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## Review of Diapriidae of the Faroe Islands

(Hymenoptera, Diapriidae)

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The Faroe Islands are isolated in the North Sea but, despite sparse vegetation, are home to numerous insects. The diapriid fauna was previously studied by Kryger & Schmiedeknecht (1938) and Petersen (1956), but taxonomic knowledge has advanced significantly so a reevaluation is necessary. This study aims to update the diapriid checklist for the Faroes by reviewing historic material and some recent collections from the island Koltur. We identified ten species: *Aclista alticollis* (Thomson, 1858), *Aclista cf. insolita* Nixon, 1957, *Basalys abruptus* (Thomson, 1858), *B. longipennis* (Kieffer, 1911), *Miota exsecta* Wall, 1998, *Pantoclis similis* (Thomson, 1858), *P. trisulcata Kieffer*, 1907, *Synacra atracta* Macek, 1995, *Trichopria*? *aptera* (Ruthe, 1859), and *Zygota parallela* (Thomson, 1858) and found nine taxa new to the Faroes: *Aclista, Synacra, Zygota, A. alticollis, B. abruptus, B. longipennis, M. exsecta, P. similis* and *S. atracta*. In addition, we provide CO1 barcode sequences for *A. alticollis*, and an identification key for all Faroese diapriids.

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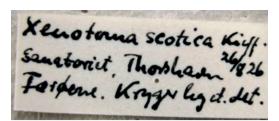
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#### Introduction

The Faroe Islands are an archipelago in the North Atlantic Ocean north of Scotland, south east of Iceland and west of Norway. The subpolar oceanic climate is characterized by cold (12°C) summers, and stormy, wet but mild (~5°C) winters demanding

high rates of adaptation of flora and fauna (Cappelen & Laursen 1998). While some diapriids can have huge distribution areas that span several continents, we expect the diapriid fauna of the Faroes to be similar to those of the nearby islands and coastal areas of Iceland, Greenland, Norway and Scotland which have comparable terrain and climate.



**Fig. 1.** Example of a handwritten label of the female *Pantoclis trisulcata* specimen by J. P. Kryger: *Xenotoma scotica* Kieffer, Streymoy Is., Sanatoriet near Tórshavn, ♀, 26.8.1926, leg. and det. J. P. Kryger.

The diapriid fauna was previously evaluated only by Kryger & Schmiedeknecht (1938) who specifically studied Faroese Hymenoptera and by Petersen (1956) in the context of his study of Icelandic Hymenoptera. They recorded: Aclista macroneura Kieffer, 1909, now Zygota parallela (Thomson, 1858); Cinetus fuscipes (Kieffer, 1907); Loxotropa aptera (Ruthe, 1859), now Trichopria aptera; L. suecica Kieffer, 1911, now Basalys suecicus; L. thomsoni Kieffer, 1911, now T. nigricornis (Marshall, 1868); Pantoclis trisulcata Kieffer, 1907; Xenotoma gracilicornis Kieffer, 1910, now Pantolyta flaviventris (Thomson, 1858); and X. scotica Kieffer, 1910, now Belyta sanguinolenta (Nees, 1834). Other authors studying the Faroese fauna (Landt 1800, Hansen 1881) did not mention any diapriids from the Faroe Islands.





Fig. 2. Aclista alticollis: A. male habitus, lateral; B. female habitus, lateral.

Almost seventy years since the last evaluation of Faroese diapriid taxonomy has advanced greatly and it is time to review the fauna again. This study is the first integrative taxonomic study of Faroese diapriids combining traditional morphology of the historic material identified by Kryger & Schmiedeknecht (1938) together with recently collected material which we have barcoded.

#### Material and methods

Fifty-six freshly caught specimens were examined for this study. All specimens were collected by Agnes Kreiling in 2021 and 2022 on the island of Koltur (Faroe Islands) using pitfall traps and Malaise traps, dry mounted on card points and deposited at the SNSB-ZSM and FOMNH collections. Of these DNA sequencing was attempted for sixteen specimens: the CO1 barcodes of two species (ZSM-IRT-Koltur-1 and ZSM-IRT-Koltur-3) were successfully obtained and uploaded on the Barcode of Life database (www.boldsystems.org). All sequences are publicly available in the BOLD project KODIA. Historical material from the collection of Jens Peter Kryger (NHMD) was also examined for this study. Twenty-five specimens from one collection event in 1826 comprising card mounted and ethanol preserved specimens of which the latter were dried and mounted. We have referred to Kryger & Schmiedeknecht (1938) to interpret the locality labels of J. P. Kryger (Fig. 1).

## Repository acronyms

FOMNH – Faroe Islands National Museum, Koltur island

NHMD – Zoological Museum of the Natural History Museum of Denmark

SNSB-ZSM – Bavarian State Collection of Zoology in Munich, Germany

#### Taxonomic part

## Aclista alticollis (Thomson, 1858) Fig. 2A-B

Nomenclature: Acoretus alticollis Thomson, 1858: 157, \$\varphi\$. Xenotoma nigra Kieffer, 1907: 23,25, \$\varphi\$. Synonymized by Nixon (1957). Pantoclis cilipes Kieffer, 1907: 31, 37, \$\varphi\$. Synonymized by Nixon (1957). Anectata (Acoretus) fallax Kieffer, 1909: 544, \$\varphi\$. Synonymized by Nixon (1957). Anectata (Acoretus) alticollis var. aestivalis Kieffer, 1909: 547, \$\varphi\$. Anectata (Acoretus) alticollis var. isotoma Kieffer, 1909: 547, \$\varphi\$.

Examined material: FAROE ISLANDS: Koltur Is., N61.98487, W6.96508, 3&, 19, 17.6.2022, Malaise trap, leg. A. Kreiling, det. J. Hübner/J. Macek (SNSB-ZSM), one male sequenced (BOLD:ACR7790). Koltur Is., N61.98473, W6.96653, 29, 26.7.2021, pitfall trap, KolturM1, leg. A. Kreiling, det. J. Hübner/J. Macek (SNSB-ZSM), one male sequenced (BOLD:ADU5289).





Fig. 3. Aclista cf. insolita male: A. habitus, lateral; B. habitus, dorsal.

**Distribution.** A common species widely distributed in North-West Europe (e.g. Nixon 1957). This is the first record of the species for the Faroe Islands. In addition the Barcode of Life database (www. boldsystems.org) has sequences from Denmark, Finland and Canada.

**Notes.** Sequence information was obtained for four of the Faroese specimens above and the species was assigned two BINs: ADU5289 and ACR7790. Both BINs were already recorded for Canada, Denmark and Finland, but only identified down to genus level. This is the first record of the genus *Aclista* from the Faroe Islands. *A. alticollis* was previously represented on BOLD by five other BINS, representing 106 specimens from Belarus, Canada, Denmark, Finland, Germany, Norway. It may be a species complex, although possibly some of these BINs are misidentified.





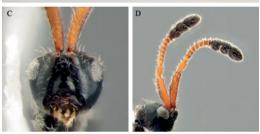


Fig. 4. Basalys abruptus female: A. habitus, lateral; B. habitus, dorsal; C. face; D. antennae, lateral.

### *Aclista* cf. *insolita* Nixon, 1957 Fig. 3A-B

**Examined material:** FAROE ISLANDS: Streymoy Is., Tórshavn, 2\$\delta\$, 4.6.1926, leg. J. P. Kryger, *Xenotoma gracilicornis* det. Kryger (FOMNH).

**Notes.** Kryger & Schmiedeknecht (1938) identified the material as *Xenotoma gracilicornis*, now *Pantolyta flaviventris* according to Chemyreva & Kolyada (2021), however it does not belong to *Pantolyta* and no other Faroese *Pantolyta* was seen during the current study. *P. flaviventris* should be removed from the checklist of the Faroe Islands.

#### Basalys abruptus Thomson, 1858 Figs 4A-D,5A-D

Nomenclature: Basalys abrupta Thomson, 1858: 368, ♀. Incorrect termination. Loxotropa convexa Kieffer 1911: 932. Synonymized by Nixon (1980).

Examined material: FAROE ISLANDS: Koltur Is., N61.98487, W6.96508, 3&, 2\, 17.6.2022, Malaise trap, Koltur-M3, leg. A. Kreiling, det. J. Hübner/D. Notton (SNSB-ZSM). Koltur Is., N61.98473, W6.96653, 2&, 2\, 2\, 2







Fig. 5. Basalys abruptus male: A. habitus, lateral; B. habitus, dorsal; C. face; D. antenna.

26.7.2021, pitfall trap, Koltur-OCR, leg. A. Kreiling, det. J. Hübner/D. Notton (SNSB-ZSM). Koltur Is., N 61.99041, W 6.97188, 12 δ, 27 ♀, 3.8.2022, pitfall trap, Koltur-KMM, leg. A. Kreiling, det. J. Hübner/D. Notton (SNSB-ZSM). Streymoy Is., Sanatoriet near Tórshavn, ♀, 28.7.1926, leg. J. P. Kryger, Loxotropa suecica det. Kryger (FOMNH); Sanatoriet near Tórshavn, δ, 14.7.1926, leg. J.P. Kryger, L. suecica det. Kryger (FOMNH); Tórshavn, ♀,14.7.1926, leg. J. P. Kryger, L. suecica det. Kryger (FOMNH).

**Distribution.** A common and widespread species in Europe (e. g. Hellén 1963, Kozlov 1978, Nixon 1980). This is the first record for the Faroe Islands. In addition the Barcode of Life database (www.boldsystems. org) has sequences from Bulgaria, Germany, Norway and Canada.

**Notes.** We have followed the interpretation of *Basalys abruptus* given by Nixon (1980) who saw type material. Kryger & Schmiedeknecht (1938) identified the Faroese material above as being *Loxotropa suecica* (Kieffer, 1911) now *B. suecicus* according to Johnson (1992), however we are not certain of the correct interpretation of that name and *B. suecicus* should be removed from the checklist for the Faroe Islands.



**Fig. 6.** Basalys longipennis female: **A.** habitus, lateral; **B.** habitus, dorsal.

#### Basalys longipennis (Kieffer, 1911) Fig. 6A-B

**Nomenclature:** *Loxotropa longipennis* Kieffer, 1911: 932, ♀.

Examined material: FAROE ISLANDS: Streymoy Is., Sanatoriet near Tórshavn, 29, 28.7.1926, leg. J.P. Kryger, *Loxotropa suecica* det. Kryger (FOMNH).

**Distribution.** A widespread species in Europe (e. g. Kozlov 1978, Nixon 1980). This is the first record for the Faroe Islands. In addition the Barcode of Life database (www.boldsystems.org) has a sequence from Norway.

**Notes.** We have followed the interpretation of *Basalys longipennis* given by Nixon (1980) who saw type material. Kryger & Schmiedeknecht (1938) identified the Faroese material above as *Loxotropa suecica* (Kieffer, 1911) now *B. suecicus*, however we are not certain of the correct interpretation of that name as we have not seen the type and *B. suecicus* should be removed from the checklist for the Faroe Islands.

#### Miota exsecta Wall, 1998 Fig. 7A-D

Nomenclature: *Miota exsecta* Wall, 1998: 62,65, fig. 7, &.

Examined material: FAROE ISLANDS: Streymoy Is., Sanatoriet near Tórshavn, ♂, 28.7.1926, leg. J. P. Kryger, Cinetus fuscipes det. Kryger (FOMNH); Tórshavn, 1♂, 1♀, 24.7.1926, leg. J. P. Kryger, C. fuscipes det. Kryger (FOMNH); Sanatoriet near Tórshavn, 2♂, 15.7.1926, leg. J.P. Kryger, C. fuscipes det. Kryger (FOMNH); Sanatoriet near Tórshavn, ♂, 28.7.1926, leg. J. P. Kryger, C. fuscipes det. Kryger (FOMNH).

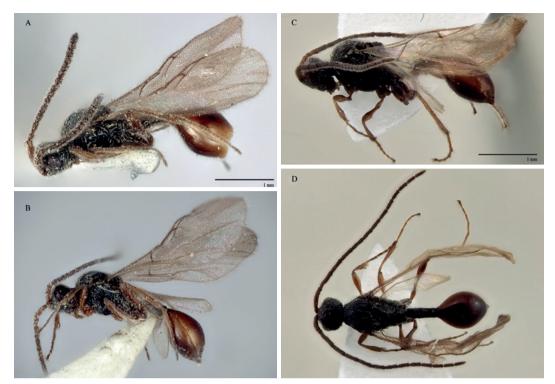


Fig. 7. Miota exsecta: A. female habitus, lateral; B-C. male habitus, lateral; D. male habitus, dorsal.

**Distribution.** This species is poorly known in Europe having only recently been described from material collected in Germany and Switzerland (Wall 1998). This is the first record for the Faroe Islands.

**Notes.** Kryger & Schmiedeknecht (1938) identified the material as *Cinetus fuscipes* however it is not a *Cinetus* and no other Faroese *Cinetus* was seen during this study. *C. fuscipes* should be removed from the checklist for the Faroe Islands. The female of *M. exsecta* was previously unknown but we have not described it here as the only available specimen is damaged.

## *Pantoclis similis* (Thomson, 1858) Fig. 8A-D

**Nomenclature:** *Belyta similis* Thomson, 1858: 172,  $\circ$ . *Pantoclis rufiventris* Kieffer, 1907: 32, 39,  $\circ$ . Synonymized by Nixon (1957).

Examined material: FAROE ISLANDS: Streymoy Is., Sanatoriet near Tórshavn, &, 28.7.1926, leg. J. P. Kryger, *Xenotoma scotica* det. Kryger (FOMNH); Sanatoriet near Tórshavn, &, 26.8.1926, leg. J. P. Kryger, *X. scotica* det. Kryger (FOMNH); Sanatoriet near Tórshavn,

 $\delta$ , 22.7.1926, leg. J. P. Kryger, X. scotica det. Kryger (FOMNH).

**Distribution.** A common and widespread species in Europe (e. g. Nixon 1957, Hellén 1964, Kozlov 1978). This is the first record for the Faroe Islands. In addition the Barcode of Life database (www.boldsystems. org) has sequences from Norway.

**Notes.** Kryger & Schmiedeknecht (1938) identified the material as *Xenotoma scotica*, now *Belyta sanguinolenta* according to Macek (1996), however it does not belong to *Belyta* and no other Faroese *Belyta* was seen during the current study. *B. sanguinolenta* should be removed from the checklist of the Faroe Islands. The examined material was identified using Nixon's (1957) key.

# *Pantoclis trisulcata* **Kieffer, 1907** Fig. 9A-C

Nomenclature: Pantoclistrisulcata Kieffer, 1907: 32, 40,  $\circ$ . Examined material: FAROE ISLANDS: Streymoy Is., Sanatoriet near Tórshavn,  $\circ$ , 26.8.1926, leg. J. P. Kryger, Sanatoriet near Tórshavn, Sanatoriet near Tórsha



Fig. 8. Pantoclis similis male: A. habitus, dorsal; B. head, lateral; C. face, frontal; D. wing venation.

Tórshavn, Ç, 26.8.1926, leg. J. P. Kryger, *X. scotica* det. Kryger (FOMNH); Tórshavn, old garden at Landavegur (as gamle havn), Ç, 2.6.1926, leg. J. P. Kryger, *X. scotica* det. Kryger, *Pantoclis trisulcata* det. B. Petersen (FOMNH).

**Distribution.** A common and widespread species in Europe (e.g. Nixon 1957, Hellén 1964, Kozlov 1978). Previously recorded from the Faroe Islands by Petersen (1956). In addition the Barcode of Life database (www.boldsystems.org) has sequences from Finland and Norway.

**Notes.** Kryger & Schmiedeknecht (1938) identified the material as *Xenotoma scotica*, now *Belyta sanguinolenta* according to Macek (1996), however it does not belong to *Belyta* and no other Faroese *Belyta* was seen during the current study. *B. sanguinolenta* should be removed from the checklist of the Faroe Islands. Petersen (1956) realized the error and correctly redetermined it as *Pantoclis trisulcata*.

## Synacra atracta Macek, 1995 Fig. 10A-B

**Nomenclature:** Synacra (Paratelopsilus) atracta Macek, 1995: 477, figs 3,10,16,  $\Im$ 

Examined material: FAROE ISLANDS: Streymoy Is., Ljósávatn Lake south of Tórshavn, ♂, 15.6.1926, leg. J. P. Kryger, *Xenotoma scotica* det. Kryger (FOMNH).

**Distribution.** A widespread species in Europe (e. g. Macek 1995). This is the first record of the species for the Faroe Islands. In addition the Barcode of Life database (www.boldsystems.org) has sequences from Norway.

**Notes.** Kryger & Schmiedeknecht(1938) identified the material as *Xenotoma scotica*, now *Belyta sanguinolenta* according to Macek (1996), however it does not belong to *Belyta* and no other Faroese *Belyta* was seen during the current study. *B. sanguinolenta* should be removed from the checklist of the Faroe Islands. This is the first record of the genus *Synacra* from the Faroe Islands.





Fig. 9. Pantoclis trisulcata female: A. habitus, lateral; B. habitus, dorsal.

## *Trichopria* ? *aptera* (Ruthe, 1859) Fig. 11A-B

Nomenclature: Diapria aptera Ruthe, 1859: 313, ♀.

Examined material: FAROE ISLANDS: Koltur Is., N61.99041, W6.97188, altitude 87 m, δ, 3.8.2022, pitfall trap, sampling event 2022-08-03-KMM-P, leg. A. Kreiling, det. J. Hübner/H. Gabel (SNSB-ZSM). Streymoy Is., Sanatoriet near Tórshavn, \$\particle{\Pi}\$, 15.7.1926, leg. J. P. Kryger, Loxotropa thomsoni det. Kryger (FOMNH); Tórshavn, δ, 22.8.1926, leg. J. P. Kryger, L. aptera det. Kryger (FOMNH); Tórshavn, δ, 24.7.1926, leg. J. P. Kryger, L. thomsoni det. Kryger (FOMNH); Tórshavn, δ, 24.7.1926, leg. J. P. Kryger, L. thomsoni det. Kryger (FOMNH).

**Distribution.** The distribution of this species is poorly known owing to taxonomic problems explained below. Previously recorded from the Faroe Islands by Kryger & Schmiedeknecht (1938) and Petersen (1956).

**Notes.** Kryger & Schmiedeknecht (1938) found one male specimen, which they identified as *L. aptera* Ruthe, 1859, now *Trichopria aptera*, and four male specimens they identified as *L. thomsoni* Kieffer, 1911 now *T. nigricornis* (Marshall, 1868). From the same material however Petersen (1956) did not recognise





**Fig. 10.** Synacra atracta male: **A.** habitus, lateral; **B.** habitus, dorsal.

two different species and made L. thomsoni a junior synonym of L. aptera. Unfortunately there is uncertainty over the correct interpretation of T. aptera because the type from Iceland has been missing since 1859 (Ruthe 1859, Petersen 1956, Notton 1995), this species belongs to a particularly difficult species group and Icelandic material has not been critically revised. Problems with Petersen's synonymy were outlined by Notton (1995) and since then Notton has seen material suggesting there are two closely related brachypterous Trichopria in Iceland, either of which could be *T. aptera*. For the time being we are following the morphological concept of Petersen (1956) bearing in mind that this may include more than one species, pending a detailed revision of Icelandic material which is unfortunately outside the scope of the current paper. However since *L. thomsoni* is not certainly synonymized with T. aptera, T. nigricornis should be removed from the checklist for the Faroe Islands.





**Fig. 11.** *Trichopria* ? *aptera* male: **A.** habitus, lateral; **B.** habitus, dorsal.

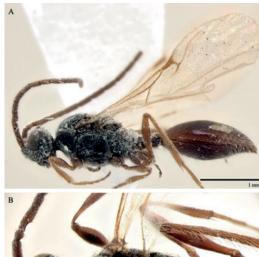
### *Zygota parallela* (Thomson, 1858) Fig. 12A-B

Nomenclature: Belyta parallela Thomson, 1858: 175, &. Aclista macroneura Kieffer, 1909: 469, &. Synonymized by Macek (1997).

Examined material: FAROE ISLANDS: Esturoy Is., Eiði (as Ejde), &, 8.8.1926, leg. J. P. Kryger, A. macroneura det. Kryger (FOMNH). Streymoy Is., Sanatoriet near Tórshavn, &, 22.7.1926, leg. J. P. Kryger, A. macroneura det. Kryger (FOMNH); Tórshavn, &, 14.6.1926, leg. J. P. Kryger, A. macroneura det. Kryger (FOMNH); Tórshavn, north of Viðarlundin park, also known as Plantajan (as n. for Plantagen), &, 27.6.1926, leg. J. P. Kryger, A. macroneura det. Kryger (FOMNH).

**Distribution.** A widespread species in Europe (e.g. Macek 1997). Previously recorded from the Faroe Islands by Kryger & Schmiedeknecht (1938) as *Aclista macroneura*.

**Notes.** This is the first record of the genus *Zygota* from the Faroe Islands.





**Fig. 12.** *Zygota parallela* male: **A.** habitus, lateral; **B.** head, mesosoma and petiole, dorsal.

## Provisional key to Diapriidae of the Faroe Islands

The	male of Basalys longipennis is unknown.
1	Notauli absent
-	Notauli present 6
2	Antenna 12-segmented (females) 3
-	Antenna 14-segmented (males) 5
3	Antennal club gradually expanded; base of large tergite without hair tufts
-	Antennal club with abrupt 3-segmented club; base of large tergite with hair tufts 4
4	Antennal segment 11 slightly but distinctly transverse
-	Antennal segment 11 slightly elongate
5	Wings vestigial; base of large tergite without hair tufts
-	Wings extending beyond apex of metasoma; base of large tergite with hair tufts

Radial cell open ...... 7 Radial cell closed ...... 8 7 Mandibles long, without eredge straight, barely overlapping, together forming a backwards directed beak; apex of scape with sharp flanges; female with 12 antennal segments ..... ...... Synacra atracta Mandibles without eredge curved, overlapping, together not beak-like; apex of scape without sharp flanges; female with 15 antennal segments ...... Zygota parallela Marginal vein about as long as its distance from basal vein ...... Miota exsecta Marginal vein much shorter than its distance Mandibles with lower tooth long, sickle-shaped, more or less widely crossing; apex of poststigmal vein posteriorly directed; petiole more than about twice as long as wide ...... 10 Mandibles with lower tooth not long, sickleshaped, not widely crossing; apex of poststigmal vein basally directed; petioleless less than 1.5 times as long as wide ...... 11 Mandibles shorter, not so widely crossing ..... Mandibles longer, conspicuously sickle-shaped and widely crossing at tips .. Aclista cf. insolita The two lateral keels of the propodeum closer together; radial cell shorter; smaller darker overall ...... Pantoclis trisulcata The two lateral keels of the propodeum not so

#### Discussion

close; radial cell longer; larger overall, and

usually with parts of body and legs reddish/yellowish ....... Pantoclis similis

Even today with advanced methodologies and literature Diapriidae is a difficult taxon; their taxonomy is subject to constant reevaluation, even at genus level, so it is understandable that earlier works (Kryger & Schmiedeknecht 1938, Petersen 1956) now need updating. Our study adds and updates significantly the previously limited understanding of the diapriid fauna of the Faroe Islands and corrects some taxonomic mistakes. We show the value of reevaluating historic material, complemented with specimens collected using pitfall and Malaise

traps, to cover a wider geographical, temporal and ecological envelope, sampling as many species as possible. Using integrative methods, as we have initiated with Aclista alticollis, will allow further species to be identified using comparison of CO1 barcodes complementing morphological data and placing them in their wider genetic context. The specific biology of many diapriids is unknown and there are no biological observations for the Faroe Islands, yet the Faroe Islands offer a unique opportunity in diapriid research, the constantly humid climate favours their dipteran hosts, e.g. at lat least 30 species of Mycetophilidae fungus gnats have been recorded (Kjærandsen & Jorgensen 1992; pers. comm. J. Kjærandsen) an important host group for belytine diapriids, and even though there are no native trees there is a diverse range of fungi, over 600 species (Vesterholt 1998) which provide food for these fly hosts. Consequently we believe there will be further opportunities to discover more diapriid species and uncover their biology.

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