

Additions to the Norwegian fauna of calypterate Diptera (Tachinidae, Calliphoridae, Muscidae)

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Data on *Linnaemya perinealis* Pandellé, 1895 (Tachinidae), *Boreellus atriceps* (Zetterstedt, 1845) (Calliphoridae), *Helina cilipes* (Schnabl, 1911), *Spilogona puberula* (Ringdahl, 1918), *S. sanctipauli* (Malloch, 1921), *S. trilineata* (Huckett, 1932), *Limnophora scrupulosa* (Zetterstedt, 1845) and *L. sinuata* Collin, 1930 (Muscidae), all recently captured in Norway for the first time, are presented. *S. trilineata* is also reported as new to the Palaearctic Region, and *L. sinuata* as new to the Palaearctic mainland. A new record of *B. atriceps* from Svalbard is presented and its biology discussed.

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Below are reported some rather interesting captures of flies made in Norway mainly during the summer 1982. None of them have been recorded from this country before. Unless otherwise stated the specimens have been caught by the author and are in his collection. Some duplicates have been presented to the British Museum (Natural History), London (BMNH), Museum of Zoology, Copenhagen (ZMC), and Staatliches Museum für Naturkunde, Stuttgart (SMNK). The Norwegian localities are presented according to the system of Økland (1981).

Family Tachinidae

Linnaemya perinealis Pandellé, 1895.

Material: — Oppland, OS, Sør-Fron: Harpefoss, EIS 62, 1♂ 14 July 1981, T. Nielsen, Malaise-trap; ON, Nord-Fron: 3 km E of Vinstra, EIS 62, 1♂ 17 July 1982, Ø. Rognes; 11♂♂ 17 July 1982 (2♂♂ in SMNK).

All specimens from 1982 were mounted with the terminalia partly extended, and one male has been dissected. The genitalia agree with the figures given by Herting (1961), Chao (1962) and Zimin (1954, 1963). The specimens from 1982 were netted in low vegetation during the early part of a sunny day after a night with very heavy rainfall, one of the very few during the extremely dry summer of 1982. The species is very characteristic on account of the two successive pairs of discal

setae on T3 and T4, the shape and size of the cercal plate, and the narrowness of the surstyli. Its host is unknown. Benno Herting, Ludwigsburg, has kindly examined my material and agrees with my identification.

The species has been recorded from the Pyrenees (type specimen in Paris revised by Herting 1961, cf. also Herting 1978), USSR (Zimin 1954), Mongolia (Zimin 1954, Mesnil 1972, Herting 1973) and China (Chao 1962).

Family Calliphoridae

Boreellus atriceps (Zetterstedt, 1845).

Material: — Oppland, ON, Lom: 1 km N of Krossbu, 1250 m, lower to middle alpine zone, EIS 60, 2♂♂ 1♀ 22 July 1982; 1 km W of Sognefjellhytta, 1400 m, middle alpine zone, EIS 60, 1♂ 3♀ 22–23 July 1982; 1♂ 22–23 July 1982, A. Rognes; 3♂♂ 5♀ 22–23 July 1982, T. Rognes; 1♂ 22–23 July 1982, T. Rognes, BMNH; 3♀ 22–23 July 1982, Ø. Rognes; 1♂ 22–23 July 1982, Ø. Rognes, BMNH. — Sogn og Fjordane, SFI, Luster: 1,5 km N of Berdalseter, 1300 m, middle alpine zone, EIS 60, 1♂ 1♀ 23 July 1982, A. Rognes.

All the localities are in the western part of the Jotunheimen mountain massif. Specimens were attracted by and captured with hand net on slices of fresh (2–4 days since frozen condition) liver exposed to the sunshine and observed almost continuously for varying periods of time. One of the males was taken close to the putrid carcass of a hare (*Lepus timidus* L.) teeming with fly larvae. The weather was sunny and clear with a slight breeze. Lemming (*Lemmus lemmus* L.) burrows were observed and faecal pellets were abundant

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all over the ground at all localities. Especially the locality W of Sognefjellhytta was obviously the winter-burrows of lemmings. Attempts to attract the species with liver slices in the upper alpine zone near Juvasshytta (ON, Lom, 1841 m) were unsuccessful, despite of good weather conditions. No lemming burrows or faecal pellets were observed in that area, however.

The species was first described by Zetterstedt (1845: 1311, as *Sarcophaga atriceps*) from a single female specimen captured by Dahlbom «ad radicem alp. Mullfjellen . . .» (Sweden, Jämtland) 27 July 1840, now in Museum of Zoology, Lund. In the Swedish Museum of Natural History, Stockholm, is another female which I have been able to examine. It is labelled (1) «Gl.» (2) «P.Wg.», which means that it has been taken on Gotland by the well known entomologist Peter Fredrik Wahlberg, who lived from 1800 to 1877, according to Smith (1981). No other records from Sweden exist, and surprisingly the species was unknown to Ringdahl (1945: 210, «ej känd av förf.»). In Finland *B. atriceps* was recorded by Bonsdorff (1866: 143) from «Lappmarken» and «Tuovilanlaks» (now Tuovilanlahti = Maaninka in Savonia borealis) (specimens not seen). The only modern record in Scandinavia is from above the tree-line on the hill Ailigas in northern Finland (Laponia inarensis: Utsjoki), where 2 ♂♂ and 10 ♀♀ were captured in blow-fly traps baited with meat or human faeces (Nuorteva 1964, Hedström & Nuorteva 1971). Outside Scandinavia the species is known from Svalbard (Collin 1925, cf. Nuorteva 1967), the arctic parts of the USSR (Zumpt 1956, Chernov 1959, 1961, 1965, Lobanov 1976), the arctic parts of North America (Hall 1948, McAlpine 1965) and Greenland (Collin 1931). It is a blowfly species to reach very far to the North. According to map given by McAlpine (1965: 78) it occurs well N of 80°N at Ellesmere I., and I have recently been able to examine 3 ♂♂ and 2 ♀♀ taken at Bockfjorden, Haakon VII Land, Vest-Spitsbergen, a locality at about 79° 30'N 13° 20'E (specimens in Tromsø Museum).

Dead mammals belonging to the following species have been reported to serve as larval food for *B. atriceps*: walrus (*Odobenus rosmarus* (L.)) (Hall 1948), lemming (*Dicrostonyx groenlandicus* (Traill)), arctic hare (*Lepus arcticus* Ross), husky dog (*Canis familiaris* L.) (McAlpine 1965), lemming (*Lemmus obensis* (Brants) = *Lemmus sibiricus* of Walker et al. 1964), Middendorf's vole (probably *Dicrostonyx torquatus* (Pallas)) (Chernov 1965), arctic fox (obviously *Alopex lagopus* L.) (Collin 1925, cf. Nuorteva 1967). McAlpine relates the fantastic number of 1812 adults to have emerged from a single medium sized carcass of *D. groenlandicus*. Dead *Lemmus lemmus* (L.) is probably the main substrate for larval development in Scandinavia, although no direct evidence such as successful breeding has been reported as yet.

McAlpine relates the interesting observation

from Ellef Ringnes I. (Canada, NWT) that larvae of *B. atriceps* do not go underneath the carcass or downward under protective soil for pupation, as other blowflies do, but move to the exterior of the carcass and pupate in the hair exposed to the sun to receive the fullest possible benefit of the insolation heat, both directly and indirectly by the heat absorbed by the dead animal's hair. Chernov's (1965:81) observation near Dickson (USSR: western part of Taymyr Peninsula) that the many dead lemmings («*Lemmus obensis* Brants» = *L. sibiricus*) «lying freely on the ground» were infested to the maximum level with *B. atriceps* larvae is consistent with McAlpine's observations. It is also remarkable that *B. atriceps* was not among the species obtained from carcasses of lemmings (again *L. obensis*, rendered as «Siberian lemming» in the *Ent. Rev. Wash.* translation p. 43, whereas «obskogo lemminga» i.e. oblemming is used in the original) and «short-skulled voles» dead in burrows (Chernov 1965: 81). Nuorteva's citation of Chernov (1961) to the effect that «*Boreellus atriceps* develops in the burrows of *Lemmus lemmus* (L.)» (Nuorteva 1964: 225) is possibly due to a mistranslation of the relevant parts of Chernov's work (1961: 37, lines 22—23 from above). Chernov here reports to have found larvae and puparia of *B. atriceps* in humus nearby burrows, not within as implied by Nuorteva, and states elsewhere (1961: 37, lines 8—9 from below) that the larvae develop in rotting meat. Neither can I find that the specific name «*Lemmus lemmus* L.» is mentioned by Chernov (1961) who only uses the general expression «lemming». *Lemmus lemmus* (L.) does not exist as far east as Anabar Bay (Yakutskaya ASSR) (about 115°E) which was the study area of Chernov (1961), and *Lemmus sibiricus* is probably the species meant (cf. information on distribution in Walker et al. 1964).

Equally problematical are Nuorteva's (1967: 62) statement to the effect that the adults are able «to take shelter in the burrows of lemmings» and Hedström & Nuorteva's (1971: 125) reference to its «occurrence in the burrows of lemmings». In fact I can find no evidence to this effect in the sources cited by these authors (i.e. Chernov 1961, McAlpine 1965), although it may of course be true. However, I think it likely that the adults are able to seek refuge in any space below upper ground level, e.g. also in crevices beneath or between stones, a type of shelter abundantly available in most parts of alpine and arctic habitats, and that the presence of lemming burrows *per se* does not play a decisive role, if a role at all, in the ability of the species to withstand the rigorous conditions of the arctic as implied by Nuorteva and Hedström. Note that *B. atriceps* apparently thrives well at Svalbard where no burrowing rodents occur. The association of *B. atriceps* with lemming burrows observed in other parts of the Arctic (Chernov 1961) and also shown by the Norwegian localities cited above may simply be due to a higher frequ-

ency of carcasses in such areas than elsewhere.

McAlpine (1965: 90—91) suggests that the key to the understanding of the success of insects such as *B. atriceps* in the harsh conditions of the Arctic is an ability on their part to tolerate «frequent interruptions of development in various stages», which would result in the extension of «individual life cycles over a period of several years» for some portion at least of the breeding population, assure «continuation of the species regardless of conditions in any single season», and amount to «perenniality in generations, a well known and apparently indispensable characteristic of the plants that grow in such areas». He relates the case of a dead husky at Ellef Ringnes I. on which were present all stages of *B. atriceps* during the whole period of his visit there. He thinks it is a strong possibility that some of the specimens might «have taken several years to complete their life cycles». This may also be the case for the Scandinavian population of this species although no experimental or other evidence is available.

B. atriceps «is one of the earliest insects to appear in the spring in the High Arctic» (McAlpine 1965) and the adults were observed before 13 July on Ellef Ringnes I. (about 79°N). Chernov (1961) lists it is common in the first third of June at the tundra near Anabar Bay (about 73°N). It is not known whether this early appearance is due to survival through the winter of (almost) fully matured larvae, of puparia or of adults.

The adults have been reported to visit meat and faecal matter (Chernov 1961, Nuorteva 1964), and Chernov (1961) lists it as commonly visiting flowers at the study area of Anabar Bay. No observation of flower visits exists from Scandinavia.

B. atriceps adults are well equipped for life in arctic environments by having a very dark shining blue-black integument which to me appears quite identical to that of *Protophormia terraenovae* (Robineau-Desvoidy, 1830) whose skin is well able to absorb radiant heat and probably also protects against ultraviolet radiation (Sýchevskaya & Shaidurov 1965, Sýchevskaya 1966).

Family Muscidae

Helina cilipes (Schnabl in Schnabl & Dziedzicki, 1911).

Material: — Oppland, ON, Skjåk: 2 km W of Nordberg, about 450 m, EIS 70, 8♂♂ 21 July 1982; Nord-Fron: 3 km E of Vinstra, EIS 62, 1♂ 16 July 1982.

The specimens from Skjåk were taken on the ground or on stones at the edge of an old football-playground in a very dry sandy area with pine forest close to the river Otta. Many more could have been taken. Both localities lie to the E or NE of the Jotunheimen mountain massif and the climate is very dry, especially in the Skjåk area, since the predominantly south-westerly winds over southern Norway gives off all moisture as

rainfall to the west of or within the higher mountain areas.

Of the specimens from Skjåk, one was mounted with extended terminalia and another dissected. The genitalia agree closely with the figures given by Hennig (1957). All the specimens have short, rather inconspicuous pale hairs on the underside of scutellum, as described by Fonseca (1968: 44) and Lyneborg (1970: 35).

The species has been recorded from Sweden (Skåne 1♂, Småland 1♂) (Ringdahl 1952, 1956), Finland (Nylandia 2♂♂, Karelia australis 1♂) (Tiensuu 1935), Poland, USSR (Lithauen, Leningrad district) (Hennig 1957), England (Dorset, at Studland) (Fonseca 1968) and Spain (Granada 6♂♂ 2♀♀ 2200—2550 m) (Lyneborg 1970).

Spilogona puberula (Ringdahl, 1918).

Material: — Sogn og Fjordane, SFI, Årdal: Vetti, 230 m, EIS 60, 1♂ 24 July 1982.

The specimen was taken on a stone at the bank of the swift-flowing river Utlei in Utladalen just below the farm Vetti in the southern part of Jotunheimen. I have compared the specimen with all material of this species present in Ringdahl's collection in Lund, Sweden (7♂♂ O. Ringdahl leg., 1♂ 1♀ H.C. Hockett leg.).

The species has previously only been reported from Sweden (Torne Lappmark: Abisko; Jämtland: Åre) (Hennig 1959) and Alaska (Hockett 1965).

Spilogona sanctipauli (Malloch, 1921).

Material: — Oppland, ON, Lom: Juvasshytta, 1841 m, upper alpine zone, EIS 61, 7♂♂ 15♀♀ 19 July 1982.

The specimens were taken on the ground or within flowercups on a sunny day within a circumference of 200 m from the lodge Juvasshytta in the Galdhøpiggen mountain massif in Jotunheimen. One male has been dissected and the genitalia agree with the ones figured by Hennig (1959) and Hockett (1965).

The species is widely distributed in the arctic parts of North America and Greenland (Hockett 1965, McAlpine 1965). Together with one named *Spilogona obsoleta* (Malloch, 1920) it was the only muscid fly to occur at Ellef Ringnes I. (Canada, NWT), «the most barren part of the high arctic region» (McAlpine 1965: 73). According to Hennig (1959) it has also been captured in the arctic parts of the USSR (Kolyuchin I., Wrangel I., Taymyr Peninsula). Adrian C. Pont (in litt. 10 May 1981) informs me that he has seen many specimens from Northern Sweden (Torne Lappmark: Mt Nuolja near Abisko).

Spilogona trilineata (Hockett, 1932).

Material: — Oppland, ON, Lom: Juvasshytta, 1841 m, upper alpine zone, EIS 61, 1♂ 19 July 1982.

This record from the Galdhøpiggen mountain massif in central Jotunheimen is the first one from the Palaearctic Region. The single specimen which agrees fairly well with Hockett's descrip-

tion (1932: 283) has been dissected and the terminalia agree with Hockett's (1965) figures. Adrian C. Pont has most kindly compared it with two specimens from North America in the collections of the BMNH and he agrees with my identification. Furthermore, I have myself compared it with two males from Canada (NWT: Eskimo Point, G.G. DiLabio leg.; Chesterfield, J.G. Chillcott leg.) (both in my own collection), and one male from USA (Alaska: Anchorage, 11 June 1921, J.M. Aldrich leg.) (in USNM). The holotype was taken at the latter locality 6 June 1921, also by J.M. Aldrich.

The species is very characteristic on account of the hairy eyes, the narrow grey dusted stripe on mesonotum along the *dc* setae, and the deep V-shaped excavation in the cercal plate. In the Norwegian specimen the parafacialia at the base of the antenna are narrower than the third antennal segment, a dusted spot on the middle of the disc of scutellum can hardly be said to be present, though a slightly greyish area is present apically, the spots of the abdomen tend to coalesce, especially on T3, and a darkened area of more or less coalesced spots is present on T5. The Canadian specimens are rather like the Norwegian one in all these respects. The specimen from Alaska, however, has the parafacialia distinctly broader above than below, and in the upper part broader than the third antennal segment. This segment is also narrower than in the other specimens I have seen. The spot on the middle of the disc of the scutellum is rather striking, and the spots on T3 separated by a distinct greyish white dusted line. On T5 no spots are present.

The species is widely distributed in northern North America from Alaska to Quebec and Labrador (Hockett 1965). Even though it has not been recorded from Greenland the presently known range parallels the type of ampho-atlantic distribution presented by e.g. *Carex scirpoidea* Michaux (Cyperaceae) whose only known locality in the Old World is Solvågntind in northern Norway (NSI, Saltedal) (Hultén 1958, Gjærevoll 1973).

Limnophora scrupulosa (Zetterstedt, 1845).

Material: — Rogaland, RY, Sandnes: Graveren, EIS 7, 1 ♂ 27 Sept. 1981, 1 ♂ 6 June 1982, 2 ♂ ♂ 30 July 1982, T. Jonassen.

The locality at Graveren lies close to the southern end of Gandsfjorden, and the specimens were taken on clayey ground. Adrian C. Pont has kindly verified the identification of the specimen from 27 Sept. which has the terminalia exposed. They agree with Lyneborg's (1965a: 219) figures.

The species has been reported from Sweden (Skåne), Denmark (Jutland, Zealand), Great Britain (England, Scotland, Wales), Poland's Baltic coast (Deep, Stolp), France (English Channel coast: Calvados, Pas-de-Calais; Pyrenees), E. Germany (Blankenburg), and USSR (New'yansk in Ural) (Hennig 1959, Lyneborg 1965a, Michelsen 1977).

Limnophora sinuata Collin, 1930.

Material: — Vest-Agder, VAY, Flekkefjord: 1 km NW of Eikåsgrend at Netlandsvatn, 197 m, EIS 4, 1 ♀ 3 Aug. 1981; Lindesnes: Buhølen, EIS 2, 1 ♂ 7 Aug. 1981. VAI, Sirdal: 2 km S of Tonstad, EIS 8, 15 ♂ ♂ 6 ♀ ♀ 2 Aug. 1981. — Rogaland, RY, Gjesdal: Between Eikjeskog and Mån, EIS 7, 5 ♂ ♂ 6 ♀ ♀ 21 June 1981; Madlandsheia along Fossbekken, 400—490 m, subalpine zone, EIS 7, 6 ♂ ♂ 3 ♀ ♀ 19 June 1982 (1 ♂ 1 ♀ in ZMC); Strand: towards Prekestolen, 300—500 m, subalpine zone, EIS 7, 5 ♂ ♂ 24 May 1981, 1 ♂ 13 June 1981 (in ZMC), 8 ♂ ♂ 9 ♀ ♀ 20 June 1981 (1 ♂ 2 ♀ ♀ in ZMC, 2 ♂ ♂ 2 ♀ ♀ in BMNH), 4 ♂ ♂ 5 ♀ ♀ 23 Aug. 1981. RI, Forsand: Røssdalen, EIS 7, 1 ♂ 5 June 1982; Songesand by Helmikstølen, EIS 8, 3 ♀ ♀ 5 Sept. 1982. — Hordaland, HOY, Bergen: Bjørndalen, subalpine zone, EIS 31, 1 ♀ 4 July 1982; Between Bjørndalen and Redningshytten, below tree-line, EIS 31, 1 ♂ 5 July 1982; Gullfjellet, above tree-line, 450—600 m, EIS 31, 2 ♂ ♂ 5 July 1982; Ulriken, above tree-line, about 500 m, EIS 31, 3 ♂ ♂ 29 June 1982. — Sogn og Fjordane, SFI, Årdal: Svalheim in Utladalen, 50 m, EIS 51, 5 ♂ ♂ 5 ♀ ♀ 25 July 1982; Vetti, by the river Utlei, 230 m, EIS 60, 2 ♂ ♂ 1 ♀ 24 July 1982.

Limnophora islandica Lyneborg, 1965 is a junior synonym of *Limnophora sinuata* Collin, 1930 according to Adrian C. Pont (in litt. 9 Sept. 1982).

All the localities are in the western part of southern Norway, and all the material has been captured on stones at the banks of fast-flowing streams or rivers, except for one female taken at the edge of a lake. Several specimens have been dissected and the terminalia agree with Collin's (1930) and Lyneborg's (1965a) figures. I have also examined the male holotype and a male paratype (including genital preparations) of *L. islandica* in ZMC, and found them to be conspecific with the Norwegian specimens.

Ringdahl (1954) reports to have taken «*Limnophora exsurda* Pand.» in Aurland «på stenar invid en mindre fors» («on stones near a small waterfall», my translation) (Sogn og Fjordane, SFI, Aurland, EIS 51). I have been able to examine this material (taken 2 July 1949) which is in Museum of Zoology, Lund. 2 ♂ ♂ 2 ♀ ♀ belong, not unexpectedly, to *Limnophora olympiae* Lyneborg, 1965 (Lyneborg 1965b). A single female belongs to *L. sinuata*.

The species has previously been reported from W. Greenland (1 ♂ Orpiksuit, 68°37'N), E. Greenland (1 ♂ Hekla Havn, 70°27'N) (Collin 1930) and Iceland (1 ♂ Skutils fjördur, 1 ♂ Gránunes W of Hofsjökull, 1 ♂ 1 ♀ Skaftafell S of Vatnajökull) (Lyneborg 1965a). Thus its presently known range is a case of almost maximally restricted ampho-atlantic distribution.

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REFERENCES

- Bonsdorff, E.J. 1866. Finlands tvåvingade insekter (Diptera). Andra delen. *Bidrag kännedom Finlands natur folk* 7. Finska Vetenskaps-Societeten, Helsingfors, 306 pp.
- Chao, C.-m. 1962. Materialy po faune takhin Larvaevoridae (Tachinidae) Kitaya. I. Rod. *Linnaemyia* R.-D. (In Chinese with russian title, summary and key.) *Acta ent. sin.* 11 (1), 83—98.
- Chernov, Yu.I. 1959. Synanthropic Diptera of the Yugorsky Peninsula and of the Vaigach Island. (In Russian with English title; for English translation see *Ent. Rev. Wash.* 38, 521—523 (1960)). *Ént. Obozr.* 38, 579—582.
- 1961. Kompleks sinantropnykh dvukrylykh v arkticheskikh tundrakh Yakutii. *Nauchnye doklady vysshei shkoly, biologicheskie nauka* 3, 35—38.
- 1965. A complex of synanthropic Diptera in the tundra zone of the USSR. (In Russian with English title and summary; for English translation see *Ent. Rev. Wash.* 44, 39—44). *Ént. obozr.* 44, 74—83.
- Collin, J.E. 1925. Diptera (Cyclorrhapha) from Spitsbergen. Results of the Oxford University Expedition to Spitsbergen 1924. *Ann. Mag. nat. Hist.* (9) 16, 332—337.
- 1930. A revision of the Greenland species of the anthomyid genus *Limnophora* sens. lat. (Diptera), with figures of the male genitalia of these and many other Palaearctic species. *Trans. ent. Soc. Lond.* 78, 255—281, Plates XV-XXVII.
- 1931. The Oxford University Expedition to Greenland, 1928. — Diptera (Orthorrhapha Brachycera and Cyclorrhapha) from Greenland. *Ann. Mag. nat. Hist.* (10) 7, 67—91.
- Fonseca, E.C.M.d'Assis 1968. Diptera Cyclorrhapha Calyptrata. Section (b) Muscidae. *Handbk. Ident. Br. Insects* 10 (4) (b), 1—119.
- Gjærevoll, O. 1973. *Plantegeografi*. Universitetsforlaget, Trondheim, Oslo, Bergen, Tromsø. ISBN 82-00-02258-7.
- Hall, D.G. 1948. *The blowflies of North America*. The Thomas Say Foundation.
- Hedström, L. & Nuorteva, P. 1971. Zonal distribution of flies on the hill Ailigas in subarctic northern Finland. *Ann. ent. fenn.* 37, 121—125.
- Hennig, W. 1955—1964. 63b. Muscidae. — In: Lindner, E. (ed.), *Die Fliegen der Palaarktischen Region* 7 (2), 1—1110.
- Herting, B. 1961. Beiträge zur Kenntnis der europäischen Raupenfliegen (Dipt., Tachinidae) III—VI. *Stuttg. Beitr. Naturk.* 65, 1—12.
- 1973. Ergebnisse der zoologischen Forschungen von Dr. Z. Kaszab in der Mongolei 327. Tachinidae (Diptera). *Stuttg. Beitr. Naturk.* (A) 259, 1—39.
- 1978. Revision der von Perris und Pandellé beschriebenen Tachiniden und Rhinophorinen (Diptera). *Stuttg. Beitr. Naturk.* (A) 316, 1—8.
- Huckett, H.C. 1932. The North American species of the genus *Limnophora* Robineau-Desvoidy, with descriptions of new species (Muscidae, Diptera). *J.N.Y. ent. Soc.* 40, 25—76, 105—158, 279—325, Plates VII-XIII.
- 1965. The Muscidae of Northern Canada, Alaska and Greenland (Diptera). *Mem. ent. Soc. Can.* 42, 369 pp.
- Hultén, E. 1958. The ampho-atlantic plants and their phytogeographical connections. *K. svenska Vetensk.-Akad. Handl.* (4) 7 (1), 1—340.
- Lobanov, A.M. 1976. Opredelitel' samok sem. Calliphoridae (Diptera) fauny SSSR po yaitsekladam. *Opredelitel' po faune SSSR, izdavaemye zoologicheskim institutom Akademii Nauk SSSR* 109, 1—48.
- Lyneborg, L. 1965a. On Muscidae and Anthomyiidae (Diptera) from Iceland. With descriptions of two new species. *Opusc. ent.* 30, 211—226.
- 1965b. Muscidae (Diptera) from Greece, collected by E. Janssens and R. Tollet, with descriptions of four new species. *Bull. Inst. r. Sci. nat. Belg.* 61 (23), 1—14.
- 1970. Some Muscidae from Spain, with descriptions of six new species (Insecta, Diptera). *Stenstrupia* 1, 29—54.
- McAlpine, J.F. 1965. Insects and related terrestrial invertebrates of Ellef Ringnes Island. *Arctic* 18, 73—103.
- Mesnil, L.P. 1944—1975. 64 g. Larvaevorinae. — In: Lindner, E. (ed.), *Die Fliegen der Palaarktischen Region* 10, 1—1435.
- Michelsen, V. 1977. Oversigt over Danmarks Muscidae (Diptera). *Ent. Meddr.* 45, 109—163.
- Nuorteva, P. 1964. The zonal distribution of blowflies (Dipt., Calliphoridae) on the arctic hill Ailigas in Finland. *Ann. ent. fenn.* 30, 218—226.
- 1967. 8. Observations on the blowflies (Dipt., Cal-

- liphoridae) of Spitsbergen. *Ann. ent. fenn.* 33, 62—64.
- Økland, K.A. 1981. Inndeling av Norge til bruk ved biogeografiske oppgaver — et revidert Strandsystem. *Fauna, Oslo* 34, 167—178.
- Ringdahl, O. 1945. Översikt över de hittills från Sverige kända arterna av familjen Tachinidae (Diptera). *Ent. Tidskr.* 66, 177—210.
- 1952. Catalogus insectorum Sueciae XI Diptera Cyclorapha: Muscaria Schizometopa. *Opusc. ent.* 17, 129—186.
- 1954. Nya fyndorter för norska Diptera. *Norsk ent. tidsskr.* 9, 46—54.
- 1956. Tvåingar. Diptera Cyclorapha Schizophora Schizometopa. 1. Fam. Muscidae. Häfte 2. *Svensk Insektfauna* 11, 91—195.
- Smith, K.G.V. 1981. List of full names of cited authors. — In: Crosskey, R.W. (ed.), *Catalogue of the Diptera of the Afrotropical Region*, British Museum (Natural History), London, pp. 1197—1217.
- Sýchevskaya, V.I. 1966. O sinantropnykh mukhakh Pamira. *Zool. Zh.* 45, 390—399.
- Sýchevskaya, V.I. & Shaidurov, V.S. 1965. O tempe-
rature tela nekotorykh sinantropnykh mukh na vostochnom Pamire. *Zool. Zh.* 44, 779—783.
- Tiensuu, L. 1935. Die bisher aus Finnland bekannten Musciden. *Acta Soc. Fauna Flora fenn.* 58 (4), 1—56.
- Walker, E.P., Warnick, F., Lange, K.I., Uible, H.E., Hamlet, S.E., Davis, M.A. & Wright, P.F. 1964. *Mammals of the World*, Vol. 2, pp. 647—1500. The John Hopkins Press, Baltimore.
- Zetterstedt, J.W. 1845. *Diptera Scandinaviae disposita et descripta*, 4, 1281—1738. Lundae.
- Zimin, L.S. 1954. Vidý roda *Linnaemyia* Rob.-Desv. (Diptera, Larvaevoridae) fauny SSSR. *Trudy Zoologicheskogo Instituta Akademii Nauk SSSR* 15, 258—282.
- 1963. Paraziticheskie dvukrylye podtribý Linnaemyina palearkticheskoi oblasti. *Trudy vsesoyuznogo nauchno-issledovatel'skogo Instituta Zashchity Rastenií* 17, 186—215.
- Zumpt, F. 1956. 64i. Calliphorinae. — In: Lindner, E. (ed.), *Die Fliegen der Palaearktischen Region* 11, 1—140 (Lieferungen 190, 191, 193).

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