

## Checklist of the hepatic flora of sub-Antarctic Îles Kerguelen

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**Abstract** – A checklist of the hepatics of Îles Kerguelen (49°S, 70°E) is presented, based on literature, and on recent collections by N.J.M. Gremmen and R.S. Poulsen. A total of 37 species are listed, of which five are new records for the archipelago.

**Hepaticae / checklist / Antarctic / Îles Kerguelen**

### INTRODUCTION

The Kerguelen archipelago (49°S, 70°E) is a very isolated island group in the southern Indian Ocean, over 3500 km from Africa and Australia, and some 1800 km from the Antarctic continent. It was the first sub-Antarctic island group to be visited by botanists and naturalists collecting hepatics. From 12 May to 20 July 1840 J. D. Hooker, a member of the British Naval Expedition of 1839-1843 on the ships “Erebus” and “Terror” under Captain J. C. Ross, collected 10 species of hepatics (7 presently accepted species, also confirmed in the area, 1 species found to be identical with the later described *Cephaloziella transvaalensis*, and 2 species – *Fossombronia pusilla* and *Noteroclada confluens* – that are probably not correctly named in these islands (Hooker & Taylor, 1844; Taylor, 1846; Taylor & Hooker, 1847). Since Hooker’s visit in 1840, a number of other collectors, not always botanists, have collected hepatics in these islands. The results were published of collections by H. N. Moseley, naturalist on H.M.S. “Challenger”, in January – February 1874 (Mitten, 1876a), Rev. A. E. Eaton, naturalist of the Transit of Venus expedition, in October 1874 and January 1875 (Mitten, 1876b, 1879), F. Naumann, member of S.M.S. “Gazelle”, in October 1874 – February 1875 (Schiffner, 1890), E. Werth, botanist, collecting in January 1902 and again in September 1902 – January 1903, E. Vanhöffen, zoologist, collecting in January 1902, and Urbansky, collecting in September 1902 – January 1903, all members of “Die Deutsche Südpolar-Expedition” on the ship “Gauss” (Schiffner, 1906). In the

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last 100 years the only published collections were made by J.-P. Hébrard (February – March 1969), who only listed six species that were reported earlier from the islands (Hébrard, 1970; Desplanques & Hébrard, 1972), and by J. J. Engel (collecting in 1971), who published two species of *Clasmatocolea* (one new for the islands) in his monograph of this genus (Engel 1980) and numerous collections of *Hygrolembidium ventrosum* (Schuster & Engel, 1987). Finally Grolle (2002) reported one additional species based on the Hébrard collection and some additional data about the occurrence of some species.

In December 2003 and January 2004 N. J. M. Gremmen collected some 150 specimens of hepatics on Kerguelen. Collections were made on Île Australia and Île Mayes, two islands in the Golfe du Morbihan, in Val Studer and the slopes leading up to Mt. Amery, and around Port-aux-Français. This material was identified by J. Váňa, and yielded 30 species of hepatics: 25 of these were already known from the area and 5 species are newly recorded for the archipelago. The most common species in the material are *Clasmatocolea rigens*, *Cryptochila grandiflora* and *Plagiochila heterodonta*.

In addition, records of 12 species collected by R. S. Poulsen in 1998 from Péninsule Courbet, Péninsule Rallier du Baty and the adjoining Baie de la Mouche, from La Mortadelle, and from Île Mayes are published here. These specimens were sent to J. Váňa for identification by R. Ochyra (Kraków). One species from this collection (the type of *Pachyglossa grolleana* Váňa) has been published elsewhere (Váňa & Gremmen, 2005).

Voucher specimens from Gremmen (NJMG) collection are in F and PRC, those of Poulsen (RSP) collection in C and KRAM; some duplicates are in PRC.

## STUDY AREA

Kerguelen is the largest of the island groups in the sub-Antarctic region, and consists of a main island, 6500 km<sup>2</sup> in size, surrounded by about 60 off-lying islands of 1-200 km<sup>2</sup> (Chapuis *et al.*, 2002). The nearest land is Heard Island, ca 500 km to the south, and Îles Crozet, some 1400 km westward of Kerguelen. The geological age of the islands is estimated at ca 40 million years, which is considerably older than the other Southern Indian Ocean Islands. The climate is cold, with a mean temperature of ca 4.5°C, and a monthly mean of 2°C in the coldest and 8°C in the warmest month. Precipitation ranges from c. 800 mm in the eastern part of the island to over 3000 mm in the western parts, and is mostly in the form of rain. Snow occurs on average at some 120 days annually. Winds are strong, and predominantly from westerly directions. During the Quaternary the archipelago was heavily glaciated. At present some 10% of the area is glaciated, with the Cook Ice Cap covering some 500 km<sup>2</sup>.

## SPECIES PRESENTLY KNOWN FROM KERGUELEN

*Acrobolbus ochrophyllus* (Hook. f. & Taylor) R.M. Schust. — (Mitten, 1876a, 1876b, 1879, 1884; Schiffner, 1890, 1893-1895; Stephani, 1901-1906; Bonner, 1962

[IH 2], 1976 [IH 8], 1987 [IH 8/9], 1985 [IH 10], 1990 [IH 12]; Arnell 1963: 363; Vána, 1985; Grolle, 2002). Péninsule Rallier du Baty: *RSP* 778; Île Australia: *NJMG* 432, 433, 602, 757 *p.p.*, 897 *p.p.*

***Aneura subcanaliculata*** R.M. Schust. — (maybe the report of *A. pinguis* in Mitten, 1879, 1884, Schenck, 1905 belongs here). Île Australia: *NJMG* 232, 726 (new for Kerguelen).

***Blepharidophyllum densifolium*** (Hook.) C. Massal. — (Mitten, 1876a, 1879, 1884; Schiffner 1893-1895; Grolle, 1965, 1971b, 1971c; Hébrard, 1970; Desplanques & Hébrard, 1972; Grolle, 2002; Schuster, 2002). Île Australia: *NJMG* 758.

***Cephaloziella transvaalensis*** S.W. Arnell — (the report of *Anastrophyllum minutum* in Hooker & Taylor, 1844, Taylor & Hooker, 1847, Gottsche *et al.*, 1844-1847, Vána, 1982 belongs here, see Grolle, 2002).

***Cephaloziella varians*** (Gottsche) Steph. — Île Australia: *NJMG* 220, 319A, 416, 462, 508, 515, 533, 634, 1854; Île Mayes: *NJMG* 161, 2013 (new for Kerguelen).

***Chiloscyphus coadunatus*** (Sw.) J.J. Engel & R.M. Schust. — (Hooker & Taylor, 1844; Taylor & Hooker, 1847; Gottsche *et al.*, 1844-1847; Mitten, 1879, 1884; Stephani, 1906-1909; Bonner, 1976 [IH 8], 1985 [IH 10], 1987 [IH 8/9]; Grolle, 2002).

***Chiloscyphus randii*** (S.W. Arnell) J.J. Engel & R.M. Schust. — (Schiffner, 1890; Bonner, 1985 [IH 10]; Grolle, 2002). Île Australia: *NJMG* 546 *p.p.*

***Chiloscyphus werthii*** J.J. Engel & R.M. Schust. — (Schiffner, 1906; Bonner, 1985 [IH 10]; Grolle, 2002). Île Australia: *NJMG* 328, 444, 482, 483 *p.p.*, 546 *p.p.*, 909. The specimens agree well with the type of this poorly known species; only the autoecious inflorescence cannot be detected in all specimens.

***Clandarium clandestinum*** (Mont.) R.M. Schust. — (Mitten, 1876b, 1879, 1884; Schiffner, 1890; Bonner, 1962 [IH 2]; Grolle, 1965, 2002). Île Australia: *NJMG* 251 *p.p.*, 320 *p.p.*, 325, 833 *p.p.*

***Clasmatocolea humilis*** (Hook. f. & Taylor) Grolle — (Hooker & Taylor, 1844; Taylor & Hooker, 1847; Gottsche *et al.*, 1844-1847; Mitten, 1884; Stephani, 1906-1909; Engel, 1980; Grolle, 1959b, 1971b, 1971c, 2002). Île Australia: *NJMG* 43 *p.p.*, 44 *p.p.*, 97, 230, 249 *p.p.*, 417 *p.p.*, 735, 736 *p.p.*, 757 *p.p.*, 770, 857, 859 *p.p.*

***Clasmatocolea rigens*** (Hook. f. & Taylor) J.J. Engel — (Schiffner, 1890; Stephani, 1917-1925; Bonner, 1985 [IH 10]; Grolle, 2002). Île Australia, Île Mayes, and Île Longue: *NJMG* (35 specimens). This very common species was also newly found in Île de la Possession, Crozet Archipelago, near the scientific station (*NJMG* 4245 *p.p.*, 4264, 4275).

***Clasmatocolea vermicularis*** (Lehm.) Grolle — (Engel, 1980; Grolle, 2002).

***Cryptochila grandiflora*** (Lindenb. & Gottsche) Grolle — (Stephani 1906-1909 as *Adelanthus magellanicus*; Grolle, 1971a, 1972b, 2002; Desplanques & Hébrard, 1972). La Mortadelle: *RSP* 627, 652; Île Australia and Val Studer: *NJMG* (24 specimens).

***Fossombronina australis*** Mitt. — (Mitten, 1879, 1884; Schiffner, 1890, 1906; Stephani, 1898-1900; Bonner, 1965 [IH 5]; Schuster, 1994; Grolle, 1971c, 2002). La Mortadelle: *RSP* 588; Île Australia: *NJMG* 313 *p.p.*, 321, 327, 660.

***Gymnocoleopsis cylindriflora*** (Mitt.) R.M. Schust. — (Mitten, 1876a, 1876b, 1879, 1884; Stephani, 1901-1906; Bonner, 1976 [IH 8], 1985 [IH 10], 1987 [IH 8/9]; Schuster, 1995, 2002; Grolle, 1971c, 2002) or Île Australia: *NJMG* 404.

***Herzogobryum atrocapillum*** (Hook. f. & Taylor) Grolle — (Taylor, 1846; Taylor & Hooker, 1847; Gottsche *et al.*, 1844-1847; Mitten, 1876a, 1879, 1884; Stephani, 1901-1906; Bonner, 1966 [IH 5]; Grolle, 1966, 1971b, 1971c, 1975, 2002; Schuster, 1996, 2002; Bednarek-Ochyra *et al.*, 2000). Péninsule Courbet: *RSP* 369B *p.p.*; Île Australia: *NJMG* 194A *p.p.*, 774, 896, 897 *p.p.*

- Herzogobryum vermiculare*** (Schiffn.) Grolle — (Schiffner, 1890; Stephani, 1901-1906 under as *Acolea stygia*; Bonner, 1966 [IH 6]; Schuster, 1996, 2002; Grolle, 1966, 1971c, 1972a, 1975, 2002).
- Hygrolembidium ventrosom*** (Mitt.) Grolle — (Mitten, 1876a, 1876b, 1879, 1884; Schiffner 1893-1895; Stephani, 1906-1909; Herzog, 1952; Bonner, 1985 [IH 10]; Schuster & Engel, 1987; Bednarek-Ochyra *et al.*, 2000; Schuster, 2000; Grolle, 1971c, 2002).
- Jamesoniella colorata*** (Lehm.) Schiffn. — (Hooker & Taylor, 1844; Taylor & Hooker 1847; Gottsche *et al.*, 1844-1847; Mitten, 1876a, 1879, 1884; Schiffner, 1890; Wright, 1905; Grolle, 1971a, 2002). Île Mayes: *RSP* 219; Île Australia: *NJMG* 43 p.p., 75, 205, 231, 431, 497, 913.
- Jensenia difformis*** (Nees) Grolle — (Stephani, 1898-1900; Schiffner, 1906; Hässel de Menéndez, 1961; Hébrard, 1970; Grolle, 1964, 1971b, 1971c, 2002; Bonner, 1989 [IH 11]). Île Australia: *NJMG* 300 p.p., 447, 756 p.p., 760 p.p., 833 p.p., 1816 p.p., 1817 p.p.
- Jungermannia coniflora*** Schiffn. — (Mitten, 1879, 1884 – erroneously as *Solenostoma humile*, see Váňa, 1974; Schiffner, 1890; Stephani, 1901-1906; Grolle, 1971c, 2002). Péninsule Courbet: *RSP* 362; *NJMG* 185 p.p., 331A, Île Mayes: *NJMG* 1816 p.p., 1817 p.p.
- Lepidozia laevifolia*** (Hook. f. & Taylor) Gottsche *et al.* — (Schiffner, 1890 erroneously as *L. quadrifida*, see Schiffner 1906; Fulford, 1966; Grolle, 2002). Île Australia: *NJMG* 249 p.p., 405, 745, 796.
- Leptoscyphus expansus*** (Lehm.) Grolle — (Schiffner, 1890; Stephani, 1906-1909; Bonner, 1963 [IH 4]; Grolle, 1971b, 2002).
- Lophozia lancistipa*** (Grolle) R.M. Schust. — Île Australia: *NJMG* 320 p.p. (**new for Kerguelen**).
- Lophozia leucorhiza*** (Mitt.) R.M. Schust. — (Mitten 1876a, 1879, 1884; Stephani, 1901-1906; Schuster, 1966b, 2002; Bonner, 1976 [IH 8], 1987 [IH 8/9], 1990 [IH 12]; Grolle, 2002).
- Marchantia berteriana*** Lehm. & Lindenb. — (Schiffner, 1890; Bischler-Causse, 1993; Grolle, 2002). La Mortadelle: *RSP* 626 p.p.
- Marchantia polymorpha*** L. — (Hooker & Taylor, 1844; Taylor & Hooker, 1847; Gottsche *et al.*, 1844-1847; Mitten, 1884; Schenck, 1905; Wright, 1905; Schiffner, 1906; Hébrard, 1970; Schuster 1992: 329; Bischler-Causse, 1993; Grolle, 2002).
- Pachyglossa fissa*** (Mitt.) Herzog & Grolle — (Mitten, 1876a, 1879, 1884; Schiffner 1893-1895; Stephani, 1906-1909; Grolle, 1959a, 1971c, 2002; Fulford, 1963a, 1963b; Bonner, 1966 [IH 6], 1989 [IH 11]; Bednarek-Ochyra *et al.*, 2000). Île Australia: *NJMG* 757 p.p.
- Pachyglossa grolleana*** Váňa — Péninsule Courbet: *RSP* 369B, 491; La Mortadelle: *RSP* 626 p.p. (Váňa & Gremmen, 2005).
- Pedinophyllopsis abdita*** (Sull.) R.M. Schust. & Inoue — (Mitten, 1876a, 1876b, 1879, 1884; Schiffner, 1906; Stephani, 1906-1909; Grolle, 1963, 2002; Desplanques & Hébrard, 1972; Bonner, 1978 [IH 9], 1987 [IH 8/9]). La Mortadelle: *RSP* 717; Île Australia: *NJMG* 243 p.p., 244 p.p., 249 p.p., 257, 513, 580, 673, 908; Île Mayes: *NJMG* 130, 2016; Val Studer: *NJMG* 1429 p.p., 1485.
- Plagiochila heterodonta*** (Hook. f. & Taylor) Gottsche *et al.* — (Hooker & Taylor, 1844; Taylor & Hooker, 1847; Gottsche *et al.*, 1844-1847; Mitten, 1876a, 1876b, 1879, 1884; Schiffner, 1890, 1906; Stephani, 1901-1906; Bonner, 1962 [IH 1], 1976 [IH 8], 1987 [IH 8/9], 1989 [IH 11]; Grolle, 1971b, 1971c, 2002; Desplanques & Hébrard, 1972). Péninsule Rallier du Baty: *RSP* 770B; Île Australia, Île Mayes, and Val Studer: *NJMG* (35 specimens).

***Plagiochila minutula*** (Hook. f. & Taylor) Gottsche *et al.* — (Hooker & Taylor, 1844; Taylor & Hooker, 1847; Gottsche *et al.*, 1844-1847; Mitten, 1884; Schiffner, 1890; Stephani, 1901-1906; Bonner, 1962 [IH 1], 1976 [IH 8], 1987 [IH 8/9], 1989 [IH 11]; Grolle, 2002). Île Australia: *NJMG* 68, 73, 417, 481, 769, 864, 858; Île Mayes: *NJMG* 1826.

***Riccardia leptothallus*** R.M. Schust. — Île Australia: *NJMG* 48 p.p., 330, 442, 724, 918 p.p. (new for Kerguelen).

***Riccardia marionensis*** R.M. Schust. — (maybe the report of *A. multifida* in Mitten, 1876b, 1879, 1884; Schenk, 1905 belongs here). Île Australia: *NJMG* 228, 732, 781, 918 p.p. (new for Kerguelen).

***Symphyogyna podophylla*** (Thunb.) Mont. & Nees — (Mitten, 1876a, 1876b, 1879, 1884; Grolle, 2002). La Mortadelle: *RSP* 645; Île Australia: *NJMG* 46, 47 p.p., 48 p.p., 370 p.p.

***Temnoma quadripartitum*** (Hook.) Mitt. — (Mitten, 1876a, 1879, 1884; Schiffner, 1890, 1893-1895; Fulford, 1963a; Schuster, 1966a; Bonner, 1990 [IH 12]; Grolle, 2002).

***Tylimanthus tenellus*** (Taylor ex Lehm.) Mitt. — (Mitten, 1876b, 1879, 1884; Schiffner, 1890; Stephani, 1906-1909; Hässel de Menéndez & Solari, 1972; Grolle, 1971b, 1971c, 2002; Bonner, 1990 [IH 12]). Île Mayes: *RSP* 281; Péninsule Courbet: *RSP* 361, 390; La Mortadelle: *RSP* 634; Baie de la Mouche: *RSP* 786; Île Australia: *NJMG* 483 p.p., 484.

## DISCUSSION

Earlier summaries of the knowledge of the hepatics flora from the area were published by Mitten (1884), Schiffner (1906), and recently in the catalogue of Grolle (2002), which included all sub-Antarctic and temperate islands in the eastern sector of the Southern hemisphere. In table 1 the number of species added

Table 1. Number of new species reported from the archipelago

<i>Reference</i>	<i>new records</i>
Hooker & Taylor (1844)	6
Taylor (1846)	1
Mitten (1876a)	9
Mitten (1876b)	2
Mitten (1879)	2
Schiffner (1890)	6
Stephani (1898-1900)	1
Schiffner (1906)	1
Grolle (1971a)	1
Engel (1980)	1
Grolle (2002)	1
Vána & Gremmen (2005)	1
Present account	5
<b>Total</b>	<b>37</b>

to the flora in each account from the literature is given. This shows that the addition of new records to the hepatic flora of Kerguelen after the initial work of Hooker & Taylor (1844), Mitten (1876a) and Schiffner (1890) has been very slow.

Of the 37 species presently known from Kerguelen only one (*Chiloscyphus werthii*) seems to be restricted to this island group. Ten species are restricted to the sub-Antarctic islands of the Southern Indian Ocean Province (SIP: Îles Crozet, Îles Kerguelen, Prince Edward Islands, Heard Island, and McDonald Island). Because Kerguelen is the oldest of the subantarctic islands, and also the largest, one would expect the species richness to be at least as large as that of the Prince Edward Islands (49) or Crozet (43), where the climate is comparable. Also one would expect that the number of species restricted to a single island would be higher for Kerguelen than for the other islands. This is not the case. Of 19 hepatic species known only from the SIP islands only one is restricted to Kerguelen, one from Heard, none from Crozet, and six from the Prince Edward Islands (based on data from Grolle, 2002, Váňa & Gremmen, 2005, and this account). This appears to be related to the differences in intensity of study at the different islands. Of the six Prince Edward Islands species four belong to the genus *Riccardia*, which was extensively studied on these islands by Schuster (1989).

It seems likely therefore that a serious effort to survey the hepatic flora of Kerguelen would yield a considerable number of additional species. Many parts of the archipelago have not been studied so far, and many of the visits on which our knowledge of the hepatic flora is based have been quite short. Any detailed biogeographical treatment of the hepatics flora of this archipelago at this stage would be premature.

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