Hainsbachtal, pond margin, from grasses (Poaceae), 14.VII.2025, leg. Bernet Y., det. Ulitzka M.R., coll. Ulitzka; 1 ♀ macroptera (no collection number), Norway, EIS 169, Sør-Varanger, 16.VII.2004, leg. et det. Kobro S., coll. Ulitzka.

Variation in males of *B. dispar*

Figs 2, 8–9, 12.

According to zur Strassen [2003] and Mound *et al.* [2018], males of *B. dispar* are exclusively micropterous, although this condition appears to be restricted to Palaearctic populations (Fig. 2). Males from this region possess short wing rudiments (approximately 130–220 μm long), with a well-defined fore wing clavus, a developed metascutellum, and abdominal ctenidia. In these character states, they resemble the “intermediate female forms” described above.

(Hemi-)macropterous males have been documented only from the Nearctic (Figs 8, 9), where *B. dispar* is generally less common [Shull, 1909; Stannard, 1968; University of Alberta E.H. Strickland Entomological Museum, 2025]. Apart from their smaller size (body length about 1 mm), they are similar to (hemi-)macropterous females in colouration and general mor-

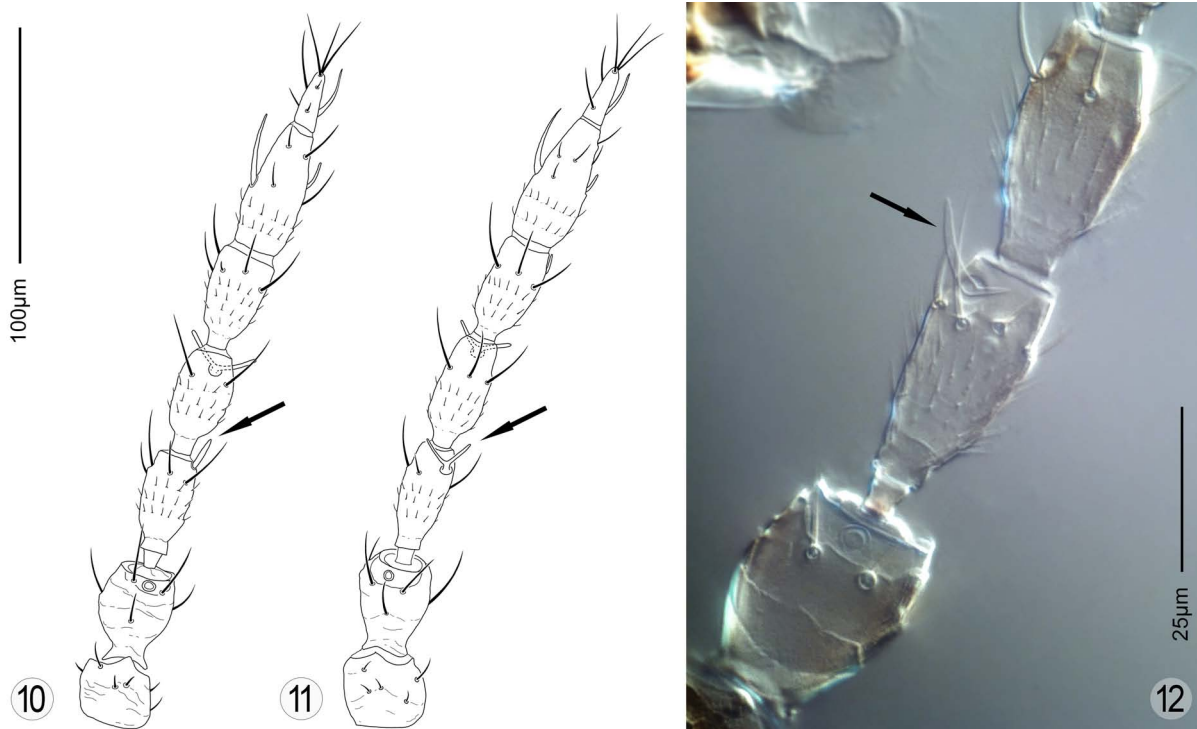
phology. Like micropterous males, they possess narrow glandular areas, one on each of sternites III–VII.

Schliephake & Klimt [1979: 156] state that micropterous males of *B. dispar* have a simple sense cone on antennal segment III. This feature, however, appears to be variable. In the majority of micropterous males from Europe in the first author's collection, this sense cone is forked, similar to that on segment IV. One male collected in northern Norway, however, exhibits a simple sense cone, as does a macropterous specimen from Canada (Hood No. 1903) examined here and a micropterous specimen from Alaska (Lot 45-19058a). A hemimacropterous male from Canada (wing length 303 μ m), however, has a forked sense cone on antennal segment III. Finally, an unusual condition was observed in a micropterous male from Alaska (Lot 45-19058b), in a macropterous male from Canada (UASM #27562), and in all macropterous males from Minnesota: in these specimens, the sense cone on segment III on both antennae is distinctly forked but shows a marked reduction of the mesal branch, i.e. the tine directed towards the inner margin of the antenna (Fig. 12).

NOTE. Males morphologically referable to forma *sibirica* have not been observed. Furthermore, males have never been documented in any series comprising females of forma *sibirica*.

MATERIAL STUDIED. 1 ♂ microptera (MU-329), Germany, Baden-Württemberg, Blaubeuren-Pappelau, in leaf sheath of *Typha latifolia* (Typhaceae), 1.IX.1995, leg. et det. Ulitzka M.R., coll. Ulitzka; 2 ♂♂ microptera (MU-D-20/5, MU-D-20/47), Germany, Baden-Württemberg, Reichenbach, damp forest meadow, from grasses (Poaceae), 14.VI.2012, leg.

et det. Ulitzka M.R., coll. Ulitzka; 2 ♂♂ microptera (MU-D-403/3–4), Germany, Thuringia, Stein-Rachelsberg Nature Reserve, Alte Hainsbachtal, pond margin, from grasses (Poaceae), 14.VII.2025, leg. Bernet Y., det. Ulitzka M.R., coll. Ulitzka; 1 ♂ microptera (MU-GB-33/1), Great Britain, East Sussex, Hastings, Combe Valley, 50°57'32"N 0°33'24"E, river bank, from flowering *Ranunculus* sp. (Ranunculaceae), 14.V.2022, leg. Binns D., det. Ulitzka M.R., coll. Ulitzka; 1 ♂ microptera (no collection number), Norway, EIS 169, Sør-Varanger, Bjørnevatn, 16.VII.2004, leg. et det. Kobro S., coll. Ulitzka; 1 ♂ macroptera (no collection number), Canada, Alberta, Caribou Mts., 58°42'N 114°58'W, from grasses and sedges, 8.VII.1970, leg. et det. Heming B.S., coll. Senckenberg Museum, Frankfurt; 1 ♂ macroptera (UASM #27562) and 1 ♂ hemimacroptera (no collection number), Canada, Alberta, S of Whitecourt, Horne Lake, sweeping low damp meadow, 12.VII.1969, leg. et det. Heming B.S., coll. University of Alberta E.H. Strickland Entomological Museum; 1 ♂ macroptera (Hood No. 1903), Canada, Labrador, Davis Inlet, from grasses, 3.VIII.1950, leg. Backus R.H., det. Hood J.D., coll. USNM, Beltsville, Maryland; 2 ♂♂ microptera (Lot 45-19058), USA, Alaska, Homer, from native redtop grass (*Agrostis gigantea*, Poaceae), 23.VII.1945, leg. Chamberlin J.C., det. Crawford J.C., coll. USNM, Beltsville, Maryland; 4 ♂♂ macroptera (no collection number), USA, Minnesota, Grand Portage, from leaves of *Calamagrostis* (Poaceae), 10.VIII.1931, leg. et det. Hood J.D., coll. USNM, Beltsville, Maryland.



Figs 10–12. *Baliothrips dispar* (Haliday, 1836): 10 — forma *sibirica*, right antenna; 11 — European form, right antenna; 12 — antennal segments II–IV, left antenna of a male from Minnesota, sense cone on III with a reduced mesal tine (DIC micrograph). Indicated: sense cones on segments III.

Рис. 10–12. *Baliothrips dispar* (Haliday, 1836): 10 — форма *sibirica*, правый усик; 11 — европейская форма, правый усик; 12 — II–IV членики усика, левый усик самца из Миннесоты; сенсилла на III членике с редуцированным мезальным зубцом (микрофотография в DIC, дифференциально-интерференционный контраст). Обозначено: сенсилла на III членике.

Discussion

B. dispar exhibits considerable intraspecific variability, most notably in wing morphology, the presence or absence of abdominal tergal ctenidia, and the structure of the sense cones on antennal segment III. This variability is particularly evident in females assigned to the so-called 'forma *sibirica*', which differs from European populations in several key characteristics.

Based on European populations, wing morphology in *B. dispar* has generally been regarded as sexually dimorphic and relatively stable: females are typically macropterous (or hemimacropterous), whereas males are micropterous (Figs 1, 2). When the species is considered across its entire distribution range, however, this interpretation requires modification in two respects. First, in forma *sibirica* females are consistently micropterous, and the reduction of the wings is reflected in corresponding modifications of thoracic structures, most notably in a reduced metascutellum (Figs 3, 4). Second, fully winged males occur in Nearctic populations (Fig. 8).

Among females, two specimens from Magadan (MU-98, MU-258) represent an intermediate condition between the European morphotype and forma *sibirica*. Although short-winged, these individuals possess a well-defined clavus with retinaculum and a fully developed metascutellum (Fig. 5) — features absent in forma *sibirica*. This suggests a gradual reduction of wing-associated structures rather than a discrete morphological separation.

The reduction observed in forma *sibirica* is not restricted to the wings themselves but also affects structures functionally associated with flight. The metascutellum, a structure associated with the flight apparatus, is distinctly reduced, and the abdominal tergal ctenidia are absent (Fig. 6). These ctenidia have been interpreted as structures involved in the positioning and protection of the wing fringe cilia when the wings are at rest [Priesner, 1928; Lewis, 1973; Mound, Kibby, 1998]. In flightless forms, this function becomes obsolete, and the loss of ctenidia can therefore be understood as part of a correlated reduction of wing-associated morphology.

Such reduction may be ecophenotypic and influenced by environmental factors, particularly temperature, winds and photoperiod. In wind-exposed open tundra habitats, selection may favour reduced flight capacity because weak-flying insects are prone to downwind drift and displacement, so that investment in functional wings may yield little benefit or even increase mortality risk. In thrips, adults may readily drift downwind, underscoring the importance of wind-driven transport for their movement and the potential advantage of reduced flight capacity under persistently windy conditions [Roff, 1990]. Seasonal variation in wing form has been reported for several Thripidae [Köppä, 1969; Morison, 1970; Lewis, 1973; Ananthakrishnan, 1984; Nakao, 1993, 1996, 1997]. However, Kamm [1972] demonstrated that, at least in *Anaphothrips obscurus* (Müller, 1776), temperature alone does not affect wing morphology, suggesting that the mechanisms involved may differ between species or depend on additional environmental cues.

Given the extreme environmental conditions in which forma *sibirica* occurs, the observed reduction of wings may represent an ecologically driven adaptation. In tundra habitats such as those of Yakutia, flight may be both unnecessary and energetically costly. In Thripidae, females represent the reproductive and colonising stage of the population, and the energetic costs of wing development and flight musculature directly compete with egg production. In stable tundra habitats, where dispersal offers little advantage, the reduction of wings may allow a reallocation of resources towards reproduction rather than flight [Lewis, 1973; Roff, 1992; Zera, Denno, 1997].

Wing polymorphism in insects is generally understood as reflecting a trade-off between dispersal capability and reproductive investment. Long-established, persistent habitats tend to favour reduction of dispersal capability, whereas unstable, patchy, or recently colonised habitats select for dispersive morphs able to locate and colonise suitable habitat patches [Roff, 1986; Zera, Denno, 1997; Guerra, 2011]. Although rarely emphasised in ecological literature, Thysanoptera exhibit the same principle. Mound [2005] provides evidence for an association between wing reduction and habitat stability in thrips, and Lewis [1973] relates the production of macropterous individuals to dispersal from deteriorating or temporary habitats. Crespi [1986] and Kobro [2007] demonstrated in fungus-feeding thrips that wing form is closely related to habitat persistence and resource distribution.

Within Thripidae, wing polymorphism is comparatively uncommon and, where present, most often concerns females, whereas males are typically consistently micropterous. An exception to this pattern is found in *Thrips angusticeps* Uzel, 1895 and *Frankliniella fusca* (Hinds, 1902), in which micropterous adults occur seasonally in both sexes [zur Strassen, 2003; Edde, 2022].

This broader pattern of variation in dispersal-related traits is paralleled in *B. dispar* by marked geographic differences in reproductive mode. In Siberian populations referred to as forma *sibirica*, males are apparently absent and reproduction may be obligately parthenogenetic. Such a condition is typically associated with long-term habitat persistence and a reduced need for dispersal.

In contrast, European males are consistently micropterous (Fig. 2), whereas North American material has repeatedly included hemi- and fully macropterous males over many decades of collecting (Figs 8, 9). If North American populations originated through secondary introduction, dispersal may have been particularly important during the initial stages of establishment and subsequent spread. Under such conditions, selection favoring dispersal may have promoted the persistence, or increased the expression, of macropterous males. Furthermore, this tendency may have been reinforced by the apparent rarity of the species in the Nearctic, where low population density could favour greater male mobility and thus the continued occurrence of winged males. European populations persisting in habitats with long-term

continuity, by contrast, would be expected to experience stabilizing selection favoring microptery while retaining sexual reproduction. Nevertheless, this interpretation remains tentative, because no macropterous males are known from the presumed source range.

Taken together, the available observations are consistent with the possibility that the geographic pattern in *B. dispar* reflects a continuum of dispersal strategies within the species. On this view, European populations would represent habitat stability combined with sexual reproduction but reduced dispersal, North American populations would represent sexually reproducing populations in which dispersal has remained more important, and the apparently parthenogenetic Siberian populations would represent the extreme endpoint of dispersal reduction of this species.

An additional and previously unreported observation concerns the structure of the sense cone on antennal segment III in males. In six specimens from different geographic regions, the sense cone on segment III is distinctly forked but shows a marked reduction of the inner tine (Fig. 12). This condition occurs bilaterally and cannot be attributed to preparation artefacts or accidental damage. Importantly, the sense cone on segment IV in the same individuals is always normally forked, indicating that this is not a general malformation but a character state restricted to segment III.

Together with specimens bearing a fully forked sense cone and others with a simple, unforked cone on segment III, this suggests a morphological series in which a normally forked sense cone may pass through an intermediate condition with a reduced mesal tine before appearing simple. Such intermediate states are rarely mentioned in the literature, where sense cones are generally described only as “simple” or “forked” [Zhang *et al.*, 2019]. Since the reduced mesal tine occurs in both micropterous and macropterous males, it cannot presently be associated convincingly with wing reduction or dispersal capacity. At present, this condition is best interpreted as an unusual morphological variant within *B. dispar*.

Beyond their biological and evolutionary significance, these reductions also have practical taxonomic consequences. In particular, the absence of lateral ctenidia on the abdominal tergites (Fig. 6), a character normally of considerable diagnostic value within the *Thrips* genus-group, makes specimens of *B. dispar* forma *sibirica* difficult to place using modern identification keys. This may lead to confusion with *Platythrips tunicatus* (Haliday, 1852) [cf. zur Strassen, 2003], especially because micropterous females of *B. dispar* forma *sibirica* resemble apterous females of *P. tunicatus* in sharing the absence of a metascutellum (cf. Fig. 4).

Platythrips, however, can be reliably separated from *B. dispar* forma *sibirica* by the following characters: (1) presence of a spinula on the mesothoracic furca, (2) presence of a small intermediate seta between the posteroangular setae on the pronotum, (3) abdominal tergal setae s1–s3 very stout and conspicuous, (4) presence of craspeda along the posterior margins of the abdominal tergites, (5) median posteromarginal setae

positioned at the margin, and (6) abdominal sternite II bearing only two pairs of posteromarginal setae.

Recognition of this suite of characters should reduce the risk of misidentifying *B. dispar* forma *sibirica* as *P. tunicatus* when applying modern keys, and likewise lessen the chance that such specimens are interpreted as representing an undescribed genus. In this context, it seems possible that certain records from cold regions of material “resembling *Baliothrips*” may in fact refer to *B. dispar* forma *sibirica*; for example, Chiasson [1985, p. 82] noted: “A genus closely resembling *Baliothrips* (simple instead of forked sense cones on antennal segment III) was found on Ellesmere Island.”

The taxonomic implications of this reduction syndrome should therefore be considered when identifying northern populations of *B. dispar* characterised by microptery and by reduction or loss of diagnostic morphological characters.

Conclusion

The variability observed in *Baliothrips dispar* demonstrates that several morphological characters traditionally regarded as stable within Thripidae, such as wing development, ctenidia, metascutellum structure, and the form of antennal sense cones, may be subject to gradual reduction and modification within a single species. This case highlights the importance of considering geographic and ecological context when interpreting diagnostic characters in Thysanoptera. Populations of *Baliothrips dispar* assigned to forma *sibirica* in particular illustrate how prolonged habitat stability may lead to extreme reduction of dispersal-related structures, culminating in apparently parthenogenetic, flightless forms that challenge conventional taxonomic expectations.

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