**Halophila minor** (Hydrocharitaceae), a new record with taxonomic notes of the *Halophila* from the Hong Kong Special Administrative Region, China

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**Abstract** *Halophila minor* (Zoll.) den Hartog is reported as a new record of *Halophila* species in the Hong Kong Special Administrative Region (SAR), in addition to the two known species *H. ovalis* and *H. beccarii*. This also represents the first locality of the species in continental China besides the reported localities in Hainan and Nansha Islands. The *Halophila* species have a peculiar taxonomic history in China, especially in the Hong Kong SAR where the first record dated back to 1856 (from Kowloon Bay). Recently there has been clear scientific evidence to distinguish *H. minor* from *H. ovata* (the latter has been confirmed not occurring in the Hong Kong SAR in this report), though the former was once considered conspecific to the latter. The worldwide distribution and taxonomy of *Halophila* have recently been made clear and thus permitting correct identifications of the species. Seagrasses are of conservation concerns, as the coastal environment of the Hong Kong SAR has been subject to the threat of rapid infrastructure development.

**Key words** *Halophila*, *Halophila minor*, *Halophila ovalis*, *Halophila beccarii*, *Halophila ovata*, new record, key, Hong Kong.

Further to the report reviewing seagrasses in the Hong Kong Special Administrative Region (SAR) by Kwok et al. (2005), a new record of a marine vascular plant, *Halophila minor* (Zoll.) den Hartog has been confirmed based on field observations and authentic herbarium specimens. Comparison to existing herbarium specimens and species descriptions in relevant literature (e.g. Wang & Sun, 1992) has confirmed this seagrass species as having been hitherto unrecorded in the Hong Kong SAR.

The present discussion and taxonomic treatment of plant materials from the Hong Kong SAR are based on examination of specimens of *Halophila* species freshly collected from various localities, including but not limited to those provided by Kwok et al. (2005). This is supplemented with re-examination of herbarium specimens deposited in herbaria in the Hong Kong SAR (mainly in the Hong Kong Herbarium [HK]). The voucher specimens of previous published records of *Halophila* species in Hong Kong were examined although some of them could not be located. In addition, expert opinion regarding taxonomic identification of difficult species was sought (Dr. John Kuo, personal communication).

### 1 Taxonomic history

The species of *Halophila* present a peculiar taxonomic history, especially in the Hong Kong SAR. Despite a previous review (Hodgkiss & Morton, 1978a) which claimed that the earliest discovery of *Halophila* in Hong Kong dated back to 1912 (citing Dunn & Tutcher, 1912), the earliest record of *Halophila* from Hong Kong was indeed “*H. ovata*” based on a
sterile specimen (Harland 282, BM) collected in 1856 by W. A. Harland from “Kau-lung Bay” (i.e. the present day Kowloon Bay) (Hance, 1872). More than a century later, Hodgkiss and Morton (1978b) examined all previous collections at the University of Hong Kong and, following den Hartog’s (1970) treatment, concluded that they all belonged to *H. ovata* Gaudich. This was in addition to their discovery of *H. beccarii* Asch. The local knowledge of the taxonomy of *Halophila* has changed little since 1978. Although only two taxonomic entities were known to exist in the Hong Kong SAR since 1978, three specific names (*H. ovalis*, *H. ovata*, and *H. beccarii*) have appeared in previous literature. Wu et al. (2002) considered *H. ovata* as a misapplied name of *H. ovalis* based on a review of the specimens deposited in HK.

Nomenclature and delimitations of the species, namely *H. ovalis*, *H. ovata* and *H. minor*, have been revised severally in modern times, initially by den Hartog (1957), then by Doty and Stone (1967), den Hartog (1970), and lastly by Sachet and Fosberg (1973), resulting in different taxonomic concepts concerning the species. Of the three species, den Hartog (1957) recognized only *H. ovalis* and *H. minor* (*sensu lato*, including *H. ovata*) but later considered that the name *H. ovata* had priority over *H. minor* (den Hartog, 1970). Kuo (2000) presented an excellent treatise on the treatments of the species and their respective types by various authorities with the conclusion that *H. ovata* and *H. minor* are distinct species.

To clarify the taxonomy of the species occurring in the Hong Kong SAR and to provide a basis for the *Flora of Hong Kong* project conducted by the Hong Kong Herbarium of the Agriculture, Fisheries and Conservation Department (AFCD) and the South China Botanical Garden, the Chinese Academy of Sciences, a taxonomic treatment of the *Halophila* species including the names previously applied to the taxa are presented here to put them into a systematic context. Each citation to relevant taxonomic literature in which an authentic specimen is quoted or is extant is indicated in this paper by the “*” symbol.

**2 Taxonomic treatment of *Halophila* species found in the Hong Kong SAR**


A genus of about 13 species in tropical and warm temperate seas (Kuo & den Hartog, 2001). Three species recorded in the Hong Kong SAR.

**Key to the species**

1. Leaves ovate; lateral shoots short, 1 cm or less, often inconspicuous, with only one pair of leaves; cross-veins present, linking the mid-rib and intramarginal veins.
   2. Leaf blades 6–13 mm, with 7–12 pairs of cross-veins at an angle of 70°–90°………………1. *H. minor*
   2. Leaf blades 10–40 mm, with 12–25 pairs of cross-veins at an angle of 45°–60°………………2. *H. ovalis*

1. Leaves oblong-ovate to lanceolate; lateral shoots longer, 1–1.5 cm, with 6–10 leaf blades at the top; cross-veins lacking, mid-rib and intramarginal veins present……………………………………3. *H. beccarii*

**Halophila** sect. *Halophila*

According to Kuo and den Hartog (2001), the section *Halophila*, which currently comprises nine species, is the most morphologically diverse group in the genus *Halophila*. Species in this section are monoecious or dioecious, minute to robust plants bearing extremely short erect lateral shoots, with two scales at the base and a pair of petiolate leaves at the top. Petioles are usually longer or as long as the leaf blades and cross-veins are present. Leaf margins are smooth or serrate and leaf surface is naked or hairy. In female flowers, 3 to 6
styles are present (Kuo & den Hartog, 2001). Besides the two species described below, *Halophila australis* Doty & Stone (known from South Australia) and *H. ovata* Gaudich. (known from the Indo-Pacific Region) also belong to this section.


*Halophila lemnopsis* Miq., Fl. Ind. Bat. 3; 230. f. 176. 1856.

*Halophila ovata* auct. non Gaudichaud: \(^*\) Hodgkiss & Morton in Memoirs of the Hong Kong Natural History Society 13: 28–32. 1978; \(^*\) Hong Kong Herbarium, Check List of Hong Kong Plants 73. 1978 et 77. 1993 [quoad specim. 1978-05, Morton s.n. (HK 33276); 1971-06-23, Thrower s.n. (HK 30426)].

\( \text{Figs. 1, 2} \)

![Fig. 1. Halophila minor. Dried plant specimen showing habit (AFCD Marine Parks Division, s.n., HK 38543).](image)

![Fig. 2. Halophila minor. Leaf showing veins (AFCD Marine Parks Division, s.n., HK 38543).](image)

Leaf blades ovate, 6–12 mm long, 3.5–6 mm wide with (4–)7–12 occasionally branched cross-veins, space between intramarginal veins and blade margin narrow.

Dioecious. Male flowers with tepals 1.5 mm long, anthers 2.5–3.5 mm long. Female flowers with 3 styles, 8–20 mm long. Fruits 2–3.5 mm in diam. (Kuo & den Hartog, 2001).

Distribution: China (Hong Kong, Hainan and Nansha Islands), Indo-Pacific Region.

Specimens examined:

**China. Hong Kong** (\( \text{AFC} \)): Ho Chung (\( \text{AFC} \)), AFCD Biodiversity Survey (\( \text{AFC} \)) s.n. (HK 39894); Hoi Ha (\( \text{AFC} \)), AFCD Marine Parks Division (\( \text{AFC} \)) s.n. (HK 38543); Hong Kong Island (\( \text{AFC} \)), Tai Tam Bay (\( \text{AFC} \)), S. L. Thrower s.n. (HK 30426), B. S. Morton s.n. (HK 33276); Lantau Island (\( \text{AFC} \)), Yam O (\( \text{AFC} \)), AFCD Biodiversity Survey (\( \text{AFC} \)) s.n. (HK 38544); To Kwa Ping (\( \text{AFC} \)), AFCD Biodiversity Survey (\( \text{AFC} \)) s.n. (HK 38542); Tsam Chuk Wan (\( \text{AFC} \)), AFCD Biodiversity Survey (\( \text{AFC} \)) s.n. (HK 39895).


*Halophila minor* auct. non (Zoll.) Hartog: Xing, Ng & Chau in Memoirs of the Hong Kong Natural History Society 23: 122. 2000.


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Rhzome internodes and petiole up to 10 cm long. Leaf blade varies in shape from oblong-elliptic, spatulate, obovate, to ovate, rarely linear, 10–40 mm long, 5–20 mm wide, with 12–28 often branched cross-veins on either side of the midrib.

Dioecious. Male flowers with tepals 3–5(–6) mm, anthers 1.5–2.5 mm long. Female flowers with 3 styles, 10–40 mm long. Fruits 3–6 mm in diam. Seeds subglobose (Kuo & den Hartog, 2001).

This species is the most common seagrass in the tropical and subtropical regions of the Indo-West Pacific and inhabits various environments, resulting in considerable morphological variation (Kuo & den Hartog, 2001).

**Distribution:** China (Hong Kong, Guangdong, Taiwan, Hainan and Nansha Islands), North Pacific, South Africa, Indo-Pacific and South Australia.

**Specimens examined:**

**China. Hong Kong** (香港): Lai Chi Wo (荔枝窝), AFCD Biodiversity Survey (渔护署生物多样性调查) s.n. (HK 39897); Lantau Island (大屿山), San Tau (散头), Y. W. Lam (林英伟) 794 (HK 36160), 821 (HK 36161), s.n. (HK 38567, HK 38568); Kai Kuk Shu Ha (鸡谷树下), Y. W. Lam (林英伟) s.n. (HK 38570); Siu Tan (小滩), AFCD Biodiversity Survey (渔护署生物多样性调查) s.n. (HK 39898).

**Halophila sect. Microhalophila** Ascherson

Plants in this section are delicate, minute, monoecious with two scales at the base of erect lateral shoots, which bear a pseudo-whorl of 4 to 10 leaves at the top. The leaf blades, with naked surface and smooth or slightly serrulate margins, lack cross-veins. The male and female flowers develop on different floral shoots of the same plant (Kuo & den Hartog, 2001).

**Halophila beccarii**, which occurs in Hong Kong, is the only species classified in this section (Kuo & den Hartog, 2001).

**Halophila minor**, a new record with taxonomic notes from Hong Kong


Thin rhizomes with 2 scales covering the base of the erect stem bearing a group of 4–10 leaves at the top. Blades lanceolate, up to 13 mm long, 1–2 mm wide, with pointed apex but lacking cross-veins. Female flowers with 2 styles, 10–15 mm long. Fruits ellipsoid to ovoid, 4–5 mm by 1.2 mm. Seeds globose, 1.2 × 1 mm.

The lack of cross-veins clearly distinguishes this species from other *Halophila* species. The species is usually associated with mangrove communities and often exposed at low tide (Kuo & den Hartog, 2001), and has high fecundity and rapid rhizome extension rates so that it can colonize some areas in very short time and disappear quickly when unfavourable conditions come (Fong, 1999).

**Distribution**: China (Hong Kong, Hainan, Guangdong, Taiwan), Indo-Pacific Region.

**Specimens examined**:

**China. Hong Kong**: Ha Pak Nai (下白泥), Y. W. Lam (林英伟) 698 (HK 36162); Hong Kong Island (香港岛), Tai Tam Bay (大潭湾), B. S. Morton s.n. (HK 33275); Lantau Island (大屿山), Tai Ho Wan (大蚝湾), Y. W. Lam (林英伟) 667 (HK 36163); Nam Chung (南涌), AFCD Biodiversity Survey (渔护署生 物多样性调查) s.n. (HK 39064); Tsim Bei Tsui (尖鼻咀), B. S. Morton s.n. (HK 33274).

**3 Dubious records**

*Halophila ovata* auct. non Gaudichaud

The species *Halophila ovata* was first published in: Freycinet, Voy. Bot. 430. t. 40 f. 1. 1829. The type specimen, *Gaudichaud s.n.* (P), was collected in Mariana Islands, but the exact locality and date are unknown (Kuo, 2000).

Based on our examination of herbarium specimens, all records previously reported under the name “*Halophila ovata*” in the Hong Kong SAR are mostly misidentifications of *H. ovalis* and in rare cases *H. minor*. Vegetatively, *H. ovata* is a species similar in size to *H. minor* but much smaller in leaf length and fewer in the number of cross-veins. Moreover, *H. ovata* is distributed chiefly in the southeastern part of the Indo-Pacific Region such as in the Philippines, Guam and Micronesia Islands, whereas *H. minor* is known from the northern and western part of the same region (including Kenya, India, Malaysia and northern Australia) and has a disjunct distribution (Kuo & den Hartog, 2001).

The “*Halophila ovata*” described and illustrated by Hodgkiss and Morton (1978b) is a misidentification of *H. minor* (which is treated in this paper, after a re-examination of a voucher specimen deposited in HK). *Halophila minor* and *H. ovata* can be distinguished by several major characters (Kuo, 2000; Kuo & den Hartog, 2001) as shown in Table 1.

<table>
<thead>
<tr>
<th>Character</th>
<th><em>H. ovata</em></th>
<th><em>H. minor</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Space between intramarginal vein and blade margin</td>
<td>0.4–0.6 mm</td>
<td>0.15–0.19 mm</td>
</tr>
<tr>
<td>Space between two cross-veins</td>
<td>1–1.75 mm</td>
<td>0.65–0.85 mm</td>
</tr>
<tr>
<td>Number of cross-veins</td>
<td>4–8</td>
<td>(4–)7–12 (~13)</td>
</tr>
<tr>
<td>Branching of cross-veins</td>
<td>never branched</td>
<td>rarely branched</td>
</tr>
</tbody>
</table>

The name *Halophila minor* (Zoll.) den Hartog listed by Xing et al. (2000) is followed by citing a synonym, *H. ovata* Gaudich., and localities at Tung Chung and Lai Chi Wo. That synonymy was likely based on the previous understanding (e.g. den Hartog, 1970) and earlier
records. Fong (1999) stated that “H. ovata” was known from three localities in the Hong Kong SAR, namely San Tau in Tung Chung, Sheung Sze Wan in Sai Kung and Lai Chi Wo. So far, based on recent field surveys and herbarium records, no authentic specimen of H. minor is known from Tung Chung and Lai Chi Wo. The “Halophila minor” reported in Xing et al. (2000) and the “Halophila ovata” reported in Fong (1999) were likely based on misidentification of H. ovalis.

4 Discussion

Despite the fact that some authors considered H. ovata and H. minor as being conspecific, Kuo (2000), based on detailed studies of specimens from their ranges of distribution including the use of electron microscopy, has confirmed that the two species are distinct. The world distribution of these two species are also different. The recent publications by Kuo (2000) and Kuo & den Hartog (2001) of the worldwide distribution and taxonomy of seagrasses including Halophila provide a vast reservoir of information on seagrass taxonomy and ecology and thus permit correct identifications of the species.

Halophila minor was previously overlooked in the Hong Kong SAR probably owing to the reliance on the outdated taxonomy and misapplied names in local literature. This paper reports H. minor as a new record of a third species of the genus Halophila in the Hong Kong SAR, in addition to the two known species, H. ovalis and H. beccarii (Hong Kong Herbarium, 2004), and confirms that H. ovata does not occur in the Hong Kong SAR although the species name appeared in previous literature. This also represents the first locality of the species in continental China besides the reported localities in Hainan and Nansha Islands (Xing & Wu, 1996; Zhao & Li, 1999). Seagrasses are of local conservation concern, as the coastal environment of the Hong Kong SAR has been subject to the threat of rapid infrastructure development.

This paper has only addressed the taxonomic aspect of Halophila. A better understanding of the ecology of Halophila species is required. Field observations revealed that the species could occupy a long stretch of intertidal area under favourable conditions. However, the populations could disappear or reduce greatly in coverage in the next year without apparent observed changes or disturbance to the habitat. Understanding the ecology of Halophila, in particular, habitat requirements, life-history patterns as well as reproductive and dispersal strategies would be useful in formulating appropriate conservation measures for Halophila.

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