The Dolichopodidae (Diptera) of Greenland

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The four species of Dolichopodidae known from Greenland are redescribed and keyed. The Greenland dolichopodid fauna is discussed with regard to distribution and relative scarcity of species.

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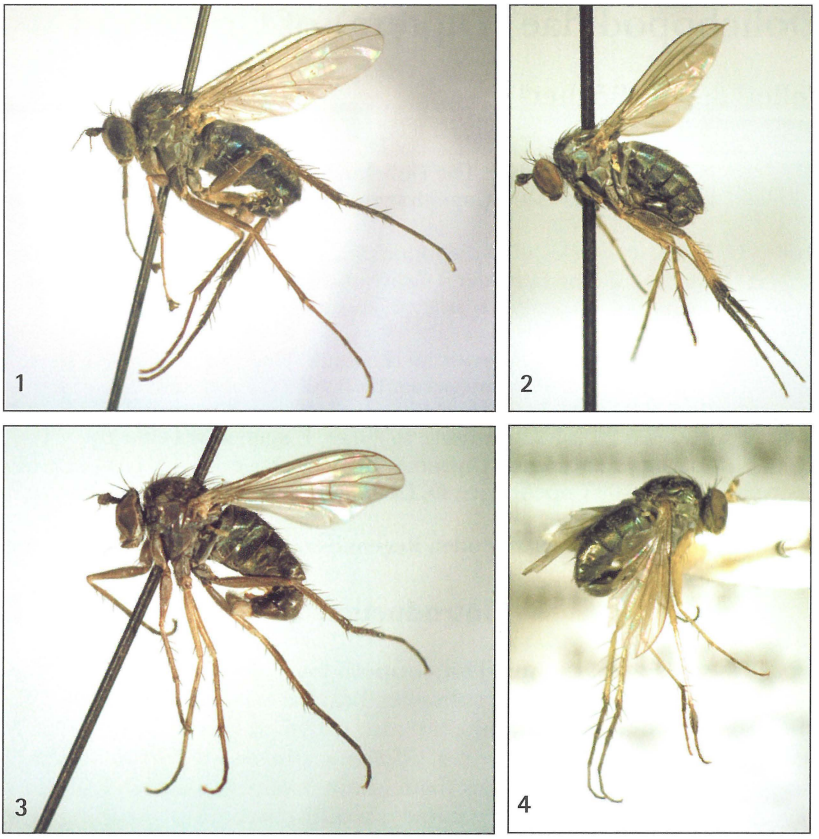
Introduction

With over 6500 species, the family Dolichopodidae (Diptera) or long-legged flies is among the most species rich in the suborder Brachycera. The majority of the species features brilliant green to blue colours, but also mainly yellow (e.g. *Achalcus*, *Neurigona*, *Xanthochlorus*), and brown or black (e.g. *Medetera*, *Micromorphus*, *Aphrosylus*, *Hydrophorus*) forms exist. The body size ranges from about 1 mm to 10 mm, legs are generally rather to very long (hence the family name), mouthparts are protruding (less than in Empididae) and the wing venation is reduced and rather simple, with vein $M_{1(+2)}$ often showing a distinct bend (e.g. *Dolichopus*) or even a fork (e.g. *Sciapus*). Males of many species show distinct ornaments on antennae, legs, wings or even body which seem to play a role during courtship (see Figs 13, 14).

Since most species are distinctly hygrophilous, the highest species richness and abundances are encountered in humid habitats such as swamps, saltmarshes, humid forests and carrs, humid heathland and peatmoors, and on shallow and sparsely vegetated banks of running as well as stagnant water bodies. Other species (e.g. *Sciapus*, *Neurigona*, *Medetera*) prefer vertical surfaces for mating and foraging and are mainly found on tree trunks and fences but only *Medetera* species actually seem to breed in trees. Microhabitats with a very special dolichopodid fauna are rotholes and sapruns. In fact, most museum specimens of *Systenus* and *Australachalcus melanotrichus* are reared from rothole debris or sapruns fluids rather than collected as adults in the field. Tropical habitats such as rainforests undoubtedly house the highest species richness although abundances there are often much lower than in more temperate regions. A large number of species show very specific habitat requirements and is sensitive to environmental alterations which renders them excellent agents for bio-indication and site quality assessment (Pollet & Grootaert, 1999; Pollet, 2000, 2001).

All species are considered predatory on soft-bodied invertebrates such as mites, springtails, enchytraeid worms and aphids. This holds true for the larval stages as well, except for the larvae of *Thrypticus* that live as stem miners in Cyperaceae, Poaceae, Juncaceae and Pontederiaceae (Dyte, 1993). The larval development in most species takes place in the soils of the habitats of the adults. Larvae of most *Medetera*, on the contrary, are found



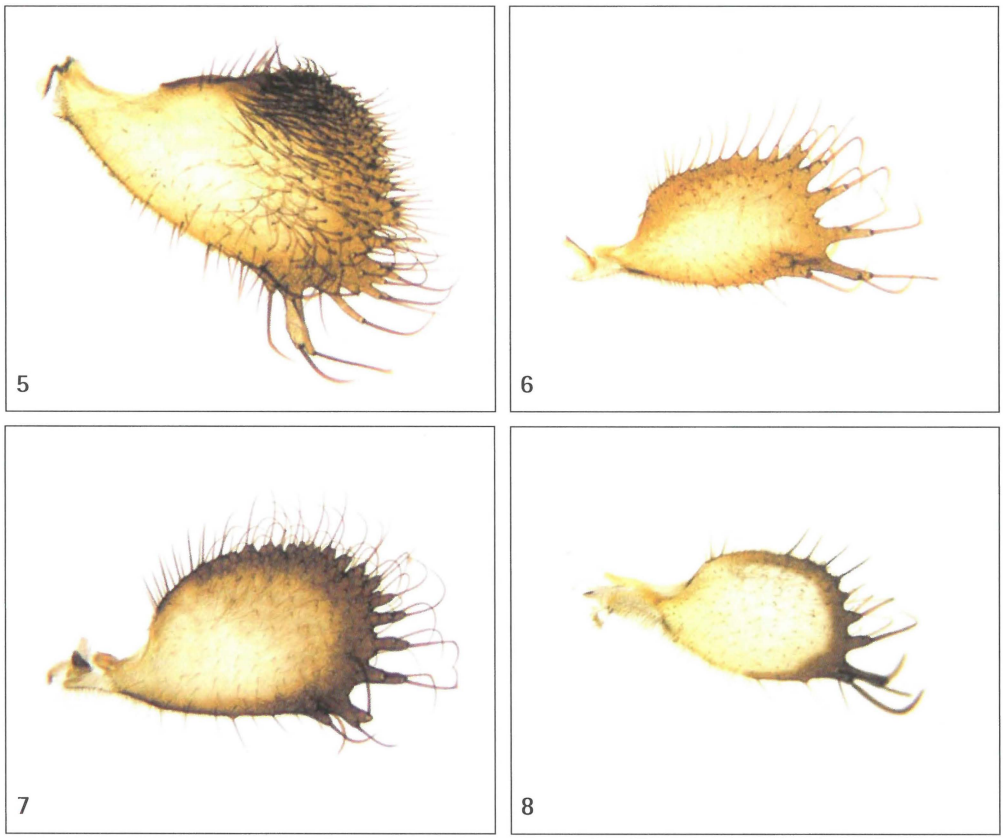
Figures 1-4. General habitus (male). 1, *Dolichopus dasyops*; 2, *Dolichopus groenlandicus*; 3, *Dolichopus humilis*; 4, *Dolichopus plumipes*.

under bark of trees where they hunt for larvae, pupae and freshly emerged adults of bark beetles (Scolytidae) and thus might represent potential biological control agents. Larvae of coastal species are found in wet sandy soils of beaches, among decaying algae or even within or amid barnacles (e.g. *Aphrosylus*).

In the temperate regions of the northern hemisphere, most species are active during spring until early autumn with a distinct peak at the end of June and the beginning of July. Several species of *Rhaphium*, however, are active very early in the season (May) and, in warm years, produce a smaller second generation during autumn. Nevertheless, most species seem to be univoltine although their activity period often covers several months. Cold-preferent species in the genera *Campsicnemus*, *Syntormon* and *Hydrophorus* are even encountered during late autumn and winter although it is assumed that the major part of their populations hibernates in the larval or pupal stage.

Material and methods

The entire ZMUC collection of Greenland dolichopodid flies was examined during March 2004. Collections by the junior author during August 2004 at the Thule airbase added another two specimens. A total of 1050 mounted specimens, and 231 specimens from alcohol samples were investigated.



Figures 5-8. Cercus (genital lamella). 5, *Dolichopus dasyops*; 6, *Dolichopus groenlandicus*; 7, *Dolichopus humilis*; 8, *Dolichopus plumipes*.

All specimens were databased and localities were assigned to the different zoogeographical regions of Greenland (see Table 1).

Table 1. Distribution of Dolichopodidae over zoogeographical regions of Greenland.

Geographical regions Dolichopodidae	NW	nSW	sSW	S	SE	NE	Greenland No specimens
Dolichopus dasyops	23	–	–	–	–	–	23
Dolichopus groenlandicus	3	537	120	196	42	6	904
Dolichopus humilis	49	–	–	–	–	–	49
Dolichopus plumipes	–	1	14	269	–	1	285
No species	3	2	2	2	1	2	4
No specimens	75	538	134	465	42	7	1261

In what follows, a key to males and females, and a description of each species is presented. In the latter, special attention is drawn to special sex-linked features only present in male specimens, the so-called Male Secondary Sexual Characters (MSSC). In most cases, these MSSCs are not only important for diagnostic purposes but are also phylogenetically re-

levant. In addition, for each species the overall distribution range and the distribution in Greenland are discussed. Finally, the Greenland dolichopodid fauna is compared to the faunas of other parts of the Holarctic region north of 60°N (for original data, see Grichanov, 2004; Kahanpää & Grichanov, 2004; Pollet, 2004; Pollet et al., 2004).

Abbreviations: ad: anterodorsal; ap: apical; av: anteroventral; pd: posterodorsal; pv: posteroventral; MSSC: Male Secondary Sexual Character; fore leg: leg I, mid leg: leg II, hind leg: leg III. Tarsomeres of legs are indicated as 1 to 5, starting from the basis (metatarsus) towards the apex (5th tarsomere).

Results

Only four species were detected, all congeneric: *Dolichopus dasyops, D. groenlandicus, D. humilis* and *D. plumipes* (see Table 1).

Key to males

1. All postocular bristles black 2
- Lower postocular bristles yellow to white 3
2. Fourth and 5th tarsomere of leg I strongly flattened and black, 5th tarsomere about as deep as long (Fig. 13). Antenna with scape yellow on ventral ½ (Fig. 15) ..... *Dolichopus dasyops* Malloch
– Leg I without flattened tarsomeres. Antenna entirely black (Fig. 18) ..... *Dolichopus groenlandicus* Zetterstedt
3. Metatarsus II pennate laterally (Fig. 14). Tibia II with a longitudinal narrow brown streak anterodorsally, whitish at apex. Femur III with 1 ad preapical bristle. Antenna mainly yellow with 1st flagellomere black on apicodorsal ½ (Fig. 16) ..... *Dolichopus plumipes* (Scopoli)
– Leg II unmodified. Femur III with 2 ad preapical bristles. Antenna entirely black, with scape remarkably long, about 2x as long as wide (Fig. 18) ..... *Dolichopus humilis* Van Duzee

Key to females

1. All postocular bristles black 2
– Lower postocular bristles yellow to white 3
2. Antenna with scape yellow on ventral ½. All femora entirely dark yellow ..... *Dolichopus dasyops* Malloch
– Antenna entirely black. Femur III entirely, and femur I largely dark brown ..... *Dolichopus groenlandicus* Zetterstedt
3. Antenna mainly yellow with 1st flagellomere black on apicodorsal ½. Femur III with 1 ad preapical bristle. All femora and coxa I entirely yellow ..... *Dolichopus plumipes* (Scopoli)
– Antenna entirely black, with scape longer dan wide. Femur III with 2 ad preapical bristles. Coxa I entirely blackish brown, and femora I and III largely brown ..... *Dolichopus humilis* Van Duzee

All Greenland *Dolichopus* species show a standard dolichopodid arrangement of large bristles on the mesonotum, including 1 large humeral, 1 inner and 1 outer posthumeral, 1 presutural, 1 sutural, 2 notopleural, 2 supraalar, 1 postalar and 6 dorsocentral bristles. They also feature a small clutch of minute white setae in front of their posterior spiracle (a synapomorphy shared with *Gymnopternus* and *Lichtwardtia*, see Pollet, 2004; Brooks, 2005), with 8 setae in *D. plumipes* and 5 setae in the other three species.

***Dolichopus dasyops* Malloch, 1919** (Figs 1, 5, 9, 13, 15)

Description. Largest *Dolichopus* species in Greenland with body and wing length over 5.5 mm (Fig. 1). Male. **Head**. Face shining whitish yellow (pale golden) (MSSC), slightly narrowing below antenna, nearly parallel on clypeus; at clypeus slightly wider than 1st flagellomere of antenna. Frons and occiput blackish brown with metallic green bronze reflection. All postoculars black. Palp small, yellowish brown with black pubescence. Antenna black with apicoventral ½ of scape pale yellow; 1st flagellomere about as long as wide, 0.9x as long as scape and pedicel combined. Arista dorsal, 1.4x as long as 1st three antennal segments combined (Fig. 15).

Thorax shining green bronze, with greenish grey pleura. Scutellum with sparse white pubescence on dorsum and sparse white fringe between medial bristles. **Abdomen** shining bluish green. Cercus obscure yellow, transparent, with broad apical black margin and strong curved bristles on apicodorsal inner margin (Fig. 5). **Wing** transparent without costal stigma, 2.7x as long as wide (Fig. 9). Halter pale yellow. Squamal fringe dark brown.

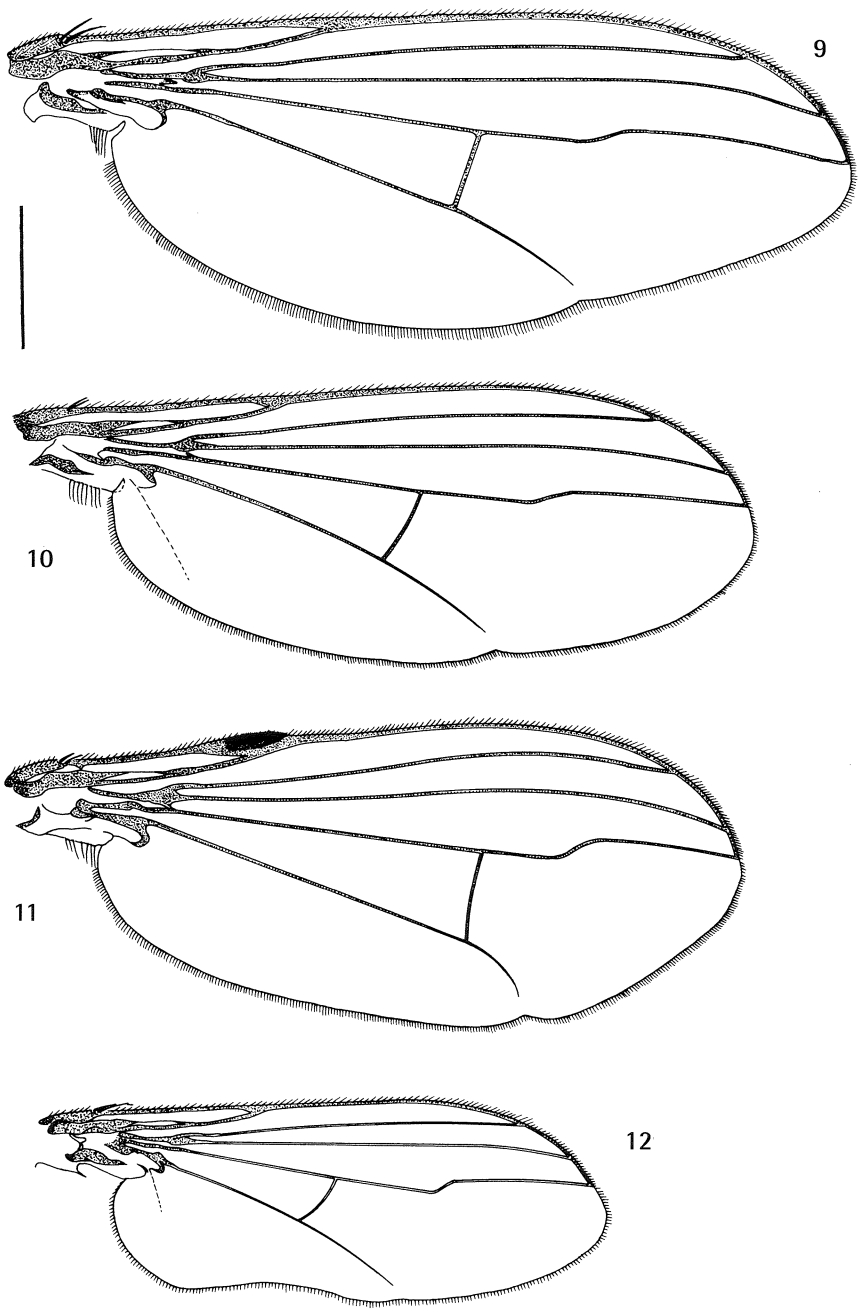
Legs long, yellowish brown to brown. All coxae blackish brown, dusted greenish grey, with only coxa I yellowish brown on anterior face. Coxa III with strong erect black bristle just below ½ at anterior $^{1}/_{3}$. Femur I and II yellowish brown, darker dorsally, and femur III brown, yellowish on ventral ½. Femur I with short dense inclined ventral pubescence, strongest on basal ½. Femur II and III with strong ad preapical black bristle. Femur III with pv fringe of rather long dark brown bristles on apical ½ (MSSC). Tibia I brown, darker towards apex, with 4 ad, 3-4 (p)d, 6-7 pv and 2 ap bristles. Tibia II yellow brown, with 6 ad, 3 pd, 2-3 av, 1-2 pv and 4 ap bristles. Tibia III strongly swollen, brown, gradually darker towards apex; with 6-7 ad, 6-7 pd and 1 preapical dorsal bristle; with 1 av bristle at apical ¼, preceded by row of about 10 thin, rather inclined bristles beyond basal ¼ and less than apical ¼; with pd face largely bare, especially at basal $^{1}/_{3}$, followed by horseshoe shaped area of greyish white pile, prolonged at about basal $^{2}/_{5}$ posteroventrally into narrow stripe of whitish pile towards apex, and ending into pd, rather oblique whitish comb at apical $^{1}/_{6}$ (MSSC). Tarsus I brown with tarsomeres $I_{2\text{-}3}$ paler ventrally; tarsomere I_1 1.2x as long as tarsomeres $I_{2\text{-}3}$ combined; tarsomeres $I_{4\text{-}5}$ blackish brown, flattened laterally, with tarsomere I_5 slightly deeper than long, with apical concavity; tarsomeres $I_{2\text{-}5}$ with only sparse pubescence on anterior face (MSSC) (Fig. 13). Tarsus II brown, blackish brown from apex of tarsomere II_1 onwards, latter as long as tarsomeres $II_{2\text{-}5}$ combined, with 1 dorsal bristle. Tarsus III entirely blackish brown, with 3 dorsal and 2-3 ad bristles; tarsomere III_1 0.9x as long as tarsomeres $III_{2\text{-}3}$ combined.

Female. As in male, except for: face parallel-sided, 1.3x as wide as 1st flagellomere. Coxa I mainly brownish yellow with basal ½ blackish brown. Femur III brownish yellow, slightly darkened dorsally. Tibia I yellowish brown with 4-6 pv bristles. Tibia III with ventral bristles stronger. Tarsus I entirely dark brown, with tarsomere I_1 0.9x as long as tarsomeres $I_{2\text{-}5}$ combined. Tarsus II and III dark brown, with basis and ventral face of tarsomere II_1 brown.

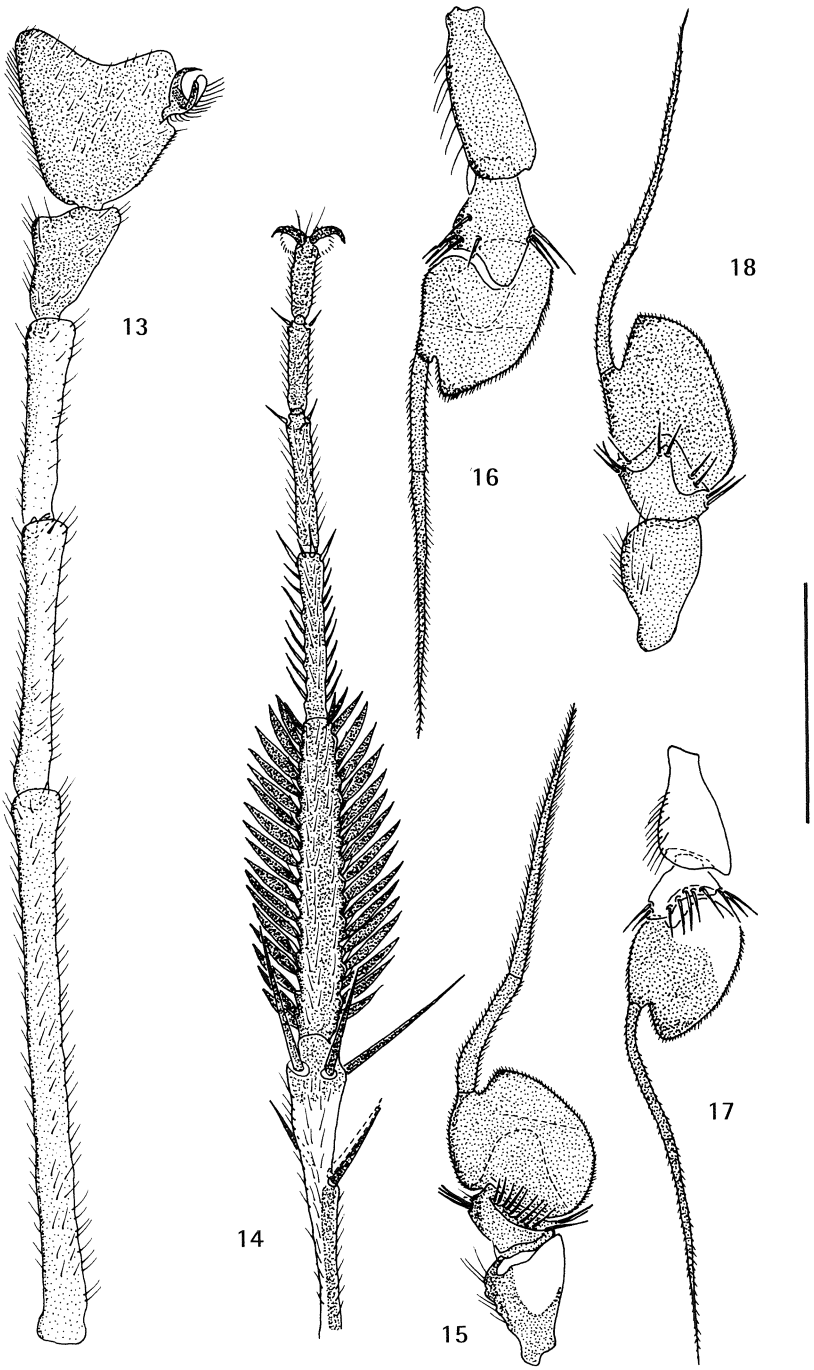
Distribution in Greenland. Collected exclusively in the Thule region during all sampling campaigns carried out there (1940, 1951, 1952 in Thule, and 2004 at Thule airbase).

Distribution. Circumpolar, described from Dolphin and Union Strait, Bernard Harbor, Northwest Territories; further recorded from Yukon Territory, Greenland and the Far East of the Palaearctic (see Negrobov, 1991; Pollet et al., 2004).

Phenology: mainly July, also August (see Fig. 19).



Figures 9-12. Wing. 9, *Dolichopus dasyops*; 10, *Dolichopus groenlandicus*; 11, *Dolichopus humilis*; 12, *Dolichopus plumipes*.



Figures 13-18. Male Secondary Sexual Characters. 13, tarsus I of *Dolichopus dasyops*; 14, tarsus II of *Dolichopus plumipes*. Antenna. 15, *Dolichopus dasyops*; 16, *Dolichopus humilis*; 17, *Dolichopus plumipes*; 18, *Dolichopus groenlandicus*.

Dolichopus groenlandicus **Zetterstedt, 1843** (Figs 2, 6, 10, 18)
Description. Medium-sized species with average body length of 4.8 mm and average wing length of 4.7 mm (Fig. 2) although smaller specimens (body and wing length about 4.0 mm) have been seen from northern SW Greenland. Male. **Head**. Face rusty brown, narrowing towards clypeus, at clypeus about 0.6x as wide as 1st flagellomere (MSSC). Frons and occiput blackish brown with bronze reflection, only frons dusted brownish. All postoculars black. Palp small, velvet black, with black pubescence. Antenna entirely black; 1st flagellomere 1.4x as long as wide and 0.8x as long as scape and pedicel combined. Arista dorsal, 1.1x as long as 1st three antennal segments combined (Fig. 18).

Thorax shining bronze on dorsum with pleura dusted bluish grey. Scutellum bare with sparse fringe of minute white setae between medial bristles. **Abdomen** metallic bluish green, dusted bluish grey as seen from frontolateral angle. Hypopygium with rather small brown cercus (Fig. 6). **Wing** smoked with small costal stigma (MSSC), 2.7x as long as wide (Fig. 10). Halter yellowish. Squamal fringe black.

Legs with all coxae blackish brown. Coxa III with strong erect black bristle just below middle at anterior 1/3. Femur I dark brown with apical 2/5 yellow, femur II brownish yellow with dark basis and femur III entirely dark brown. Femur II and III with strong ad preapical black bristle. Tibiae yellow with extreme basis infuscated, and tibia III black on apical ¼. Tibia I with 2 ad, 2 pd, 2-3 pv and 2 ap bristles. Tibia II with 5 ad, 3 pd (most basal bristle small), 1-2 av and 5 ap bristles. Tibia III strongly swollen, with 6-7 ad, 5 pd, 1 preapical dorsal and 2 ap bristles; with 1 av bristle at apical 2/5, preceded by row of 6-7 small rather inclined ventral bristles between basal 1/3 and apical 2/5; dorsal and pd face largely void of pubescence, latter face with distinct zone of dark yellow pile between basal 1/5 and ½ and with preapical oblique comb of yellowish white to brown setae in notch (MSSC). Tarsus I and II brownish yellow, dark brown from apical 1/5 of 1st tarsomere onwards. Tarsus II without dorsal bristles. Tarsus III entirely black with 3-4 dorsal and 4 ad bristles.

Female. As in male, except for: face greyish white with yellowish tinge, nearly parallel-sided, 1.2x as wide as 1st flagellomere. Femur II with basoventral ½ dark brown. Tibia I with 3-4 pv bristles. Tibia II with 6 ad bristles.

Distribution in Greenland. Most common *Dolichopus* species in Greenland, collected during all but two years of investigation and accounting for 72.1% of Greenland dolichopodid specimens examined. Occurs in all zoogeographical regions in Greenland, except for Northern Greenland. More than 92% of all specimens originates from the southern (S) and southwestern regions (nSW, sSW). First ZMUC specimens date from 1889.

Distribution. Exclusively (northern) Nearctic, described from Greenland and further recorded from Alaska, Northwest Territories, British Columbia, Colorado and Newfoundland (Labrador) (see Pollet et al., 2004). The Colorado record seems dubious.

Phenology: June–September, with distinct activity peak in July (64% of specimens) (Fig. 19). Its activity period is restricted to July in northeast and northwest Greenland, and to July and August in southeast Greenland.

Dolichopus humilis **Van Duzee, 1921** (Figs 3, 7, 11, 16)
Description. Medium-sized species with body and wing length of about 4.5 mm (Fig. 3). Male. **Head**. Face shining silvery white, narrowing below antenna and slightly widening towards clypeus; at clypeus 0.8x as wide as 1st flagellomere. Lower postoculars white. Palp small, brownish yellow with basal ½ dark brown. Frons and occiput blackish brown, former with weak bluish reflection, latter with strong green reflection. Antenna entirely blackish brown with long scape; 1st flagellomere 1.3x as long as wide, and 0.6x as long as scape and pedicel combined. Arista as long as 1st three antennal segments combined (Fig. 16).

Thorax bronze green with pleura greenish grey dusted. Scutellum bare with sparse white marginal fringe. **Abdomen** metallic green, greyish dusted laterally. Cercus obscure yellowish white with blackish band along apical and ventral margin, with long curved marginal bristles (Fig. 7). **Wing** rather broad, 2.4x as long as wide, with strong costal stigma (MSSC); vein M_1 with smooth bend (Fig. 11). Halter yellowish. Squamal fringe mostly entirely white.

Legs. All coxae blackish brown; coxa III with erect black bristle just below ½, in anterior ½. Femur I dark brown with yellowish knee, femur II brownish yellow and femur III pale brown; all femora with short white ventral pubescence. Femur II with 1 ad preapical and femur III with 2 ad preapical black bristles. Tibia I slightly dilated towards apex, yellowish brown, with 2 ad, 3 (p)d, 2-3 pv, 2 ap and 1 long, curved apicoventral bristles. Tibia II yellow with 4 ad, 2 pd, 1 av and 5 ap bristles. Tibia III swollen in basal ½ and on apical 1/5, mainly yellowish brown, with ventral face brownish yellow and pd face and apical 1/5 dark brown; with 5 ad, 5 pd, 1 dorsal preapical and 2 ap bristles; with 1 ventral bristle at apical 2/5, preceded by row of 8-9 smaller, rather inclined bristles between basal 1/5 and apical 2/5; pv face with dark brown pile between basal 1/5 and ½; dorsal face largely bare, with pv preapical, rather longitudinal comb of white setae (MSSC). Tarsus I yellowish brown, dark brown from apical ¼ of tarsomere I_1 onwards; tarsus I 0.9x as long as tibia I. Tarsus II yellow, dark brown from apical ¼ of tarsomere II_1 onwards. Tarsus II_1 black with basal 2/3 of tarsomere III_1 blackish brown; tarsomere III_1 with 2 dorsal and 1 ad bristles.

Distribution in Greenland. Restricted in distribution to Thule, where it was collected in fair numbers – and more abundantly than the sympatric *D. dasyops* – only in 1951 and 1952. It accounts for only 3.8% of all Greenland specimens examined.

Distribution. Northern Nearctic, described from a site on the boundary between Northwest Territories and Yukon Territory (longitude 141°, latitude 69°20'). Further recorded from Alaska and Greenland (see Pollet et al., 2004).

Phenology: July (Fig. 19).

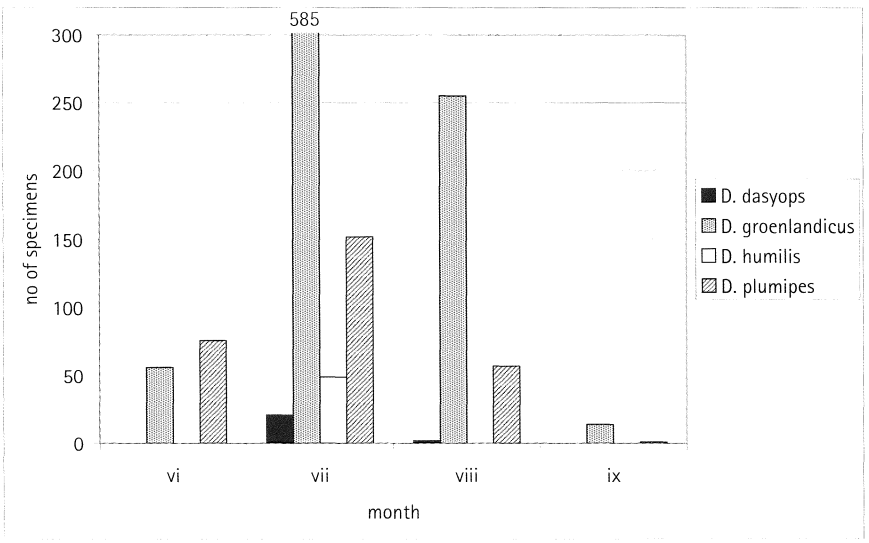


Figure 19. Phenology of Dolichopodidae in Greenland.

***Dolichopus plumipes* (Scopoli, 1763)** (Figs 4, 8, 12, 14, 17)

Description. Smallest *Dolichopus* species of Greenland with average body length of 4.4 mm, and average wing length of 4.2 mm (Fig. 4). Male. **Head**. Face pale golden yellow (MSSC), slightly narrowing below antennae and widening towards clypeus; at clypeus 0.6x as wide as 1st flagellomere. Frons and occiput blackish brown with bronze reflection, only occiput with strong dusting. Lower postoculars pale yellow. Palp small, pale yellow with black pubescence. Antenna pale yellow with only apicodorsal 2/3 of 1st flagellomere dark brown; latter 1.3x as long as high, as long as scape and pedicel combined. Arista dorsal, 1.3x as long as first three segments combined (Fig. 17).

Thorax shining green bronze, pleura greenish grey. **Abdomen** shining green, laterally with grey dusting. Cercus ovoid, transparent white to yellow with narrow black marginal band, with denticulate bristles at apex and curved ventral bristles (Fig. 8). **Wing** with hind margin concave at basis, without costal stigma (Fig. 12). Halter yellow. Squamal fringe black.

Legs mainly pale yellow. Coxa I entirely pale yellow with anterior face dusted white; coxa II and III blackish brown with yellow apex, latter with erect black bristle at middle and anterior 1/3. Femur II and III with black ad preapical bristle. Tibia and tarsus I pale yellow, blackish brown from apical 1/5 of tarsomere I_1 onwards; tibia I with 2-3 ad, 2 (p)d, 2-3 pv and 2 ap bristles. Tibia II narrow, elongate, pale yellow with flat bare dorsal face with distinct dark brown stripe between basal 1/10 and apical 1/10, latter part broader, white (MSSC); with 5 ad (1st small), 2 pd, 1 av and 5 ap bristles. Tarsus II entirely black, with tarsomere II_1 flattened, pennate laterally (MSSC) (Fig. 14). Tibia III pale yellow with apicodorsal 1/8 black, with 5-6 ad, 5 pd, 1 preapical dorsal and 2 ap bristles; with 1 av bristle at apical ¼, preceded by dense ventral pubescence with several rather erect setae; pv face with narrow spot of yellow pile between about basal ¼ to 2/5, producing narrow stripe of similar pile, ending in short oblique pd comb of white setae at apical 1/8. Tarsus III entirely black, tarsomere III_1 with 2 dorsal and 1 ad bristles.

Female. As in male, except for: face greyish white with weak yellow tinge, parallel-sided, 1.2x as wide as 1st flagellomere. Tibia II entirely pale yellow, tarsus II blackish brown with extreme basis brownish yellow. Tibia III with 6-7 ad, and 2 av bristles at apical 2/5 and ¼, preceded by 6-7 rather strong pv bristles.

Distribution in Greenland. *D. plumipes* is the second-most common *Dolichopus* species in Greenland, representing 22.3% of all specimens examined. More than 94% of all specimens were collected in South Greenland.

Distribution: Holarctic, described from Slovenija ("carnioliae indigena"). Thus far recorded in the Nearctic from Alaska, Northwest Territories, Alberta, Ontario, Quebec, New Brunswick, Nova Scotia, Newfoundland, and St-Pierre and Miquelon, south to California, Utah, Nebraska, Arkansas, and Michigan (including Montana, Wyoming and Iowa). Also known from Greenland and Mexico. Recorded from most of the Palaearctic, from Western Europe to the Far East and Mongolia (see Pollet et al., 2004). In Europe, it is a euryotopic species with its main distribution in grasslands and marshlands. Although it occurs in almost every habitat type, it seems to avoid oligotrophic habitats like peatbogs and humid heathland as well as dense forests.

Phenology: June–September, with a distinct activity peak in July (53% of specimens) (Fig. 19). The two specimens from northern southwest and northeast Greenland were collected in July.

Discussion

Table 2 gives an overview of the Dolichopodid fauna of other regions in the northern hemisphere, north of 60°N.

Greenland's dolichopodid fauna with four species is staggeringly poor as compared to other Palaearctic and Nearctic regions at the same latitude, except for Iceland. Apart from the dubious Colorado record of *Dolichopus groenlandicus*, both *Dolichopus dasyops*, *D. groenlandicus* and *D. humilis* can be termed northern, almost exclusively Nearctic species, whereas *D. plumipes* has a much wider distribution in the Holarctic. The fact that only *Dolichopus* is represented in Greenland is not surprising as this is the dominant genus in all northern regions throughout the Holarctic. Only in northern European Russia, Medeterinae seem to contain more representatives which is, however, mainly due to the elaborate research efforts on the genus *Medetera* by Negrobov (1967), Negrobov & Stackelberg (1974) and Negrobov & Thuneberg (1970).

Besides *Dolichopus* and *Medetera*, also *Hydrophorus* and *Campsicnemus* are rather species rich in the northern Holarctic. Several reasons might explain their apparent absence in Greenland. As mentioned before, most *Medetera* species live and breed on trees which are rare beyond the southernmost, innerfjord, subarctic areas (Narssaq district) where *Betula pubescens*, *Sorbus groenlandica* and *Salix glauca* may reach heights of 4-5 m. *S. glauca* is the only tree that also occurs along inland rivers in West Greenland till about 70°N. Although it remains possible that the generally small, blackish and cryptic *Medetera* species may have been overlooked in surveys in the latter regions, the absence of bark beetles (Coleoptera: Scolytidae) in Greenland – as major prey for the larval stages of arboreal *Medetera* species – suggests that this genus is really lacking on the island.

Representatives of the genus *Hydrophorus* are rather large, greyish species that are mostly found while skating on shallow water surfaces in search of mates or prey. Their larvae breed in muddy or sandy riparian habitats. These habitat types occur in Greenland where *Hydrophorus* species could survive but their dispersal would certainly be hampered by the lack of a dispersion route except through the high arctic. The present lack of this genus in collections might thus be due either to an undersampling of their habitats or to unfavourable climatological conditions. In this respect, average temperatures reaching max. 5°C even during summer (July) might not be sufficiently high to allow larval development of these rather large species. Adults, on the contrary, seem less affected by low temperatures as several European species (e.g. *H. bipunctatus*, *H. litoreus*, *H. praecox*) have been recorded as late as October (Assis Fonseca, 1978), when they represent, together with certain *Campsicnemus* and *Syntormon* species, the only active adult Dolichopodidae.

Campsicnemus species are small, equally obscure flies that inhabit riparian habitats and are often found together with *Hydrophorus*. Here too, it cannot be excluded that representatives actually occur in Greenland, but possibly they have been overlooked or their habitats thus far undersampled. Note that in Iceland, the two latter genera are both represented by one saltmarsh-inhabiting species.

The distribution of two species, *D. dasyops* and *D. humilis*, limited to the Thule region is striking as is the fact that *D. groenlandicus* was not encountered here. *D. dasyops* has been found at both Thule and the Thule airbase, whereas *D. humilis* is only recorded from Thule itself. This kind of restricted distributions often suggests recent human introduction. In the present case, this would imply that human transport of suitable materials (soil, plant material) took place prior to 1940 (= first records of both species in Thule). As Denmark permitted the US to establish its military stations only in April, 1941 and as the Thule airbase was erected as late as 1951, a recent introduction of at least *D. dasyops* must be excluded. A more plausible explanation is natural dispersal from the American

Table 2. Dolichopodid faunas in zoogeographical regions north of 60°N.

	Nearctic				Palaearctic			
Circumpolar geographical regions #	AK	YT	NT	IS	NO	FI *	RUN	EPA
Greenland species								
Dolichopus dasyops		+	+					
Dolichopus groenlandicus	+		+					
Dolichopus humilis	+	+	+					
Dolichopus plumipes	+		+	+	+	+	+	+
No species per genus								
Achalcinae (*Achalcus* spp.)	–	–	–	–	4	3	–	–
Diaphorinae	9	1	1	–	23	23	9	13
Argyra	4	–	–	–	11	11	2	1
Asyndetus	–	–	–	–	–	–	–	2
Chrysotus	2	–	–	–	9	9	6	9
Diaphorus	3	1	1	–	3	3	1	–
Melanostolus	–	–	–	–	–	–	–	1
Dolichopodinae	54	11	26	1	67	69	40	84
Dolichopus	50	10	24	1	52	58	38	66
Gymnopternus	1	–	–	–	7	6	1	4
Hercostomus	1	1	2	–	5	2	1	10
Pelastoneurus	1	–	–	–	–	–	–	–
Poecilobothrus	–	–	–	–	–	–	–	1
Sybistroma	–	–	–	–	1	–	–	–
Tachytrechus	1	–	–	–	2	3	–	3
Hydrophorinae	30	13	24	1	17	21	20	27
Aphrosylus	–	–	–	–	1	–	–	–
Hydatostega	1	–	1	–	–	–	–	–
Hydrophorus	25	10	19	1	12	17	13	17
Liancalus	–	–	–	–	1	1	1	1
Paraphrosylus	1	–	–	–	–	–	–	–
Peodes	–	–	–	–	1	–	2	2
Scellus	3	3	3	–	1	1	3	4
Thinophilus	–	–	–	–	1	2	1	3
Medeterinae	9	2	8	–	44	51	42	46
Dolichophorus	–	–	–	–	–	1	–	1
Medetera	8	2	8	–	36	37	32	38
Systenus	–	–	–	–	4	3	–	3
Thrypticus	1	–	–	–	4	10	10	4
Neurigoninae (*Neurigona* spp.)	–	–	–	–	5	4	1	2
Peloropeodinae	–	–	–	–	2	1	1	1
Chrysotimus	–	–	–	–	2	1	1	–
Micromorphus	–	–	–	–	–	–	–	1
Rhaphiinae (*Rhaphium* spp.)	15	3	4	–	25	27	22	24
Sciapodinae (*Sciapus* spp.)	–	–	–	–	4	8	–	1
Sympycninae	11	–	1	2	23	27	14	27
Calyxochaetus	1	–	–	–	–	–	–	–
Campsicnemus	6	–	1	1	9	13	7	13
Lamprochromus	–	–	–	–	1	1	–	1
Sympycnus	3	–	–	–	4	2	1	–
Syntormon	1	–	–	1	6	8	4	11
Telmaturgus	–	–	–	–	1	1	–	1
Teuchophorus	–	–	–	–	2	2	2	1
Xanthochlorinae (*Xanthochlorus* spp.)	–	–	–	–	2	2	1	–
Total no species	128	30	64	4	216	236	150	225

AK: Alaska; YT: Yukon Territory (Canada): NT: Northwestern Territories (Canada); IS: Iceland; NO: Norway; FI: Finland; RUN: Northern European Russia; EPA: East Palaearctic.

* *Chrysotus angulicornis* considered as synonym of *Chrysotus gramineus*; *Hercostomus chalybeus* assigned to *Gymnopternus*.

mainland via Ellesmere Island which is only 70 km offshore (closest point of Greenland to the North American coast). Assuming this dispersal route, it remains, however, enigmatic why both species did not disperse further south to warmer and presumably more hospitable regions, or even to other sites in Northwest Greenland. It is possible that unfavourable conditions, especially in the northern regions, prohibit dispersal to a large extent, even during the short and cold summers. This seems to be confirmed by the fact that 80 of 82 dolichopodid specimens from northwestern and northeastern Greenland (north of 72°N) were collected in July only. Dispersal to the south, on the other hand, is most probably prevented by the large glaciers in the Melville Bugt (Bay), which also proved an impassable barrier for e.g. the musk ox and other animals and plants. It is, however, clear that only more intensified sampling and in-depth ecological research can shed more light on these cases.

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