New record of *Schmitzia hiscockiana* Maggs & Guiry (Rhodophyta, Florideophyceae) in the Bay of Morlaix, Brittany, France

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**Abstract** – The red alga *Schmitzia hiscockiana* Maggs & Guiry is reported for Brittany for the first time. Our finding point to the southernmost limit of geographic distribution of this species. Molecular sequences (COI-5P, psbA, rbcL and LSU) are provided for the species and molecular phylogeny resolved *Schmitzia hiscockiana* along with two unidentified australian species of *Schmitzia* as sister to the lineage encompassing the Acerosiphonales and the Ceramiales.

**Calosiphonaceae / Gigartinales / Acerosiphonales / Ceramiales / COI-5P / psbA and rbcL and LSU sequences / molecular phylogeny**

The red alga *Schmitzia hiscockiana* Maggs & Guiry was described in 1985 by Christine Maggs and Mike Guiry. They frequently found this species in the course of subtidal algal surveys around the coasts of the British Isles from 1979 to 1984 (Maggs & Guiry, 1985). Since its description from specimens from south-west coast of Bardsey Island, N. Wales, UK, this conspicuous species has been reported more recently around the British Isles (Morton 1994, 2003) on various hard substrata as well as on maerl bed (Peña *et al.*, 2014). Its southern limit, to date, is the Isles of Scilly off the western tip of Cornwall (Maggs & Guiry, 1985). In addition to the British Isles, this species has been recorded in Scandinavia, Norway (Karlsson, 1995; Lein *et al.*, 1999; Husa *et al.*, 2014) and Sweden (Karlsson, 1990).

During a dive organized on July 8th 2014 at Basse Plate in front of Roscoff Marine Station, near the island of Batz, to document with *in situ* underwater photography a recently described species, *Kallymenia crouaniorum* A. Vergès & L. Le Gall (Robuchon *et al.*, 2014), we observed a handful of individuals of *Schmitzia hiscockiana* Maggs & Guiry growing on the rocks among understory red seaweeds

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Fig. 1. Underwater photography of Schmitzia hiscockiana growing on the rock among understory red seaweeds of a kelp forest formed by Laminaria hyperborea.

Fig. 2. Habit of Schmitzia hiscockiana. Specimen PC0659033. Scale bar = 1 cm.
Schmitzia hiscockiana in the Bay of Morlaix, France

(Rhodophyta) of a kelp forest formed by Laminaria hyperborea (Gunnerus) Foslie (Fig. 1). Another specimen was found on June 22th 2015 on the Méloine reef eastward of the Bay of Morlaix, in the context of an inventory supported by the French Marine Protection Agency. To the best of our knowledge, this species has not been hitherto reported southward of the British Isles. These new records extend the distribution of this species to North West Brittany, a region which is characterized by pockets of cold water (Gallon et al., 2014).

The observation of Schmitzia hiscockiana in this cold-water pocket is congruent with the hypothesis that boreal species may have found a refuge there after the Last Glaciation Maximum (Provan, 2005). No reproductive structures were observed underwater nor after observation of the four individuals sampled (LLG5057 (PC0145157), LLG5058 (PC0145158), BDR0093 (PC0659033, Fig. 2), PML0237 (PC0534587). These new records double the diversity of the genus Schmitzia for France where Schmitzia neapolitana (Berthold) P.C.Silva was recorded in the Bay of Morlaix (Feldmann herbarium PC0461124, PC0512050-54 Magne herbarium...
Table 1. Collection details of the specimens of *Schmitzia hiscockiana* collected in Finistère, Brittany along with GenBank accession numbers

<table>
<thead>
<tr>
<th>Field ID (PC ID)</th>
<th>Locality</th>
<th>COI-5P</th>
<th>rbcL</th>
<th>psbA</th>
<th>LSU</th>
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<tbody>
<tr>
<td>LLG5057 (PC0145157)</td>
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<td>KX676506</td>
<td>KX679281</td>
<td>KX676511</td>
<td>KX676509</td>
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<td>KX676505</td>
<td>KX679280</td>
<td>KX676510</td>
<td>KX676508</td>
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<tr>
<td>BDR0093 (PC0659033)</td>
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<td>KX676507</td>
<td></td>
<td></td>
<td>KX679279</td>
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<tr>
<td>PML0237 (PC0534587)</td>
<td>la Méloine, 22/06/2015</td>
<td></td>
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<td></td>
<td>Lat: 48,77485</td>
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<tr>
<td></td>
<td>Long: -3,777316</td>
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</tr>
</tbody>
</table>

PC0498428-30) and in the Mediterranean Sea at Banyuls-sur-Mer (Magne herbarium PC0498423-25). Unfortunately, no specimen of this latter species has been collected yet in the course of our survey in Brittany which started in 2007. The mitochondrial COI-5P, the plastid psbA and *rbcL* and the nuclear LSU sequences are provided here (Table 1) and are the first molecular data released for the species and for an identified species of this genus. Inclusion of these sequences in the alignment analysed by Saunders *et al.* (2016) followed by RaxML phylogenetic analysis resolved *Schmitzia hiscockiana* as a close ally to the two unidentified species of *Schmitzia* from Australia (Saunders *et al.*, 2004) and together the three species of *Schmitzia* were resolved as sister to the lineage encompassing the Acrosymphytales and the Ceramiales. As discussed by Saunders and colleagues (2016), further analyses including *Schmitzia neapolitana*, which is the generitype of the genus *Schmitzia*, would be needed to ascertain the monophyly of *Schmitzia* before revising its familial and ordinal position within the Rhodymeniophycaeae.

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**REFERENCES**


