

Blowflies (Diptera, Calliphoridae) of the Faroe Islands, species list and collection sites

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The distribution, flight periods and sex ratios of blowflies of the family Calliphoridae (Diptera, Brachycera) in the Faroe Islands based on 3827 specimens collected throughout the archipelago are given. Five species: *Calliphora vicina* Robineau-Desvoidy, 1830, *Calliphora uralensis* Villeneuve, 1922, *Calliphora vomitoria* (Linnaeus, 1758), *Cynomya mortuorum* (Linnaeus, 1761), *Protophormia terraenovae* (Robineau-Desvoidy, 1830) were recorded, *C. vomitoria* for the first time.

Key words: Diptera, Calliphoridae, *Calliphora*, *C. uralensis*, *C. vicina*, *C. vomitoria*, *Cynomya*, *C. mortuorum*, *Protophormia*, *P. terraenovae*, Faroe Islands.

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Introduction

The Faroe Islands are located in the North East Atlantic in the approximate centre of a triangle formed by Scotland, Iceland and Norway. The 18 main islands cover around 1400 km² and 17 islands are populated by man. Some of the current fauna and flora must have colonised the Faroes after the end of the Weichselian glaciation, 9500 years ago (Enckell, 1985), but the chances of dispersal for certain species must have improved after man's arrival at the islands 1300 years ago (Johansen, 1985). Given the ecology of most Diptera species, human traffic to the islands has undoubtedly been the main vector for the introduction of various fly species to the islands. Past knowledge of the Calliphoridae (Diptera, Brachycera) in the Faroe Islands is based mainly on collections made by J. P. Kryger during the summers of 1925 and 1926 (Lyneborg, 1968). This current paper is based on

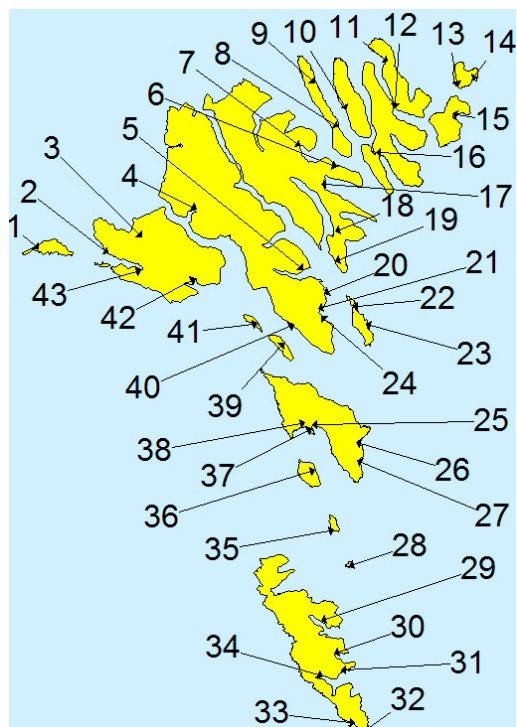
3827 specimens collected during an archipelago-wide study carried out nearly 80 years later by the senior author and 22 other collectors. As a consequence of this investigation, local names have been given to the Faroese blowfly genera and species (Jensen & Thomsen, 2009).

Material and methods

Blowflies were sampled throughout the year between mid-2005 and December 2010 over most of the Faroes (Map 1). Many flies were collected with sweep nets but others were caught opportunistically e.g. inside houses. The vast majority of the flies came from in or close to inhabited buildings. Most specimens from Tvøroyri came from an electric fly killer in a fish factory. Knut Rognes assisted with registration schemes and verified the first 54 identifications,

including all five identified species. Taxonomic nomenclature and identification follow Rognes (1991). The blowflies from this study are deposited at the Faroese Museum of Natural History, except for a few specimens held temporarily by J-K. Jensen.

Blowflies were collected from 43 sites arranged in numerical order (Map 1), with respective island in brackets: 1. Mykines (Mykines), 2. Biggjarðskorð (Vágoy), 3. Fjallavatn (Vágoy), 4. Vestmanna (Streymoy), 5. Kaldbak (Streymoy), 6. Leirvík (Eysturoy), 7. Fuglafjørður (Eysturoy), 8. Húsar (Kalsoy), 9. Mikladalur (Kalsoy), 10. Kunoy (Kunoy), 11. Viðareiði (Viðoy), 12. Hvannasund (Viðoy), 13. Kirkja (Fugloy), 14. Hattarvík (Fugloy), 15. Svínøi (Svínøi), 16. Klaksvík (Borðoy), 17. Gøta (Eysturoy), 18. Runavík (Eysturoy), 19. Tøftir (Eysturoy), 20. Høivík (Streymoy), 21. Tórshavn (Streymoy), 22. Nólsoy (Nólsoy), 23. Urðin (Nólsoy), 24.



MAP 1. Geographical distribution of all 44 collection sites, and numbering of respective place names.

Argir (Streymoy), 25. Mølheyggjarnir á Sandi (Sandoy), 26. Húsavík (Sandoy), 27. Dalur (Sandoy), 28. Lítla Dímun (Lítla Dímun), 29. Tvøroyri (Suðuroy), 30. Hov (Suðuroy), 31. Porkeri (Suðuroy), 32. Akraberg (Suðuroy), 33. Sumba (Suðuroy), 34. Vágur (Suðuroy), 35. Stóra Dímun (Stóra Dímun), 36. Skúvoy (Skúvoy), 37. Sandur (Sandoy), 38. Gróthúsvatn (Sandoy), 39. Hestur (Hestur), 40. Velbastað (Streymoy), 41. Koltur (Koltur), 42. Sandávágur (Vágoy) and 43. Sørvágur (Vágoy).

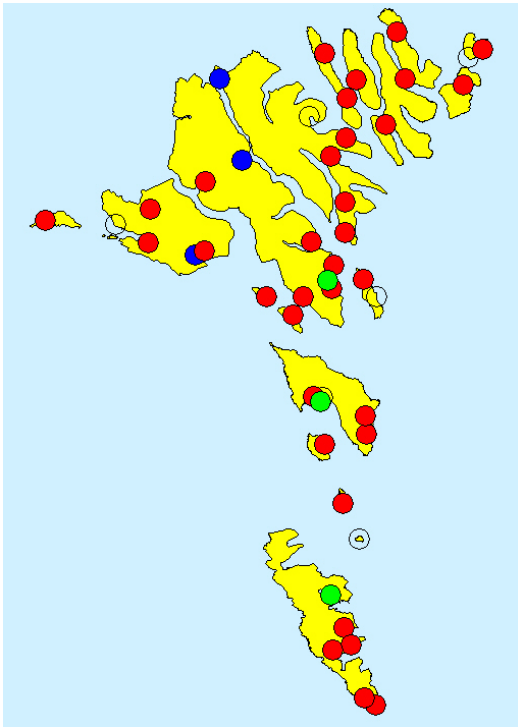
Results

We examined 3827 specimens: 869 *Calliphora uralensis* (23%), 1757 *C. vicina* (46%), 712 *C. vomitoria* (19%), 173 *Cynomya mortuorum* (5%) and 316 *Protophormia terraenovae* (8%).

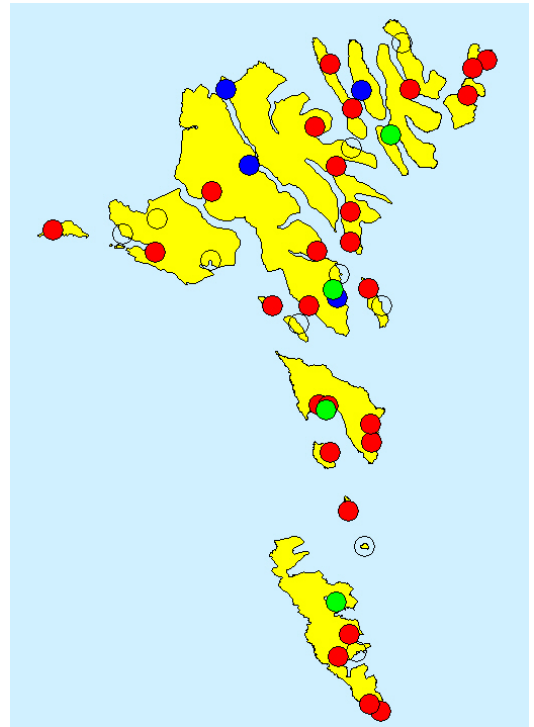
Calliphora vicina Robineau-Desvoidy, 1830

Material. Of 1757 specimens of *C. vicina* collected, 579 (33%) were males and 1178 (67%) females. Flies were collected in January (2♂♂2♀♀), February (12♂♂12♀♀), March (54♂♂78♀♀), April (44♂♂135♀♀), May (76♂♂210♀♀), June (72♂♂117♀♀), July (87♂♂170♀♀), August (146♂♂157♀♀), September (32♂♂87♀♀), October (37♂♂91♀♀), November (6♂♂13♀♀) and December (5♂♂8♀♀) (Figures 1–2). Additionally, there were 104 (6♂♂98♀♀) specimens where the collection dates are unknown.

C. vicina were collected at 37 of the 44 collecting sites: 1 (34♂♂40♀♀), 3 (2♀♀), 4 (8♂♂57♀♀), 5 (7♀♀), 6 (1♂2♀♀), 8 (1♀), 9 (6♂♂3♀♀), 10 (7♂♂12♀♀), 11 (2♂♂1♀), 12 (1♂7♀♀), 14 (4♂♂22♀♀), 15 (5♂♂11♀♀), 16 (2♂♂), 17 (155♂♂253♀♀), 18 (7♂♂ 10♀♀), 19 (2♂♂14♀♀), 20 (1♀), 21 (10♂♂17♀♀), 22 (104♂♂103♀♀), 24 (1♂3♀♀), 26 (8♂♂3♀♀), 27 (4♂♂3♀♀), 29 (32♂♂241♀♀), 30 (8♂♂12♀♀), 31 (2♂♂2♀♀), 32 (3♂♂3♀♀), 33 (10♂♂26♀♀), 34 (3♂♂1♀), 35 (8♂♂21♀♀), 36 (10♂♂8♀♀), 37 (2♂♂2♀♀), 38 (4♂♂4♀♀), 39 (13♂♂17♀♀), 40 (90♂♂231♀♀), 41 (12♂♂8♀♀), 42 (1♂5♀♀) and 43 (20♂♂25♀♀) (Map 2).



MAP 2. *Calliphora vicina* Robineau-Desvoidy, 1830. Red: sites where recorded only in 2005–10; blue: only in 1925–26; green: in both periods; open circles: not recorded.



MAP 3. *Calliphora uralensis* Villeneuve, 1922. Red: sites where recorded only in 2005–10; blue: only in 1925–26; green: in both periods; open circles: not recorded.

Calliphora uralensis Villeneuve, 1922

Material. Of 869 specimens of *C. uralensis* collected, 249 (29 %) were males and 620 (71 %) females. It was collected in February (1♂1♀), April (1♂), May (9♂♂12♀♀), June (54♂♂53♀♀), July (88♂♂147♀♀), August (84♂♂118♀♀), September (8♂♂11♀♀), October (1♂75♀♀) (Figures 3–4). Additionally, there were 206 (3♂♂203♀♀) specimens where the collection dates are unknown.

C. uralensis was collected at 31 of the 44 collecting sites: 1 (14♂♂34♀♀), 4 (8♂♂5♀♀), 5 (1♀), 7 (1♂), 8 (1♂), 9 (1♂2♀♀), 12 (5♂♂14♀♀), 13 (6♂♂), 14 (1♂22♀♀), 15 (1♂14♀♀), 16 (5♂♂3♀♀), 17 (22♂♂15♀♀), 18 (10♂♂3♀♀), 19 (1♂1♀), 21 (2♂♂3♀♀), 22 (61♂♂67♀♀), 25 (6♂♂), 26 (3♂♂1♀), 27 (11♂♂3♀♀), 29 (15♂♂351♀♀), 30 (2♀♀), 32 (1♂4♀♀), 33 (10♀♀), 34 (3♂♂), 35 (3♂♂8♀♀), 36 (9♂♂8♀♀), 37 (8♂♂4♀♀), 38 (7♂♂), 40

(30♂♂32♀♀), 41 (1♂1♀) and 43 (13♂♂12♀♀) (Map 3).

Calliphora vomitoria (Linnaeus, 1758)

Material. Of 712 specimens of *C. vomitoria* collected, 277 (39%) were males and 435 (61%) females. It was collected in May (47♂♂25♀♀), June (80♂♂65♀♀), July (38♂♂43♀♀), August (88♂♂72♀♀), September (17♂♂18♀♀), October (3♂♂67♀♀) (Figures 5–6). Additionally, there were 149 (4♂♂145♀♀) specimens where the collection dates are unknown. These are the first records of this species from the Faroes.

C. vomitoria was collected at 15 of the 44 collecting sites: 4 (6♂♂11♀♀), 7 (1♀), 8 (1♂), 5 (1♀), 9 (1♀), 10 (1♀), 16 (2♂♂2♀♀), 17 (200♂♂107♀♀), 18 (5♂♂8♀♀), 21 (15♂♂18♀♀), 22 (6♂♂5♀♀), 29 (39♂♂270♀♀), 37 (2♀♀), 38 (1♂3♀♀) and 43 (2♂♂5♀♀) (Map 4).

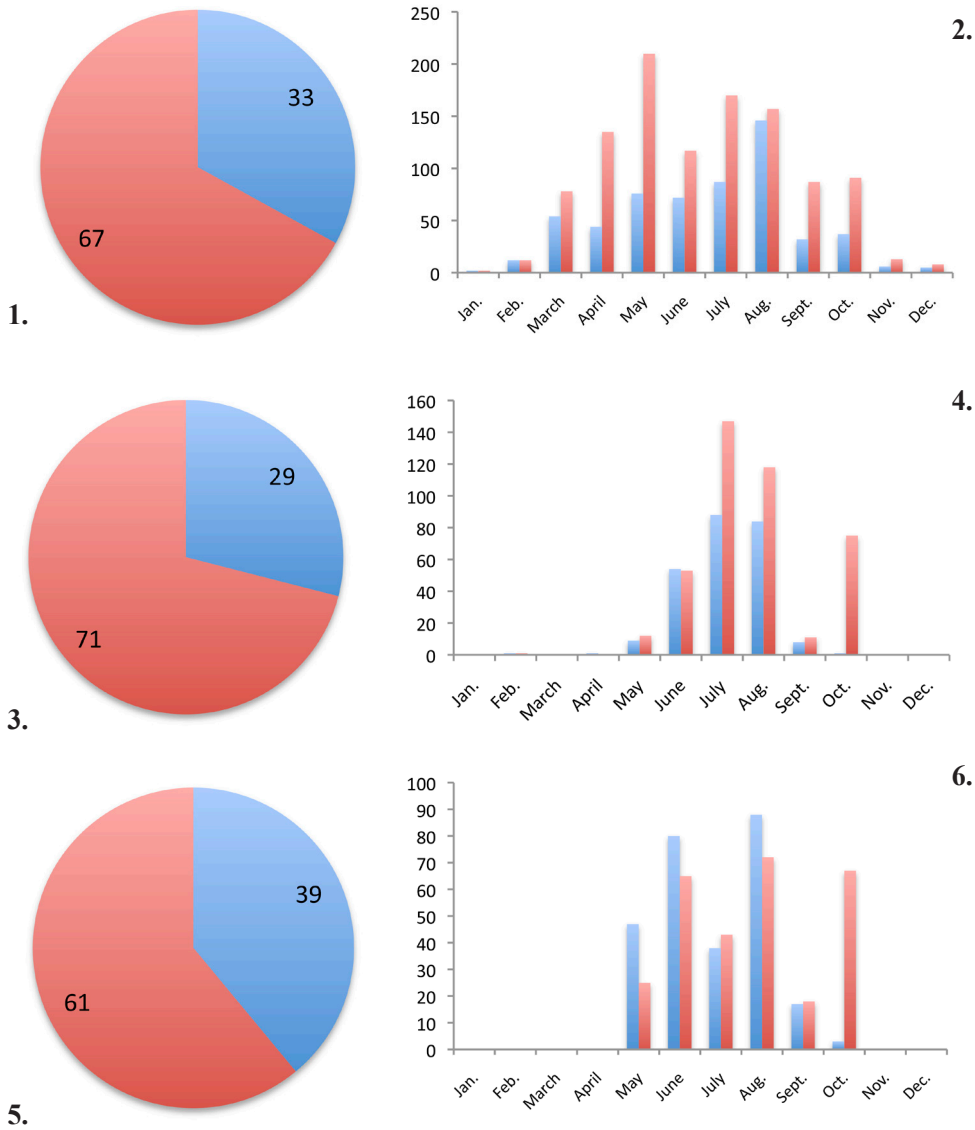


FIGURE 1–6. 1. Sex-ratio of *Calliphora vicina* Robineau-Desvoidy, 1830. (blue: males; red: females). 2. The monthly distribution of *Calliphora vicina* Robineau-Desvoidy, 1830 grouped by sex (blue: males; red: females). 3. Sex-ratio of *Calliphora uralensis* Villeneuve, 1922 individuals (blue: males; red: females). 4. The monthly distribution of *Calliphora uralensis* Villeneuve, 1922 grouped by sex (blue: males; red: females). 5. Sex-ratio of collected *Calliphora vomitoria* (L., 1758) individuals (blue: males; red: females). 6. The monthly distribution of *Calliphora vomitoria* (L., 1758) grouped by sex (blue: males; red: females).

***Cynomya mortuorum* (Linnaeus, 1761)**

Material. Of 173 specimens of *C. mortuorum* collected, 105 (61%) were males and 68 (39%) females. It was collected in May (1♂4♀♀), June (2♂♂5♀♀), July (80♂♂32♀♀), August

(19♂♂29♀♀) (Figures 7–8). There was a single female specimen where the collection date is unknown.

C. mortuorum was collected at 15 of the 44 collecting sites: 1 (4♂♂6♀♀), 2 (2♀♀),

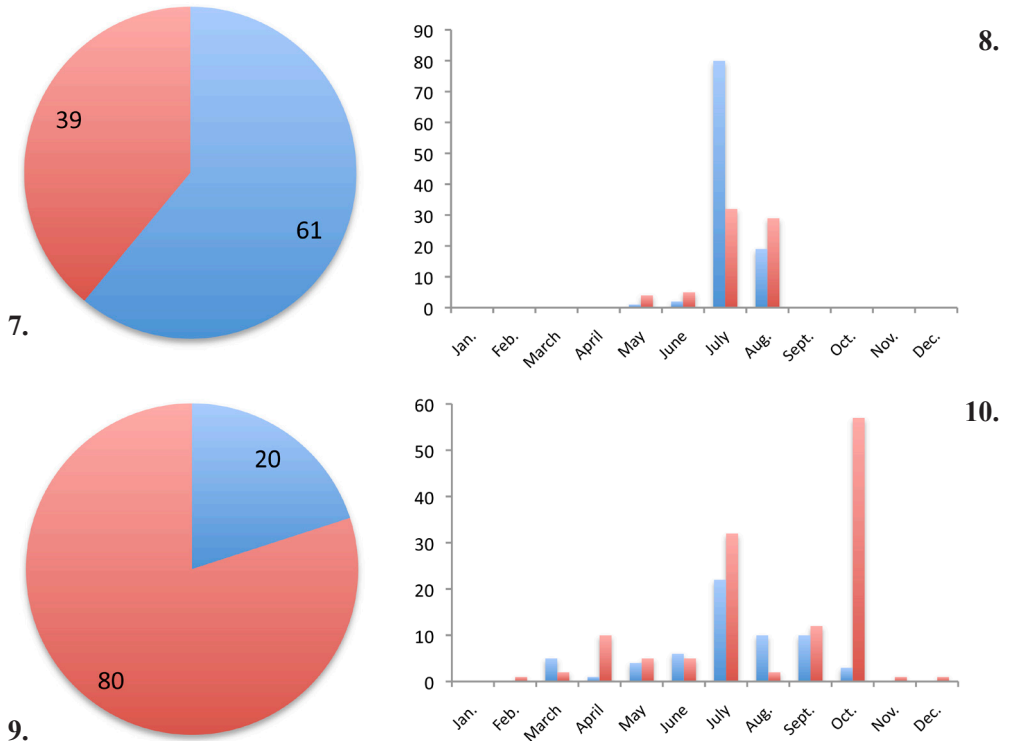


FIGURE 7–10. 7. Sex-ratio *Cynomya mortuorum* (L., 1761) (blue: males; red: females). 8. The monthly distribution of *Cynomya mortuorum* (L., 1761) grouped by sex (blue: males; red: females). 9. Sex-ratio of *Protophormia terraenovae* (Robineau-Desvoidy, 1830) individuals (blue: males; red: females). 10. The monthly distribution *Protophormia terraenovae* (Robineau-Desvoidy, 1830) grouped by sex (blue: males; red: females). In October all but one specimen were collected in an electric fly trap in Tvøroyri.

10 (1♂2♀♀), 14 (1♂), 19 (1♀), 21 (1♂), 22 (3♂♂4♀♀), 23 (1♀), 27 (1♂), 28 (77♂♂24♀♀), 29 (1♀), 33 (1♀), 35 (7♂♂20♀♀), 36 (10♂♂5♀♀), and 40 (1♀) (Map 5).

Protophormia terraenovae (Robineau-Desvoidy, 1830)

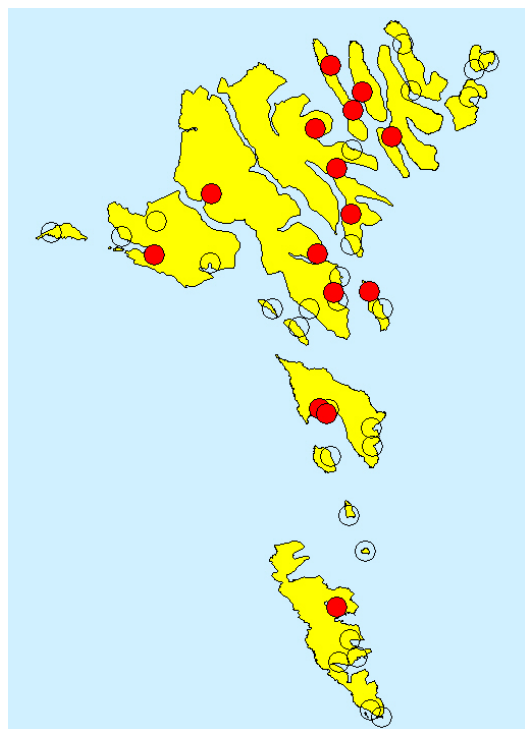
Material. Of 316 specimens of *P. terraenovae* collected, 64 (20%) were males and 252 (80%) females. It was collected in February (1♀), March (5♂♂2♀♀), April (1♂10♀♀), May (4♂♂5♀♀), June (6♂♂5♀♀), July (22♂♂32♀♀), August (10♂♂2♀♀), September (10♂♂12♀♀), October (3♂♂57♀♀), November (1♀) and December (1♀) (Figures 9–10). Additionally, there were 127 (3♂♂124♀♀) specimens where the collection dates are unknown.

P. terraenovae was collected at 19 of the 44

collecting sites: 1 (1♀), 4 (6♂♂16♀♀), 5 (2♀♀), 7 (1♀), 10 (2♀♀), 14 (2♂♂), 17 (9♂♂9♀♀), 18 (10♂♂4♀♀), 19 (1♂), 21 (6♂♂1♀), 22 (2♂♂), 24 (2♂♂), 27 (2♀♀), 29 (8♂♂203♀♀), 34 (1♂), 37 (1♂), 40 (12♂♂6♀♀) 41 (4♂♂4♀♀) and 42 (1♀) (Map 6).

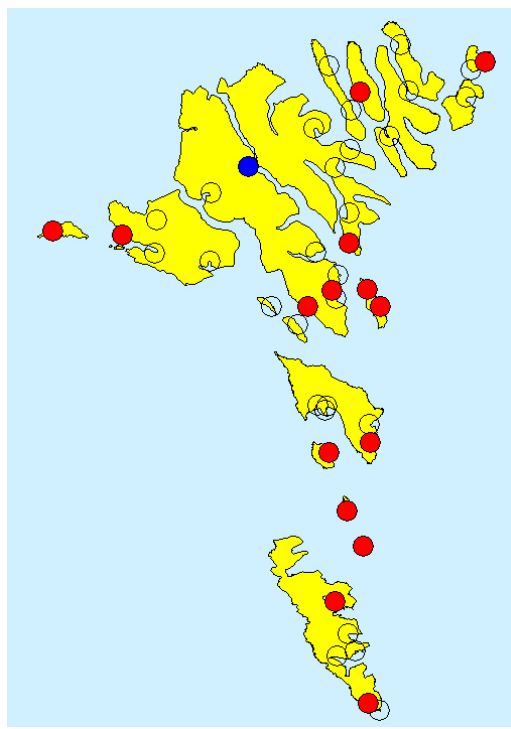
Discussion and conclusion

Fish, sheep and whale meat are the primary protein source of the Faroese human population and, until recent times, air-drying was the normal method used to preserve these foods. Therefore, blowflies that lay eggs in the meat that result in maggots and putrefaction have always been a menace to the Faroese people. It is, thus, surprising that the literature on blowflies in the Faroe Islands is



MAP 4. *Calliphora vomitoria* (Linnaeus, 1758). Red: sites where recorded only in 2005–10; open circles: not recorded.

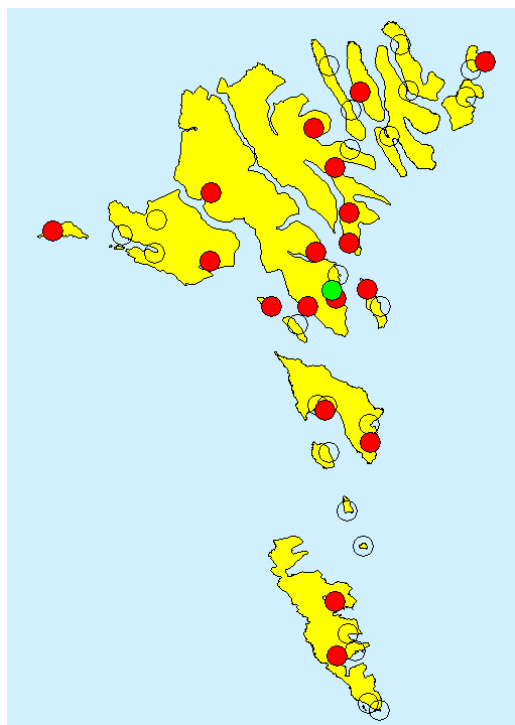
extremely limited. Until now, the only Faroese distribution maps for blowflies have been those of Lyneborg (1968), which represents the collections made during 1925–26 at 15 localities (cf. 117 in the present survey): *Calliphora vicina* (Lyneborg: 5; present work: 37), *Calliphora uralensis* (Lyneborg: 8; present work: 31), *Calliphora vomitoria* (Lyneborg: not recorded; present work: 15), *Cynomya mortuorum* (Lyneborg: 1; present work: 15), *Protophormia terraenovae* (Lyneborg: 1; present work: 19). Hence, our survey makes a significant contribution to clarify the distribution of these four species, and additionally added *Calliphora vomitoria*, which most likely has arrived in the Faroes after 1925–26, to the local fauna. *C. vicina* appears to be the most successful blowfly being recorded on all islands whereas *C. mortuorum* is the rarest, except on Skúvoy where it is common, and on Lítlu Dímun, where it is the only blowfly species collected. Our survey showed that *C. vicina* are active during the whole year and *P. terraenovae* with nine months. In contrast,



MAP 5. *Cynomya mortuorum* (Linnaeus, 1761). Red: sites where recorded only in 2005–10; blue: only in 1925–26; open circles: not recorded.

the flight periods of *C. uralensis*, *C. vomitoria* and *Cynomya mortuorum* are restricted to the summer and fall (May–October).

In recent years, numerous immigrant insect species, such as the hoverfly *Eristalis pertinax* (Scopoli, 1763), the bumblebee *Bombus pratorum* (Linnaeus, 1761), have succeeded in breeding and surviving the winter in the Faroes (Jensen, 2009, Madsen & Jensen, 2011). Hence, finding *Calliphora vomitoria* for the first time is not surprising. Given its widespread distribution within the archipelago, it has probably been present for some time. Additional blowfly species may be expected to turn up in the future. To the north, six blowfly species have been reported from Iceland (Ólafsson, 1991; Erling Ólafsson, personal communication) and, to the south, six species occur on the Shetland Islands (Johnston, 1999). *Pollenia rudis* (Fabricius 1794) present in Iceland, and *Bellardia viarum* (Robineau-Desvoidy, 1830) and *Bellardia vulgaris* Robineau-Desvoidy, 1830), both present in Shetland, are possibly the most



MAP 6. *Protophormia terraenovae* (Robineau-Desvoidy, 1830). Red: sites where recorded only in 2005-2010; green: in both periods; open circles: not recorded.

likely species to establish themselves in the Faroes. It would be useful to repeat this survey sometime in the future to look for changes in the blowflies of this archipelago.

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