

Wetland Coleoptera of the Faroe Islands

Klukkur í vátlendi í Føroyum

Garth N. Foster¹ and Janus Hansen²

¹ The Aquatic Coleoptera Conservation Trust, 3 Eglinton Terrace, Ayr KA7 1JJ, Scotland, UK. Email: latissimus@btinternet.com

² Faroese Museum of Natural History, FO-100 Tórshavn, Faroe Islands. Email: janush@ngs.fo

Úrtak

Gamlar skrásetingar av vatnklukkum og nærskyldum klukkusløgum verða gjøgnumgingnar. Greitt verður frá nýggjum kanningum, sum økja um vitan okkara um útbreiðsluna hjá hesum klukkum. Einki nýtt slag varð funnið í hesum kanningum. Klukkufaunan í Føroyum er sera avbyrgd, og hon verður viðgjørd við støði í tí.

Abstract

Records of aquatic beetles and related species (Coleoptera: Haliplidae, Dytiscidae, Hydrophiloidea, Scirtidae) of the Faroe Islands are critically re-examined. New data are supplied that extend knowledge of the habitats of these species without adding further species. The fauna is discussed with respect to its isolated status.

Introduction

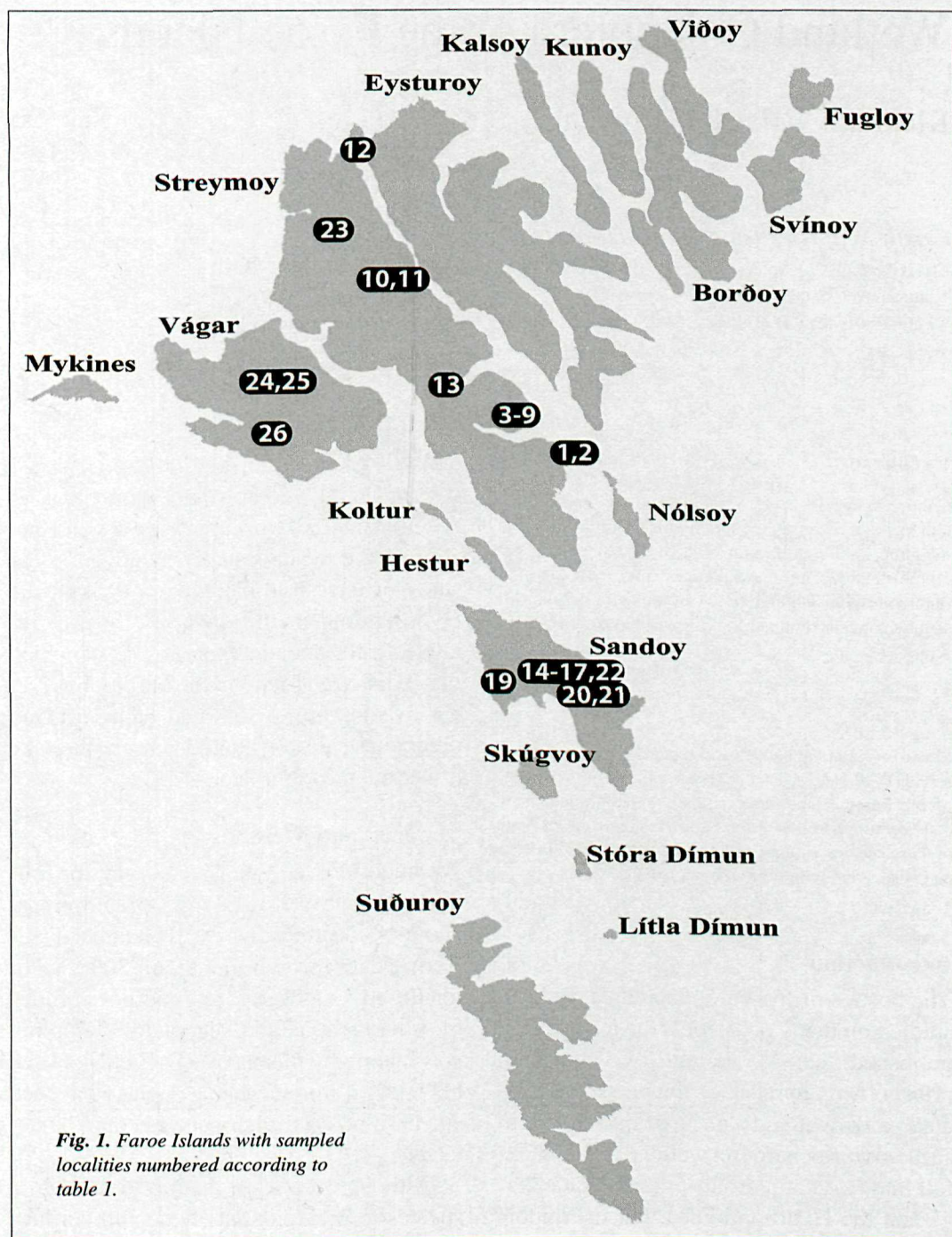
The beetles of the Faroe Islands have been studied on many occasions, the most recent published survey being by Bengtson (1981). A reappraisal of the beetles associated with wetlands is justified by recent survey work. Faroese wetland Coleoptera fall into two main groups, the Hydradephaga and the Hydrophiloidea, but the oppor-

tunity is taken to consider other species associated with wetlands and more likely to be encountered working with a pond net than by the means usually deployed in the study of terrestrial Coleoptera. Within the Hydrophiloidea the genus *Cercyon* includes truly aquatic species one of which may have been found in the Faroes, but others live in rotting seaweed, compost and dung; these are considered here for the sake of taxonomic completeness.

Material and Methods

We undertook an intensive survey for four days in June 2004, taking 30 samples at about 18 locations, whilst JH had been collecting data for two months in 2002. GNF identified localities with good possibilities of finding aquatic Coleoptera. Sampling was mainly by means of a D-framed sweep net with a 1 mm mesh bag deployed at each site until no no further species could be detected.

Although we were unable to add more species to previous lists we could confirm



Locality	Nr.	<i>Haliphus fulvus</i>	<i>Hydroporus erythrocephalus</i>	<i>Hydroporus memnonius</i>	<i>Hydroporus nigrita</i>	<i>Hydroporus palustris</i>	<i>Hydroporus pubescens</i>	<i>Stictotarsus multilineatus</i>	<i>Agabus bipustulatus</i>	<i>Helophorus aequalis</i>	<i>Helophorus flavipes</i>	<i>Anacaena globulus</i>	<i>Elodes</i> sp.
Sandvíkatangi	1			+	+		+		+				
Sandvíkatangi	2		+	+	+		+		+				
Kaldbak	3			+	+				+			+	
Brúnavatn	4	+											
Brúnavatn	5			+	+								
near Brúnavatn	6		+				+	+	+				
near Brúnavatn	7						+		+				+
near Brúnavatn	8						+		+				+
near Brúnavatn	9						+	+			+		
Hvalvík	10								+		+	+	
Hvalvík	11			+			+		+		+		
Vatnið á Mølini	12	+											
Vatnið á Mølini	13					+			+				
Vatnið á Mølini	14							+					
Kollfjarðardalur	15				+		+		+	+	+		
Kollfjarðardalur	16						+			+			
E. side of Gróthúsvatn	17			+	+		+		+		+		
Gróthúsvatn	18	+				+							
above Gróthúsvatn	19		+			+	+					+	
Nyktjörn	20					+							
Tyrilsválur	21		+				+		+			+	
Stórvatn	22							+			+		
Stórvatn	23										+		
Djúpidalur	24		+				+		+		+		
Sandsvatn	25						+						
Saksunardalur	26				+								
Saksunardalur	27						+		+				
Klovin	28		+		+		+		+			+	+
headwaters of river Sjatlá	29				+		+		+			+	
Airport ponds	30		+				+		+			+	
No. occurrences		3	7	6	9	4	18	4	17	2	8	9	1
% occurrence		10	23	20	30	13	60	13	57	7	27	30	3

Table 1. Sampled localities, with species presence denoted by +.

the status of most species that had been reported, and draw attention to records requiring confirmation. This paper also provides an opportunity to update the checklist in terms of new understanding of the status of several species.

Results

Species commentary

These commentaries cover both old records and data acquired recently, with a critical appraisal of the basis for old records. Only those species that have been emboldened can be regarded as confirmed for the Faroes. The names follow recent checklists (Hansen, 1999; Löbl and Šmetana, 2003).

HALIPLIDAE

***Haliplus fulvus* (Fab.)**. West (1930) recorded this species from Suðuroy, Sandoy and Eysturoy. Found at three localities (10%) in 2004. The habitat, still water lakes over sand, often in deeper water in association with sparse vegetation, is typical of its occurrence in general.

DYTISCIDAE

***Agabus bipustulatus* (L.)**. Sharp (1900) identified "*Agabus bipustulatus*" from material taken by N. Annandale in June 1900 near Tórshavn; Sharp (1903) also reported "*Agabus bipustulatus* var." taken by Annandale in August 1903, also at Tórshavn. Nielsen (1908) referred to this species as *Agabus alpestris* Heer, as did Mjöberg (1917). Walker (1938) referred to *solieri* only, and Bengtson (1981) referred to *Agabus solieri* Aubé, but equated it to "*A. bipustulatus* Sharp". Drotz *et al.* (2001)

have convincingly demonstrated that *solieri* is no more than a form of *bipustulatus* that can be produced under altitudinal stress. *A. bipustulatus* is the only large diving beetle in the Faroes. The female is of the dull form typical of north-west Europe, as was noted by Holdhaus (1911), and the body shape and size are those of *solieri*. *A. bipustulatus*, including many young larvae, were found in 57% of samples in June 2004, mainly in small, still or slowly moving water bodies with some submerged vegetation. The islands from which it is known are Suðuroy, Streymoy, Eysturoy, Sandoy, and Vágar.

***Hydroporus erythrocephalus* (L.)**. This was originally recorded by Mjöberg (1917), who described a new variety, *faroensis*. This was a form of female that appears matt because of intense microreticulation of the upper surface, by priority having the name *deplanatus* Gyllenhal. It is the commonest form of female in Scotland, but is replaced further south by the female form with the same reticulation as the male. Miller (2003) has demonstrated that such female cuticular features have evolved on several occasions in Dytiscidae, being a device to resist copulation. This species is typical of deeper, still water in small water bodies, usually on peat and among vegetation.

West (1930) noted it from Streymoy, Viðoy and Suðuroy, and described it as local. In June 2004 it was found in 23% of samples.

***Hydroporus memnonius* Nicolai**. West

(1930) reported one specimen from Ljósa south of Tórshavn. In June 2004, we found it in 20% of samples. This species was confined to extremely shallow water with mosses, avoiding areas of water movement when in gullies and springfed mires. The females were of the male-like form, as is typical of much of Scotland, with the matt female form *castaneus* Aubé occurring only in the southern Border areas.

***Hydroporus nigrita* (Fab.)**. West (1930) reported only one specimen, found at Tórshavn. *H. nigrita* was common in shallow flushes in June 2004, being found in 30% of all samples. The *nigrita*-species group has recently been reviewed by Shaverdo (2004). The status of *H. nigrita* as the commonest Palaearctic member of the group is confirmed, being found everywhere including Iceland and most Iberian mountain ranges, confined in the east to east Siberia and Kazakhstan. It can occur up to 2,500 m above sea level, but is more common in lower areas.

***Hydroporus palustris* (L.)**. West (1930) noted four records, but could give details only for Borðoy and Eysturoy. It occurred four times in June 2004. One of the localities, a pool named Nykutjørn, was unusual in having a thin cover of bogbean (*Menyanthes trifoliata* L.) throughout, and is the only known Faroese site for white water lily (*Nymphaea alba* L.). There the *H. palustris* were of the pale form that once attracted specific status as *tinctus* Hamlet Clark. These specimens had an entirely yellow head and a pronotum similarly colou-

red with a narrow dark mark on much of the hind margin. However, all specimens had the typical elytral pattern obscurely marked.

***Hydroporus pubescens* (Gyllenhal)**. Most earlier authors have commented on the abundance of this species on the Faroes. Despite the occasional occurrence of pale specimens, this species has not attracted other names in regular use. We found it in 60% of samples, usually as the commonest species in still water, and in abundance in salt pans and peat pools.

***Stictotarsus multilineatus* (Falkenström)**. Sharp (1900) recorded *Hydroporus griseostriatus* as being taken by N. Annandale near Tórshavn in June 1900, the first Faroese record according to Reuter (1901). West (1930) added records for Vágar, Streymoy, and Borðoy, mainly in montane lakes. In the survey in June 2004 it was found only four times.

Unfortunately the name of this species has changed considerably and is not yet secure. Falkenström (1922) described the var. *multilineatus* for what was then known as *Potamodytes griseostriatus* (DeGeer), having previously been described within *Dytiscus*, transferred to *Hydroporus*, and then to *Deronectes* and *Potamonectes*. Subsequently the specific status of *multilineatus* was recognised by Nilsson and Holmen (1995) on the basis of chromosome studies, with it being most widespread species in the north-west of Europe, and the species occurring in Shetland and the Faroes. The change of specific epithet came soon after a

redefinition of *Stictotarsus* to include the *griseostriatus*-complex. This is not the final position as mitochondrial DNA studies (Ribera *et al.*, 2002) have revealed the artificial nature of *Stictotarsus* and the need to reassign the *griseostriatus* complex once more, an extraordinarily unstable situation reflecting the difficulty in understanding the affinities of this group.

HELOPHORIDAE

***Helophorus aequalis* Thomson.** Angus (1992) differentiated three species of large *Helophorus* in the northern Palaearctic area, *H. aquaticus* (L.), *H. aequalis* Thomson and *H. grandis* Illiger. Angus (1970) noted that Linné's material formerly assumed to be the larger species named as *aquaticus* was in fact a smaller species, leaving the name *grandis* to be applied to the largest species. This arrangement, with reference to the larger *grandis* and the smaller *aquaticus* pertained until Angus (1982) discovered that the smaller species in fact comprised two species with distinctive karyotypes, the more western *aequalis* Thomson and the eastern and montane *aquaticus* (L.). Thus it is difficult to be sure which species is intended in distribution papers published over this period, including that of Bengtson (1981), who referred only to *H. aquaticus*.

H. aquaticus and *aequalis* are smaller than *H. grandis* and have finer teeth on the last visible (seventh) abdominal sternite, those of *grandis* giving the rear edge a strongly castellated appearance. *H. aequalis* is the more western of the two small-

er species, *H. aquaticus* being recorded in the north-west only from Denmark and Finland, and known from neither Norway nor Sweden (Hansen, 1987). *H. grandis* is rare in northern Scotland, not being known from Shetland or the Outer Hebrides, whereas *H. aequalis* is more common in Scotland, occurring in the Uists and on Unst, the nearest Shetland island to the Faroes. On this basis, the expectation is that only one species, *aequalis*, is to be expected in the Faroes. We found this species abundant in grass-edged pools and ditches in the meanders of the river in Kollfjarðardalur on Streymoy. The area was highly enriched, and the pools typical of the habitat with which *aequalis* and *grandis* are normally associated. One female was unusually large, 6.5 mm long, at the top end of the range given by Angus (1992) for *aequalis* and in the middle of the range for *grandis*; it is, however, clearly *aequalis*. The occurrence of a few unusually large females of *aequalis* may give rise to records of *grandis*. Hansen (1881) recorded both *grandis* and *aquaticus*, records overlooked by Sharp (1900), as was originally noted by Reuter (1901). Nielsen (1908) repeated Hansen's records. Mjöberg (1917) noted only *Helophorus aquaticus* L., but with reservation.

***Helophorus brevipalpis* Bedel.** Bengtson (1981) recorded this species, as *guttulus*, from eight localities on Sandoy, Koltur, Streymoy, Eysturoy, and Borðoy, with earlier records adding Nólsoy. Angus (1985) showed *guttulus* Motschulsky to be a Caucasian species, the Faroese species intend-

ed being *brevipalpis*. It is surprising that this species has not been encountered by us. *H. brevipalpis* has a bimodal daily flight pattern (Lewis and Taylor, 1965) but with morning flight activity lending itself to long distance transport. This is the most abundant water beetle in flight in western Europe in early summer, and it is conceivable that earlier finds relate to occasional migrations reaching the Faroes.

***Helophorus flavipes* (Fab.)**. Confusion has been engendered by continued reference to *H. viridicollis* Stephens, treated as a synonym of *H. flavipes* by Angus (1992), but a name that covered at least one other species, *obscurus* Mulsant, before the full nature of the complex was resolved. It is unlikely that any member of the complex other than *flavipes* occurs in the Faroes. West (1930) indicated that *viridicollis* was "not to be common in the Faroes and not to occur in the northern isles". Bengtson (1981) echoed this information for *H. flavipes*: "apparently not very common and mainly confined to the southern islands", adding that the eight localities were in grassland and in rich vegetation on cliffs and shelves, presumably as pitfall trap material. But Bengtson (1981) continued to treat *viridicollis* as a separate species: he also identified Mjöberg's (1917) *H. glacialis* Villa as *viridicollis*, thus referable to *flavipes*.

In 2004 this species was usually found as single specimens, and in a range of habitats from the more typical acid water pools to a saltpan and a river. Bringing all the records together, it has been found on the

following islands: Suðuroy, Stóra Dímun, Sandoy, Koltur, Hestur, Streymoy, Eysturoy and Svínøy.

HYDROPHILIDAE

***Cercyon haemorrhoidalis* (Fab.)**. Sharp (1900) recorded *Cercyon flavipes* as being taken by Nelson Annandale near Tórshavn in June 1900; *C. flavipes* (Fab.) is an accepted synonym of *haemorrhoidalis*. West (1930) noted the occurrence of *C. haemorrhoidalis* in all sorts of dung in most Faroese isles. He assigned Mjöberg's (1917) *C. melanocephalus* L. to this species. We found this species in sheep dung on Streymoy and Sandoy, and in sheep and cow dung on Vágur.

***Cercyon marinus* Thomson**. Mjöberg (1917) reported this species from Trongisvaag (now Trongisvágur), Suðuroy, without any reference to habitat. West (1930) checked Mjöberg's material in the State Museum of Natural History, Stockholm. This species occurs in wet, often decomposing, vegetation, and, as such, must be regarded as the only truly freshwater *Cercyon* species. We failed to find it.

***Cercyon littoralis* (Gyllenhal)**. Mjöberg (1917) was also the first to record this species in the Faroes, again from Trongisvágur, Suðuroy. West (1930) noted this record and added a second from under the carcase of a crow on Sandoy. We found two specimens under dead seaweed at Søltuvík, Sandoy on 6 June 2004. Other variants on spelling the name are incorrect.

***Megasternum concinnum* (Marsham).** Hansen (1881) reported *Megasternum boletophagum* from the Faroes, and Sharp (1903) noted the same taxon named from material taken by Annandale on Nólsoy in August 1903. Nielsen (1908) referred to "*Megasternum boletophagum* [sic] Marsh." as did Mjöberg (1917) in adding a record from Trongisvágur, Suðuroy. West (1930) noted a fossil specimen at Tórshavn, and occurrence in a whale carcass, as well as noting the taxon to be well distributed in the Faroes, usually being found under stones. H. G. Vevers and F. C. Evans (Walker, 1938) found this taxon in association with puffin burrows on Mykines. Bengtson (1981) recorded "*Megasternum obscurum boletophagum* (Marsham)" in all the islands surveyed except Skúvoy and Borðoy, a predictable result for this species, which is readily caught in pitfall traps. Hansen (1999) showed that the name *boletophagus* Marsham did not refer to this species, and that the other name in widespread use, *obscurus* Marsham, was not available, necessitating a new combination based on an old name, *Megasternum concinnum* (Marsham) to describe this species. Single males were found in sheep dung at Kaldbak, on Streymoy, and at Vatnsóy, Vágur, in June 2004.

***Anacaena globulus* (Paykull).** Hansen (1881) recorded *Hydrobius limbatus*, followed by Nielsen (1908). Over much of Europe this record could not be assigned to a particular species, following van Berge Henegouwen's (1986) separation of *Anacaena lutescens* (Stephens) from *A. limbata*

(Fab.) s. str. Given that there has only been one record of the latter in Scotland, all other material being referable to the parthenogenetic and normally dark female form *A. lutescens*, it might be reasonable to suppose that Hansen was referring to *lutescens*. However, as he did not refer to *globulus*, a common Faroese species, it is safer to set his record aside. Holdhaus (1911) first recorded *Anacaena globulus*. Bengtson (1981) reported this species from 14 sites on 11 islands, and noted that it was usually in small numbers in a variety of habitats. We found this species in 30% of the samples taken in 2004. Strikingly, it was often absent from some springfed mires, a typical habitat in the rest of Europe, but it occurred in numbers in the *Sphagnum* carpet margin of a wind-eroded pool above Gróthúsvatn on Sandoy, a habitat that would normally be occupied by *Enochrus affinis* (Thunberg) over most of north-west Europe.

STAPHYLINIDAE

The majority of *Stenus* species are associated with wetland vegetation. It is not possible to assign names in earlier use with certainty, but we recorded only *S. brunnipes* Stephens from the east side of Gróthúsvatn on Sandoy and *S. nitidiusculus* Stephens in four samples, from Eysturoy, Sandoy, Streymoy and Vágur. Both species were previously reported by West (1930) and Bengtson (1981).

SCIRTIDAE

***Elodes minuta* L.** Hansen (1881) noted *Helodes minuta*, mainly collected in 1863-1868 by Dr A. Bergh. Mjöberg (1917)

recorded four specimens from Trongisvágur, Suðuroy, in 1915, and one example in Hestur in 1902. West (1930) notes occurrence in streams on Suðuroy and Streymoy, possibly mainly as larvae, though this is not entirely clear. Klausnitzer (1996) does not list this record for the Faroes, possibly considering previous records to be applicable to species other than *Elodes minuta*. An *Elodes* larva was found in an exposed grassy ditch in Klovin, Vágur in June 2004, but it could not be reared to the adult. An adult *Elodes* was found by JH in a spring at Dysjarnar on Vágoy on 20 June 2004; unfortunately it is not identifiable to species with certainty, being female.

CURCULIONIDAE

***Notaris aethiops* (Fab.)**. The only weevil regularly found in water is *N. aethiops*, typically associated with bur-reed (*Sparganium* spp.). However the two Faroese specimens were found in beach debris on Sandoy (West, 1930).

Other records

Brown (1945) noted the occurrence of the following in pools in October 1943: *Agabus bipustulatus*, *Hydroporus pubescens*, *H. palustris*, *Deronectes griseostriatus* De G. (= *Stictotarsus multilineatus*), *Helophorus viridicollis* Steph. (= *H.*

flavipes), and *Anacaena globulus*. These were identified by Professor F. Balfour-Browne. Brown did not specify the islands on which they were found, but he visited five: Vágur, Streymoy, Eysturoy, Borðoy and Suðuroy.

Nilsson (1996) provided an accurate and conservative checklist of Faroese aquatic beetles, without adding further data.

Species-Area relationship

Ribera *et al.* (2003) recently explored the species-area relationship for aquatic beetles in western Europe, and noted better predictive fits if the fauna was divided into its lotic and lentic elements. Reworking the multilinear regression analysis but including the Faroes, Iceland and Greenland (Table 2) the relationship between species numbers and the logarithm of area, connection to the mainland (islands being assigned 0), and the minimum latitude is highly significant ($r = 0.89$, $p < 0.0001$). The model predicts that there should be no running water species and eleven stagnant water species. The observed values are one (*Anacaena globulus*, though occupying stagnant habitats in the Faroes in addition to running water sites as further south) and eleven, respectively.

	logA	mLat	logC	logS	logRUN	logSTA
Greenland	4.34	60.00	0.00	0.70	0.00	0.70
Iceland	2.01	64.50	0.00	1.04	0.30	0.95
Faroe isl.	0.15	61.40	0.00	1.08	0.00	1.04

Table 2. Data additional to Ribera *et al.* (2003).
 A: area (Km²), Lat: minimum latitude, C: connection to mainland., S: total No. species, RUN: running, STA: standing.

Discussion

The current work has not generated any additions to the Faroese checklist, but it has at least consolidated the position. The fauna is highly impoverished, without whirligig beetles (Gyrinidae), larger diving beetles, reed beetles (Donaciinae), or Dryopoidea. The paucity of the beetle fauna is matched by impoverishment in other parts of the fauna. In particular the absence of mosquitoes and amphibians must surely explain the absence of Colymbetinae and Dytiscinae. Arguments concerning the potential for dispersal to the Faroes are irrelevant if there is no food available upon arrival.

Of the fourteen aquatic species known with some certainty from the Faroes, three are also Nearctic as well as being Palaearctic, with a further two introduced to the New World. Six of the species extend to North Africa, a further five occur as far south as the Iberian Peninsula, two get to France, and only one, *S. multilineatus*, is particularly restricted, being known south to Ireland and east to West Siberia.

However, the precise distribution of *S. multilineatus* and *S. griseostriatus* (De-Geer) remains to be clarified, the latter being known south to Morocco, and also in North America and Asia. But whatever the precise status of *S. multilineatus* it is the only boreomontane water beetle in the Faroes, the rest being widely distributed species in western Europe frequently found in lowlands. Thus the affinities of the fauna are primarily western and Atlantic, entirely as would be expected on islands influenced by the Gulf Stream.

With one exception, all of the species

found are known to fly, *Agabus bipustulatus*, *Hydroporus pubescens*, the *Cercyon* and the *Helophorus* taking readily to flight throughout adult life. The exception is *Anacaena globulus*, well known for its lack of flight ability (Jackson, 1956) and also, of course, for its occurrence in most wetland habitats on remote islands within its range. Phenomena typical of island faunas are evident. Those species that have become established are very common and occupy a wider range of habitats than on the mainland. *Hydroporus memnonius* and *H. nigrita* might have been thought rare on the basis of West (1930) having only found one of each, neither having been otherwise previously recorded, but we found them common once an appropriate sampling method was used. Species that we could not find, *Helophorus brevialpis* and *Cercyon marinus*, might well have occurred as a result of temporary colonisation. Colour forms occur more frequently than on the mainland. The pale form of *Hydroporus palustris* in the Nykutjørn is particularly striking. Mjöberg (1917) referred to a spotted form of *Cercyon littoralis*, and West (1930) confirmed that Mjöberg's series from Trongisvágur includes both dark and spotted forms. Finally the "rules of substitution" on islands, i.e. where species normally not occupying certain habitats do so in the absence of the species normally occupying this habitat, are always of interest. The occurrence of *Anacaena globulus* in the "wrong" habitat has been noted. The dominance of *Hydroporus palustris* in larger water bodies and that of *H. erythrocephalus* in smaller pools will be established by refer-

ence to work done in 2002; here it is sufficient to note that this difference is less clear, if anything the reverse, in northern Scotland. The widespread occurrence of *Agabus bipustulatus*, with larvae present in all still and most slow-running habitats, is not typical of areas occupied by other large diving beetles.

The prediction of lentic species in the Faroes is within 0.0068 logarithmic units of the actual 12 species (Sphaeridiinae excluded). This is the lowest residual of all eighteen areas under consideration, possibly reflecting the accuracy of the observation for the Faroes.

Finally, there is no evidence of beetles responding to climate change. In Scotland, the most extreme example thus far is that of *Rhantus suturalis* (Macleay). This species, which ranges from Europe to New Zealand, was known until recently in Scotland only from the extreme south on six occasions up to 1950. It was discovered in Fife by Mr T. Huxley in 2002, and in 2003 by GNF near the northern extremity of mainland Scotland in Caithness, at a site that had been sampled frequently since 1985. Thus there is activity further south that may yet result in additions to the Faroese fauna.

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