

The Sarcophagidae (Diptera) of Norway¹

KNUT ROGNES

Rognes, K. 1986. The Sarcophagidae (Diptera) of Norway. *Fauna norv. Ser. B*, 33, 1—26.

Sarcophagid material from Norway in the museum collections of the Universities in Bergen, Oslo and Tromsø and in author's own collection has been revised and records of the 49 species presently known from Norway presented. 5 species, viz. *Amobia distorta* (Allen, 1926), *Blaesoxipha rossica* Villeneuve, 1912, *Helicophagella noverca* (Rondani, 1869), *Heteronychia boettcheriana* (Rodendorf, 1937) and *H. ostensackeni* (Rodendorf, 1937), are recorded from Scandinavia for the first time. *Phrosinella septentrionalis* Rodendorf, 1970 is established as a new junior synonym of *Tachina sannio* Zetterstedt, 1838 (now in *Phrosinella*). *Sarcophaga tuberosa verticina* Ringdahl, 1945 is tentatively established as a new junior synonym of *Parasarcophaga (Liosarcophaga) pleskei* Rodendorf, 1937. The male terminalia of *Macronychia agrestis* (Fallén, 1820), *M. polyodon* (Meigen, 1824), *M. striginervis* (Zetterstedt, 1838) and *Parasarcophaga pleskei* Rodendorf, 1937 are illustrated. The zoogeography of the Norwegian species is discussed.

K. Rognes, Stavanger Lærerhøgskole, Postboks 2521 Ullandhaug, N-4001 Stavanger, Norway.

INTRODUCTION

The Sarcophagidae (rather unappropriately called fleshflies) is a large and cosmopolitan fly family whose members usually can be recognised by silvery grey and black colours, striped thorax, striped, banded, tessellate or spotted abdomen, and a strongly setose body. In the world fauna about 2300 species are known (Hennig 1973). They are very small to very large calypterate flies with strong setae in a row on the hypopleuron (meron). All members are larviparous. In the Scandinavian fauna they can be distinguished from the Tachinidae by an undeveloped postscutellum, from most Rhinophoridae by a posteriorly broad and truncate lower squama, and from most Calliphoridae by their non-metallic colour and the position of the outer *ph* seta on or medial to a line through the *prst* seta parallel with the long axis of the fly. However, some non-metallic calliphorids are similar to sarcophagids even in these respects. This applies to some species of the genus *Pollenia* Robineau-Desvoidy, recognisable e.g. by presence of long wavy golden yellow hairs in addition to the normal black thoracal vestiture, and to the genus *Helicobosca* Bezzi, recognisable by yellow palpi and very strong setae in the lower half of the parafacialia. My reasons for treating *Helicobosca* as a calliphorid rather than a sarcophagid will be

given elsewhere. The genus has for the sake of convenience been included separately at the end of the present paper.

Strøm, (1781, 1784), Zetterstedt (1838, 1844, 1845, 1855), Siebke (1877), Schøyen (1889), Storm (1891, 1896, 1907), Strand (1900), Bidentkap (1901), Ringdahl (1944a, 1944b, 1952, 1954) and Rognes (1982) have published records of Sarcophagidae from Norway, and a total of 29 species (*Helicobosca palpalis* excluded) have previously been recorded. The present revision lists 49 species from Norway, of which 5 are first records from Scandinavia. In comparison it may be noted that Lundbeck (1927) published 45 species from Denmark, Hackman (1980) 57 from Finland, Ringdahl (1952) 65 from Sweden and Pont (1975) 55 from the British Isles.

MATERIAL AND METHODS

Nearly all available Norwegian material of Sarcophagidae, i.e. about 700 specimens, partly in my own collection (380 specimens), partly in the museum collections of the Universities in Bergen (mainly O. Bidentkap, A. Fjellberg, L. Greve, A. Løken, N. Knaben, T.R. Nielsen leg.), Oslo (mainly J. Knaben and J.H.S. Siebke leg.), and Tromsø (mainly T. Soot-Ryen leg.) form the basis of the present study. In addition a few small private collections (B. Sagvolden, J.H. Simonsen) have been examined. I have not seen the Trondheim collection (mainly V. Storm leg.) revised by Ringdahl (1944a), nor foreign collections, except for occasional specimens.

The Norwegian species have been assigned to

¹) Paper no. 4 in a series based on investigations financed by a grant («vikarstipend») from Stavanger Lærerhøgskole 1982—1983.

4 subfamilies, i.e. Miltogrammatinae (Miltogrammatinae), Macronychiinae, Paramacronychiinae (Agriinae) and Sarcophaginae, in accordance with the definitions (mainly based on the structure of the male postabdomen) of these or equivalent groups given by Rodendorf (1937, 1967), Zumpt (1952, 1956) and Kurahashi (1970, 1972, 1975). A short diagnosis for each subfamily based mainly on Norwegian material is given below.

The main works used for identification of species are those of Böttcher (1913–1914), Stein (1924), Lundbeck (1927), Rodendorf (1930, 1935, 1937, 1970, 1971a, 1975a, 1982), Séguy (1941), Ringdahl (1945b), Emden (1954), Kano, Field & Shinonaga (1967), Mihályi (1979c) and Verves (1982a). Numerous other papers have also been consulted, especially those of Aldrich (1916), Allen (1926), Draber-Moňko (1964–1981), Gregor & Povolný (1961), Grunin (1964), Kurahashi (1970–1975), Lehrer (1959–1981), Léonide & Léonide (1973–1982), Mihályi (1975–1979b), Parker (1916–1923), Patton (1934), Patton & Wainwright (1935–1937), Povolný (1961–1977), Povolný & Slamečková (1959–1979), Povolný & Staněk (1969), Rodendorf (1925–1978), Rodendorf & Grunin (1938), Rodendorf & Verves (1977a–1980), Shewell (1971), Strukan (1967), Venturi (1947–1960), Verves (1973–1983) and Wainwright (1928–1940). Within the Sarcophaginae (except *Blaesoxipha* Loew) no attempt has been made at naming female specimens. Even though Kulikova (1982) has given a key to 15 species based on the structure of the female postabdomen, many females are still unknown or undescribed. Almost all males which do not have visible genitalia have been dissected for examination of these parts. The terminalia have been stored in glycerol in microvials to avoid distortion or compression. Drawings have been made from such preparations.

The faunistic data have been presented in accordance with the system of Økland (1981). The distribution in terms of the European Invertebrate Survey (EIS) system for Norway (for references, see Rognes 1980) is also given. For the benefit of the reader a map (Fig. 26) is included showing the numbers assigned to each square of the EIS system.

For each species I have given some notes on its biology. I have also indicated its world distribution in broad terms. This information has been extracted from the available catalogues for different parts of the world (Downes 1965, Souza Lopes 1969, Souza Lopes et al 1977, Dear

1980), and the sources used for identification (see above). A few other papers have also been consulted (Collart 1954, 1958, Saccà & Rivosecchi 1954, Stackelberg 1962). In addition more detailed information on the North European distribution is given, extracted from Pont (1975) for the British Isles, Lundbeck (1927) for Denmark, Tiensuu (1939, 1964), Junnikkala (1960), Brander (1964), Hedström (1964), Hedström & Nuorteva (1971), Hanski & Nuorteva (1975), Hanski (1976), Hanski & Kuusela (1977, 1980), Pyörnilä & Pyörnilä (1979), Hackman (1980) and Kuusela & Hanski (1982) for Finland, and Ringdahl (1937, 1945b, 1951, 1952, 1958) and Persson (1983) for Sweden.

SYSTEMATIC LIST

Subfamily Miltogrammatinae

Diagnosis. Flies of small size. Arista bare. Gena in profile much narrower than half eye height. Prosternum, propleuron and basisternum bare. Hind coxae bare behind. Posterior spiracle of thorax operculate with unequal lappets or rhinophorid-like with two subequal fringes. Male postabdomen with a T6, a compound T7 + 8, and an epandrium. Spiracle VI in membrane, spiracle VII in T7 + 8. Processus longus absent or present. Epiphallus absent or present.

The species in this subfamily prefer dry habitats and are associated with fossorial hymenoptera, the larvae being parasites, predators or guests in their nests.

The nomenclature follows Rodendorf (1970). One new combination and one new synonymy are established.

Genus *Amobia* Robineau-Desvoidy, 1830

Pachyophthalmus Brauer & Bergenstamm, 1889

1. *Amobia distorta* (Allen)

Pachyophthalmus distortus Allen, 1926

Material: AK, Frog: Sønderstøa Degerud. EIS 28.

Data of capture: 16 June.

Note. The single male specimen has been misidentified by Ringdahl (1944b) as *signata* Meigen. However, the dissected genitalia leave no doubt as to its identity. Two females in the Oslo collection (EIS 28, 47) and 3 females in my collection (EIS 17, 28) belong either to *distorta* or *signata*.

Biology. Bred from nests of *Trypoxylon politum* Say (Sphecidae) (Allen 1926) and *Odynerus cras-*

sicornis (Panzer) (Eumenidae) (Draber-Moňko 1964).

Distribution. Palaearctic and Nearctic Regions. Not on the British Isles. Not previously recorded from Scandinavia.

Genus *Metopia* Meigen, 1803

2. *Metopia argyrocephala* (Meigen)

Musca leucocephala Rossi, 1790, preocc.; *Tachina argyrocephala* Meigen, 1824.

Material: AK, Oslo: Alunsjøen, Bygdøy, Tøyen; Frog: Sønderstø Degerud; Asker: Brønnøya. ON, Vang: Øylo. BØ, Øvre Eiker: Burud, Ulleland. BV, Rollag: ?loc. TEY, Drangedal: Tørnes. TEI, Tokke: Dalen. AAI, Åmli: Bjorevja. RY, Sandnes: Melsheia, Myrland; Stavanger: Krossberg; Klepp: Øksnevad; Rennesøy: Vikevåg. HOY, Askøy: Herdla. HOI, Kvinnherad: Rosendal. SFI, Leikanger: Fosse. NSI, Beiarn: Kvål. EIS 7, 10, 14, 16, 18, 27, 28, 31, 35, 39, 50, 52, 126.

Date of earliest and latest capture: 1 June, 11 Aug.

Note. Only males have been included. Females are not separable from those of *rondaniana* or *tshernovae* (among others) also occurring in Norway.

Biology. Séguy (1941) and Venturi (1952) cite a number of Apidae, Sphecidae and Vespidae species as hosts for the larvae. Lomholdt (1975, 1976) reports it as parasitoid of *Crabro peltarius* (Schreber), *Sphex rufocinctus* Brullé, *Ammophila pubescens* Curtis and *Oxybelus argentatus* Curtis. However, as *argyrocephala* only relatively recently has been distinguished from species such as *tshernovae* and *rondaniana* these records may not be reliable.

Distribution. Palaearctic (cf. map in Verves 1982b), Nearctic, Neotropical and Oriental (Verves 1979d). Regions. British Isles. Denmark (also specimens in my own collection), Finland (north to Ostrobothnia borealis) and Sweden (north to Torne Lappmark).

3. *Metopia campestris* (Fallén)

Tachina campestris Fallén, 1820; *Tachina amabilis* Meigen, 1824, teste Lundbeck 1927: 224. Material. AK, Oslo: Ljan, Tøyen. HES, Elverum: Grundset. OS, Gausdal: Espedal (780 m). ON, Nord-Fron: Moen. TEI, Vinje: Haukelisetter (980 m). VAI, Kvinesdal: Gjemlestad. RY, Stavanger, Krossberg; Strand: Prekestolhytta. RI, Forsand: Røssdalen, Songesand. HOI, Eidfjord: Hjølmodalen (350 m), Sysenvatndammen (980 m). SFI, Balestrand: Brekke. TRI, Målselv: Fri-

hetsli. EIS 4, 7, 24, 28, 32, 33, 49, 55, 62, 147. Date of earliest and latest capture; 5 June, 1 Sept.

Biology. Bred from a *Pompilus* nest (Pompilidae) by Lundbeck (1927). Also reported as a cleptoparasite (feeding on the provisions of the host nest) of *Sphex rufocinctus* Brullé and *Gorytes laticinctus* (Lepeletier) (Sphecidae) (Lomholdt 1975).

Distribution. Palaearctic (cf. map in Verves 1982b) and Nearctic Regions. British Isles. Denmark (also specimens in my own collection), Finland (north to Ostrobothnia borealis and Regio kuusamoensis) and Sweden (north to Torne Lappmark).

4. *Metopia rondaniana* Venturi

Metopia rondaniana Venturi, 1952

Material. HES, Elverum: Grundset. EIS 55.

Date of capture: Unknown.

Biology. Unknown.

Distribution. Palaearctic Region east to Altai Mts. Not on the British Isles. Denmark (specimens in my own collection) and Finland.

5. *Metopia tshernovae* Rodendorf

Metopia tshernovae Rodendorf, 1955

Material: AK, Oslo: Oslo. BØ, Ringerike: Hønefoss. HEN, Åmot: ?loc. EIS 28, 36, 64?

Dates of capture: Unknown.

Biology: Unknown.

Distribution. Europe, Kazakhstan. Not on the British Isles. Denmark (specimen in my own collection), Finland.

Genus *Miltogramma* Meigen, 1803

6. *Miltogramma punctata* Meigen

Miltogramma punctata Meigen, 1824

Material: VAY, Lyngdal. Toftealand. EIS 4.

Date of capture: 20 Aug.

Biology. Bred from nests of *Ammophila hirsuta* Scop. (= *Podalonia viatica*) (Sphecidae) and *Colletes davesianus* Smith, *C. fodiens* Latr., *C. inexpectatus* Nosk., *C. succinctus* L. and *Halictus sexnotatulus* Nyl. (Apidae) (Tiensuu 1939, Séguy 1941, Draber-Moňko 1969).

Distribution. Palaearctic Region. British Isles. Denmark, Finland (north to Tavastia australis) and Sweden (north to Gästrikland).

Genus *Miltogrammidium* Rodendorf, 1930

Pseudomiltogramma Rodendorf, 1930

7. *Miltogrammidium brevipilum* (Villeneuve)

Miltogramma brevipilum Villeneuve, 1911

Material: HES, Kongsvinger: Vinger. EIS 38?

Date of capture: June (cf. Siebke 1877: 90).

Note. The specimen stood in the Oslo collection under *Miltogramma oestracea* Fall. In 1944 it was sent to O. Ringdahl, who identified it as «*Miltogramma ? testaceifrons* Ros.» according to attached label. The specimen must be the one from Kongsvinger mentioned in Siebke (1877: 90). The frons measures 0.32x and the face 0.23x head width and it runs to *brevipilum* in Venturi's key (1960). It fits Rodendorf's (1930: 47) description well.

Biology. Unknown.

Distribution. Europe, Turkestan (in Kazakh SSSR). Not on the British Isles. Sweden (Öland, Gotland).

Genus *Oebalia* Robineau-Desvoidy, 1863

Ptychoneura Brauer & Bergenstamm, 1889

8. *Oebalia cylindrica* (Fallén)

Tachina cylindrica Fallén, 1810

Material: AK, Oslo: Tøyen. EIS 28.

Date of capture: 11 June.

Biology. Larvae live in the nests of *Crabro ambiguus* Dahlb., *C. capitosus* Schuck, *C. cinxius* Dahlb., *C. tibialis* Fabr., *Trypoxylon attenuatum* Smith (Sphecidae) (Tiensuu 1939, Rodendorf 1975a). The larvae nourish themselves from paralysed chironomid midges (Rodendorf 1975a). Distribution. Europe. British Isles. Denmark, Finland (north to Ostrobotnia borealis) and Sweden (north to Lycksele Lappmark).

9. *Oebalia minuta* (Fallén)

Tachina minuta Fallén, 1810; *Tachina rufitarsis* Meigen, 1824 (teste Ringdahl 1937: 38)

Material: AK, Oslo: Tøyen. VE, Tjøme: ?loc. EIS 19, 28.

Date of earliest and latest capture: 26 June, 7 Aug.

Biology. Larvae live in the nests of *Crabro cinxius* Dahlb., *Rhopalum clavipes* (L.) and *R. coarctatum* (Dahlb.) (Sphecidae) (Rodendorf 1975a, Lomholdt 1976).

Distribution. Europe, Japan. British Isles. Denmark and Sweden (north to Ångermanland).

Genus *Phrosinella* Robineau-Desvoidy, 1863

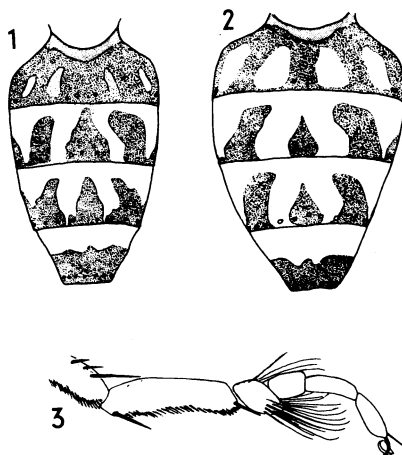
Euhilarella Townsend, 1915; *Pedimya* Rodendorf, 1924

10. *Phrosinella sannio* (Zetterstedt), N.COMB.

Tachina sannio Zetterstedt, 1838: 636; 1844:

1020; *Tachina pilitarsis* Zetterstedt, 1844: 1021; *Phrosinella septentrionalis*: Stackelberg 1962, nomen nudum; *Phrosinella septentrionalis* Rodendorf, 1970: 643, N.SYN.

Note on taxonomy. I have examined the ♀ holotype of *Tachina sannio* captured in Sweden at «Åsele d. 28. Jul. 1832» (in Museum of Zoology, Lund). I find it to be conspecific with the ♀ paratype of *Phrosinella septentrionalis* from «Norv. Dowre» (in Naturhistorisches Museum, Vienna) (also examined). Furthermore, I have examined the ♂ holotype of *Tachina pilitarsis* which was captured in Norway at «Oestre Næs Værdalæ 10 Jul. 1840» (in Museum of Zoology, Lund). Zetterstedt (1844: 1022) suggested that *sannio* and *pilitarsis* were conspecific, and Ringdahl (1934, 1937, 1945a) agreed with this, though misidentifying both as *Phrosinella nasuta* (Meigen). The abdominal pattern of the male and female, and the very characteristic fore tarsus of the male are shown in Figs. 1—3. The true *P. nasuta* which apparently does not occur in Scandinavia (see below), is smaller, has a different abdominal pattern (cf. Rodendorf 1971a: figs. 106, 109), and unmodified fore tarsi in the male sex. I have seen 1 ♂ 1 ♀ from southern Yugoslavia (R.L. Coe) (cf. Mihályi 1980), 2 ♀ ♀ from southern France (C.J. Wainwright) and 1 ♀ from Spain (O.W. Richards) of *nasuta* (all in British Museum (Natural History), London). Rodendorf (1970, 1971a, 1971b) knew his *septentrionalis* only from the female sex. Verves (1980f) described the male of *septentrionalis* on



Figs. 1—3. *Phrosinella sannio* (Zetterstedt, 1838). 1 — Male abdominal pattern (Sandå), 2 — Female abdominal pattern (Lauve), 3 — Fore tarsus of male, medial view, (Sandå).

the basis of 2 ♂♂ from Taymyr in the Asiatic part of the USSR. It is the same as Zetterstedt's *piliarsis* and conspecific with Scandinavian material. Most interestingly, the Palaearctic *sannio* and all the Nearctic *Phrosinella* species listed by Downes (1965) have modified fore tarsi in the male (cf. Allen 1926, Reinhard 1961). Verves (1980f) therefore united them in a separate subgenus *Euhilarella* Townsend, as opposed to *Phrosinella* (s.str.) containing the remaining Palaearctic species (including *nasuta*) which have unmodified male tarsi.

Material: TEI, Kviteseid: Lauve (E of Skredtveit), Nordbø; Tokke: Lårdal. AAI, Åmli: Sandå. ON, Dovre: ?loc. (paratype ♀ of *septentrionalis*). NTL, Verdal: Østre Nes (holotype ♂ of *piliarsis*). EIS 10, 17, 71?, 98.

Date of earliest and latest capture: 28 June, 10 July.

Habitat: Roadsides, gravel pits, sandy ground.

Biology. Unknown.

Distribution. Leningrad region and Taymyr N.O. in USSR. All records from Finland (Tiensuu 1939, Hackman 1980) of *nasuta* (north to Ostrobothnia borealis and Regio kuusamoensis) probably belong to the present species. I have seen 3 ♂♂ from Sortavala (Karelia ladogensis) (now USSR) (Tiensuu leg.) and 3 ♂♂ 1 ♀ from Paanajärvi (Regio kuusamoensis) (now USSR) (R. Frey leg.) (all Museum of Zoology, Helsinki) reported as *nasuta* by Tiensuu (1939), which all belong to *sannio*. All records from Sweden (north to Lule Lappmark) also probably belong to the present species (cf. Ringdahl 1952). I have seen 6 ♂♂ 17 ♀♀ from Småland, Norrbotten and Lule Lappmark (Ringdahl leg.) (all Museum of Zoology, Lund) identified as *nasuta* by Ringdahl which all belong to *sannio*. One of the females («Luleå 14.7—17») carries Villeneuve's determination label.

Genus *Senotainia* Macquart, 1846

Sphixapata Rondani, 1859; *Sphexapata*, emend.

11. *Senotainia conica* (Fallén)

Tachina conica Fallén, 1810

Material: Ø, Halden: near Halden. AK, Oslo: Tøyen. HES, Elverum: near Elverum. HEN, Åmot: ?loc. OS, «Land» (Nordre Land or Søndre Land): ?loc. BØ, Ringerike: Hønefoss. VE, Brunlanes: Oddanesand. TEI, Kviteseid: Nordbø; Tokke: Dalen, Lårdal. RY, Hå: Brusand; Klepp: Orresanden. EIS 3, 7, 11, 16, 17, 20, 28, 36, 45?, 55, 64?

Date of earliest and latest capture: 15 June, 7 July.

Biology. Bred from nests of *Halictus gracilis* Mor., *H. subauratus* Rossi (Apidae) and *Bembex integra* Panz., *Crabro scutellatus* Schev., *Oxybelus uniglumis* L., *Philanthus apivorus* Latr., *P. triangulum* Fabr., *Sphex albisectus* Lep., *Tachytes unicolor* Panz., *Thyreopus peltarius* Schreb. (Sphecidae) (Lundbeck 1927, Tiensuu 1939, Séguy 1941, Draber-Moňko 1978).

Distribution. Palaearctic Region. British Isles. Denmark, Finland (north to Ostrobothnia borealis and Regio kuusamoensis), Sweden (north to Norrbotten).

12. *Senotainia imberbis* (Zetterstedt)

Tachina imberbis Zetterstedt, 1838; *Ptychoneura crabronum* Kramer, 1920

Material: AK, Oslo: Tøyen; Bærum: Østerås. OS, Lunner: Grua. HOI, Ullensvang: Lofthus. EIS 28, 32, 36.

Date of earliest and latest capture: 8 June, 27 July.

Biology. Bred from nests of «*Coelocrabo cinxius* Dahlb. et *capitosus* Schuck.» (Séguy 1941).

Distribution. Europe. Not on the British Isles. Finland (north to Regio kuusamoensis), Sweden (north to Torne Lappmark).

Subfamily Macronychiinae

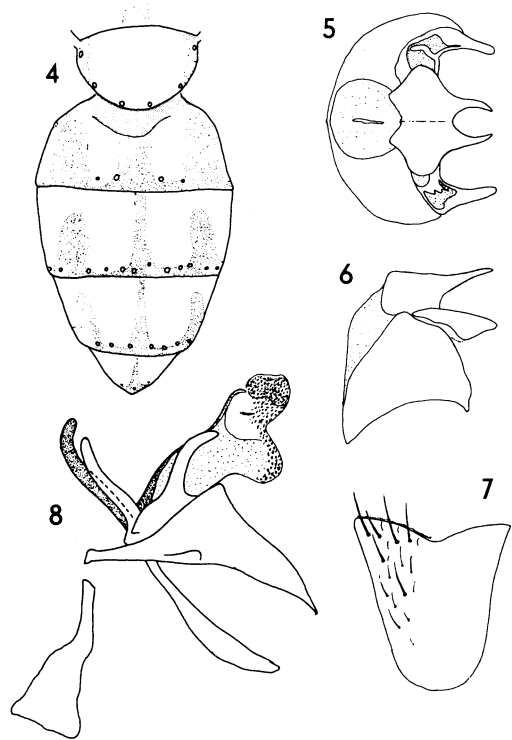
Diagnosis. Flies of moderate to large size. Arista bare. Gena in profile about half of eye height. Head shorter at vibrissae than at lunula, in profile view. Prosternum, propleuron and basisternum bare. Hind coxae bare behind. Posterior spiracle non-operculate, similar to the one in Rhizophoridae, with hairs along circular rim very short ventrally, developed as longer fringes anteriorly and posteriorly. Male postabdomen with a free T6, T7 and T8 partly to fully separate (Figs. 13, 19), and an epandrium. T6 and T7 each with a transverse row of strong setae. Spiracle VI in membrane, spiracle VII in T7. Processus longus present. Epiphallus present. Female postabdomen developed as a black pointed piercing ovipositor in some species.

The species are associated biologically with subterranean hymenopterans. A single genus, *Macronychia* Rondani (Rodendorf 1967).

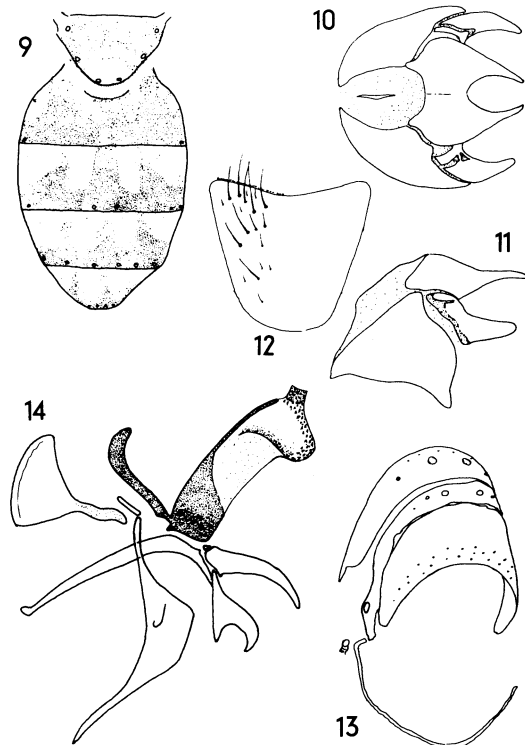
The nomenclature adopted is that of Verves (1982a).

Genus *Macronychia* Rondani, 1859

Macronichia Rondani, 1859: 229; *Macronychia* Rondani, 1859: 239; *Moschusa* Robineau-Desvoidy, 1863.



Figs. 4—8. *Macronychia agrestis* (Fallén, 1820). 4 — Scutellar and abdominal pattern, including bases of marginal setae, 5 — Epandrium, surstyli and cerci, posterior view, 6 — Epandrium, surstyli and cerci, left lateral view, 7 — ST 5, ventral view, 8 — phallosome, epiphallus, hypandrium, pregonite, postgonite, phallapodeme and ejaculatory sclerite, left lateral view, (Hof).



Figs. 9—14. *Macronychia polyodon* (Meigen, 1824). 9 — Scutellar and abdominal pattern, including bases of marginal setae, 10 — Epandrium, surstyli and cerci, posterior view, 11 — Epandrium, surstyli and cerci, left lateral view, 12 — ST 5, ventral view, 13 — male postabdomen (T6, T7, T8 and ST 6) (epandrium removed), posterolateral view, 14 — phallosome, epiphallus, hypandrium, pregonite, postgonite, phallapodeme and ejaculatory sclerite, left lateral view, (Hidra).

13. *Macronychia agrestis* (Fallén)

Tachina agrestis Fallén, 1820

Material. AK, Ås: ?loc. HES, Åsnes: Hof. EIS 28, 47.

Date of earliest and latest capture: 19 June, 29 July.

Note. A male from Hof dated 19 June 1848 has been dissected. The scutellar and abdominal pattern, including bases of marginal setae, and the terminalia are shown in Figs. 4—8.

Biology. Unknown.

Distribution. Europe. Altai. Not on the British Isles. Denmark, Finland (north to Tavastia australis), Sweden (north to Östergötland).

14. *Macronychia polyodon* (Meigen)

Tachina polyodon Meigen, 1824

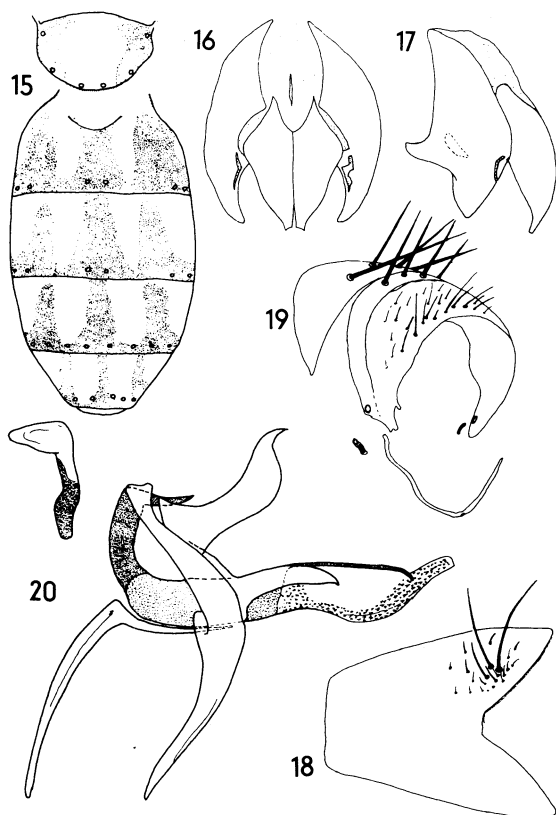
Material. VAY, Flekkefjord: Hidra. EIS 4.

Date of capture: 23 July.

Note. The only specimen available has been dissected. The scutellar and abdominal patterns, including bases of marginal setae, and the terminalia are shown in Figs. 9—14.

Biology. Larvae in nests of *Cemonus* Panz., *Clytochrysus chrysostomus* (Lep.), *Coelocrabro cinxius* Dahlb., *Crossocerus elongatulus* (van der Linden), *Oxybelus uniglumis* (L.), *Solenius larvatus* Wesm. (Sphecidae) and *Bombus hortorum*, *B. terrestris* (Apidae) (Séguy 1941, Lomholdt 1976, Verves 1982a).

Distribution. Palaearctic Region. British Isles. Denmark, Finland (Regio aboensis) and Sweden (Skåne, Östergötland).



Figs. 15–20. *Macronychia striginervis* (Zetterstedt, 1838). 15 — Scutellar and abdominal pattern, including bases of marginal setae, 16 — Epandrium, surstyli and cerci, posterior view, 17 — Epandrium, surstyli and cerci, left lateral view, 18 — ST 5, ventral view, 19 — male postabdomen (T6, T7, T8 and ST 6) (epandrium removed), posterolateral view, 20 — phallosome, epiphallus, hypandrium, pregonite, postgonite, phallopodeme and ejaculatory sclerite, left lateral view, (Stangenes).

15. *Macronychia striginervis* (Zetterstedt)
Xysta striginervis Zetterstedt, 1838; *Miltogramma ungulans* Pandellé, 1895.

Material. HEN, Tynset: Tyllidalen. TEI, Tokke: Dalen. VAY, Kristiansand: Stangenes. EIS 2, 16, 72.

Date of earliest and latest capture: 28 June, 4 July.

Note. The male from Stangenes has been dissected. The scutellum and abdomen, including terminalia are shown in Figs. 15–20.

Biology. Larvae in the nests of *Clytochrysis cavifrons* Thoms. (Sphecidae) (Emden 1954).

Distribution. Palaearctic Region. British Isles.

Denmark, Finland and Sweden (north to Lule Lappmark).

Subfamily Paramacronychiinae

Diagnosis. Flies of moderate to large size. Arista long pubescent or bare. Prosternum, propleuron and basisternum bare (but propleuron hairy in *Dexagria* Rodendorf, 1978). Hind coxae bare behind. Posterior spiracle of thorax operculate, posterior lappet larger than anterior one. Male postabdomen with T6, T7 and T8 all fused into a single large sclerite in front of the epandrium, carrying at least a transverse row of strong setae near fore margin. Behind this row a trace of a suture indicating posterior border of the T6 part. Spiracle VI and VII within the sclerite. Surstyli sometimes fused with the epandrium. Processus longus absent or very strongly reduced. Epiphallus absent (Norwegian material) or present.

The larvae are associated with other live or dead insects. Members of some genera are known to cause myiasis in man (*Wohlfartia* Brauer & Bergenstamm, *Angiometopa* Brauer & Bergenstamm).

The nomenclature follows Verves (1982a). Note that the genus *Helicobosca* Bezzi is placed in this subfamily by most authors (cf. Verves 1980c, 1982a), but that I consider it as belonging in the Calliphoridae. My reasons for this will be given elsewhere.

Genus *Agria* Robineau-Desvoidy, 1830

Pseudosarcophaga Kramer, 1908 (see Shewell, 1971)

16. *Agria mamillata* (Pandellé)

Sarcophila mamillata Pandellé, 1896.

Material: AK, Oslo: Sognsvatn, Sørkedalen; Bærum: Steinshøgda. TEI, Kviteseid: Kviteseid gamle kirke. EIS 17, 28, 36.

Date of earliest and latest capture: 21 June, 26 June.

Biology. Bred from various *Hyponomeuta* species (Lundbeck 1927, Tiensuu 1939, Séguy 1941, Junnikkala 1960, Pyörnilä & Pyörnilä 1979) and *Lasiocampa pini* (Séguy 1941) (both Lepidoptera). The fly «... oviposits on the skin of the last-instar larvae of *Hyponomeuta* species. The hatching larvae penetrates the skin and lives as an endoparasite of its host. After destroying the first host, the parasite larva attacks a second one and so on until it is ready for pupation. The parasite hibernates as a pupa in the ground.» (Junnikkala 1960: 34–35).

Distribution. Palaearctic Region. British Isles. Denmark, Finland (north to Ostrobothnia borealis) and Sweden (Skåne, Värmland).

Genus *Brachicoma* Rondani, 1856.
Brachycoma, emend.

17. *Brachicoma devia* (Fallén)

Tachina devia Fallén, 1820; *Tachina vilis* Zetterstedt, 1844; *Brachicoma devia borealis*: Ringdahl 1944b.

Material: AK, Oslo: Tøyen. HEN, Åmot: ?loc.; Tynset: Tyllidalen. OS, Sør-Fron: Harpefoss. ON, Vågå: Vågåmo. BØ, Kongsberg: Hvittingfoss; Hurum: Filtvet; Flesberg: Hvila. BV, Rollag: Rollag stasjon. VE, Tjøme: Tjøme. TEI, Bø: Øvrebrø; Seljord: Ulvenes; Kviteseid: Kviteseid, Skredi; Fyresdal: between Aslestad and Slystøyl (650 m); Tokke: Langesæ (650 m). VAY, Lindesnes: Ytre Jørgenstad. VAI, Kvinesdal: Gjemlestad. RY, Stavanger: Byhaugen, Krossberg, Stavanger, Tjensvoll; Randaberg: near Hålandsvatn. RI, Forsand: Lerang. HOY, Bergen: Lakesvåg, Storetveit, Åstveit (Golfbanen). NTI, Steinkjer: Gulbergaunet. FN, Porsanger (FI, Karasjok?): Vuorje. EIS 1, 4, 7, 16, 17, 18, 19, 27, 28, 30, 39, 62, 64?, 71, 72, 101, 166.

Additional material (not seen). «Tromsø» (TRY, Tromsø: Tromsø, EIS 162) (Ringdahl 1954).

Date of earliest and latest capture: 24 April, 6 Aug.

Note. The specimen from Vuorje («Vuorjegaisa») has been identified by O. Ringdahl as «*Brachycoma borealis* Ringd.» (according to label) and published as «*Brachycoma devia borealis* Ringd.» by Ringdahl (1944b). It does not fit the original description of *borealis* particularly well (cf. Ringdahl 1932). The arista is thickened on distinctly less than inner half, the frontal stripe hardly broader than an orbit, and in other features it hardly differs from most specimens of *devia*. Neither does it fit Verves' (1982a) redescription very well, as it has 2 medial marginal setae on T3 and dusting on definitely more than basal half of the abdominal tergites (though rather weak). I am very much in doubt about this specimen, but prefer to treat it as *devia* for the present time.

Biology. Bred from a number of *Bombus* Latreille species (Apidae) and from «*Vespa silvestris*» (Vespidae) (Séguy 1941). In the Bergen collection are several specimens bred by Ove Meidell from nests of *Bombus agrorum* F. (= *B. pascuorum* (Scop.) of Løken 1973). A label on one of them reads: «Snyttet i larvæ av *Bombus agrorum*» («parasitised a larva of. . .»), my translation). This is in accordance with Emden (1954) who reports the larvæ «to attack and kill the prepupal stage of the host. . .». Rather surpris-

ingly it was attracted to meat bait by Gregor & Povolný (1961).

Distribution. Palaearctic and Nearctic Regions. British Isles. Denmark, Finland and Sweden (north to Torne Lappmark).

Subfamily Sarcophaginae

Diagnosis. Flies of very small to very large size. Arista with long hairs in basal half. Prosternum and basisternum hairy. Propleuron bare. Hind coxae hairy behind. Posterior spiracle of thorax operculate, with large posterior lappet. Coxopleural streak absent (cf. Downes 1955). Male post-abdomen with T6 reduced to narrow transverse strips carrying long hairs or completely absent. T7 + 8 (first genital segment) without indications of sutures and never with transverse row of setae near fore margin, but often with marginal row. Spiracle VI in membrane, spiracle VII in T7 + 8. Surstylus small. Processus longus very strongly reduced (see also Patton 1934, Patton & Wainwright 1935a, 1935b, 1936a, 1936b, 1937, as «spiracle VIII» or «proximal segment of ninth coxite», and Zumpt & Heinz (1950), as «10th sternum»). Epiphallus absent.

Some species have larvæ which are saprophagous, developing in excrement, small-size carrion or other kinds of decomposing animal matter. A few are known to cause myiasis in man. Several species are parasitic in various kinds of invertebrates. The biology of a large number of species is unknown.

I have adopted the generic and specific nomenclature of Rodendorf (1965, 1970) with a few exceptions, and have listed the genera in accordance with Rodendorf (1965). Some synonyms have been taken from Séguy (1941), Souza Lopes et al (1977) and Dear (1980). One new specific synonymy is tentatively proposed.

Genus *Blaesoxipha* Loew, 1861

Listeria Robineau-Desvoidy, 1863; *Servaisia* Robineau-Desvoidy, 1863.

18. *Blaesoxipha agrestis* (Robineau-Desvoidy)
Musca lineata Fallén, 1817, preocc.; *Listeria agrestis* Robineau-Desvoidy, 1863.

Material: ON, Nord-Fron: Kvam. BV, Nes: Nesbyen. EIS 44, 62.

Dates of capture: The specimen from Kvam was captured 2 Aug.

Biology. Larvæ parasitic in grasshoppers (Rodendorf 1937, Séguy 1941, Léonide & Léonide 1971).

Distribution. Palaearctic and Afrotropical Regions. Not on the British Isles. Not reported from Denmark by Lundbeck (1927), but I have collected 22 ♀♀ in that country on a locality where it was very numerous on dry sun-exposed ground (East Jutland, Mols Bjerger 12 July 1979). Also known from Sweden (north to Hälsingland).

19. *Blaesoxipha gladiatrix* (Pandellé)

Sarcophaga gladiatrix Pandellé, 1896; *Blaesoxipha laticornis*: Rodendorf 1937 (only males); Wainwright 1940.

Material: AK, Oslo: Kværner; Bærum: Østerås, Øverland. BØ, Øvre Eiker: Ulleland. TEI, Sauherad: Nordagutu. MRY, Gjemnes: Osmarka (Raumyr). EIS 18, 28, 84.

Date of earliest and latest capture: 23 June, 5 Aug.

Note. The males and females agree with Léonide & Léonide's (1979, 1982) concept of *gladiatrix*.

Biology. Parasitic in grasshoppers, mostly of the *Chorthippus bicolor-mollis-biguttulus* group (Léonide & Léonide 1979). *C. bicolor* and *C. biguttulus* occur in Norway (Knaben 1943).

Distribution. Incompletely known because *gladiatrix* only recently (Léonide & Léonide 1979, 1982) has been kept apart from *Blaesoxipha grylloctona* Loew. Known with certainty from France (including Corsica) and the British Isles.

20. *Blaesoxipha rossica* Villeneuve

Blaesoxipha rossica Villeneuve, 1912

Material: MRY, Gjemnes: Osmarka (Raumyr). EIS 84.

Date of capture: 14 July.

Note. The ovipositor is very well visible and the specimen fits the description of Rodendorf (1937) and Emden (1954) very well.

Biology. Larvae parasitic in grasshoppers (Rodendorf 1932, 1937, Séguy 1941, Léonide 1967, Léonide & Léonide 1971). Of the hosts mentioned by Léonide & Léonide (1971), *Chorthippus bicolor* and *C. biguttulus* occur in Norway (cf. Knaben 1943).

Distribution. Palaearctic Region. British Isles. Not previously reported from Scandinavia. It may, however, have been confused with *B. erythrura* (Meigen) which has been recorded from Denmark, Finland and Sweden.

Genus *Sarcotachinella* Townsend, 1917

Arhopocnemis Enderlein, 1928

21. *Sarcotachinella sinuata* (Meigen)

Sarcophaga sinuata Meigen, 1826; *Sarcophaga arvorum* Meigen, 1826.

Material: Ø, Halden: near Halden. RY, Stavanger: Sunde (indoors on window). EIS 7, 20. Dates of capture: The specimen from Sunde was captured 20 June.

Note. Zetterstedt (1845: 1289) reported this species in Norway «ad Næs Verdaliæ» (NTI, Verdali: Nes) (cf. Schøyen 1889: 7), but the record was retracted by Zetterstedt (1859: 3267). I have not seen this material.

Biology. Parasite of grasshoppers (Aldrich 1916, Rodendorf & Verves 1978). Lundbeck reared it from a pupa found in the ground. Attracted to faeces (Rodendorf 1959). A single specimen captured on food markets in Budapest (Aradi & Mihályi 1971).

Distribution. Palaearctic and Nearctic Regions. British Isles. Denmark, Finland (north to Karelia borealis) and Sweden (north to Gällivare in Torne Lappmark).

Genus *Helicophagella* Enderlein, 1928

Bellieria: authors, not Robineau-Desvoidy, teste Souza Lopes (1955) and Souza Lopes et al (1977).

22. *Helicophagella agnata* (Rondani)

Sarcophaga agnata Rondani, 1860

Material: RI, Forsand: Songesand. SFI, Balestrand: Bøyum. EIS 7, 59.

Additional material (not seen). «Aurland 1 ex.» (SFI, Aurland: Aurland, EIS 51) (Ringdahl 1954). The specimen could not be found in Ringdahl's collection in Lund (R. Danielsson in litt. 2 Sept. 1983).

Biology. Bred from *Helix aspersa* Müller, 1774 (Emden 1954). This snail is not known from Norway (cf. Kerney & Cameron 1979).

Distribution. Europe. British Isles. Denmark, Finland and Sweden (Skåne, Småland).

23. *Helicophagella crassimargo* (Pandellé)

Sarcophaga crassimargo Pandellé, 1896

Material: AK, Oslo: Tøyen; Eidsvoll: Eidsvoll. HES, Elverum: Grundset. OS, Sør-Fron: Harpefoss. ON, Nord-Fron: Vinstra. VAI, Kvinesdal: Gjemlestad. NNØ, Sørfold. Røsvik. EIS 4, 28, 37, 55, 62, 131.

Date of earliest and latest capture: 8 July, 20 Aug.

Biology. Keilin (1919) bred a female of supposedly this species from *Helicella virgata* (da Costa), which is unknown from Norway (cf. Kerney & Cameron 1979). A specimen was captu-

red on food-markets in Budapest (Aradi & Mihályi 1971).

Distribution. Palaearctic Region east to Central Asia. British Isles. Denmark, Finland (north to Ostrobothnia *kajanensis*) and Sweden (north to Norrbotten).

24. *Helicophagella melanura* (Meigen)

Sarcophaga melanura Meigen, 1826; *Myiophora striata* Robineau-Desvoidy, 1830

Material: AK, Oslo: Bekkelaget, ?loc.; Bærum: Nordli NW of Østerås. HEN, Rendalen: Solbakken near Storsjøen. AAY, Grimstad: Ryvingen. VAY, Mandal: Mandal (Kvisla). RY, Klepp: Boresanden, Orresanden; Randaberg: Sandestranden. SFI, Årdal: Svalheim i Utladalen. EIS 2, 6, 7, 28, 51, 64.

Date of earliest and latest capture: 1 June, 27 Aug.

Biology. Breeds in human and animal faeces, animal carcasses, privies and garbage (Rodendorf 1959, Mihályi 1965, Ishijima 1967, Kano, Field & Shinonaga 1967, Sýchevskaya 1970, Rodendorf & Verves 1978), sometimes parasitic on various molluscs (Keilin 1921, Séguy 1941), insects (Séguy 1941), birds (Emden 1954) and mammals (Séguy 1941, Emden 1954, Nielsen, Nielsen & Walhovd 1978). Adults visit faeces, meat (including dead snails) and fruits for nourishment (Kirchberg 1954, Gregor & Povolný 1961, Aradi & Mihályi 1971). Synanthropic species of hygienic importance.

Distribution. Palaearctic, Nearctic and Oriental Regions. British Isles. Denmark, Finland (north to Ostrobothnia *media*) and Sweden (north to Torne Lappmark).

25. *Helicophagella noverca* (Rondani)

Sarcophaga noverca Rondani, 1860

Material: NSY, Meløy: Storglomvatn (above tree-line at about 520 m). EIS 126?

Note. In dorsal view first genital segment (T7 + 8) of examined male specimen with large circular dusted spot surrounded by narrow band of black gloss, hind margin dusted, the marginal setae hairlike and long. Terminalia dissected.

Biology. Bred from a dead *Helix* sp. (Schmitz 1917) and from *Helix pomatia* L. (Enderlein 1928, Séguy 1941). Eberhard (1955) bred it from horse meat baits and kept it easily in culture on meat. No larval development occurred on faeces. A single specimen captured on the food-markets in Budapest (Aradi & Mihályi 1971).

Distribution. Europe (mainly in mountainous districts), Caucasus. Not on the British Isles. Not previously reported from Scandinavia. The

single, rather northern locality in Scandinavia suggests a disjunct boreo-alpine or boreo-montane distribution in Europe, even though it has been taken in Belgium (Collart 1958) and near the Polish Baltic coast (Draber-Monko 1973a).

26. *Helicophagella rosellei* (Böttcher)

Sarcophaga rosellei Böttcher, 1912

Material: AK, Oslo: Bygdøy; Frogn: Drøbak; Bærum: Nordli NW of Østerås. OS, Ringebu: Elstad; Nordre Land: Dokka. VE, ?loc. VAY, Flekkefjord: Lauvnes. NSY, Meløy: Storglomvatn (above tree-line at about 520 m). NSI, Salt-dal: Rognan. EIS 4, 19?, 28, 45, 63, 126?, 127. Date of earliest and latest capture: 31 May, 30 July.

Biology. Unknown.

Distribution. Europe. Altai Mts in Central Asia. British Isles. Northern Sweden (Härjedalen, Jämtland, Ångermanland, Torne Lappmark). A disjunct boreo-alpine or boreo-montane distribution in Europe.

Genus *Thyrsocnema* Enderlein, 1928

27. *Thyrsocnema incisilobata* (Pandellé)

Sarcophaga striata Meigen, 1826, preocc. in *Sarcophaga* by *Musca striata* Fabricius, 1794 (= *Ravinia pernix* Harris); *Sarcophaga incisilobata* Pandellé, 1896; *Sarcophaga privigna* Pandellé, 1896, preocc.

Material: AK, Oslo: Bekkelaget, Hovedøya, Oslo; Frogn: Sønderstøa Degerud; Bærum: Øverland. OS, Sør-Fron: Harpefoss; Øyer: Øyer. ON (OS?), «Fron» (Nord-Fron or Sør-Fron): ?loc. BØ, Lier: Gjellebekk; Røyken: ?loc. BV, Ål: Torpo. VE, Brunlanes: Mølen. TEI, Sauherad: Nordagutu; Kviteseid: Lauve, Skredi; Tokke: Lårdal. VAY, Flekkefjord: Hidra (Dragøy, Kirkhamn, Kråkedal). RY, Sandnes: Sviland. RI, Forsand: Songesand. HOI, Granvin: Skjervet. EIS 4, 7, 11, 17, 18, 28, 41, 43, 54, 62.

Date of earliest and latest capture: 8 June, 11 Aug.

Biology. Larvae coprophagous, also reported to parasitise a grasshopper (Séguy 1941). Bred from a snail (Keilin 1919, Rodendorf 1967). Adults attracted to faeces, meat and dead snails (Kirchberg 1954, Gregor & Povolný 1961).

Distribution. Palaearctic Region east to Central Asia. British Isles. Denmark, Finland (north to Karelia *borealis*) and Sweden (north to Jämtland).

28. *Thyrsocnema kentejana* Rodendorf
Thyrsocnema kentejana Rodendorf, 1937; *Thyrso-*
cnema kentejana lapponica Tiensuu, 1939
Material: NSI, Grane: Majavatn (310 m). EIS
111.

Date of capture: 22 July.

Biology. Unknown.

Distribution. North China, Mongolia, USSR
(South Siberia, Indigirka Basin, Sikhote-Alin),
Central Europe (Romania). Not on the British
Isles. Finland (*Lapponia inarensis*) and North
Sweden (south to Härjedalen). A disjunct boreo-
alpine distribution in Europe.

Genus *Bellieromima* Rodendorf, 1937

Bellieromima Rodendorf, 1937, as subgenus of
Thyrsocnema.

29. *Bellieromima subulata* (Pandellé)

Sarcophaga subulata Pandellé, 1896; *Sarcop-*
haga laciniata Pandellé, 1896.

Material: AK, Oslo: Bygdøy. EIS 28.

Date of capture: 25 June.

Biology. Unknown.

Distribution. Europe, Caucasus. British Isles.
Denmark, Finland (*Nylandia*) and Sweden
(Skåne, Ångermanland).

Genus *Pierretia* Robineau-Desvoidy, 1863

Thyrsocnema: Rodendorf 1937, in part.

30. *Pierretia clathrata* (Meigen)

Sarcophaga clathrata Meigen, 1826; *Sarcop-*
haga hinei Aldrich, 1916

Material: HEN, Åmot: ?loc. VE, Hof: Thorrud.
TEI, Kviteseid: Skredi; Fyresdal: between Asles-
stad and Slystøyl (650 m); Tokke: Dalen. VAY,
Flekkefjord: Nuland. HOI, Granvin: Eide. EIS 4,
16, 17, 28, 41, 64?

Date of earliest and latest capture: 24 June, 28
July.

Biology. Bred from egg-sacks of «*Epeira cornu-*
ta» (= *Araneus cornutus* Clerck, 1757 of Locket
& Millidge 1953) (Mik 1890, Lundbeck 1927)
and *Clubiona* sp. (Grunin 1964), and from grass-
hoppers (Séguy 1941).

Distribution. Palaearctic and Nearctic Regions.
British Isles. Denmark, Finland (north to Lappo-
nia enontekiensis) and Sweden (north to Torne
Lappmark).

31. *Pierretia soror* (Rondani)

Sarcophaga soror Rondani, 1860

Material: AK, Oslo: Tøyen; Bærum: Nordli NW
of Østerås, Østerås. BØ, Røyken: Slemmestad;
Hurum: Filtvet. EIS 28.

Date of earliest and latest capture: 30 May, 11
Aug.

Biology. Occasional parasite «de l'escargot» (Sé-
guy 1941), of *Helix aspersa* (Rodendorf 1967,
Draber-Moňko 1978).

Distribution. Europe, Caucasus. British Isles.
Denmark and Sweden (Skåne, Gotland).

Genus *Discachaeta* Enderlein, 1928

32. *Discachaeta pumila* (Meigen)

Sarcophaga pumila Meigen, 1826

Material: AK, Oslo: Hovedøya, Tåsen; Bærum:
Nordli NW of Østerås, Østerås. BØ, Røyken:
Slemmestad. EIS 28.

Date of earliest and latest capture: 15 July, 16
Aug.

Biology. Unknown.

Distribution. Europe. North Africa. British Isles.
Denmark, Finland (north to *Tavastia borealis*)
and Sweden (north to Uppland).

Genus *Heteronychia* Brauer & Bergenstamm,
1889

Pierretia: Rodendorf 1937 (misidentification)

33. *Heteronychia boettcheriana* (Rodendorf)

Pierretia (s.str.) *boettcheriana* Rodendorf, 1937

Material: TEI, Tokke: Lårdal. EIS 17.

Date of capture: 4 July.

Biology. Unknown.

Distribution. Europe, Caucasus. Not on the Bri-
tish Isles. Not previously known from Scandina-
via. Séguy (1941) reports it north to South Swe-
den, but his source appears to be Lundbeck's
(1927) information concerning «*offuscata*», lis-
ted as a synonym by Séguy. Lundbeck's *offu-*
scata has the postabdomen black and is not the
present species (probably *obscurata* Rodendorf).

34. *Heteronychia haemorrhoea* (Meigen)

Sarcophaga haemorrhoea Meigen, 1826

Material: AK, Oslo: Bekkelaget, Grefsen; Frogn:
Drøbak, Sønderstøa Degerud; Bærum: Høvik,
Nordli NW of Østerås, Østerås. VE, ?loc. TEI,
Tokke: Lårdal. VAY, Mandal: Mandal. EIS 2,
17, 19?, 28.

Date of earliest and latest capture: 10 June, 27
Aug.

Biology. Bred from *Cepaea hortensis* (L.) (Mik
1890, Schmitz 1917, Keilin 1919).

Distribution. Europe. British Isles. Denmark,
Finland (Ålandia) and Sweden (north to Upp-
land).

35. *Heteronychia obscurata* (Rodendorf)
Pierretia (s.str.) *obscurata* Rodendorf, 1937
Material: AK, Bærum: Øverland. EIS 28.
Date of capture: 23 June.
Note. Ringdahl (1944b) recorded a male from AK, Bærum: Høvik 16 Aug. 1935 (EIS 28). The specimen was not in the museum collections examined.
Biology. Unknown.
Distribution. Palaearctic and Oriental Regions. British Isles. Denmark, Finland (Regio Aboensis) and Sweden (north to Härjedalen).

36. *Heteronychia ostensackeni* (Rodendorf)
Pierretia s.str. *osten-sackeni* Rodendorf, 1937
Material: AK, Oslo: Bekkelaget. EIS 28.
Date of capture: 27 Aug.
Note. The two specimens (Oslo collection nos. 7764 (♂), 7763 (♀)) were associated in the original drawer and stood under the name «*Sarcophila latifrons* Fall.» Both sexes carry identical labels in Siebke's handwriting «Bæklag 27.8.46». The vein *r*₁ has a single seta on the upper wing surface in both specimens. Each measures 4 mm.
Biology. Unknown.
Distribution. Czechoslovakia, Poland (Pienin), West Germany (Heidelberg, terra typica) (Draber-Moňko 1978). Not previously known from Scandinavia. The few records available suggest a boreo-alpine or boreo-montane distribution in Europe.

37. *Heteronychia vagans* (Meigen)
Sarcophaga vagans Meigen, 1826; *Sarcophaga frenata* Pandellé, 1896; *Sarcophaga cruenta* Pandellé, 1896
Material: Ø, Halden: near Halden. AK, Oslo: Oslo, Tåsen; Bærum: Nordby gård. HEN, Åmot: ?loc. OS, Lillehammer: Maihaugen in Lillehammer, near Gausa river by Flåkåli bru W of Fåberg; Sør-Fron: E of Hundorp. ON, Nord-Fron: 3 km E of Vinstra. BØ, Ringerike, Løvli. VE, ?loc. TEI, Kviteseid: Heggteit, Skredteit; Tokke: Lårdal. HOY, Bergen: Fantoft; Samnanger: Ådland. SFI, Aurland: Fretheim. NSI, Saltdal: Saltfjell. TRY, Tromsø: Tromsøya. EIS 17, 20, 28, 30, 36, 40, 41, 54, 62, 63, 64?, 127?, 162.
Date of earliest and latest capture: 11 June, 1 Aug.
Note. The female recorded by Rognes (1982) from Dovre is not accepted here.
Biology. Bred from snails of the family Succineidae (Verves 1976).
Distribution. Palaearctic Region. British Isles.

Denmark, Finland (north to Lapponia inarensis) and Sweden (north to Torne Lappmark). Reported from above tree-line in Jämtland (Sweden) (Ringdahl 1951).

38. *Heteronychia vicina* (Macquart)
Sarcophaga vicina Macquart, 1835; *Sarcophaga ebrachiata* Pandellé, 1896
Material: AK, Bærum: Nordby gård. HEN, Åmot: ?loc. OS, Gausdal: Aulestad; Nordre Land: 3 km N of Dokka. ON, Vang: Øylo. VAY, Flekkefjord: Rasvåg. VAI, Kvinesdal: Gjemlestad. RY, Karmøy: Kopervik. RI, Forsand: towards Prekestolen. STI, Oppdal: Kongsvoll (Blesbekken). NSY, Bodø: Bodø. EIS 4, 7, 13, 28, 45, 52, 54, 64?, 79, 130.
Date of earliest and latest capture: 18 May, 11 Aug.

Note. Ringdahl's male specimen (1944b, as «*?ebrachiata*») from TRY, Karlsøy: Måkeskjær (EIS 170) could not be found in the Tromsø or other Norwegian collections. The identification is queried by Ringdahl himself so it should probably not be accepted. The recorded from ON, Dovre: Hjerkin (EIS 71?) (Ringdahl 1954) is accepted.

Biology. Unknown.
Distribution. Mountainous regions in Central Europe, Caucasus. British Isles. North Sweden (Torne Lappmark south to Härjedalen). Recorded from above the tree-line in Jämtland (Sweden) (Ringdahl 1951). A disjunct boreo-alpine distribution in Europe.

Genus *Parasarcophaga* Johnson & Tiegs, 1921

39. *Parasarcophaga aratrix* (Pandellé)
Sarcophaga aratrix Pandellé, 1896
Material. AK, Oslo: Sognsvatn. OS, Sør-Fron: E of Hundorp. AAY, Hisøy: Hisøy. VAY, Kristiansand: Vrånes. HOY, Fitjar: ?Fitjar. EIS 2, 6, 22, 28, 63.
Date of earliest and latest capture: 21 June, 22 July.
Biology. Bred from *Lymantria monacha* L. (Lepidoptera) and *Prionus coriarius* L. (Coleoptera) (Lundbeck 1927, Séguy 1941), from horse meat baits (Eberhardt 1955), and from a bird bait (Kusela & Hanski 1982). Adults attracted to faeces, meat and fruits (Gregor & Povolný 1961).
Distribution. Palaearctic Region east to Kamchatka. British Isles. Denmark, Finland (north to Ostrobothnia borealis) and Sweden (Skåne, Småland).

40. *Parasarcophaga emdeni* Rodendorf
Sarcophaga teretirostris: Lundbeck 1927, *Parasarcophaga* (*Liosarcophaga*) *teretirostris*: Rodendorf 1937, not Pandellé (misidentifications); *Parasarcophaga emdeni* Rodendorf, 1959, nomen nudum; *Parasarcophaga emdeni* Rodendorf, 1969, 1970

Note. Previously some confusion existed as to the correct use of the name *teretirostris* Pandellé, 1896. Emden (1954) and Rodendorf (1969, 1970) applied it to the species described as *kroeberei* Rodendorf, 1937. Rodendorf (1969, 1970) introduced the name *emdeni* for the species misidentified as «*teretirostris*» in his 1937 work. See Povolný & Slamečková (1979) for a discussion of this problem. Note that these authors miscite the date of *emdeni*, Rodendorf's paper of 1969 having apparently been overlooked. Note also that Nordic records of «*teretirostris*» (Tiensuu 1939, Hedström 1964, Brander 1964, Ringdahl 1952) probably all refer to *emdeni*. The true *teretirostris* is apparently absent from the Nordic countries but occurs in Western Europe from the British Isles southwards to Spain, and also in E. Germany and Poland (Povolný & Slamečková 1979). Hackman (1980) appears to regard the names as synonyms, though provides both names with a question-mark.

Material. TEI, Tokke: Lårdal. EIS 17.

Date of capture: 1 July.

Biology. Adults attracted to faeces (Rodendorf 1959). Collected on the food-markets in Budapest (Aradi & Mihályi 1971). Breeds in dead *Helicella candicans* (Verves & Kuz'movich 1979). This snail does not occur in Norway (Kerney & Cameron 1979, as *H. obvia*).

Distribution. Palaearctic Region (including North Africa) east to Altai Mts. Not on the British Isles. Denmark, Finland (north to Ostrobothnia borealis) and Sweden (Skåne, Öland, Gotland).

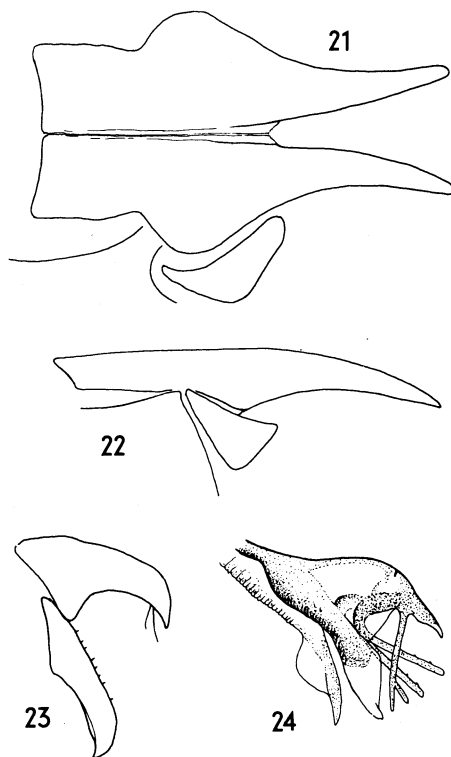
41. *Parasarcophaga pleskei* Rodendorf

Parasarcophaga (*Liosarcophaga*) *pleskei* Rodendorf, 1937; *Sarcophaga tuberosa* Pandellé ssp. *verticina* Ringdahl, 1945a, TENTATIVE N.SYN.; *Sarcophaga tuberosa* var. *harpax*: Aldrich 1916 (excluding right part of his fig. 79); *Sarcophaga harpax*: Roback 1954, Downes 1965.

Material: HEN, Åmot: ?loc. TRI, Balsfjord: Aspenes. EIS 64?, 154.

Dates of capture: The specimen from Aspenes has been captured 11 July.

Notes. The male specimen from Aspenes, which has the genitalia extended and fully visible, has



Figs. 21–24. *Parasarcophaga pleskei* (Rodendorf, 1937). 21 — Cerci, posterior view, 22 — Cerci and surstyli, left lateral view, 23 — pregonite and postgonite, left lateral view, 24 — phallosome, distal half, left lateral view (both styli shown), (Åmot).

been identified and published by Ringdahl (1944b) as *Sarcophaga tuberosa* Pand. The specimen from Åmot has been dissected by me (Figs. 21–24). Note that in most specimens I have examined (not the one figured) there is a slight bulge distally on the lower edge of the cerci as seen in profile as shown in Rodendorf's (1937) fig. 328. I have examined 4 ♂♂ (Museum of Zoology, Lund) from Torne Lappmark (labelled «Abisko» and «Jebrenj.») (Sweden) (Ringdahl leg.) identified as *tuberosa* Pand. (according to labels) by Ringdahl and placed in his collection as *tuberosa* ssp. *verticina*. The genitalia which are in an extended position are closely similar to those of the Norwegian specimens. Recently I have collected 2 ♂♂ on Newfoundland (Canada) which also are conspecific with the Norwegian material. They fit Aldrich's (1916) and later American authors' concept of «*harpax*», and G.E. Shewell, Ottawa, has identified my specimens as such. Note that this con-

cept of «*harpax*» is quite different from that of Rodendorf (1937), Gregor & Povolný (1961), Kano, Field & Shinonaga (1967) and Mihályi (1979c).

Biology. Unknown.

Distribution. Caucasus, Central Asia, China (Rodendorf 1937, Fan 1965, Verves 1978d). Sweden (Torne Lappmark, Härjedalen) (alpine and subalpine zones). Also in North America (according to own specimens from Newfoundland, see above).

42. *Parasarcophaga portschinskyi* Rodendorf
Parasarcophaga (Liosarcophaga) portschinskyi Rodendorf, 1937.

Material: TEI, Tokke: Lårdal. EIS 17.

Date of capture: 4 July.

Biology. Larvae coprophagous (Rodendorf 1959). Adults attracted to meat baits (Gregor & Povolný 1961). Also collected on food-markets in Budapest (Aradi & Mihályi 1971). «The larvae are necrophagous and may be facultative predators of butterfly larvae.» (Rodendorf & Verves 1978).» ... can be reared with decomposing animal matter in the laboratory. Sometimes... parasites of lepidopterous larvae.» (Zhang 1982).

Distribution. Palaearctic Region east to China. Not on the British Isles. In the Nordic countries previously listed only from Finland (Hackman 1980). I have collected a male in Denmark (East Jutland, Mols Bjerger 12 July 1979), and in the Bergen collection is a male from Sweden (Lule Lappmark, Messaure 1—8 July 1974, K. Müller leg.). Of 10 males in coll. Ringdahl (Lund) positioned under the name «*tuberosa* Pand.», 9 belonged to the present species (the 10th was *similis* Meade, see below). They were from Skåne, Uppland and Öland. Thus the species is probably widely distributed in the Nordic countries.

43. *Parasarcophaga similis* (Meade)

Sarcophaga similis Meade, 1876; Pandellé, 1896; *Sarcophaga appendiculata* Kramer, 1905
Material: Ø, Onsøy: Ramseklo. AK, Frog: Søn-derstøa Degerud. AAY, Grimstad: Skiftenes. EIS 6, 20?, 28.

Date of earliest and latest capture: 5 July, 8 Aug.

Note. The specimen from Søn-derstøa has been published by Ringdahl (1944b) as *scoparia* Pand.

Biology. Bred from larvae of *Mamestra oleracea* L. (Lepidoptera) and from a dead nestling of *Delichon urbicae* L. (Tiensuu 1939). Visits faeces, apparently only for nutritive purposes (Kirchberg 1954). Attracted to and reared from meat

baits (including liver, horse meat, dead snails) (Kirchberg 1954, Eberhardt 1955, Gregor & Povolný 1961, Mihályi 1965, Hanski 1976, Hanski & Kuusela 1977, 1980). «... one of the most common sarcophagid flies in Japan... Larvae breed in garbage, dead animals, animal excrement and occasionally in lavatories. Some cases of intestinal myiasis... have been reported in Japan.» (Kano, Field & Shinonaga 1967).

Distribution. Palaearctic and Oriental Regions. British Isles. Finland (Nylandia, Tavastia australis), Sweden (I have examined a male from Uppland, Sandhamn 21 July 1929, Ringdahl leg., misidentified as *tuberosa* by Ringdahl, see above under *P. portschinskyi*) (not recorded by Ringdahl 1952), but not reported from Denmark.

Genus *Robineauella* Enderlein, 1928

44. *Robineauella scoparia* (Pandellé)

Sarcophaga caerulescens Zetterstedt, 1838, teste Ringdahl 1944a, 1945a, 1945b, 1952; *Sarcophaga scoparia* Pandellé, 1896; *Sarcophaga scoparia nearctica* Parker, 1916.

Notes. I have retained Pandellé's name pending a modern revision of all Zetterstedt's types. I have also examined 2♂♂ of *nearctica* from Newfoundland (Canada). They have the epan-drium and partly the T7 + 8 red but otherwise the terminalia appear identical with those of the Norwegian specimens.

Material: Ø, Marker: Flagghytta. AK, Oslo: Alun-sjøen. HES, Stange: Stange. HEN, Åmot: ?loc. BØ, Øvre Eiker: Burud, Ulleland. TEI, Kvite-seid: Skredi; Tokke: Dalen, Lårdal. AAY, His-øy: Ramsø. AAI, Evje og Hornnes: Hornnes. OS, Ringe-bu: Elstad. EIS 5, 6, 16, 17, 21?, 27, 28, 46, 64?

Date of earliest and latest capture: 28 June, 7 Aug.

Biology. Larvae predatory on immature stages of other insects (Rodendorf 1959). Adults breed in animal corpses (Sýchevskaya 1970). The larvae are necrophagous and facultative predators of butterfly pupae (Rodendorf & Verves 1978). Adults attracted to and reared from meat baits (Eberhardt 1955, Gregor & Povolný 1961, Mihályi 1965, Hanski & Kuusela 1977, 1980, Kuusela & Hanski 1982). Kept in culture on meat, no development occurred on faeces (Eberhardt 1955). Parker (1916) reports that «specimens captured by Metz larviposited on dung and refuse», and that another one «was captured on cow manure».

Distribution. Palaearctic and Nearctic Regions. British Isles. Denmark, Finland (north to Lappo-

nia inarensis) and Sweden (north to Torne Lappmark).

Genus *Sarcophaga* Meigen, 1826

45. *Sarcophaga carnaria* (L.)

Musca carnaria Linné, 1758; *Sarcophaga atropos* Meigen, 1826; *Sarcophaga carnaria*: Patton 1934: 582, fig. 3; *Sarcophaga carnaria carnaria*: Rodendorf 1937; ?*Sarcophaga carnaria* spp. *vulgaris*: Kirchberg 1954: 110, Abb. 2.

Note. Kirchberg (1954) has apparently mixed up the names in the legends to his figures 1 and 2 (p. 110). I disagree with Lehrer (1973) who identifies Kirchberg's fig. 2 as *lehmanni*. I find the styli too large and the apical tooth on the cerci in profile view too little developed to belong to that species. The figure shows the typical appearance of a dried *carnaria* phallosome.

Material: Ø, Halden: Halden; Hvaler: ?loc.; Kråkerøy: Glombo. AK, Oslo: Bygdøy, Hovedøya, Sognsvatn, Tøyen, Tåsen; Ås: Landbrukshøgskolen; Frog: Sønderstøa Degerud; Bærum: Høvik, Nordby gård, Nordli NW of Østerås, Ostøya, Steinhøgda, Østerås. HEN, Åmot: Ygle, ?loc. OS, Lillehammer: Lillehammer, near Gausa river by Flåkåli bru; Sør-Fron: E of Hundorp; Gausdal: Svatsum; Nordre Land: Dokka, 3 km N of Dokka; Nord-Aurdal: Between Fagernes and Leira. ON, Sel: Lårgård. BØ, Kongsberg: Efteløt, Hvitvingfoss, Komnes, Kongsberg; Lier: Lahell; Hurum: Filtvedt. BV, Hol: Hovet; Rollag: Rollag st., Rollag, Øyi. VE, Sem: Jarlsberg, Teigen; Tjølling: Bisjord, Gon; Hedrum: Vestmarka. TEY, Kragerø: Kragerø; Drangedal: Tørnes. TEI, Bø: Øvrebo; Sauherad: Nordagutu; Tinn: Rjukan; Kviteseid: SKredi; Tokke: Dalen, Lårdal. AAY, Tvedestrand: Dypvåg; Tromøy: Tromøy kirke, 2.5 km N of Tromøy kirke; Hisøy: Hisøy. AAI, Evje og Hornnes: Hornnes; Bygland: Bygland. VAY, Kristiansand: Randsund, Stangenes; Mandal: Lindland (near Møll), Mandal (Kvisla, Rona); Flekkefjord: Hidra (Dragøy, Kirkhamn, Rasvåg). VAI, Kvinesdal: Foseland, Gjemlestad. RY, Sandnes: Austrått, Bogafjell, Bråstein, Eltravåg, Gisketjønn, Hetli, Stølsvik, Vagleskogen; Stavanger: Byhaugen, Forus, Gosen, Krossberg, Kvernevikskogen, Madlalia, Sunde, Tjensvoll, Ullandhaug; Hå: Ognå; Klepp: Øksnevad; Rennesøy: between Dale and Sel, Hodne. RI, Hjelmeland: Hjelmeland. HOY, Bergen: Fjøsanger, Nesttun, Storetveitmarken; Fitjar: ?Fitjar; Askøy: ?loc. HOI, Ullensvang: Dønno; Granvin: Eide, Skjervet. SFY, Gloppen: Sandane. SFI, Stryn: Innvik. MRI, Rauma: Lerheim. NSY, Sømna: Sandvåg;

Brønnøy: Hommelstø. NSI, Rana: Grønli (i Røvasdalen). TRY, Tromsø: Tromsø. TRI, Målselv: Målsnes. EIS 2, 3, 4, 5, 6, 7, 9, 11, 12, 14, 16, 17, 18, 19, 20, 22?, 26, 27, 28, 30, 35, 39, 41, 43, 45, 53, 54, 55, 63, 64?, 68, 71, 77, 110, 114, 123, 154, 162.

Date of earliest and latest capture: 20 May, 3 Sept.

Biology. Larvae apparently obligatory parasites of earthworms and unable to develop in other media under natural conditions (Eberhardt & Steiner 1952, Kirchberg 1954, Eberhardt 1955, Kirchberg 1961, Viktorov-Nabokov & Verves 1975, Rodendorf & Verves 1978). As hosts are known *Allolobophora chlorotica* (Savigny, 1826) and *A. rosea* (Savigny, 1826) (Kirchberg 1961). According to the distribution of these earthworms in Norway (cf. Stöp-Bowitz 1969) other species must also serve as hosts for *carnaria* in this country. Adults attracted to faeces, meat (including dead snails) and fruits, probably for nutritive purposes only (Kirchberg 1954, Gregor & Povolný 1961, Mihalyi 1965). Captured on the food-markets in Budapest (Aradi & Mihályi 1971). A case of cannibalism (larvae devouring parts of mother) is reported by Draber-Moňko (1937b). The larvae were subsequently fed on bird liver and adults successfully reared from them.

Distribution. Palaearctic Region east to Kamchatka and Vladivostok (cf. map in Verves 1980d). Not in Japan. Séguy's (1941) record from Réunion (Afrotropical Region) not listed by Dear (1980). British Isles. Denmark (according to specimens in my own collection), Finland (north to Savonia borealis and Karelia borealis). Published records from Sweden by Ringdahl are unreliable as *lehmanni* and *schulzi* are not kept apart from *carnaria* in his works, but probably occurs all over the country.

46. *Sarcophaga lehmanni* Mueller

Sarcophaga lehmanni Mueller, 1922; *Sarcophaga carnaria meridionalis* Rodendorf, 1937

Material: AK, Oslo: Bekkelaget. ON, Sel: Lårgård. ON or OS: Nord-Fron or Sør-Fron: ?loc. VE, Larvik: Larvik; Sem: Jarlsberg. EIS 19, 28, 62?, 71.

Date of earliest and latest capture: 10 July, 27 Aug.

Biology. Breeds in earthworms (Viktorov-Nabokov & Verves 1975). Adults attracted to meat and faeces (Gregor & Povolný 1961).

Distribution. Palaearctic Region east to central Asia. Not on the British Isles. Denmark (according to specimen captured by myself in East Jut-

land), Finland (Nylandia, Karelia australis), Sweden (according to specimen in British Museum (Natural History), London, from Skåne, Rövarekulan 2 Aug. 1980, A.C. Pont leg., which I have dissected and identified as the present species). Danish and Swedish collections are in need of revision. The specimen from Lårgård is the northernmost known (cf. Tiensuu 1939 and map in Verves 1980d).

47. *Sarcophaga schulzi* Mueller

Sarcophaga carnaria varietas *schulzi* Mueller, 1922; *Sarcophaga carnaria*: Patton 1934: 581, fig. 2; *Sarcophaga subvicina vulgaris* Rodendorf, 1937; *Sarcophaga carnaria* f. *vulgaris*: Emden 1954: 116, fig. 39 G; *Sarcophaga carnaria*: Kirchberg 1954: 110, Abb. 1; *Sarcophaga dolosa* Lehrer, 1967

Material: Ø, Fredrikstad: Øra. AK, Oslo: Bygdøy, Oslo; Bærum: Østerås. HES, Elverum: Grundset. HEN, Stor-Elvdal: Koppang. BØ, Modum: ?loc. AAY, Hisøy: Hisøy. VAY, Kristiansand: Hamre. RI, Suldal: Sandsa. HOY, Bergen: Stend. SFI, Leikanger: Fylkesgarden (near Nybø). EIS 2, 6, 15, 20, 28, 30, 50, 55, 64.

Date of earliest and latest capture: 21 May, 1 Aug.

Biology. Larvae parasitic in earthworms (Kirchberg 1954, Grunin 1964). Adults attracted to faeces and meat (including dead snails) (Kirchberg 1954, Gregor & Povolný 1961).

Distribution. Palaearctic Region east to Altai Mts. British Isles. In the USSR north to the Kola Peninsula (Verves 1981b). Finland (north to Tavastia borealis and Savonia borealis), Sweden (according to specimen from Uppland, Ledsundet W of Öregrund 15 — 16 July 1980, A. C. Pont leg., in British Museum (Natural History), London, which I have dissected and identified as the present species). Probably mixed with *carnaria* and *lehmanni* in Danish and Swedish collections.

48. *Sarcophaga subvicina* Rodendorf

Sarcophaga vicina Villeneuve, 1899, preocc.; *Sarcophaga subvicina subvicina* Rodendorf, 1937.

Material: AK, Oslo: Bygdøy; Bærum: Høvik, Nordby gård, Ostøya; Asker: Brønnøya. OS, Ringebu: Elstad. BØ: Drammen: Drammen. TEI, Tokke: Lårdal. VAY, Mandal: Mandal. RY, Sandnes: Austrått, Bogafjell, Melsheia, Stølsvik; Stavanger: Forus, Godalen, Gosen, Krossberg, Lille Stokkavatn, Madlalia, Sunde, Tjensvoll, Ullandhaug; Klepp: Øksnevad; Strand: 1 km E of Jøssang; Rennesøy: between

Dale and Sel, Hodnefjell; Karmøy: Kopervik. HOY, Bergen: Espegegn, Fana kirke, Fjøsanger, Grønnestølen, Hop, Myravatn (Tveiterås), between Rådal and Stend, Storetveit, Åstveit; Fitjar: ? Fitjar; Samnanger: Ådland; Askøy: Herdla. SFI, Leikanger: Njøs. MRI, Rauma: Lerheim. NTI, Steinkjer: Gulbergauget. NSY, Bodø: Bodø. EIS 2, 7, 13, 14, 17, 22?, 28, 30, 39, 40, 50, 63, 77, 101, 130.

Date of earliest and latest capture: 11 May, 29 Sept.

Biology. Adults attracted to faeces and dead snails, apparently for feeding only (Kirchberg 1954).

Distribution. Palaearctic Region east to Ural and Caucasus. Vladivostok. In the USSR north to Leningrad region (Verves 1981b). British Isles. Denmark, Finland (north to Tavastia australis) and Sweden (Skåne, Dalarne). The record from Bodø appears to be the northernmost known. *S. subvicina* is the most common sarcophagid in the coastal areas of Western Norway.

Genus *Ravinia* Robineau-Desvoidy, 1863

49. *Ravinia pernix* (Harris)

Musca pernix Harris, 1780; *Musca striata* Fabricius, 1794, preocc.; *Sarcophaga haematodes* Meigen, 1826; *Ravinia striata*: Rodendorf, 1937, 1970.

Material: Ø, Halden: near Halden. AK, Oslo: Tøyen; Frogn; Sønderstøa Degerud; Bærum: Nordli NW of Østerås. HES, Elverum: Grundset. ON, Vågå: Vågåmo; Sel: Lårgård; Vang: Nystuen. BØ, Ringerike: Hønefoss; Flesberg: Hvila. VAY, Mandal: Mandal. EIS 2, 20, 27, 28, 36, 52, 55, 71.

Date of earliest and latest capture: 5 July, 9 Aug. Biology. Breeds in faeces, also human (Kirchberg 1954, Mihályi 1965, Sýchevskaya 1970). Occasional producer of intestinal myiasis in man (Rodendorf & Verves 1978). Bred from snails, grasshoppers and a beetle (Séguy 1941, Rodendorf & Verves 1978). Adults attracted to faeces, meat and fruits (Eberhardt 1955, Gregor & Povolný 1961). Captured on the food-markets in Budapest (Aradi & Mihályi 1971). «... breeds in human faeces and dead animals in nature and is easily reared from such media in the laboratory» (Kano, Field & Shinonaga 1967).

Distribution. Palaearctic and Oriental Regions. British Isles. In the USSR north to the Arctic Circle near the Kola Peninsula (Verves 1981b). Denmark, Finland (north to Lapponia kemensis) and Sweden (north to Lule Lappmark).

Notes on other species

Below are given some annotations concerning species recorded from Norway by Ringdahl (1952), but which I do not accept as belonging to the Norwegian fauna on the basis of presently available evidence. However, they may ultimately be captured in this country.

Hilarella hilarella (Zetterstedt, 1844)

Recorded from Norway by Ringdahl (1952: 147, No. 325). The record is probably based on Siebke (1877: 90, as *Miltogramma hilarella*) who reports to have taken a female «Ad Christianiam in horto botanico. . . 14 August 1850». No corresponding specimen could be traced in the Oslo museum, neither is there any evidence in the museum correspondence that Ringdahl ever received any specimen under this name for identification. As Siebke's collection was rearranged by W.M. Schøyen after its reception by the museum (cf. Natvig 1943), the specimen actually before Siebke may be impossible to locate. Record not accepted.

Phrosinella nasuta (Meigen, 1824)

Recorded from Norway by Ringdahl (1952: 147, No. 323). Record probably based on holotype of *Tachina pilitarsis* Zetterstedt, 1844 from Norway (cf. Siebke 1877: 81) erroneously synonymised by Ringdahl with *nasuta* Meigen. See above under 9. *Phrosinella sannio*. Record not accepted.

Angiometopa ruralis (Fallén, 1817)

Recorded from Norway by Ringdahl (1952: 147, No. 309). The record is probably based on Siebke (1877: 96, as *Sarcophaga ruralis*) who reports to have captured a female «ad Aaset in par. Aamodt Østerdaliae 27 Juli 1870. . .». In the Oslo collection a single specimen (No. 7749) stood under the name *Sarcophaga ruralis* Fall. It was labelled (1) «Aamot» (2) «Siebke» and must be the one referred to by Siebke (l.c.). It is a female *Billaea triangulifera* (Zetterstedt) (Tachinidae). Record not accepted.

Brachicoma devia borealis Ringdahl, 1932

Recorded from Norway by Ringdahl (1944b, 1952). I have seen the specimen on which this record was based. See above under 17. *Brachicoma devia*.

Miltogramma oestraceum (Fallén, 1820).

Recorded from Norway by Ringdahl (1952: 147, No. 312). The record is probably based on

Siebke (1877: 90) who cites two localities, i.e. Kongsvinger, and Sarpsborg. The specimen from Sarpsborg could not be found in the collection. The specimen from Kongsvinger is a female *Miltogrammidium brevipilum*. See above under that name (no. 7).

ZOOGEOGRAPHIC DISCUSSION

The highest number of sarcophagid species are known from the southern or south-eastern parts of Norway (Fig. 25), which have the highest summer temperatures (Abrahamsen et al 1977, Gjessing & Ouren 1983). This is in accordance with the distribution of sarcophagids in Finland and Sweden (Tiensuu 1939, Ringdahl 1952).

The Norwegian species can be divided into four groups according to their presently known distribution in Norway. However, as the number of specimens captured in Norway is very low, the presented picture is likely to undergo considerable changes in the future. (1) Widely distributed species: 2. *Metopia argyrocephala*, 3. *M. campestris*, 17. *Brachicoma devia*, 23. *Helicophagella crassimargo*, 26. *H. rosellei*, 37. *Heteronychia vagans*, 38. *H. vicina*, 41. *Parasarcophaga pleskei*, 45. *Sarcophaga carnaria* and 48. *S. subvicina*. (2) Species known only from Northern Norway: 25. *Helicophagella noverca* and 28. *Thyrocnema kentejana*. (3) Species known only from Western Norway: 20. *Blaesoxipha rossica* and 22. *Helicophagella agnata*. (4) Species known only from Southern Norway: All species not mentioned above under (1), (2) or (3). The majority of species in this fourth group is known exclusively from the southern or south-eastern parts of Norway, but about one third are known also from Western Norway.

As far as their world distribution is concerned, the Norwegian species appear to belong to three distributional types: (1) Species occurring only in Fennoscandia and northern parts of the USSR. Only one species, the miltogrammine *Phrosinella sannio* belongs here. Its closest relatives, judged by the apomorphic fore tarsus in the males, live in North America. (2) Species with disjunct northern and southern distributional areas in Eurasia (boreo-alpine or boreo-montane distribution). Six species belong here, viz. 25. *Helicophagella noverca*, 26. *H. rosellei*, 28. *Thyrocnema kentejana*, 36. *Heteronychia ostensackeni* (?), 38. *H. vicina* and 41. *Parasarcophaga pleskei*. (3) Species with a more or less continuous southern distribution in Europe or Eurasia, reaching north to the lowlands of

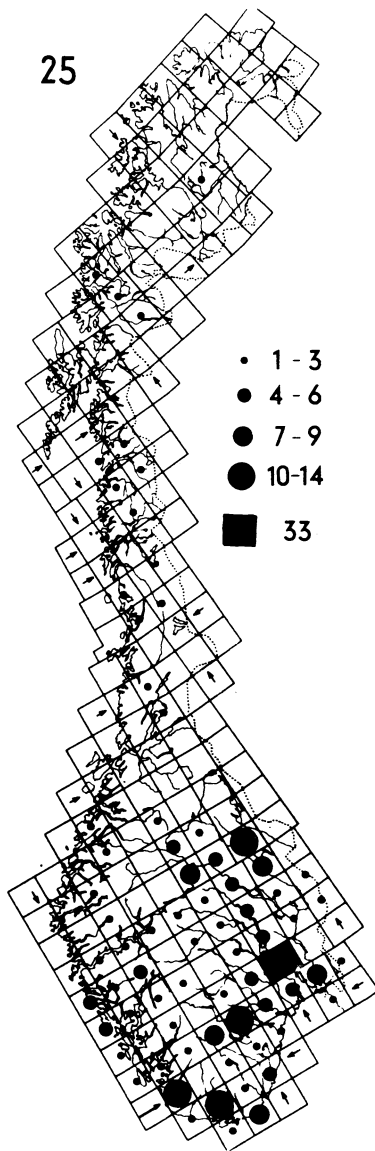


Fig. 25. Number of sarcophagid species recorded from each square of the EIS system for Norway.

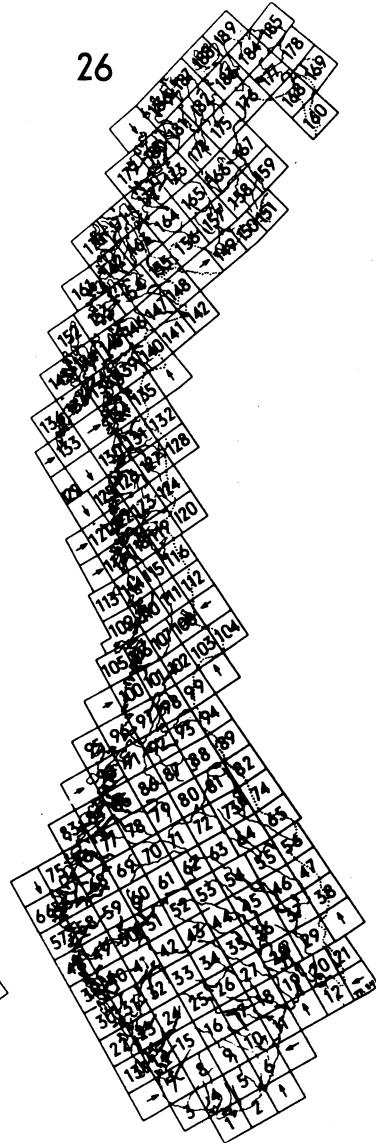


Fig. 26. The numbered squares of the EIS system for Norway.

Southern Norway to a greater or lesser extent, sometimes high into the mountains or farther north, often synanthropic. The 42 remaining species belong to this group. No doubt several zoogeographical groups are included within this concept «southern» (cf. e.g. Rodendorf 1959), but an analysis is not possible on the basis of the material at hand.

Note on *Helicobosca palpalis* (Robineau-Desvoidy, 1830)

I consider the genus *Helicobosca* Bezzi, 1906 as belonging in the Calliphoridae (see above, Introduction, Paramacronychiinae). For convenience, data on the known Norwegian material is presented below.

Material. VE, ?loc. AK, Bærum: Steinshøgda, Østøya. TEI, Tokke: Dalen. NSI, Saltdal: Rognan. EIS 16, 19?, 28, 127.

Date of earliest and latest capture: 19 June, 29 July.

Note. The specimens from VE, labelled «*Theria muscaria* Meig.» in Bidenkap's hand, have apparently never been published. As they do not carry Ringdahl's determination labels, they are probably not the source for Ringdahl's (1952) listing of the present species from Norway. Most probably Ringdahl's source is Siebke's record (1877: 96, as *Sarcophaga muscaria* Meig.) from «Løiten Hedemarkiæ 15 Juli 1870». In the Oslo collection a specimen stood under *Theria muscaria* Meig. labelled (1) Løiten (2) Siebke (No. 7766) which must be the specimen referred to by Siebke. It is a female *Billaea triangulifera* (Zetterstedt) (Tachinidae).

Distribution. Western Palaearctic Region, east to Altai (Verves 1982a). British Isles. Denmark, Finland and Sweden (north to Jämtland and Ångermanland).

ACKNOWLEDGEMENTS

Many thanks are due to L. Greve Jensen, Museum of Zoology, Bergen, J.E. Raastad, Museum of Zoology, Oslo, and A. Fjellberg, Tromsø Museum, for having made the collections of calypterate Diptera in their care available to me; to R. Danielsson, Lund, R. Contreras-Lichtenberg, Vienna, B. Lindeberg, Helsinki, and A.C. Pont, London, for loan of material; to A.C. Pont, L. Greve Jensen and F. Midtgaard for help with literature; to G.E. Shewell, Ottawa, for having checked my identification of some Newfoundland Sarcophagidae and for useful information; to J.-C. Léonide, Marseille, for having checked the identity of the *Blaesoxipha* material; to Torbjørn Rognes for help with the preparation of the maps; to S. Andersen, Copenhagen, T. Jonassen, F. Midtgaard, T.R. Nielsen, A.-J. Nilsen and S. Svendsen for gift of material; and to B. Sagvolden and J.H. Simonsen for letting me see their collections. The grant from Stavanger Lærerhøgskole 1982—1983 is gratefully acknowledged.

REFERENCES

Abrahamsen, J., Dahl, E., Jacobsen, N.K., Kalliola, R., Pålsson, L. & Wilborg, L. 1977. *Naturgeografisk regionindelning av Norden*. Nordiske Utredninger 1977 no. 34, Stockholm, ISBN 91-7052-339-8, 130 pp.

- Aldrich, J.M. 1916. *Sarcophaga and allies in North America*. The Thomas Say Foundation of the Entomological Society of America, LaFayette, Indiana, 302 pp, 16 pls.
- Allen, H.W. 1926. North American species of two-winged flies belonging to the tribe Miltogrammini. *Proc. U.S. Nat. Mus.* 68 (9), 1—106.
- Aradi, M.P. & Mihályi, F., 1971. Seasonal investigations of flies visiting food markets in Budapest. *Acta Zool. Acad. Scient. Hung.* 17, 1—10.
- Bidenkap, O. 1901. Foreløbig oversigt over de i det arktiske Norge hidtil bemærkede Diptera Brachycera. *Tromsø Mus. Aarsh.* 23 (1900), 13—112.
- Böttcher, G. 1912a. Zu Meigen's und Pandellé's *Sarcophaga*-Typen nebst Anmerkungen zu Kramer's «Tachiniden der Oberlausitz». *D. ent. Zeitschr.* 1912, 343—350.
- Böttcher, G. 1912b. Die männlichen Begattungswerkzeuge bei dem Genus *Sarcophaga* Meig. und ihre Bedeutung für die Abgrenzung der Arten. I. Allgemeines. *D. ent. Zeitschr.* 1912, 525—544.
- Böttcher, G. 1912c. Die männlichen Begattungswerkzeuge bei dem Genus *Sarcophaga* Meig. und ihre Bedeutung für die Abgrenzung der Arten. (Dipt.) II. Spezieller Teil. *D. ent. Zeitschr.* 1912, 705—736.
- Böttcher, G. 1913a. Die männlichen Begattungswerkzeuge bei dem Genus *Sarcophaga* Meig. und ihre Bedeutung für die Abgrenzung der Arten. (Dipt.) (Fortsetzung.). *D. ent. Zeitschr.* 1913, 1—16.
- Böttcher, G. 1913b. Die männlichen Begattungswerkzeuge bei dem Genus *Sarcophaga* Meig. und ihre Bedeutung für die Abgrenzung der Arten. (Dipt.) (Fortsetzung.). *D. ent. Zeitschr.* 1913, 115—130.
- Böttcher, G. 1913c. Die männlichen Begattungswerkzeuge bei dem Genus *Sarcophaga* Meig. und ihre Bedeutung für die Abgrenzung der Arten. (Dipt.) (Fortsetzung). *D. ent. Zeitschr.* 1913, 239—254.
- Böttcher, G. 1913d. Die männlichen Begattungswerkzeuge bei dem Genus *Sarcophaga* Meig. und ihre Bedeutung für die Abgrenzung der Arten. (Dipt.) (Fortsetzung). *D. ent. Zeitschr.* 1913, 351—378.
- Böttcher, G. 1914. *Sarcophaga lunigera* nov. spec. (Dipt.). *D. ent. Zeitschr.* 1914, 434—436.
- Brander, T. 1964. Lounais-Hämeen kärpäsistä, Brachycera (Diptera). *Lounais-Hämeen Luonto* 16, 51—69.
- Collart, A. 1954. Quelques Sarcophaginæ d'Italie (Diptera, Calliphoridae). *Bull. Ann. Soc. ent. Belg.* 90, 260—263.
- Collart, A. 1958. Notes sur la faune des Hautes-Fagnes en Belghiques. *Inst. r. Sci. nat. Belg.* 34 (31), 1—5.
- Dear, J. 1980. 91. Family Sarcophagidae. — In: Crosskey, R.W. (ed.), *Catalogue of the Diptera of the Afrotropical Region*, British Museum (Natural History), London, pp. 801—818.
- Downes, W.L. 1955. Notes on the morphology and

- classification of the Sarcophagidae and other calyptrates (Diptera). *Proc. Iowa Acad. Sci.* 62, 514–538.
- Downes, W.L. 1965. Family Sarcophagidae (Stephanostomatidae, Metopidae). — In: Stone, A., Sabrosky, C.W., Wirth, W.W., Foote, R.H. & Coulson, J.R. (eds.), *A catalog of the Diptera of America North of Mexico*, Agriculture Handbook no. 276, United States Department of Agriculture, Washington D.C., pp. 933–961.
- Draber-Moňko, A. 1964. *Pachyophthalmus distortus* All. (Diptera, Sarcophagidae) a new parasite of *Odynerus crassicornis* (Panz.) (Hymenoptera). *Bull. Acad. Pol. Sci. Cl. II*, 12, 579–582.
- Draber-Moňko, A. 1966. Bemerkungen über die paläarktischen Arten der Gattung *Pachyophthalmus* B.B. (Diptera, Sarcophagidae). *Polskie pismo ent.* 36, 395–405.
- Draber-Moňko, A. 1969. Übersicht der in Polen vorkommenden *Miltogramma*-Arten (Diptera, Sarcophagidae). *Polskie Pismo ent.* 39, 321–330.
- Draber-Moňko, A. 1971. Niktóre Calyptrata (Diptera) Bieszczadów. *Fragm. Faun. Warsz.* 17, 483–543.
- Draber-Moňko, A. 1973a. Przegląd krajowych gatunków z rodziny Sarcophagidae (Diptera). *Fragm. Faun. Warsz.* 19, 157–225.
- Draber-Moňko, A. 1973b. Einige Bemerkungen über die Entwicklung von *Sarcophaga carnaria* (L.) (Diptera, Sarcophagidae). *Polskie Pismo ent.* 43, 301–308.
- Draber-Moňko, A. 1978. Scathophagidae, Muscinae, Gasterophilidae, Hippoboscidae, Calliphoridae, Sarcophagidae, Rhinophoridae, Oestridae, Hypodermatidae i Tachinidae (Diptera) Pienin. *Fragm. Faun. Warsz.* 22, 45–229.
- Draber-Moňko, A. 1981. Sarcophagidae and Rhinophoridae (Diptera) of Warsaw and Mazovia. *Memorabilia Zoologica* 35, 131–140.
- Eberhardt, A.I. 1955. Untersuchungen über das Schmarotzen von *Sarcophaga carnaria* an Regenwürmern und vergleich der Biologie einiger *Sarcophaga*-Arten. *Z. Morph. Ökol. Tiere* 43, 616–647.
- Eberhardt, A.I. & Steiner, G. 1952. Untersuchungen über das Schmarotzen von *Sarcophaga* spp. in Regenwürmern. *Z. Morph. Ökol. Tiere* 41, 147–160.
- Emden, F.I. van 1954. Diptera Cyclorhapha Calyptrata (I). Section (a) Tachinidae and Calliphoridae. *Handbk Ident. Br. Insects* 10 (4) (a), 1–133.
- Enderlein, G. 1928. Klassifikation der Sarcophagiden. Sarcophagiden-Studien I. *Arch. klassif. phylog. Ent.* 1, 1–56.
- Fan, Tse-Teh 1965. *Key to species of common synanthropic flies in China*, Peking, 330 pp. < Only parts seen >
- Gjessing, J. & Ouren, T. 1983. *Det Bestes store Norge Atlas*. Forlaget Det Beste, Oslo, 232 pp., ISBN 82-7010-152-4.
- Gregor, F. & Povolný, D. 1961. Výsledky stacionárního výzkumu synantropních much okolí východoslovenské vesnice. *Zoologické Listy < Folia Zoologica >* 10, 17–44.
- Grinin, K. Ya. 1964. K biologii i rasprostraneniyu nekotorykh vidov mukh podsemeistva Sarcophaginae (Diptera, Sarcophagidae) fauny SSSR < On the biology and distribution of certain Sarcophaginae (Diptera, Sarcophagidae) in the USSR >. *Ent. obozr.* 63, 71–79. (In Russian. English translation in *Ent. Rev. Wash.* 43, 36–39, 1964).
- Hackman, W. 1980. A check list of the Finnish Diptera. II. Cyclorhapha. *Notul. ent.* 60, 117–162.
- Hanski, I. 1976. Breeding experiments with carrion flies (Diptera) in natural conditions. *Ann. ent. fenn.* 42, 113–121.
- Hanski, I. & Kuusela, S. 1977. An experiment on competition and diversity in the carrion fly community. *Ann. ent. fenn.* 43, 108–115.
- Hanski, I. & Kuusela, S. 1980. The structure of carrion fly communities: differences in breeding seasons. *Ann. zool. fenn.* 17, 185–190.
- Hanski, I. & Nuorteva, P. 1975. Trap survey of flies and their diel periodicity in the subarctic Kevo Nature Reserve, northern Finland. *Ann. ent. fenn.* 41, 56–64.
- Hedström, L. 1964. Lounais-Hämeen kärpäsiä, Bra-chycera (Diptera). *Lounais-Hämeen Luonto* 15, 77–89.
- 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. 1973. 31. Diptera (Zweiflügler). *Handb. Zool.* 4 (2) 2/31: 1–337 (Lieferung 20).
- Ishijima, H. 1967. Revision of the third stage larvae of synanthropic flies of Japan (Diptera: Anthomyiidae, Muscidae, Calliphoridae and Sarcophagidae). *Jap. J. san. Zool.* 18, 47–100.
- Junnikkala, E. 1960. Life history and insect enemies of *Hyponomeuta malinellus* Zell. (Lep., Hyponomeutidae) in Finland. *Ann. zool. Soc. zool. bot. fenn. 'Vanamo'* 21 (1), 1–44.
- Kano, R., Field, G. & Shinonaga, S. 1967. *Fauna Japonica Sarcophagidae (Insecta, Diptera)*. Biogeographical Society of Japan, Tokyo, 168 pp, 41 plates.
- Keilin, D. 1919. On the life-history and larval anatomy of *Melinda cognata* Meigen (Diptera Calliphorinae) parasitic in the snail *Helicella (Heliomanes) virgata* da Costa, with an account of the other Diptera living upon molluscs. *Parasitology* 11, 430–455.
- Keilin, D. 1921. Supplementary account of the dipterous larvae feeding upon molluscs. *Parasitology* 13, 180–183.
- Kerney, M.P. & Cameron, R.A.D. 1979. *A field guide to the land snails of Britain and North-West Europe*. Collins, London, 288 pp.
- Kirchberg, E. 1954. Zur Larvennahrung einiger heimischer *Sarcophaga*-Arten, insbesondere zur Frage, ob *S. carnaria* L. als obligatorischer Regenwurmparasit anzusehen sei (Diptera, Tachinidae). *Z. Morph. Ökol. Tiere* 43, 99–112.
- Kirchberg, E. 1961. Zucht von *Sarcophaga carnaria*

- L. (Dipt., Tachinidae) aus einer Freilandpopulation von Regenwürmern des Genus *Allolobophora* Eisen (Oligoch. Lumbricidae) (Zur Kenntnis der Gattung *Sarcophaga* Mg. III). *Anzeiger für Schädlingskunde* 34, 6—7.
- Knaben, N. 1943. Oversikt over Norges Orthoptera. *Bergens Mus. Aarb.* 1943 (2), 1—43.
- Kulikova, N.A. 1982. Ispol'zovanie morfologii yaitsekladov dlya opredeleniya samok serykh myasnykh mukh (Diptera, Sarcophagidae) < Utilisation of ovipositor morphology for identification of female flies (Diptera, Sarcophagidae) >. *Zool. Zh.* 61, 1518—1523.
- Kurahashi, H. 1970. Studies on the calypterate muscoid flies from Japan VII. Revision of the subfamily Miltogramminae (Diptera, Sarcophagidae). *Kontyû, Tokyo* 38, 93—116.
- Kurahashi, H. 1972. Studies on the calypterate muscoid flies from Japan IX. Subfamily Macronychiinae (Diptera, Sarcophagidae). *Kontyû, Tokyo* 40, 173—180.
- Kurahashi, H. 1975. Studies on the calypterate muscoid flies from Japan XI. Subfamily Agriinae (Diptera, Sarcophagidae). *Kontyû, Tokyo* 43, 202—213.
- Kuusela, S. & Hanski, I. 1982. The structure of carrion fly communities: the size and the type of carrion. *Holarct. Ecol.* 5, 337—348.
- Lehrer, A.Z. 1959. Neue oder seltene Sarcophagidae aus der Rumänischen Volksrepublik (Diptera). *Beitr. Ent.* 9, 900—908.
- Lehrer, A.Z. 1961a. Contribution à la connaissance des Sarcophagines (Diptera, Sarcophagidae) du Maramourèche (Roumanie). *Fragm. faun. Warsz.* 8, 527—537.
- Lehrer, A.Z. 1961b. Étude critique sur les Sarcophagines de la région de Jassy (Roumanie) (Diptera, Sarcophagidae). *Fragm. faun. Warsz.* 9, 123—134.
- Lehrer, A.Z. 1966. Quelques données bio-morphologiques sur l'espèce *Discachaeta cucullans* Pandellé 1896. (Fam. Sarcophagidae, Diptera). *Bull. Ann. Soc. r. belg. ent.* 102, 197—200.
- Lehrer, A.Z. 1967. Espèces nouvelles du genre *Sarcophaga* Meigen (Fam. Sarcophagidae, Diptera). *Zool. Anz.* 178, 210—219.
- Lehrer, A.Z. 1973. La taxonomie du genre *Sarcophaga* Meigen (Fam. Sarcophagidae, Diptera). *Annot. zool. bot.* 89, 1—22.
- Lehrer, A.Z. 1975a. Deux nouvelles espèces paléarctiques du genre *Sarcophaga* Meigen (Diptera, Sarcophagidae). *Bull. Ann. Soc. r. belg. ent.* 111, 102—108.
- Lehrer, A.Z. 1975b. Sur *Sarcophaga rosellei* Böttcher, 1912 et deux espèces affines nouvelles (Diptera, Sarcophagidae). *Bull. Ann. Soc. r. belg. ent.* 11, 278—284.
- Lehrer, A.Z. 1975c. Statut de *Bellieria novercoides* (Bött.) et établissement de deux espèces nouvelles du genre *Bellieria* Rob.-Desv. (Diptera Sarcophagidae). *Bull. Ann. Soc. r. belg. ent.* 111, 285—288.
- Lehrer, A.Z. 1976a. Diagnose de *Bellieria cepelaki* Lehrer, 1975 (Diptera Sarcophagidae). *Bull. Ann. Soc. r. belg. ent.* 112, 158—161.
- Lehrer, A.Z. 1976b. *Leclercqiomyia*: genre nouveau de Sarcophagines paléarctiques (Diptera: Sarcophagidae). *Bull. Ann. Soc. r. belg. ent.* 112, 195—203.
- Lehrer, A.Z. 1976c. Nouvelles Sarcophagines d'Eurasie (Diptera Sarcophagidae). *Bull. Ann. Soc. r. belg. ent.* 112, 259—266.
- Lehrer, A.Z. 1976d. Cinq espèces nouvelles pour la faune paléarctiques des diptères Sarcophagidae. *Annot. zool. bot.* 115, 1—11.
- Lehrer, A.Z. 1977a. *Sarcophaga baraschi* n.sp. (Diptera, Sarcophagidae). *Bull. Soc. ent. Mulhouse* 1977, 13—15.
- Lehrer, A.Z. 1977b. Espèces nouvelles du genre *Heteronychia* B.B. de la faune de la Bulgarie (Diptera, Sarcophagidae). *Acta zool. Bulg.* 7, 27—36.
- Lehrer, A.Z. 1977c. Deux nouvelles Sarcophagides d'Europe occidentale (Diptera, Sarcophagidae). *Bull. Ann. Soc. r. belg. ent.* 113, 52—62.
- Lehrer, A.Z. 1977d. Deux nouvelles *Heteronychia* de Turquie (Diptera, Sarcophagidae). *Bull. Ann. Soc. r. belg. ent.* 113, 223—228.
- Lehrer, A.Z. 1978a. Calliphorides et Sarcophagides nouveaux de la faune de l'Espagne. *EOS Rev. Esp. Ent.* 52, 139—148.
- Lehrer, A.Z. 1978b. Une nouvelle *Sarcophaga* à la mémoire du Dr Josef Moucha (Diptera, Sarcophagidae). *Bull. Soc. ent. Mulhouse* 1978, 1—3.
- Lehrer, A.Z. 1978c. Deux nouvelles *Sarcophaga* Meigen d'Autriche (Diptera, Sarcophagidae). *Bull. Ann. Soc. r. belg. Ent.* 114, 127—131.
- Lehrer, A.Z. 1981. *Parasarcophaga paularnaudi* n.sp. nouvelle Sarcophagine du Proche-Orient (Diptera, Sarcophagidae). *Bull. Ann. Soc. r. belg. Ent.* 117, 186—188.
- Léonide, J. 1967. Contribution à l'étude biologique des Diptères Sarcophagidés, parasites d'Acridiens. Cycle biologique de *Blaesoxipha rossica* Vill., injection de larves dans le corps de l'hôte par les femelles de Sarcophagidés. *C. r. Acad. Sc. Paris (D)* 265, 232—234.
- Léonide, J. & Léonide, J.-C. 1971. Contribution à l'étude des Diptères Sarcophagidés acridiophages, V: Notes faunistiques et biologiques. *Bull. Soc. ent. Fr.* 76, 111—122.
- Léonide, J. & Léonide, J.-C. 1973. Contribution à l'étude des Diptères Sarcophagidés acridiophages, VII. Description de *Blaesoxipha dupuisi* n.sp. *Bull. Soc. ent. Fr.* 78, 277—289.
- Léonide, J. & Léonide, J.-C. 1974. Contribution à l'étude des Diptères Sarcophagidés acridiophages, IX. *Blaesoxipha lautaretensis* Villeneuve est-elle une espèce valable? Commentaires sur l'état actuel de la systématique des *Blaesoxipha*. *Bull. Soc. ent. Fr.* 79, 152—157.
- Léonide, J. & Léonide, J.-C. 1979. Contribution à l'étude des Diptères Sarcophagidés acridiophages. XII. Biotaxonomie de *Blaesoxipha gladiatrix* (Pandellé 1896) Villeneuve 1911. *Bull. Soc. ent. Fr.* 84, 247—265.

- Léonide, J. & Léonide, J.-C. 1982. Contribution à l'étude des Diptères Sarcophagidés acridiophages. XIII. — Biotaxonomie de *Blaesoxipha grylloctona* Loew 1861. Nouvelles réflexions sur la systématique de ce genre et les méthodes d'investigation. *Ann. Soc. ent. Fr. (N.S.)* 18, 483—506.
- Locket, G.H. & Millidge, A.F. 1953. *British spiders Vol. II*, The Ray Society, London, 449 pp.
- Løken, A. 1973. Studies on Scandinavian bumble bees (Hymenoptera, Apidae). *Norsk ent. Tidsskr.* 20, 1—218.
- Lomholdt, O. 1975. The Sphecidae (Hymenoptera) of Fennoscandia and Denmark. *Fauna ent. scand.* 4 (1), 1—224.
- Lomholdt, O. 1976. The Sphecidae (Hymenoptera) of Fennoscandia and Denmark. *Fauna ent. scand.* 4 (2), 225—452.
- Lundbeck, W. 1927. *Diptera Danica. Part VII. Platypezidae, Tachinidae*. G.E.C. Gad, Copenhagen, 560 pp.
- Mihályi, F. 1965. Rearing flies from faeces and meat, infected under natural condition. *Acta zool. Acad. sc. hung.* 11, 153—164.
- Mihályi, F. 1975. Beschreibung vier neuer Sarcophagiden Arten aus Ungarn (Diptera). *Acta zool. Acad. sc. hung.* 21, 101—108.
- Mihályi, F. 1979a. New and little known Sarcophagidae in the Carpathian basin (Diptera). *Acta zool. Acad. sc. hung.* 25, 159—164.
- Mihályi, F. 1979b. Beschreibung von *Bellieria hortobagyensis* sp.n. aus Ungarn (Diptera: Sarcophagidae) *Folia ent. hung. < Rovartani Közlemények > Ser. nov.* 32, 171—172.
- Mihályi, F. 1979c. Femeslegyek — Húslegyek Calliphoridae — Sarcophagidae. *Fauna Hungariae* 135, 1—152. < *Magyarország Állatvilága XV. kötet (Diptera II.)* 16. füzet >
- Mihályi, F. 1980. Ergebnisse der Albanien-Expedition 1961 des Deutschen Entomologischen Institutes. 93. Beitrag, Diptera: Calliphoridae, Sarcophagidae, Rhinophoridae. *Beitr. Ent. Berlin* 30, 333—341.
- Mik, J. 1890. Dipterologische Miscellen. XVI. *Wien ent. Zeit.* 9, 153—158.
- Natvig, L.R. 1943. Entomologien ved Det Kongelige Frederiks Universitet. Et bidrag til norsk entomologisk historie. I. Tidsrommet 1813—1907. *Norsk ent. Tidsskr.* 7, 1—73.
- Nielsen, S.A., Nielsen, B.O. & Walhovd, H. 1978. Blowfly myiasis (Diptera: Calliphoridae, Sarcophagidae) in the hedgehog (*Erinaceus europaeus* L.). *Ent. Meddr* 46, 92—94.
- Økland, K.A. 1981. Inndeling av Norge til bruk ved biogeografiske oppgaver — et revidert Strandsystem. *Fauna, Oslo* 34, 167—178.
- Parker, R.R. 1916. New species of New England Sarcophagidae. *Can. Ent.* 48, 359—364, 422—427.
- Parker, R.R. 1919. Concerning the subspecies of *Sarcophaga dux* Thomson. *Bull. Brookl. ent. Soc.* 14, 41—46.
- Parker, R.R. 1923. New Sarcophagidae from Asia, with data relating to the *dux* group. *Ann. Mag. nat. Hist. (9)* 11, 123—129.
- Patton, W.S. 1934. Studies on the higher Diptera of medical and veterinary importance. A revision of the species of the genus *Glossina* Wiedemann based on a comparative study of the male and female terminalia. *Ann. trop. Med. Parasit.* 28, 579—588. < This paper deals in fact with the genus *Sarcophaga* s.lat. >.
- Patton, W.S. & Wainwright, C.J. 1935a. The British species of the subfamily Sarcophaginae, with illustrations of the male and female terminalia. *Ann. trop. Med. Parasit.* 29, 73—90.
- Patton, W.S. & Wainwright, C.J. 1935b. The British species of the subfamily Sarcophaginae, with illustrations of the male and female terminalia. *Ann. trop. Med. Parasit.* 29, 517—532.
- Patton, W.S. & Wainwright, C.J. 1936a. The British species of the subfamily Sarcophaginae, with illustrations of the male and female terminalia. *Ann. trop. Med. Parasit.* 30, 187—201.
- Patton, W.S. & Wainwright, C.J. 1936b. The British species of the subfamily Sarcophaginae, with illustrations of the male and female terminalia. *Ann. trop. Med. Parasit.* 30, 337—350.
- Patton, W.S. & Wainwright, C.J. 1937. The British species of the subfamily Sarcophaginae, with illustrations of the male and female terminalia. *Ann. trop. Med. Parasit.* 31, 303—317.
- Persson, P.I. 1983. Flugor på Ölands Stora alvar. *Ent. Tidskr.* 104, 151—164.
- Pont, A.C. 1975. 80. Sarcophagidae. — In: Kloet, G.S. & Hincks, W.D. (eds.), A check list of British insects. Second edition. Part 5: Diptera and Siphonaptera. *Handbk Ident. Br. Insects* 11 (5), 106—107.
- Povolný, D. 1961. *Parasarcophaga sachtlebeni* Lehrer 1959 ein Synonym von *Parasarcophaga jacobsoni* Rhodendorf 1937 (Diptera: Sarcophagidae). *Beitr. Ent.* 11, 229—232.
- Povolný, D. 1977. Zur Frage der Variabilität der Genitalien bei *Bellieria novercooides* (Böttcher, 1913). *Dtsch. ent. Z. N.F.* 24, 283—288.
- Povolný, D. & Slamečková, M. 1959. Kritische Bemerkungen zur Taxonomie der Gattung *Pierretia* R.-D. (Dipt. Sarcophagidae) nebst Beschreibung von zwei unbekanntenen Arten aus der Slowakei. *Acta ent. Mus. Nat. Pragae* 33, 423—433.
- Povolný, D. & Slamečková, M. 1967. *Heteronychia (Spathulapica) slovacica* sp.n. nebst Bemerkungen zur Taxonomie von *Heteronychia (Spathulapica) rohdendorfi* (Povolný & Slamečková, 1959) (Diptera). *Acta ent. bohemoslov.* 64, 314—318.
- Povolný, D. & Slamečková, M. 1969. Das Vorkommen von *Bellieria novercooides* (Bött.) in der Tschechoslowakei; zur Genitalmorphologie einiger mitteleuropäischer Arten der Gattung *Bellieria* (Dipt., Sarc.). *Acta ent. bohemoslov.* 66, 55—60.
- Povolný, D. & Slamečková, M. 1979. Zur Taxonomie und Ökologie einiger Sarcophagini (Diptera,

- Sarcophagidae) aus der Tschechoslowakei. *Acta ent. bohemoslov.* 76, 108—121.
- Povolny, D. & Staněk, M. 1969. Zur taxonomischen Stellung von *Heteronychia* (*Heteronychia*) *enderleini* (Jacentkovský) (Diptera, Sarcophagidae). *Acta ent. bohemoslov.* 66, 184—187.
- Pyörnilä, M. & Pyörnilä, A. 1979. Role of parasitoids in termination of a mass occurrence of *Yponomeuta evonymellus* (Lepidoptera, Yponomeutidae) in northern Finland. *Notul. ent.* 59, 133—137.
- Reinhard, H.J. 1961. New American Tachinidae and Sarcophagidae. *J. Kans. ent. Soc.* 34, 204—213.
- Ringdahl, O. 1932. Eine neue *Brachycoma*-Art. *Notul. ent.* 12, 21.
- Ringdahl, O. 1934. Bidrag til kannedomen om en del av Zetterstedts tachinid typer (Diptera). *Ent. Tidskr.* 55, 266—272.
- Ringdahl, O. 1937. Bidrag til kannedomen om de svenska tachinidernas utbredning. *Ent. Tidskr.* 58, 31—38.
- Ringdahl, O. 1944a. Revision av V. Storms Diptersamling. 1. Familjen Tachinidae. *K. norske Vidensk. Selsk. Forh.* 17 (19), 79—81.
- Ringdahl, O. 1944b. Contributions to the knowledge of the tachinids and muscids of Norway. *Tromsø Mus. Aarsh.* 65 (1942), (4), 1—27.
- Ringdahl, O. 1945a. Förteckning över de av Zetterstedt i Insecta Lapponica och Diptera Scandinaviae beskrivna tachiniderna med synonymer jämte anteckningar över en del arter. *Opusc. ent.* 10, 26—35.
- Ringdahl, O. 1945b. Översikt över de hittills från Sverige kända arterna av familjen Tachinidae (Diptera). *Ent. Tidskr.* 66, 177—210.
- Ringdahl, O. 1951. Flugor från Lapplands, Jämtlands och Härjedalens fjälltrakter (Diptera, Brachycera). *Opusc. ent.* 16, 113—186.
- Ringdahl, O. 1952. Catalogus Insectorum Sueciae XI Diptera Cyclorhapha: Muscaria Schizometopa. *Opusc. ent.* 17, 129—186.
- Ringdahl, O. 1954. Nya fyndorter för norska Diptera. *Norsk ent. Tidsskr.* 9, 46—54.
- Ringdahl, O. 1958. Dipterologiska notiser 16 och 17. *Opusc. ent.* 23, 90—94.
- Roback, S.S. 1954. The evolution and taxonomy of the Sarcophaginae (Diptera, Sarcophagidae). *Illinois Biological Monographs* 23 (3—4), 1—181.
- Rodendorf, B.B. 1925. 6. Miltogramminen-Studien I. *Zool. Anz.* 62, 80—85.
- Rodendorf, B.B. 1927. 4. Miltogramminen-Studien IV. *Zool. Anz.* 71, 157—169.
- Rodendorf, B.B. 1928. 4. Sarcophaginen-Studien I. Beiträge zur Kenntnis der Gattung *Blaesoxipha* Lw. *Zool. Anz.* 77, 23—28.
- Rodendorf, B.B. 1930. 64h. Sarcophaginae. — In: Lindner, E. (ed.), *Die Fliegen der Palaearktischen Region*, Lieferung 39, pp. 1—48.
- Rodendorf, B.B. 1932. Materialy k poznaniyu mukh, parazitiruyushchikh na saranchevyykh < Beiträge zur Kenntnis der zweiflügeligen Parasiten der Acrididen >. *Trudy po zashchite rastenii* < Bulletin of plant protection > *Seriya 1, vyp. 3*, 171—190.
- Rodendorf, B.B. 1935. 64h. Sarcophaginae. — In: Lindner, E. (ed.), *Die Fliegen der palaearktischen Region*, Lieferung 88, pp. 49—128.
- Rodendorf, B.B. 1937. *Fauna SSSR. Nasekomyye dvukrylye. T. XIX, vyp. 1. Sem. Sarcophagidae (ch. 1)*. Zoologicheskii Institut Akademii Nauk SSSR, Novaya Seriya no. 12, pp. 1—501.
- Rodendorf, B.B. 1938. Novyye vidy Sarcophaginae, sobrannyye K.Ya. Gruninyim v Sikhote-Alinskoy zapovednike. < New species of Sarcophaginae from the Sikhote-Alin state reserve territory. > *Trudy Sikhote-Alinskogo Gos. Zapovedn.* 2, 101—110.
- Rodendorf, B.B. 1955. Vidyy roda *Metopia* Mg. (Diptera, Sarcophagidae) fauny SSSR i sopedel'nykh stran. *Ent. obozr.* 34, 360—373.
- Rodendorf, B.B. 1959. Vidyy mukh podsemeistva Sarcophaginae (Diptera) v faunisticheskikh sinantropnykh kompleksakh razlichnykh landschaftnykh zon SSSR < The species of Sarcophaginae flies in the faunistic synanthropic complexes of different landscape zones of the U.S.S.R. >. *Ent. obozr.* 38, 790—797. (English translation in *Ent. Rev. Wash.* 38, 708—714.)
- Rodendorf, B.B. 1961. Studien über südiranische Sarcophagiden (Dipt.). *Stuttg. Beitr. Naturk.* 58, 1—13.
- Rodendorf, B.B. 1962. Novyye i maloizvestnyye Calliphorinae i Sarcophaginae (Diptera, Larvaevoridae) iz Azii < Neue und wenig bekannte Calliphorinen und Sarcophaginen (Diptera, Larvaevoridae) aus Asien >. *Ent. obozr.* 41, 931—941. (English translation in *Ent. Rev. Wash.* 41, 576—581.)
- Rodendorf, B.B. 1963a. Über das System der Sarcophaginen der äthiopischen Fauna. *Stuttg. Beitr. Naturk.* 124, 1—22.
- Rodendorf, B.B. 1963b. Über wenig bekannte nordische Miltogrammatinen der Gattung *Oebalia* R.-D. (Diptera, Sarcophagidae). *Beitr. Ent.* 13, 445—454.
- Rodendorf, B.B. 1964. Nekotorye dannyye o seryykh myasnyykh mukhakh (Diptera, Sarcophagidae) yuzhnogo Kitaya < Zur Kenntnis der Sarcophaginen (Diptera, Sarcophagidae) von südlichen China >. *Ent. obozr.* 43, 80—85.
- Rodendorf, B.B. 1965. Sostav tribyy Sarcophagini (Diptera, Sarcophagidae) evrazii. < Composition of the tribe Sarcophagini (Diptera, Sarcophagidae) of Eurasia >. *Ent. obozr.* 44, 676—695. (English translation in *Ent. Rev. Wash.* 44, 397—406.)
- Rodendorf, B.B. 1967. Napravleniya istoricheskogo razvitiya sarkofagid (Diptera, Sarcophagidae). *Trudy paleontologicheskogo instituta Akademii Nauk SSSR*, 116, 1—92.
- Rodendorf, B.B. 1969. Nekotorye novyye vidyy Sarcophaginae (Diptera, Sarcophagidae) iz Azii < New species of Sarcophaginae (Diptera, Sarcophagidae) from Asia >. *Ent. obozr.* 48, 943—950. (English translation in *Ent. Rev. Wash.* 48, 600—604.)

- Rodendorf, B.B. 1970. 109. Sem. Sarcophagidae — Sarkofagidy. — In: Bei-Bienko, G.Ya. (ed.), *Opre-delitel' nasekomykh evropeiskoi chasti SSSR, V, Dvukrýlye, Blokhi*, pp. 624—670. Akademiya Nauk SSSR, Zoologicheskii Institut, Leningrad.
- Rodendorf, B.B. 1971a. 64h. Sarcophaginae. — In: Lindner, E. (ed.), *Die Fliegen der palaearktischen Region*, Lieferung 285, pp. 129—176.
- Rodendorf, B.B. 1971b. Palearkticheskie vidy dvukrýlykh roda *Phrosinella* R.-D. (Diptera, Sarcophagidae) < Palaeartic species of the genus *Phrosinella* R.-D. (Diptera, Sarcophagidae) >. *Ént. obozr.* 50, 446—453. (English translation in *Ent. Rev. Wash.* 50, 254—258.)
- Rodendorf, B.B. 1975a. 64h. Sarcophaginae. — In: Lindner, E. (ed.), *Die Fliegen der palaearktischen Region*, Lieferung 311, pp. 177—232.
- Rodendorf, B.B. 1975b. Some Sarcophagidae from Southern Spain. *Steenstrupia* 3, 197—204.
- Rodendorf, B.B. 1978. *Dexagria* gen.n. — novýi rod sarkofagid (Diptera, Sarcophagidae) iz srednei Azii < *Dexagria* gen.n. — a new genus of Sarcophaginae from middle Asia >. *Ent. obozr.* 57, 416—418. (English translation in *Ent. Rev. Wash.* 57, 293—294.)
- Rodendorf, B.B. 1982. 64h. Sarcophaginae. — In: Lindner, E. (ed.), *Die Fliegen der palaearktischen Region*, Lieferung 327, 233—235.
- Rodendorf, B.B. & Grunin, K.Ya. 1938. K faune Sarcophaginae vostochnýkh sklonov srednego Sikhote-Alinya. *Trudy Sikhote-Alinskogo Gos. Zapovedn.* 2, 87—100.
- Rodendorf, B.B. & Verves, Yu. G. 1977a. K faune Sarcophagidae (Diptera) Mongolskoi Narodnoi Respubliki. I. Sarcophaginae i Sarcotachininae < On the fauna of Sarcophagidae (Diptera) of the Mongolian People's Republic. I. Sarcophaginae and Sarcotachininae >. *Nasekomye Mongolii* 5, 716—730.
- Rodendorf, B.B. & Verves, Yu. G. 1977b. New species of the genus *Blaesoxipha* Löw (Diptera, Sarcophagidae) from Transcaucasia and the Kopetdag. *Ent. Rev. Wash.* 56, 134—136. (Russian original in *Ént. obozr.* not seen.)
- Rodendorf, B.B. & Verves, Yu. G. 1978. Sarcophaginae (Diptera, Sarcophagidae) from Mongolia. *Ann. hist.-nat. Mus. nat. hung.* 70, 241—258.
- Rodendorf, B.B. & Verves, Yu.G. 1979a. K faune Sarcophagidae (Diptera) Mongolskoi Narodnoi Respubliki. II. Novýe dannýe o Sarcophaginae < On the fauna of Sarcophagidae (Diptera) of the Mongolian People's Republic. II. New data on Sarcophaginae >. *Nasekomye Mongolii* 6, 475—497.
- Rodendorf, B.B. & Verves, Yu.G. 1979b. Novýe dvukrýlye podsem. Sarcophaginae (Diptera, Sarcophagidae) iz Palearktiki < New Palaeartic Sarcophaginae (Diptera, Sarcophagidae) >. *Ent. obozr.* 58, 190—199. (English translation in *Ent. Rev. Wash.* 58, 114—121.)
- Rodendorf, B.B. & Verves, Yu.G. 1980. K faune Sarcophagidae (Diptera) Mongolskoi Narodnoi Respubliki. III. Miltogrammatinae < On the fauna of Sarcophagidae (Diptera) of the Mongolian People's Republic. III. Miltogrammatinae >. *Nasekomye Mongolii* 7, 445—517.
- Rondani, C. 1859. *Dipterologiae Italicae Prodrumus*, Vol. III. 243 (+ 2) pp. Stocchi, Parmae (= Parma).
- Rognes, K. 1980. The blow-fly genus *Lucilia* Robineau-Desvoidy (Diptera, Calliphoridae) in Norway. *Fauna norv. Ser. B.* 27, 39—52.
- Rognes, K. 1982. A small collection of calypterate Diptera (Tachinidae, Sarcophagidae, Calliphoridae, Muscidae) from the Dovre mountains, Southern Norway. *Fauna norv. Ser. B* 29, 110—114.
- Saccà, G. & Rivosecchi, L. 1954. Contributo alla conoscenza faunistica del genere *Sarcophaga* in Italia (Diptera, Calliphoridae). *Rend. Ist. sup. San.* 17, 174—187.
- Schmitz, H. 1917. Biologische Beziehungen zwischen Dipteren und Schnecken. *Biol. Zentralbl.* 37, 24—43.
- Schøyen, W.M. 1889. Supplement til H. Siebke's Enumeratio Insectorum Norvegicorum, Fasc. IV. (Diptera). *Christiania Vidensk. Selsk. Forh.* 1889 (12), 1—15.
- Séguy, E. 1941. Études sur les mouches parasites. Tome II Calliphorides. Calliphorines (suite), Sarcophagines et Rhinophorines de l'Europe occidentale et meridionale. Recherches sur la morphologie et la distribution géographique des Diptères à larves parasites. *Encycl. ent. (A)* 21, 1—436.
- Shewell, G.E. 1971. On the type of *Agria*, with description of a new Nearctic species (Diptera, Sarcophagidae). *Can. Ent.* 103, 1179—1191.
- Siebke, J.H.S. 1877. *Enumeratio Insectorum Norvegicorum Fasciculum IV. Catalogum Dipteroorum Continentem*. A.W. Brøgger, Christiania (= Oslo), 255 pp.
- Soot-Ryen, T. 1943. A review of the literature on Norwegian Diptera until the year 1940. *Tromsø Mus. Aarsh.* 65 (1942) (3), 1—46.
- Souza Lopes, H.de 1955. Considera coes sôbre os gêneros de Sarcophagidae (Diptera) propostos por Robineau-Desvoidy em 1830 e 1863. *Arquivos do Museu Nacional* 42, 265—272.
- Souza Lopes, H. de 1969. 103. Family Sarcophagidae. — In: Papavero, N. (ed.), *A catalogue of the Diptera of the Americas South of the United States*. Departamento de Zoologia, Secretaria da Agricultura, Sao Paulo, pp. 1—88.
- Souza Lopes, H. de, Kano, R., Shinonaga, S. & Kurahashi, H. 1977. Family Sarcophagidae. — In: Delgado, M.D. & Hardy, D.E. (eds.), *A Catalog of the Diptera of the Oriental Region. Vol. III. Suborder Cyclorrhapha (excluding Division Aschiza)*. The University Press of Hawaii, Honolulu, pp. 557—583.
- Stackelberg, A.A. 1962. Materialy po faune dvukrýlykh Leningradskoi oblasti. VI. Diptera, Calypt-rata, chast' 1 < List of Diptera of the Leningrad Region, VI. Diptera Calypt-rata, Part 1 > *Trudy*

- Zoologicheskogo Instituta Akademii Nauk SSSR 31, 318—388.
- Stein, P. 1924. Die verbreitetsten Tachiniden Mitteleuropas nach ihre Gattungen und Arten. *Arch. Naturg.* 90 (A) (6), 1—271.
- Stöp-Bowitz, C. 1969. A contribution to our knowledge of the systematics and zoogeography of Norwegian earthworms (Annelida Oligochaeta: Lumbricidae). *Nytt. Mag. Zool.* 17, 169—280.
- Storm, V. 1891. Diptera brachycera, quæ observavit determinavitque. *K. norske Vidensk. Selsk. Skr.* 1891, 283—313.
- Storm, V. 1896. Dipterologiske undersøgelser. *K. norske Vidensk. Selsk. Skr.* 1895, 225—241.
- Storm, V. 1907. Supplerende iagttagelser over Insecta Diptera ved Trondhjem. *K. norske Vidensk. Selsk. Skr.* 1907 (5), 1—11.
- Strand, E. 1900. Bidrag til Hallingdals og Lyngørs insektfauna. *Nyt Mag. Naturv.* 37, 46—72.
- Strøm, H. 1781. *Udkast til en Beskrivelse over Hårdanger i Bergens Stift i Norge samlet og sammenskrevet af Sal. Hr. Marcus Schnabels efterladte Papirer ved H.S. Kiøbenhavn.* <Not seen. Cited from Soot-Ryen 1943 >
- Strøm, H. 1784. *Physisk-Oeconomisk Beskrivelse over Eger-Præstegjeld i Aggerhus-Stift i Norge; tilligemed et geographisk Kort over samme, af Hans Stram, Prof. Theol. og Sognepræst til Eger. Kiøbenhavn.* <Not seen. Cited from Soot-Ryen 1943 >
- Strukan, D. 1967. Remarques sur deux Sarcophaginae peu connus de Yougoslavie (Diptera, Sarcophagidae). *Cahiers des Naturalistes, Bull. N.P., n.s.* 23, 45—47.
- Sýchevskaya, V.I. 1966. O sinantropnykh mukhakh Pamira. *Zool. Zh.* 45, 390—399.
- Sýchevskaya, V.I. 1970. Zonal'noe raspredelenie koprofil'nykh i skhizofil'nykh mukh (Diptera) v srednei Asii <Zonal distribution of coprophilus and schizophilous flies (Diptera) in middle Asia >. *Ént. obozr.* 49, 819—831. (English translation in *Ent. Rev. Wash.* 49, 498—505).
- Thompson, W.-R. 1921. Contributions à la connaissance des formes larvaires des Sarcophagides (Dipt.). II. *Ptychoneura rufitarsis* Meig. *Bull. Soc. ent. Fr.* 1921, 219—222.
- Tiensuu, L. 1939. Die Sarcophagen (Dipt.) Finnlands. *Ann. ent. fenn.* 5, 255—266.
- Tiensuu, L. 1964. Huomion arvoisia kärpäslöytöjä Lounais-Hämeestä <Bemerkenswerte Fliegenfunde aus Südwest-Häme >. *Lounais-Hämeen Luonto* 15, 76—77.
- Venturi, F. 1947. Notulae dipterologicae. I. Miltogrammini e Metopiini (Dipt. Sarcophagidae) dell'Italia centrale. *Redia* 32, 119—139.
- Venturi, F. 1952. Notulae dipterologicae. V. Revisione sistemática del genere *Metopia* Meigen (Diptera, Sarcophagidae) in Italia. *Boll. entom. Bologna.* 19, 147—170.
- Venturi, F. 1960. Sistemática e geonemia dei Sarcofagidi (excl. *Sarcophaga* Meig. s.l.) italiani (Diptera). *Frustula entomologica* 2 (7), 1—124.
- Verves, Yu.G. 1973. Novi vidi sarkofagid (Diptera, Sarcophagidae) z Ukraini. *Dopovidi Akademii Nauk Ukrain's'koi RSR, Seriya B, Geologiya, Geofizika, Khimiya ta Biologiya, Kiiiv* 1973, 946—948.
- Verves, Yu.G. 1974. K faune sarkofagid (Diptera, Sarcophagidae) SSSR. I. Triba Sarcophagini (Sarcophaginae) (po materialam kolektsii Instituta Zoologii A N USSR). *Vestnik zoologii* 1974, 30—37.
- Verves, Yu.G. 1975a. Novýe vidy mukh roda *Heteronychia* B.B. (Diptera, Sarcophagidae) <New species of the genus *Heteronychia* B.B. (Diptera, Sarcophagidae) >. *Ent. obozr.* 54, 665—667. (English translation in *Ent. Rev. Wash.* 54, 130—131.)
- Verves, Yu.G. 1975b. K faune sarkofagid (Diptera, Sarcophagidae) SSSR. II. Podsemeistva Sarcophaginae (Triba Agriini), Macronichiinae i Miltogrammatinae (po materialam kolektsii Instituta Zoologii A N USSR). *Vestnik zoologii* 1975, 73—77.
- Verves, Yu.G. 1976. K izucheniyu sarkofagid (Diptera, Sarcophagidae) — parazitov nazemnykh bryukhonogik mollyuskov. *Vestnik zoologii* 1976, 28.
- Verves, Yu.G. 1977a. Novii vid rody *Heteronychia* B.B. z Tyan'-Shanya (Sarcophagidae) <New species of the genus *Heteronychia* B.B. from the Tien Shan (Sarcophagidae) >. *Dopovidi Akademii Nauk Ukrain's'koi RSR, Seriya B, Geologichni, Khimichni ta Biologichni Nauki, Kiiiv* 1977, 266—267.
- Verves, Yu.G. 1977b. Novi vidi sarkofagid (Diptera; Sarcophagidae) z Kavkazy i Sereďn'oi Azii <New species of sarcophagid flies (Diptera: Sarcophagidae) from the Caucasus and Middle Asia >. *Dopovidi Akademii Nauk Ukrain's'koi RSR, Seriya B, Geologichni, Khimichni ta Biologichni Nauki, Kiiiv* 1977, 351—354.
- Verves, Yu.G. 1978a. Vertikal'no-zonal'nii rozpodil sarkofagid Krymy (Diptera, Sarcophagidae). *Visnik Kiiivs'kogo Universitetu, Biologiya* 20, 93—96.
- Verves, Yu.G. 1978b. Novýe i maloizvestnyé Sarcophagidae (Diptera) Sibiri i Dal'nego Vostoka <New and little-known species of Sarcophagidae from Siberia and Far East >. *Taksonomiya i ekologiya chlenistonogikh Sibiri (Novýe i maloizvestnyé vidy fauny Sibiri), Novosibirsk* 1978, 184—187.
- Verves, Yu.G. 1978c. Sarkofagidi (Diptera, Sarcophagidae) z basenu Indigirki <Sarcophagid flies (Diptera, Sarcophagidae) from the Indigirka basin >. *Dopovidi Akademii Nauk Ukrain's'koi RSR, Seriya B, Geologichni, Khimichni ta Biologichni Nauki, Kiiiv* 1978, 180—182.
- Verves, Yu.G. 1978d. K faune Sarcophaginae (Sarcophagidae, Diptera) Kavkaza. *Nauchnye Doklady Vysshei Shkoly, Biologicheskie Nauki* 1978, 36—45.
- Verves, Yu.G. 1979a. Palearkticheskie vidy podroda *Spatulapica* Fan roda *Heteronychia* (Diptera, Sar-

- cophagidae) < Palearctic species of the subgenus *Spatulapica* Fan of the genus *Heteronychia* (Diptera, Sarcophagidae) >. *Zool. Zh.* 58, 860—870.
- Verves, Yu.G. 1979b. Description of *Paramacronychia hackmani* sp.n. (Diptera, Sarcophagidae, Paramacronychiinae). *Ann. ent. fenn.* 45, 31—32.
- Verves, Yu.G. 1979c. Nový vid sarkofagid — *Robineauella kopetdaghica* sp.n. (Diptera, Sarcophagidae). *Trudy vsesoyuznogo éntomologicheskogo obshchestva* 61, 213—215. (Akademiya Nauk SSSR).
- Verves, Yu.G. 1979d. Obzor dvukrýlýkh podsem. Miltogrammatinae (Diptera, Sarcophagidae) fauny Shri Lanka < A review of the subfamily Miltogrammatinae (Diptera, Sarcophagidae) of Sri Lanka >. *Ent. obozr.* 58, 883—897.
- Verves, Yu.G. 1979e. Dva novikh roda Miltogrammatinae (Sarcophagidae, Diptera) z Ukraini i Turkmenii < Two new genera of Miltogrammatinae (Sarcophagidae, Diptera) from the Ukraine and Turkmenia >. *Dopovidi Akademii Nauk Ukrain'skoi RSR, Seriya B, Geologichni, Khimichni ta Biologichni Nauki, Kiev* 1978, 638—642.
- Verves, Yu.G. 1980a. Sôv Sarcophagidae (Diptera) from Afghanistan. *Fol. ent. hung.* 41, 355—357.
- Verves, Yu.G. 1980b. Novýe i maloizvestnyé vidy roda *Blaesoxipha* Löw, 1861 (Sarcophagidae, Diptera) iz Sibiri i Dal'nego Vostoka < New and little-known species of the genus *Blaesoxipha* Löw, 1861 (Sarcophagidae, Diptera) from Siberia and the Far East >. *Sistematika i ékologiya zhivotnykh (Novýe i maloizvestnyé vidy fauny Sibiri)* 1980, 137—145. (Akademiya Nauk SSSR, Sibirskoe otdelenie, Novosibirsk)
- Verves, Yu.G. 1980c. Sostav podsemeistva Paramacronychiinae (Diptera, Sarcophagidae) Starogo Sveta < The composition of the subfamily Paramacronychiinae (Diptera, Sarcophagidae) of the Old World >. *Zool. Zh.* 59, 1476—1482.
- Verves, Yu.G. 1980d. Karta 70 *Wohlfahrtia meigeni* (Schiner, 1862), Karta 71 *Sarcophaga carnaria* (Linnaeus, 1758), Karta 72 *Sarcophaga lehmanni* Müller, 1922. — In: Gorodkov, K.B. (ed.), *Arealy nasekomykh evropeiskoi chasti SSSR, Atlas. Kartý xx—xx*. < Provisional atlas of insects of the european part of the U.S.S.R. >. Akademiya Nauk SSSR, Zoologicheskii Institut, Leningrad.
- Verves, Yu.G. 1980e. Novýe i maloizvestnyé dvukrýlyé podsemeistv Miltogrammatinae i Macronychiinae (Diptera, Sarcophagidae) iz aziatskoi chasti SSSR < New and little known flies of the subfamilies Miltogrammatinae and Macronychiinae (Diptera, Sarcophagidae) from the asiatic part of the USSR >. *Ent. obozr.* 59, 914—924.
- Verves, Yu.G. 1980f. Taksonomicheskie zametki o nekotorykh sarkofagidakh (Diptera, Sarcophagidae). *Vestnik zoologii* 1980, 26—31.
- Verves, Yu.G. 1981a. Sarcophagidae (Diptera) from Korea. *Folia ent. hung.* 42, 197—210.
- Verves, Yu.G. 1981b. Karta 122 *Ravinia striata* (Fabricius, 1794), Karta 123 *Sarcophaga schulzi* Müller, 1922, Karta 124 *Sarcophaga subvicina* Rohdendorf, 1937. — In: Gorodkov, K.B. (ed.), *Arealy nasekomykh evropeiskoi chasti SSSR, Atlas. Kartý xx—xx*. < Provisional atlas of insects of the european part of the U.S.S.R. >. Akademiya Nauk SSSR, Zoologicheskii Institut, Leningrad.
- Verves, Yu.G. 1982a. 64h. Sarcophaginae. — In: Lindner, E. (ed.), *Die Fliegen der palaarktischen Region*, Lieferung 327, pp. 235—296.
- Verves, Yu.G. 1982b. Karta 176 *Metopia argyrocephala* (Meigen, 1803), Karta 177 *Metopia campestris* (Fallén, 1820), Karta 178 *Bercaea cruentata* (Meigen, 1826). — In: Gorodkov, K.B. (ed.), *Arealy nasekomykh evropeiskoi chasti SSSR, Atlas. Kartý 126—178*. < Provisional atlas of insects of the european part of the U.S.S.R. > Akademiya Nauk SSSR, Zoologicheskii Institut, Leningrad.
- Verves, Yu.G. 1983. The American species of the genus *Macronychia* Rondani (Macronychiinae Sarcophagidae, Diptera). *Rev. brasil. Biol.* 43, 345—354.
- Verves, Yu.G. & Kuz'movich, L.G. 1979. Sarkofaginý (Diptera, Sarcophaginae) — parazity nazemnykh bryukhonogikh mollyuskov v Ternopol'skoi oblasti. *Vestnik zoologi* 1979, 16—21.
- Viktorov-Nabokov, O.B. & Verves, Yu.G. 1975. K izucheniyu mukh (Diptera: Calliphoridae, Sarcophagidae), parazitiruyushchikh v dozhdevykh chervyak (Oligochaeta, Lumbricidae). *Problemy pochvennoi zoologii (Vil'nyus)* 1975, 97—98.
- Wainwright, C.J. 1928. The British Tachinidae (Diptera). *Trans. ent. Soc. Lond.* 76, 139—254.
- Wainwright, C.J. 1932. The British Tachinidae (Diptera). First supplement. *Trans. ent. Soc. Lond.* 80, 405—424.
- Wainwright, C.J. 1940. The British Tachinidae (Diptera): Second supplement. *Trans. ent. Soc. Lond.* 90, 411—448.
- Zetterstedt, J.W. 1938. Sectio Tertia Diptera. Pp. 477—868, in his *Insecta Lapponica*, vi + 1140 pp. Lipsiae (= Leipzig), «1840».
- Zetterstedt, J.W. 1844. *Diptera Scandinaviae disposita et descripta*. 3, 895—1280.
- Zetterstedt, J.W. 1845. *Diptera Scandinaviae disposita et descripta*. 4, 1281—1738.
- Zetterstedt, J.W. 1855. *Diptera Scandinaviae disposita et descripta*. 12, 4547—4942.
- Zetterstedt, J.W. 1859. *Diptera Scandinaviae disposita et descripta*. 13, 4943—6190.
- Zhang, Mengyu 1982. A study of the larvae of some common sarcophagid flies from China. *Entomotaxonomia* 4, 93—106. (In Chinese with English summary).
- Zumpt, F. 1952. Remarks on the classification of the Ethiopian Sarcophaginae with descriptions of new species. *Proc. r. ent. Soc. Lond. (B)* 21 (1—2), 1—18.
- Zumpt, F. 1956. Calliphoridae (Diptera Cyclorrhapha) Part 1: Calliphorini and Chrysomyiini. *Exploration du Parc National Albert Mission G.F. de Witte (1933—1935) Fascicule* 87, 1—200.
- Zumpt, F. & Heinz, H.J. 1950. Studies in the sexual armature of Diptera. II. — A contribution to the study of the morphology and homology of the male terminalia of *Calliphora* and *Sarcophaga* (Dipt., Calliphoridae). *Entomologist's mon. Mag.* 86, 207—216.