

Additions to the Swiss fauna of blowflies with an analysis of the systematic position of *Calliphora stylifera* (Pokorny, 1889) including a description of the female (Diptera, Calliphoridae)

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Additions to the Swiss fauna of blowflies with an analysis of the systematic position of *Calliphora stylifera* (POKORNY, 1889) including a description of the female (Diptera, Calliphoridae)

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Records of 14 species of Calliphoridae new to the Swiss fauna are reported. These are *Bellardia bayeri* (JACENTKOVSKY, 1937), *B. pubicornis* (ZETTERSTEDT, 1838), *B. stricta* (VILLENEUVE, 1926), *Calliphora loewi* ENDERLEIN, 1903, *C. stelviana* (BRAUER & BERGENSTAMM, 1891), *C. stylifera* (POKORNY, 1889), *Onesia zumpti* SCHUMANN, 1964, *Chrysomya albiceps* (WIEDEMANN, 1819), *Protocalliphora falcozi* SÉGUY, 1928, *P. lii* FAN, 1965, *P. nuortevai* GRUNIN, 1972, *Lucilia ampullacea* VILLENEUVE, 1922, *L. richardsi* COLLIN, 1926, and *Angioneura acerba* (MEIGEN, 1838). The female of *C. stylifera* is described for the first time. Male genitalia are figured for *C. stylifera*, *P. falcozi* and *P. lii*, and female genitalia for *C. stylifera* and *O. zumpti*. A key is provided for European *Onesia* females. The most remarkable record is that of *P. lii*, previously known only from East Siberia, Mongolia and China. The systematic position of *C. stylifera* is analysed using PeeWee. It is concluded that it is the most primitive member of a taxon defined by strong, projecting lobes of the ST5 of the male.

Keywords: Calliphoridae, Switzerland, systematics, faunistics, description, *Calliphora stylifera*

INTRODUCTION

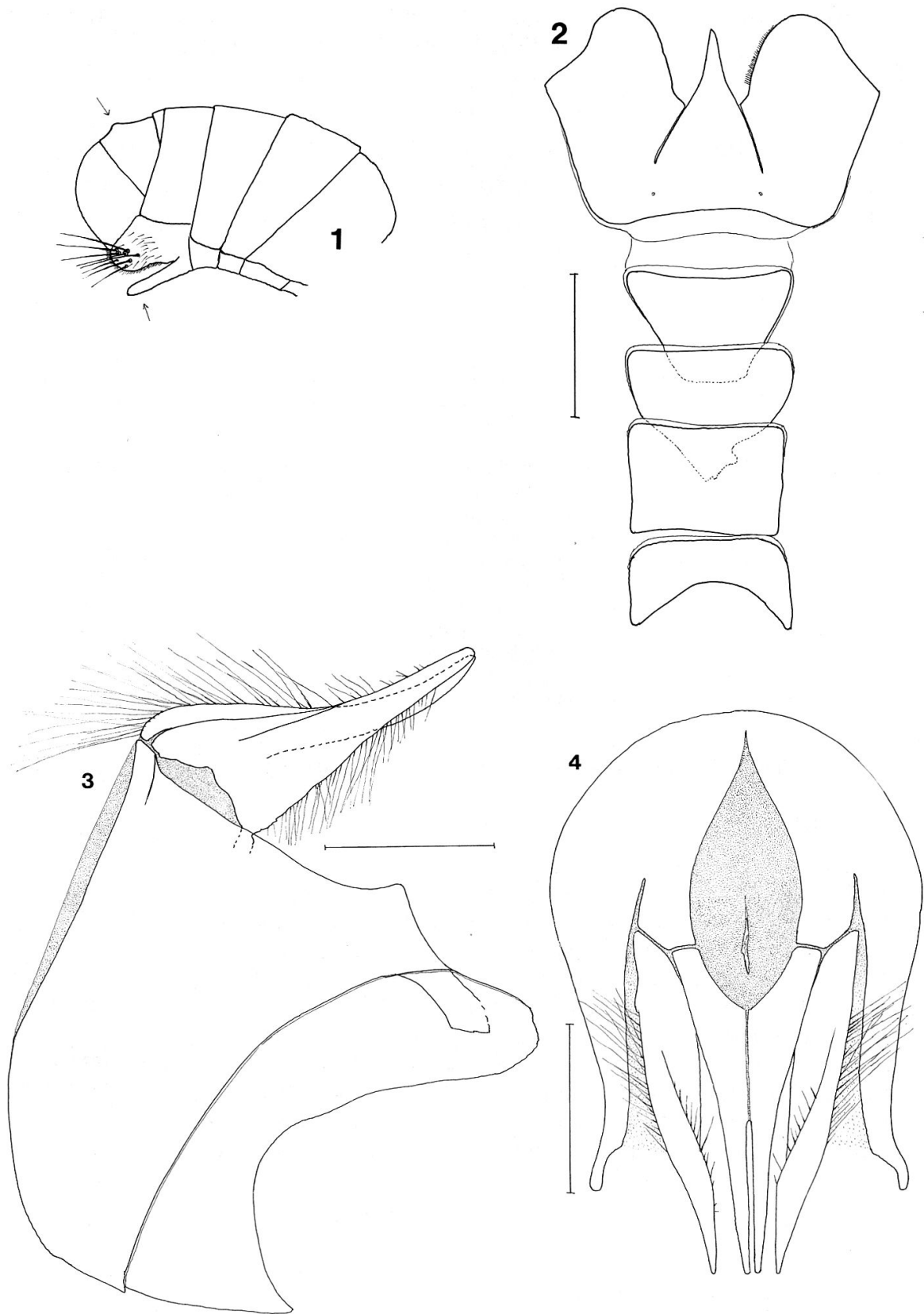
The present paper is a companion publication to my checklist of Swiss blowflies (ROGNES, 1997) and provides detailed faunistic records for blowfly species new to the Swiss fauna and which would not fit into the format of the check-list. That a species is new to the Swiss fauna means it has not hitherto been listed as occurring in Switzerland by AM STEIN (1855–56), RINGDAHL (1957), PEUS (1960), HERTING (1961, 1993), CUNY (1978), SCHUMANN (1986), MEIER & SAUTER (1989) or ROGNES (1991, or references cited there). The nomenclature follows ROGNES (1991). Depository abbreviations are as follows: BNMC – collection of the Bündner Naturmuseum, Chur; ETHZ – Entomologische Sammlung, Eidgenössische Technische Hochschule, Zürich; KR – author's private collection; CBM – private collection of B. MERZ, Zürich; CGB – private collection of G. BÄCHLI, Dietikon.

RESULTS

1. *Bellardia bayeri* (JACENTKOVSKY, 1937)

Zürich: Zürich-Allmend, 460 m, 1 ♂, 29 August 1994 (B. MERZ) (CBM)

This is a rare species known also from Norway, Denmark, Germany (East and West), Romania, Bulgaria, Russia, Armenia and Azerbaijan. Introduced in the USA (ROGNES, 1991).



Figs 1–4. *Calliphora stylifera* (POKORNY), ♂. – 1: Abdomen in right lateral view. Arrows point to mid-ventral process of ST5 (lower) and small middorsal bulge of the TST7+8 (upper). – 2: ST1–5. Scale = 1 mm. – 3: Epandrium, cerci and surstyli, left lateral view. Scale = 0.5 mm. – 4: Epandrium, cerci and surstyli, posterior view. Scale = 0.5 mm.

2. *Bellardia pubicornis* (ZETTERSTEDT, 1838)

Graubünden: Dischmatal, 7 ♂♂, 5 ♀♀, 30 May–24 July 1979 (B. WARTMANN) (CGB); do. 1 ♂, 1 ♀ (KR).

The species has a boreoalpine distribution in Europe. It is known from Austria and from subalpine and low alpine regions of Northern Europe, i.e. Scotland, Norway, Sweden, North Finland and Kola Peninsula (ROGNES, 1991).

3. *Bellardia stricta* (VILLENEUVE, 1926)

Bern: Brünig, 1 ♀, 30 June 1919 (ESCHER-KÜNDIG, no. 16803) (ETHZ). Graubünden: Lenzerheide, 1 ♀, 29 July 1994 (G. BÄCHLI) (CGB).

Both specimens have the lower calypter hairy above, and the cell R₅ in the wing open, which both distinguish it from *B. polita* MIK, and the abdomen shiny greenish metallic. Widespread in the Palaearctic Region (SCHUMANN, 1986; ROGNES, 1991).

4. *Calliphora loewi* ENDERLEIN, 1903

Graubünden: Alp Durnang (near Andeer), 1 ♀, 7 September 1913 (ESCHER-KÜNDIG, no. 15528) (ETHZ); v. d. Fuorn, La Drosa, 2200 m, 1 ♀, 22 July 1928 (F. KEISER, no. 3785) (BNMC); Landquart, 1 ♂, 18 August 1980 (H. ARTER) (CGB); Samedan: Wald, 1720 m, 1 ♂, 16 July 1986 (W. SAUTER) (ETHZ); Valbella / Casoja, 1510 m, 1 ♂, 18 July 1996 (B. MERZ) (CBM).

Widespread in the Palaearctic Region. Also in the West and East Nearctic Region (ROGNES, 1991).

5. *Calliphora stelviana* (BRAUER & BERGENSTAMM, 1891)

Graubünden: Alp Buffalora, 2200 m, 1 ♀, 19 July 1928 (F. KEISER, no. 3391) (BNMC)

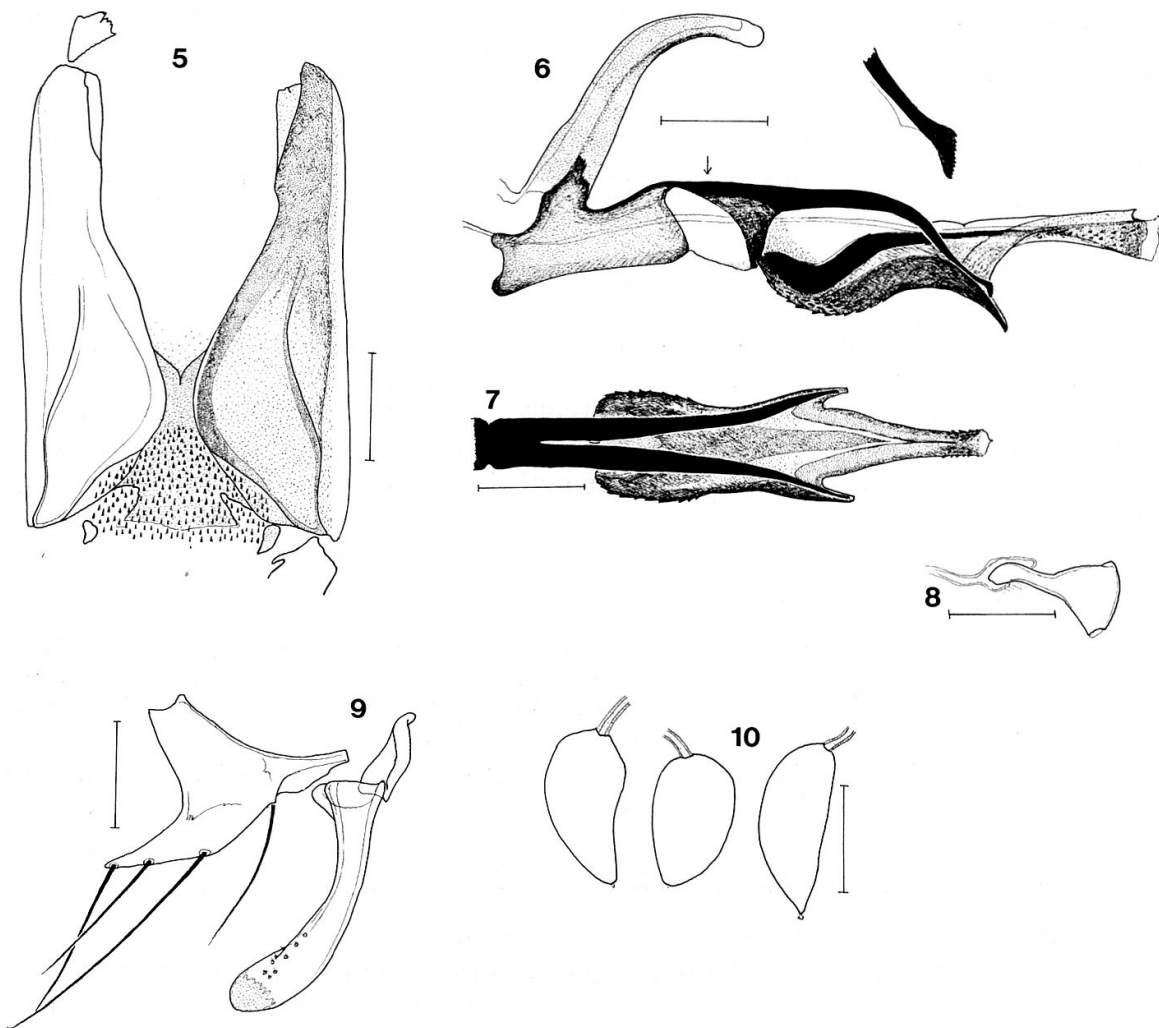
Widespread in arctic and alpine regions of the Holarctic (ROGNES, 1991).

6. *Calliphora styliфера* (POKORNY, 1889) (Figs 1–13)

Graubünden: Munt La Schera, 2350–2580 m, 1 ♂, 17 July 1928 (F. KEISER, no. 1871) (dissected and figured); do., 2200–2400 m, 1 ♂, 31 July 1931 (F. KEISER, no. 4132) (both BNMC); Ftan / Clünas, 2200 m, 1 ♀, 5 August 1996 (MERZ & BÄCHLI) (dissected and figured, spermathecae in glycerol in vial, ovipositor on slide G. pr. 353) (CBM).

Identification. Specimens run to *C. stelviana* in my key (ROGNES, 1991), but both sexes differ from *C. stelviana* by having the fore tibia with a single pv only; by having a rather less dusted abdomen; and by the presence on T3 of a complete row of strong long marginal setae which are longer than T4, and equally strong at midline as at sides. The males have a shining, bare midventral and strong stylus, projecting posteroventrally from basal part of ST5; the TST7+8, as seen in strict lateral view, has a small dorsal bulge in hind third (in this region the TST7+8 of *C. subalpina* is convex all over and that of *C. stelviana* quite straight, in profile view). The female, previously unknown, differs externally from *C. stelviana* also by absence of comb of very strong densely set setae on posterior edge of T5, and by absence of middorsal cleft of weak sclerotization reaching far forwards from the hind edge of T5; rather, the hind edge of T5 is completely and strongly sclerotized and slightly upturned in profile view.

Description. Body black, except for lower facial margin, facial ridges and anterior extremity of interfrontal stripe which are reddish. Calypters white. 1 inner post-humeral seta. Arista with long hairs.



Figs 5–10. *Calliphora stylifera* (POKORNY). – 5: Bacilliform sclerites and vestiture on membrane between them. – 6: Aedeagus, left lateral view. Inset: tip of paraphallus (enlarged). – 7: Distiphallus, dorsal view. – 8: Ejaculatory sclerite. – 9: Left pre- and postgonites. (Note that the right pregonite of the figured specimen has four distal setae apart from the basal one). – 10: Spermathecae. G. pr. 353. Scales = 0.2 mm.

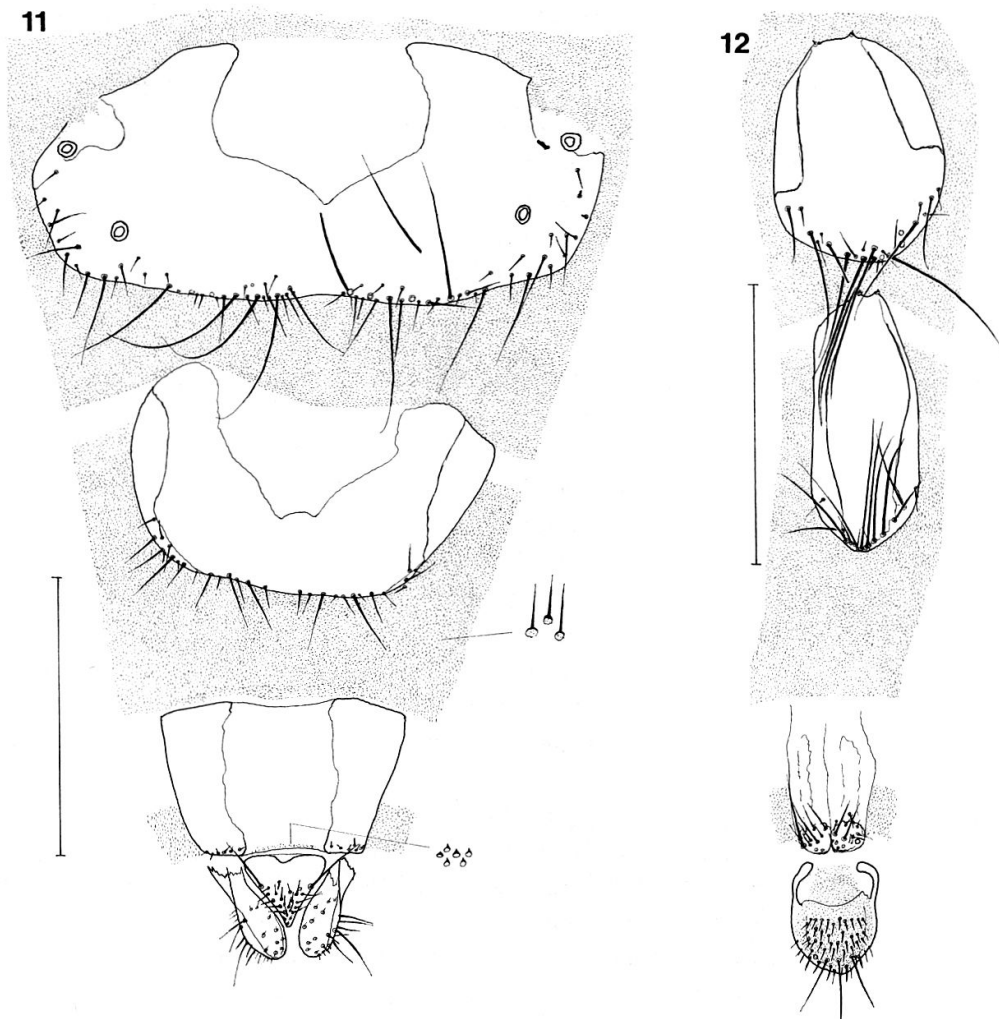
Male. Frons broad, but without prevertical laterocline seta, 0.228 times head width (in both specimens). Internal leaf-like apophyses present on ST3 and ST4. ST2, ST3 and ST4 lack alpha-setae. A pair of alpha-setae is present on ST5. ST5 with strongly projecting lobes. 5–6 strong setae present distally on the lobes. T6 present, with strong setae. TST7+8 middorsally with a small dorsal bulge in hind third as seen in strict lateral view. TST7+8 shining and without dusting except for a small band of dense white dusting behind bulge along posterior edge. Epanthrium very weakly and evenly dusted. TST7+8 extremely widened internally around articulation on left side, the broad plate serving as muscle attachments. Cerci and surstyli curved backwards. Bacilliform sclerites fused basally, very stout and strong. Base of epiphallus rather long, projecting from proximal half of basiphallus. Distiphallus very similar to the one in *C. vicina*. Pregonite with 3–4 distal setae and a strong seta close to base posteriorly. Postgonite without seta, slightly expanded distally. Posterior arms of hypandrium long, stout and separate,

anterior part of hypandrium with stout vertical flanges. Phallapodeme stout and with vertical flanges.

Female. Frons broader than an eye in dorsal view, 0.397 times head width. Parafacial broad with dense greyish-golden to brownish dusting. Occiput with black setae except for a small area midventrally where the vestiture is white. Long hairs on arista, longest above. Calypters white, lower rather short. Basal humeral setae on a broken line, in corners of right-angled triangle. 1 inner posthumeral seta. Undusted vitta between presutural acrostichal setae incomplete and narrow, not reaching setal bases. 4 pairs of marginal scutellar setae. Basicosta black and costal spine of moderate size. Front tibia with a single pv seta; mid tibia with 2–3 ad and a single v seta; hind tibia with 1–3 av setae. Most of abdomen dusted in shifting pattern. T3 with complete row of strong marginal setae. T3 much longer than T4. T5 slightly shorter than T4, pointed posteriorly. Posterior half of T5 brilliantly shining without dusting, anterior half thinly dusted in shifting pattern. Posterior edge of T5 entire, no indications whatever of incision of weak sclerotisation, and slightly upturned. No comb of strong setae along hind edge of T5. Ground setulae semierect on T3, erect on T4, and erect and intermingled with discal setae on T5. Spermathecae longish. Ovipositor sclerites without microtrichiae, except for the hypoproct. T6 and T7 both with characteristic large weakly sclerotized areas anteriorly. ST8 very weakly sclerotized, with two distal lobes, apparently also divided more proximally, but this is very difficult to make out. Epiproct, cerci and hypoproct as in most *Calliphora* species.

Distribution. *C. stylifera* is apparently a rare species, endemic to a small area in the Alps. The type material from Stelvio Pass in Italy (4 male syntypes in Budapest Natural History Museum according to ZUMPT [1956] who examined them) were apparently lost during a great fire in that museum in 1956 (Laszlo PAPP in litt. 18 February 1993). ZUMPT (1956) mentions two further males in the Budapest museum identified by POKORNY but without type labels. These were apparently lost at the same time. There are 5 male specimens (not types) in Vienna museum also identified by POKORNY which I have examined. STEIN (1924) reports to have a male from Trafoi (Italy – a little east of Stelvio Pass) (not seen).

Systematic position. *C. stylifera* presents a puzzling suite of characters. The calypters are white, the humeral setae situated on a strongly broken line and the ST5 have large projecting lobes, all features shared with e.g. *C. stelviana* and *C. subalpina*. A double ST8 in the female is a trait also shared with *C. stelviana*. In contrast, the aedeagus and the pregonite is similar to those in *C. vicina*, the epiphallus is placed basally on the basiphallus, and the cerci and surstyli have normal, not stiff, setae. To analyse its systematic position the data file shown in the Appendix was run with the parsimony program PeeWee (GOLOBOFF, 1993, 1996) which uses an implicit weighting scheme. The file contains the data matrix, character names and character state names for several *Calliphora* species and for the genera *Bellardia* and *Onesia*, and includes various tree search and diagnosing commands. A single tree was obtained (Fig. 13). The unambiguous synapomorphies supporting the various nodes are listed in Tab. 1, and the steps, extra steps, and implied weights in Tab. 2. According to this tree, *C. stylifera* is the most primitive member of a clade (node 21) defined by strongly projecting lobes of the ST5 in the male and composed of seven species. This group was first suggested by SCHUMANN & OZEROV (1992), although they included *C. stylifera* with some hesitation. The sister-group of *C. stylifera* appears to be a clade (node 20) defined by stiff vestiture on the cerci and surstyli in the male and a distal insertion of the epiphallus on the distiphallus. This



Figs 11–12. *Calliphora stylifera* (POKORNY), ♀. – 11: Ovipositor, dorsal sclerites. Stipple indicates extent of microtrichiae. Insets: shape of individual microtrichiae in areas indicated. G. pr. 353. – 12: *Calliphora stylifera* (POKORNY), ♀. Ovipositor, ventral sclerites. Stipple indicates extent of microtrichiae. G. pr. 353. Scales = 1 mm.

clade was first proposed by ROGNES (1991: 75). Dark calypters appear to have formed independently in *C. grunini* and in clades no. 25 and 17. The group composed of *C. stelviana* and *C. chinghaiensis* which I proposed earlier (ROGNES, 1991: 75) on the basis of the pregonite shape (character 9, state 2) and the aedeagus type (character 0, state 4) is absent from the tree. This is due to the fact that all characters are treated as unordered, which makes the optimization of node 20 ambiguous for these two characters.

7. *Onesia zumpti* SCHUMANN, 1964 (Figs 14–16)

Aargau / Zürich: Lägern, 1 ♀, 9 July 1975 (R. CUNY, on *Aegopodium* sp.) (dissected; T1–5 glued to card on pin; 70 first instar larvae in vial on separate pin; spermathecae and the part of uterus adjoining the spermathecal ducts in second vial; ST1–5 and ovipositor on slide G. pr. 352); Aargau / Zürich: Lägern, E Burgenwiese, 1 ♀, 6 July 1975 (R. CUNY) (both ETHZ).

The specimens have been reported as “*Onesia austriaca*” by CUNY (1978: 381). The females of the genus *Onesia* have been very difficult to identify with certainty

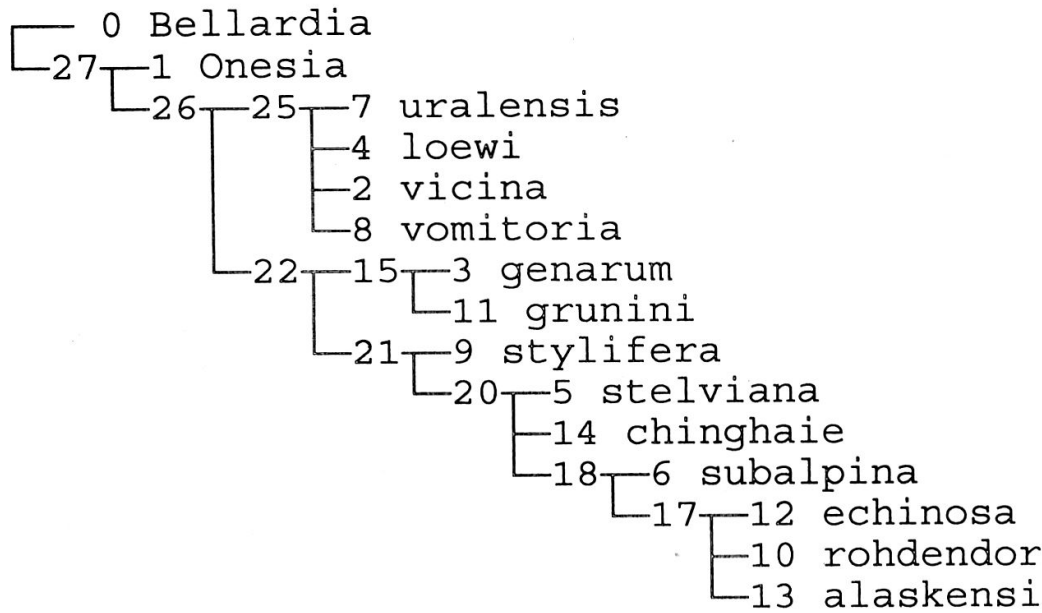


Fig. 13. Tree output by PeeWee, showing systematic position of *Calliphora stylifera* (Pokorny). See text for explanation. Taxon labels: *Bellardia* = *Bellardia* ROBINEAU-DESVOIDY, 1863; *Onesia* = *Onesia* ROBINEAU-DESVOIDY, 1830; *uralensis* = *Calliphora uralensis* VILLENEUVE, 1922; *loewi* = *C. loewi* ENDERLEIN, 1903; *vicina* = *Calliphora vicina* ROBINEAU-DESVOIDY, 1830; *vomitoria* = *C. vomitoria* (LINNAEUS, 1758); *genarum* = *C. genarum* (ZETTERSTEDT, 1838); *grunini* = *C. grunini* SCHUMANN & OZEROV, 1992; *stylifera* = *C. stylifera* (POKORNY, 1889); *stelviana* = *C. stelviana* (BRAUER & BERGENSTAMM, 1891); *chinghaie* = *C. chinghaiensis* VAN & MA, 1978; *subalpina* = *C. subalpina* (RINGDAHL, 1931); *echinosa* = *C. echinosa* GRUNIN 1970; *rohdendor* = *C. rohdendorfi* (GRUNIN, 1966); *alaskensi* = *C. alaskensis* (SHANNON, 1923). Total fit of tree 86,0 (74%); length: 27 informative + 2 uninformative steps.

in the past. Most external characters are unreliable, and detailed figures of the ovipositors have only become available very recently and only for some of the species. SCHUMANN (1964) published figures of the female abdominal sternites ST2–8, ROGNES (1991) figured the ovipositor and spermethecae of the common species *Onesia floralis* (= *sepulcralis*) and, finally, RUDZINSKI (1992) made public drawings of the ovipositor of *O. austriaca* VILLENEUVE and *O. kowarzi* VILLENEUVE. Here I publish drawings of the ovipositor of *O. zumpti* SCHUMANN, enabling this species to be identified safely (Figs. 14–16). At present only the ovipositor of the very rare *O. canescens* VILLENEUVE, 1926 from France remains to be described from Europe.

O. floralis is the only species which usually lacks a presutural intra-alar seta, but it is occasionally present on both or one side. On external characters the female (but not the male) of *O. zumpti* is recognizable on the single middorsal broad dark undusted vittae encompassing the bases of the presutural acrostichal setae (seen tangentially from behind). In this region the other *Onesia* species usually have a pattern of three vittae in the female, a single medial one on which stand the acrostichal setae, and a narrower one on each side (MIHALYI, 1979: 15, fig. 10 B). In my experience this character does not always work, so great care should be exercised.

In the ovipositor of *O. zumpti* T6, T7, ST6–8, epiproct, hypoproct and cerci are covered by microtrichiae, but T8 is not. T6 is very broad (long in the antero-

Tab. 1. Unambiguous synapomorphies defining clades on tree in Fig. 13.

Clade	Character (#)	State change
<i>C. rohdendorfi</i>	aedeagus (0)	<i>alaskensis</i> -type → <i>rohdendorfi</i> -type
<i>C. grunini</i>	lower calypter (3)	white → dark
Node 15	aedeagus (0)	<i>vicina</i> -type → <i>genarum</i> -type
Node 17	lower calypter (3)	white → dark
Node 18	inner posthumeral (2)	one → two
Node 20	cerci, surstyli vestiture (6)	normal → stiff
	epiphallallic insertion (8)	basal → distal
Node 21	lobes of ST5 in male (5)	normal → large and strongly projecting
Node 22	humeral setae (1)	on gently curved line → in corners of right-angled triangle
	inner posthumeral (2)	two → one
Node 25	lower calypter (3)	white → dark
Node 26	ST8 of ovipositor (10)	two distal lobes only → single rod with bifid apex

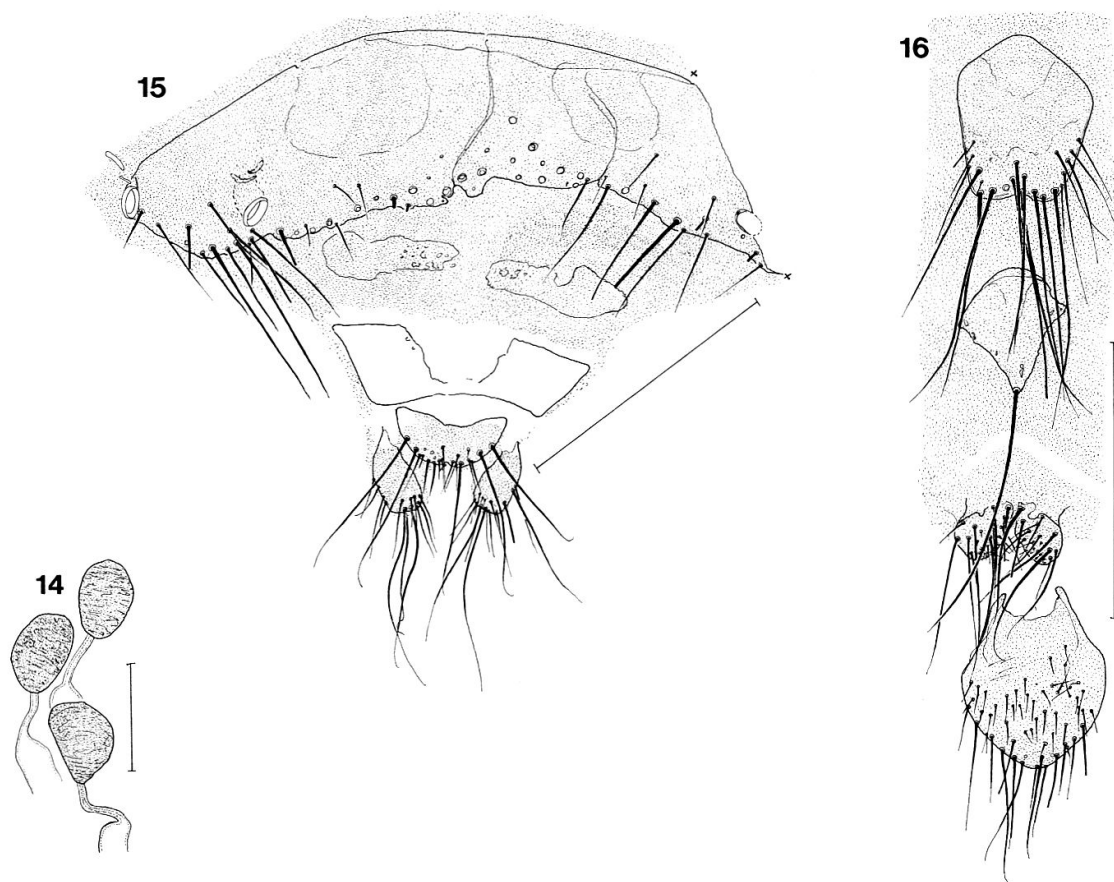
Tab. 2. Steps, extra steps (ESo: within terminals, ESi: within tree), and implied weight (fit) for characters on tree in Fig. 13 (conc = 3). Total fit for the tree = 86.0 (74 %).

Character	ESo	Steps (ESi)	Implied weight
0 aedeagus type	0	7 (0)	10.0
1 position of humeral setae	0	2 (1)	7.5
2 number of inner posthumeral	0	2 (1)	7.5
3 colour of lower calypter	0	3 (2)	6.0
4 number of fore tibial setae	1	2 (0)	(not informative)
5 lobes of male ST5	0	1 (0)	10.0
6 vestiture on cerci and surstyli	0	1 (0)	10.0
7 degree of fusion of bacilliform sclerites	0	3 (1)	7.5
8 insertion of epiphallus on basiphallus	0	1 (0)	10.0
9 shape of pregonite	0	4 (0)	10.0
10 shape of ST8 in ovipositor	0	3 (1)	7.5

posterior direction) compared to the other tergites, and divided or undivided in the middle. It has numerous long strong setae along the whole hind margin. T7 is weakly and irregularly sclerotized, with or without setae. T8 square and with or without setae. ST6 is slightly longer than broad. ST7 is posteriorly diffusely sclerotised (sometimes appearing triangular and pointed) and carrying only a single seta or no setae along margin. ST8 is formed as two wart-like lobes without a basal sclerotisation carrying the warts. The female of the European *Onesia* species can be separated by the following key in consultation with published figures.

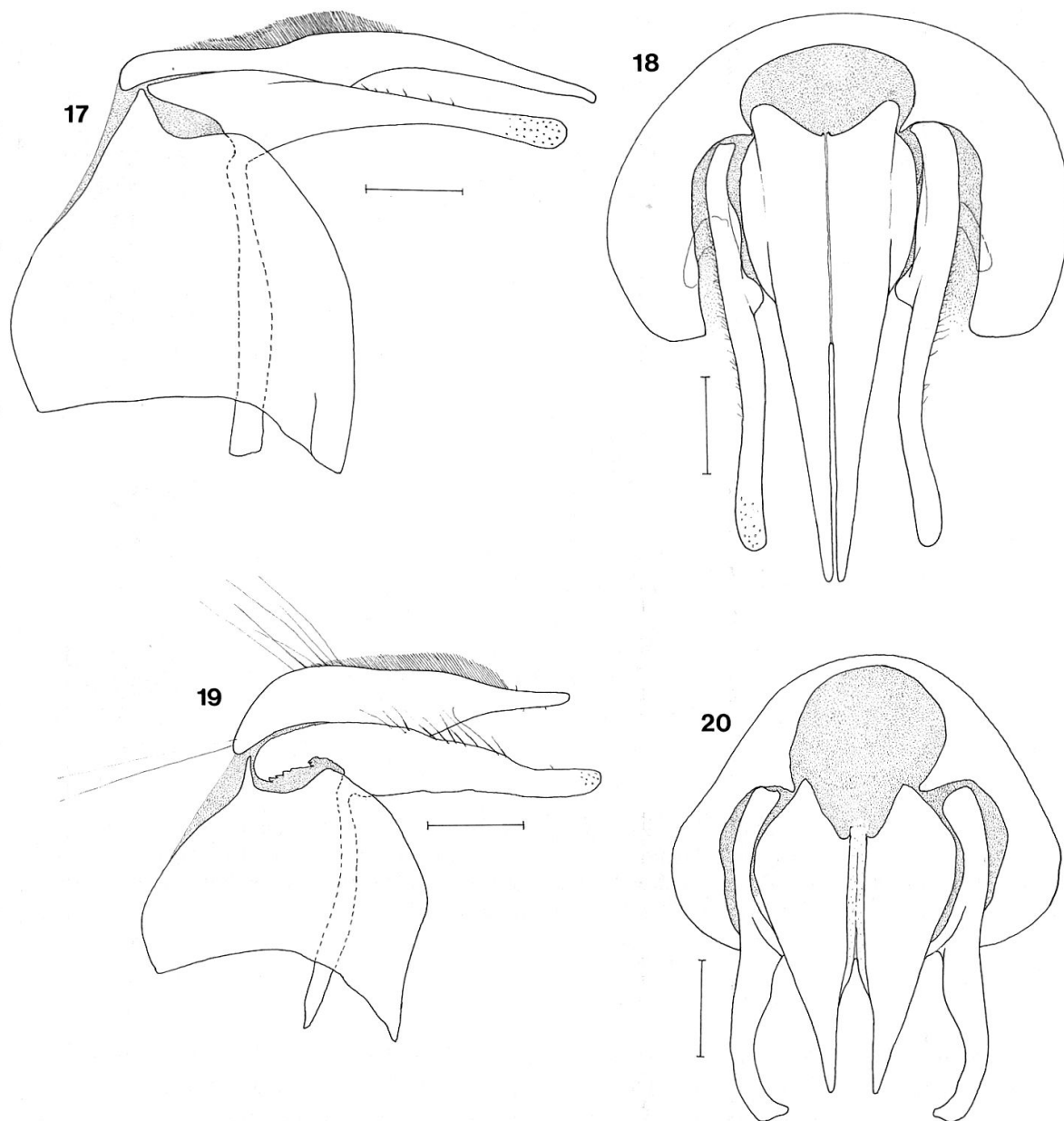
Key to females of European *Onesia* species (except *O. canescens*)

- 1 ST8 undivided, a single broad sclerite without lobes *O. floralis*
 – ST8 ending posteriorly in two small wart-like lobes 2



Figs 14–16. *Onesia zumpti* SCHUMANN, ♀. – 14: Spermathecae. Scale = 0.2 mm. G. pr. 352. – 15: Ovipositor, dorsal sclerites. Stipple indicates extent of microtrichiae. A small part of T6 (between the crosses) was lost during dissection. Scale = 1 mm. G. pr. 352. – 16: Ovipositor, ventral sclerites. Stipple indicates extent of microtrichiae. Scale = 1 mm. G. pr. 352.

- 2 ST8 with a proximal sclerotisation in front of the wart-like lobes, about as long as the lobes, proximal part lacking setae; T6 a narrow transverse band, shorter in antero-posterior direction than T8; T8 well sclerotized, more or less square, rather large, without microtrichiae, but usually with marginal setae *O. austriaca*
- ST8 without a proximal sclerotisation uniting the two wart-like lobes, setae all over the lobes; T6 rather long anteroposteriorly, like a broad transverse band across ovipositor, longer in antero-posterior direction than T8; T7 diffusely sclerotised 3
- 3 T6 as long in middle as at sides, narrowly divided or not divided at midline; ST7 diffusely sclerotised posteriorly, with a single or without marginal setae, sometimes with a posteriorly pointed triangular appearance; T8 well sclerotised, square, without microtrichiae, with or without marginal setae, each half larger than each half of the epiproct *O. zumpti*
- T6 narrower in midline than laterally; ST7 broader than long, with a distinct broad posterior edge carrying several setae; T8 very small, completely covered with microtrichiae and reduced to two small lateral sclerites, each smaller than each half of the epiproct *O. kowarzi*



Figs. 17–20. – 17: *Protocalliphora falcozi* SÉGUY, ♂. Epandrium, cerci, surstyli and bacilliform sclerites, left lateral view. – 18: *id.*, Epandrium, cerci and surstyli, posterior view. – 19: *Protocalliphora lii* FAN, ♂. Epandrium, cerci, surstyli and bacilliform sclerites, left lateral view. – 20: *id.*, Epandrium, cerci and surstyli, posterior view. Scales = 0.2 mm.

O. zumpti is a central European species known also from Austria, former Czechoslovakia, Germany and Hungary (SCHUMANN, 1986).

8. *Chrysomya albiceps* (WIEDEMANN, 1819)

Zürich: Zürich, 1 ♀, October 1995 (K. DORN) (CBM). The specimen was captured on a dead human body within an apartment.

This is a tropical and subtropical species, extending into the Mediterranean basin and occasionally reaching central Europe.

9. *Protocalliphora falcozi* SÉGUY, 1928 (Figs 17–18)

Bern: Burgdorf, 1 ♂, 28 March 1873 (MEYER-DÜR) (dissected and figured; genitalia in glycerol in vial, T1–5 glued to card on pin); Aargau / Zürich: Lägern, Eigi, 1 ♀, 25 June 1975 (R. CUNY, on “*Anthriscus*”) (both ETHZ).

The male specimen had been misidentified as “*Protocalliphora chrysorrhoea*”, but dissection of the genitalia revealed it to be a male *P. falcozi*. It has a Y-shaped lunula, a single posteroventral seta on both front tibiae (situated just above distal third or fourth), 3 anterodorsal setae on both mid tibiae (lowermost seta lost on the left one but its basal pore visible), pure white calypters, a brownish basicosta and a bright blue abdomen. The frons width measures 0.110 times head width. The male genitalia have been excellently figured by GREGOR & POVOLNY (1959) and PEUS (1960). Noteworthy are the narrow and long cerci and the long, narrow distally slightly widened surstyli which in dorsal view bend gradually outwards from the midline in the distal half.

The female specimen is one of three specimens in ETHZ all misidentified and published as “*Phormia regina*” by CUNY (1976). The remaining two specimens are both *Protocalliphora azurea* FALLÉN, 1817 (a male and a female). The *P. falcozi* specimen is not teneral and has non-corrugated shining silvery dusted parafacialia, a reddish antennal pedicel, a shiny undusted black spot on each side of the vertex, a Y-shaped lunula, a single posteroventral seta on both front tibiae (situated just above distal third or fourth), 4 anterodorsal setae on both mid tibiae, a blue and strongly dusted mesonotum, pure white calypters, a brownish basicosta and a bright blue abdomen. The frons at narrowest measures 0.23 times head width.

This bird blowfly is widely distributed in Europe and reported from Austria, the former Czechoslovakia, the former West Germany, France, Greece, Italy, Poland, Romania, the former Yugoslavia, and south and central European parts of the former Soviet Union by SCHUMANN (1986). It does not occur in Fennoscandia and Denmark (ROGNES, 1991). The following hosts were reported by GREGOR & POVOLNY (1959): *Parus major*, *Phoenicurus phoenicurus* and *Muscicapa albicollis*. I have personally identified material from France (including Corsica) bred from nest-boxes occupied by *Parus caeruleus*.

10. *Protocalliphora lii* FAN, 1965 (Figs 19–20)

Syn: *Protocalliphora kaszabi* GRUNIN, 1971 (according to GRUNIN, 1975: 625)

Wallis: Bérival, 1 ♂, 12 July 1917 (ESCHER-KÜNDIG, no. 16229) (dissected and figured; genitalia in glycerol in vial, T1–5 glued to card on pin) (ETHZ).

The specimen is not teneral and has non-corrugated, greyish dusted parafacialia with rather long black vestiture, a reddish antennal pedicel, a reddish vibrissal corner, a Y-shaped lunula, two posteroventral setae on both front tibiae, 3 anterodorsal setae on both mid tibiae (a scar for an additional seta on one of them), a blue and strongly dusted mesonotum, white calypters, a brown basicosta and a bright blue abdomen. The frons at narrowest is about three times broader than distance between posterior ocelli inclusive, 0.180 times head width, thus very broad for a *Protocalliphora* male. The specimen has been dissected and the genitalia conform very well to the figures of GRUNIN (1971) and FAN (1992: 549, figs. 1125n, 1125r). The cerci are distinctive in having quite well separated apices. Thus a rather broad cleft is formed reaching from apex to about middle. The surstyli are longer than the cerci, curved inwards apically in dorsal view, and in profile view are narrow in the distalmost third, as if dorsal parts are carved away. The setae along dorsal edge stop well behind tip giving the the apical third a smooth glossy appearance. At very high

magnification (>100x) the tip of the surstyli is seen to carry numerous very small sensory hairs (shown in one of FAN's figures).

This specimen will run to *P. peusi* in my key (1991), but it differs by having a still broader frons and distinctive genitalia.

The species is known from Russian East Siberia (Tuvinskaya ASSR), Mongolia and China (Inner Mongolia) (GRUNIN, 1971, 1975; FAN, 1992). The fact that it also occurs in Switzerland is quite remarkable and reflects the very incomplete knowledge of bird blowfly distribution in the Palaearctic Region.

11. *Protocalliphora nuortevai* GRUNIN, 1972

Graubünden: V. S-charl, 1900 m, 3 ♂♂, 2 August 1923 (F. KEISER, nos. 1766, 1772, 1806) (no. 1772 dissected); do., 1700–1800 m, 1 ♂, 30 July 1923 (F. KEISER, no. 1447); A Vaüglia S'vot, 1920 m, 1 ♂, 10 July 1929 (F. KEISER, no. 1249); V Tavrü, 1900–2000 m, 1 ♀, 18 August 1921 (F. KEISER, no. 5100) (all BNMC).

This is a distinctive species, especially in the female, which is easily identified on external features by the dark brown colour of both the parafacialia and fronto-orbital plates and on the deep ruga in the upper part of the parafacialia. Note that these records of *P. nuortevai* also are first records from the Alps. The species is known previously only from subalpine regions of Norway and Finland (ROGNES, 1991).

12. *Lucilia ampullacea* VILLENEUVE, 1922

Aargau / Zürich: Lägern, Mooshalde, 1 ♀, 4 July 1975 (R. CUNY); 1 ♂, 31 August 1975 (R. CUNY, on *Vitis vinifera*) (ETHZ); Zürich: Zürich-Waldgarten 450 m, 1 ♀, 19 August 1995 (B. MERZ) (CBM); Zürich: Dietikon-Hardwald 400 m, 1 ♀, (small and teneral) 15 May 1995 (B. MERZ) (CBM); Valais: Pfywald 1 ♂, 19 July – 7 August 1993 (G. BÄCHLI) (CGB)

A *Lucilia* species easily identified by absence of a coxopleural streak, black basicosta, a setose subcostal sclerite and a single row of black occipital setae behind the postocular row of cilia (remaining occipital setae white). CUNY's specimens were misidentified in the collection as "*L. illustris*".

Widespread in Palaearctic Region (SCHUMANN, 1986; ROGNES, 1991). Entering Oriental Region (JAMES, 1977), but absent from the Australasian Region (KURASHI, 1989).

13. *Lucilia richardsi* COLLIN, 1926

Zürich: Dietikon, 3 ♂♂, 22 July 1995 (G. BÄCHLI) (CGB).

Known from Europe, east to Georgia and Kazakhstan (ROGNES, 1991).

14. *Angioneura acerba* (MEIGEN, 1838)

Graubünden: Savognin, 1 ♂, 17–20 August 1988, (G. BÄCHLI) (CGB); Jura: Delémont, 1 ♀, 2.–6. August 1974 (G. BÄCHLI) (CGB).

Widespread in Europe (HERTING, 1961, 1993; ROGNES, 1991)

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REFERENCES

- AM STEIN, J.G. 1855–1856. VII. Bündner Dipteren. *Jahresb. naturf. Ges. Graubündens* 2: 89–111.
- CUNY, R. 1978. Muscidae und Calliphoridae (Insecta: Diptera) der Lägern (Schweiz: Jura). *Mitt. schweiz. ent. Ges.* 51: 377–394.
- FAN, Z. 1992. *Key to the common flies of China*. Second edition. Shanghai Institute of Entomology. 992 pp., 40 plates.
- GOLOBOFF, P.A. 1993. Estimating character weights during tree search. *Cladistics* 9: 83–91.
- GOLOBOFF, P.A. 1996. *PeeWee (Ver. 2.50) (August 10, 1996)*. Computer program and manual distributed by the author.
- GREGOR, F. & POVOLNY, D. 1959. Kritischer Beitrag zur Kenntnis der Tribus Phormiini (Diptera, Calliphoridae). *Cas. čsl. Spol. ent.* 56: 26–51.
- GRUNIN, K.Ya. 1971. Ergebnisse der zoologischen Forschungen von Dr. Z. KASZAB in der Mongolei. 277. Calliphoridae (Diptera) II. *Acta zool. Acad. scient. hung.* 17: 255–259.
- GRUNIN, K.Ya. 1975. Gasterophilidae, Calliphoridae, Oestridae, Hypodermatidae (Diptera) of the Soviet-Mongolian expedition, 1969–1971. *Nasekomye Mongolii* 3: 620–627.
- HERTING, B. 1961. 64e. Rhinophorinae. In: LINDNER, E. (ed.), *Fliegen palaearkt. Reg.* 9: 1–36.
- HERTING, B. 1993. Family Rhinophoridae. In: SOÓS, Á. & PAPP, L. (eds), *Catalogue of Palaearctic Diptera, 13, Anthomyiidae – Tachinidae*, pp. 102–117. Budapest. 624 pp.
- JAMES, M. 1977. Family Calliphoridae. In: DELFINADO, M.D. & HARDY, D.E. (eds.), *A catalog of the Diptera of the Oriental region. Volume III Suborder Cyclorrhapha (excluding Division Aschiza)*, pp. 526–556. Honolulu, x + 854 pp.
- KURAHASHI, H. 1989. 109. Family Calliphoridae. In: EVENHUIS, N. L. (ed.), *Catalog of the Diptera of the Australasian and Oceanian Regions*, pp. 702–718. Bishop Museum Special Publications 86. Bishop Museum Press and E. J. Brill, 1155 pp.
- MEIER, C. & SAUTER, W. 1989. Zur Kenntnis der Insektenfauna eines Auenwaldreservates an der Aare bei Villnachern AG. *Mitt. Aarg. naturf. Ges.* 32: 217–258.
- MIHALYI, F. 1979. *Femeslegyek – Huslegeyek Calliphoridae – Sarcophagidae*. *Fauna Hungarica* 135, 152 pp.
- PEUS, F. 1960. Zur Kenntnis der ornithoparasitischen Phormiinen (Diptera, Calliphoridae). *Dt. ent. Z. (N.F.)* 7: 193–235. [Includes key to *Protocalliphora* species]
- RINGDAHL, O. 1957. Fliegenfunde aus den Alpen. *Ent.Tidskr.* 78: 115–134.
- ROGNES, K. 1991. Blowflies (Diptera, Calliphoridae) of Fennoscandia and Denmark. *Fauna ent. scand.* 24: 1–272, 685 figs, 1 plate. [Includes keys to adults]
- ROGNES, K. (1997). Calliphoridae. In: B. MERZ, J.–P. HAENNI, G. BÄCHLI & C. DUFOUR (eds.), *Checklist of the Diptera of Switzerland*. 1997. (in press).
- RUDZINSKI, H.-G. 1992. Zur Unterscheidung der Weibchen von *Onesia austriaca* VILLENEUVE 1920 und *Onesia kowarzi* VILLENEUVE 1920 (Diptera: Calliphoridae). *Entomol. Z. mit Insektenbörse* 102(5): 86–90.
- SCHUMANN, H. 1964. Revision der Gattung *Onesia* ROBINEAU-DESVOIDY, 1830 (Diptera: Calliphoridae). *Beitr. Ent.* 14: 915–938.
- SCHUMANN, H. 1986. Family Calliphoridae. In: SOÓS, Á. & PAPP, L. (eds.), *Catalogue of Palaearctic Diptera, 12, Calliphoridae – Sarcophagidae*, pp. 11–58. Budapest, 265 pp.
- SCHUMANN, H. & OZEROV, A.L. 1992. Zum systematischen Status von *Abago rohdendorfi* GRUNIN, 1966 (Diptera, Calliphoridae). *Dt. ent. Z. (N. F.)* 39 (1992): 403–408.
- STEIN, P. 1924. Die verbreitetsten Tachiniden Mitteleuropas nach ihren Gattungen und Arten. *Arch. Naturgesch.* 90(A)(6): 1–271.
- ZUMPT, F. 1956. 64i, Calliphorinae. In: LINDNER, E. (ed.), *Fliegen palaearkt. Reg.* 11: 1–140.

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APPENDIX

Data file used for analysis

```
xread
'File "call"'
11 15
Bellardia      00100      00003 2
Onesia        10100      00004 2
vicina        20110      00000 0
genarum       31000      00000 0
loewi        20110      00000 0
stelviana     41001      11212 1
subalpina     51100      11111 0
uralensis    20110      00000 0
vomitoria    20110      00000 0
stylifera    21000      10100 1
rohdendor    7?11[01]   11?11 0
grunini      3??10     00?00 0
echinosa     6??10     11?11 0
alaskensi    60110     11011 0
chinghaie   4??0?     ?1?12 ?
;
cc -.;
cc= .;
cnames
{0 aedeagus
Bellardia_type Onesia_type vicina_type genarum_type stelviana_type
subalpina_type alaskensis_type rohdendorfi_type;
{1 humeral_setae on_gently_curved_line in_corners_of_right_angled_triangle;
{2 inner_posthumeral one two;
{3 lower_calypter white dark;
{4 fore_tibial_setae one two;
{5 ST5_male normal large_and_strongly_projecting;
{6 vestiture_on_cerci_and_surstyli normal stiff;
{7 bacilliform_sclerites separate fused_basally fused_for_whole_length;
{8 epiphalllic_insertion basal distal;
{9 pregonite_shape
vicina_type subalpina_type stelviana_type Bellardia_type Onesia_type;
{10 ST8_of_ovipositor
single-rod_with__bifid_apex double_throughout two_distal_lobes_only;
report;
amb-;
poly=;
conc 3;
hold 200;
mult* 200;
sv* call.trsv;
out call.out;tplot*;apo+;apo*;fit*;len*;min;steps*;icc*;out/;
procedure /;
```