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— SHORT COMMUNICATION —

Some charophytes from the Western Cyclades (Greece)

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In the summer of 2005, I visited the following islands of the Western Cyclades: Milos, Kimolos, Sifnos, Serifos, Kythnos and Kea (Tzia). Charophytes were found in Milos, Sifnos and Serifos. In Milos, I found one saline lake with the species *Lamprothamnium papulosum*. On the beach of Kamares, Sifnos, I found two localities with slightly brackish water and with the species *Chara corfuensis* and *C. vulgaris*, of which *C. corfuensis* is endemic to the area. The locality on Serifos is a freshwater dam with *C. globularis*. The locality with *C. corfuensis* in Serifos should be protected as the species is threatened there.

Key words: Greece, charophytes, saline lake, *Lamprothamnium papulosum*, *Chara corfuensis*, *Chara vulgaris*, *Chara globularis*.

INTRODUCTION

In the summer of 2005, I visited the following islands in the Western Cyclades: Milos, Kimolos, Sifnos, Serifos, Kythnos and Kea (Tzia) (Fig. 1). All these islands are generally very dry in the summer, and I found charophytes only in Milos, Sifnos and Serifos. I have not found any references to earlier collections of charophytes from these islands, and therefore I present the following documentation.

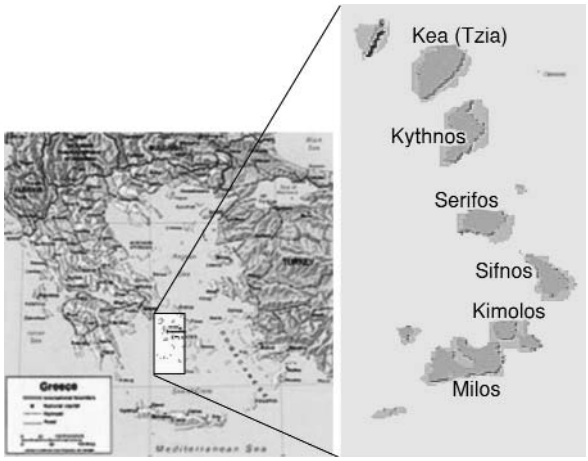

FIG. 1. Location of the Cyclades and the visited islands.

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MATERIALS AND METHODS

This work is based on material collected by the author in the given localities in 2005. The salt content of the water was measured with a Hack conductivity meter (Model 44600/CND/TDS). The specimens collected are deposited at the Botanical Museum, University of Oslo (Herb. O), Norway. Bibliography for determination: Wood (1965) and Krause (1997).

RESULTS

MILOS

Alykes

Alykes has been a large saline lake, but today is used for salt production. This means that the out/inflow of water is controlled and as a result the environment is not longer suitable for charophytes. Between the road and the sea there are some small ponds, presumably remains of the original saline lake, but today they do not host any charophytes.

Achivadolimni

Between the lake and the sea there is a road, but the out/inflow of water has been secured with a bridge. This had probably a negative effect on the lake. The bottom sediments are fine sand in shallow parts and

FIG. 2. Specimens of *Lamprothamnium papulosum* from Achivadolimni, in shallow water on a sandy bottom.

a mixture of sand and silt in deeper parts. The vegetation is dominated by *Ruppia cirrhosa* (Petagna) Grande and between stands of this species, the charophyte *Lamprothamnium papulosum* is growing (Fig. 2). The charophyte was fertile. The salt concentration in this lake was 13.74 g l^{-1}.

KIMOLOS

Kalamitsi, *Aliki*

This is a saline lake of the same type as found in Naxos (Langangen, 2004). A road which has been built between the beach and the saline lake has probably changed the watercourse in a negative way. When I visited the locality it was dry and no charophytes were found; only remains of *Ruppia* sp. On the seaside there was a large stand of the big reed *Phragmites australis* (Cav.) Trin. ex Steudel.

Korakies, *south of Prassa*

This lake is probably artificially created. Between the lake and the sea there is a big kaolin plant and much of the waste from this plant has been deposited in the lake. The bottom is soft gyttja with few specimens of *Potamogeton* sp. and with blue green-algae covering the bottom. The bottom sediment smelled of hydrogensulfide, which indicates a reducing environment. The concentration of salt was as high as 48 g l^{-1}. Charophytes were not found.

SIFNOS

Kamares (pond on the beach)

This is a small pond with standing water, filled with dense reeds of *Phragmites australis*. Along the shore, where the *Phragmites* stand was more open, *Chara vulgaris* grew in dense stands. The whole area is littered with garbage, especially plastic bags. Most probably there are plans to develop the area along the beach, a fact that will damage the pond. The salt content was 2.12 g l^{-1}.

Kamares (lake on the beach)

This is a relatively large pond, 15 × 60 m, surrounded by dense reeds of *Phragmites* and *Scirpus* sp. on the landside (Fig. 3). Here, C*hara corfuensis* was growing in dense stands down to 1 m depth, mixed with *Ruppia* sp. The bottom sediment was sand. The salt concentration was 3.66 g l^{-1} which indicates a good supply of fresh water.

SERIFOS

Fresh water dam by Psili Amos

This dam was built three years ago. The water level was low when I visited the locality. The only vegetation was scattered specimens of *Chara globularis* Thuill. The salt concentration was 0.36 g l^{-1}.

KYTHNOS and KEA (TZIA)

I visited most of the beaches, but did not find any suitable localities for charophytes in any of these two islands.

The Charophytes

In the present work, I have described seven localities, of which four have charophytes. Of these, one is a

FIG. 3. Sifnos, Kamares: *Phragmites* and *Scirpus* dominate at the beach.

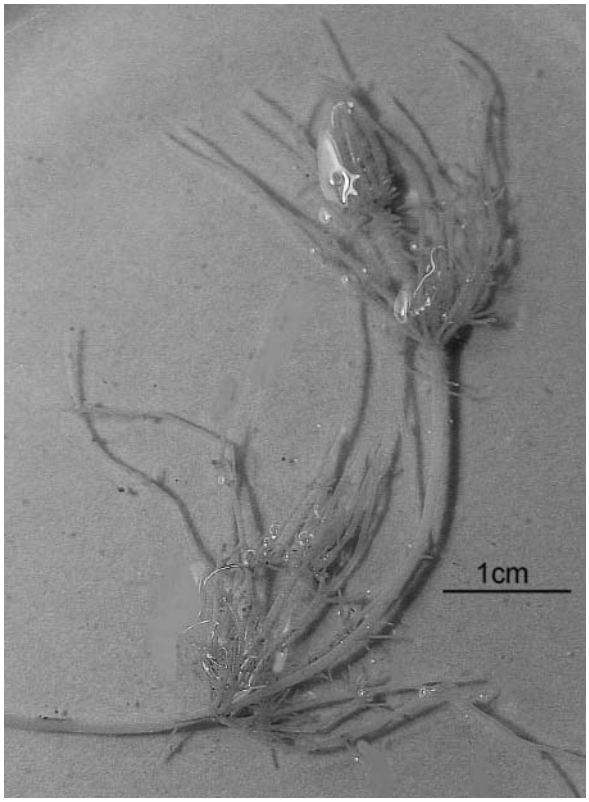

FIG. 4. A specimen of *Chara corfuensis* from the pond at the beach in Kamares, Sifnos.

typical salt lake (Langangen, 2004), two are slightly brackish and one is a freshwater lake.

Lamprothamnium papulosum (Wallroth) J. Groves

This species is found in one locality in Milos. It is a brackish-water species. The specimens found were small, dwarf forms, up to 7 cm high and only slightly incrusted. They had all dense terminal foxtails and were highly fertile, with a large number of black, ripe oospores.

Chara corfuensis J. Groves ex Filarszky (Filarszky, 1937)

The find in Kamares, Sifnos is the third known locality of this species (Fig. 4).

Description of collected specimens

Plant coarse, stem with a diameter up to 1 mm and a height up to 22 cm, moderately incrusted, grey in colour. Internodes 0.5-2 times as long as branchlets (up to 6 cm long). Cortex diplostichous on younger internodes, irregular (2-3 corticated) at older internodes, slightly tylacanthous to isostichous. On some internodes, the cortex was strongly tylacanthous.

Spine-cells variable, often solitary or in fascicles of 2-3, up to 5 times as long as the stem diameter (250-5000 μm) with acute tips. Fascicle spine-cells were: two long, two long and one short or one long and two short. Stipulodes in 2 tiers, 2 sets per branchlet, shorter than the stem diameter, upper to 600 μm, lower to 500 μm long. Branchlets 9-11 in a whorl, to 3.5 cm, slightly connivent, segments 4-6, of which the 2-3 lowest were with cortex, end-segment 2-3 celled. Bract-cells 5, verticillate, up to 4000 μm long, similar to the spine-cells. Bracteoles 2, similar to the bract-cells. Plants monoecious. Gametangia conjoined. Plants were relatively fertile, but unripe. Oogonia up to 1000 μm long, antheridium up to 500 μm in diameter.

Chara vulgaris L.

This species was found in a small pool at the beach in Kamares, Sifnos. The growth at the edge of a dense reed was very rich, and the specimens were up to 20 cm long. The specimens were typical *C. vulgaris*, in young plants fertile with unripe oospores, but in old plants, with ripe, brown oospores. The locality was slightly brackish.

Chara globularis Thuill.

Specimens were only 5-6 cm high, richly fertile, and with bract-cells shorter than the oogonia. This, combined with the connivent branchlets, gives the plants a special look. It is close to f. *humilior* Migula, except for papillous stipulodes. *Chara globularis* is a freshwater species.

DISCUSSION

In summer 2005, I visited six of the islands of the Western Cyclades. In three of these islands, I found localities suitable for charophytes (Table 1). Of these, the Milos location was a saline lake, the two locations in Sifnos were brackish water and the location in Serifos was a fresh water dam. These are the same types of localities which I found in the Central Cyclades (Langangen, 2004). Three of the species were also the same, *Lamprothamnium papulosum*, *Chara vulgaris* and *C. globularis*.

Of special interest is the find of *Chara corfuensis* in Sifnos. The species was described from a locality in the Corfu Island of the Ionian Sea, Greece (Filarszky, 1937). It has recently also been reported from the coast of Croatia (Blazencic & Blazencic, 2002).

The identification of this species is based on the description in Filarszky (1937) and Wood (1965), and icones in Filarszky (op. cit.) and Wood & Imahori (1965). The specimens studied fit well with both the descriptions and the drawings, especially those of Wood & Imahori (1965). There is one difference in

TABLE 1. Salt content (%) in some of the examined localities in Milos, Sifnos and Serifos (2005)

Locality	Salt content %	Charophytes
Milos Achivadolimni	1.4	*Lamprothamnium papulosum*
Sifnos Kamares (pond)	0.2	*Chara vulgaris*
Sifnos Kamares (lake)	0.4	*Chara corfuensis*
Serifos Psili Amos	0.04	*Chara globularis*

the structure of the stipulodes, which in the studied specimens is shorter than in the holotype. At the same time, Wood & Imahori (1965) report that the "Stipulodes ... often irregular in length, 600-1200 μm long...". Also, the similarity with *Chara hornemannii* was striking and confusing. This similarity was also noticed by Wood & Imahori (1965).

Chara corfuensis belongs to the diplostichous/tylacanthous species of the genus *Chara*. The European species which belong to this group are *C. baltica*, *C. intermedia* and *C. polyacantha* (Krause, 1997). The determination of these species is based on characters such as i) spine-cells which are single or in clusters, their length compared with stem diameter, ii) the status of the bract-cells which are verticillate with different length, iii) encrustation, and iv) fresh or brackish water habitats. The species are closely related and their systematic status is a challenge for future charophytologists (Wood & Imahori, 1965). These authors regard *C. corfuensis* as an extreme expression of *C. polyacantha*.

Charophytes are rare in the Western Cyclades islands and I have reported five localities with such algae. Of special interest is the locality with *L. papulosum* in Milos and the two localities at the Kamares beach (Serifos) with *C. vulgaris* and *C. corfuensis*. These three places are vulnerable because of the possible development and tourism. In Kamares, Sifnos the beach is partly developed and the locality with *C. vulgaris* is affected as described before. The locality with *C. corfuensis* is more protected and only slightly affected by human activities. Since *C. corfuensis* is endemic in the Balkan area, and only a few localities are known, it is necessary to protect the locality at the Kamares beach.

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