Exploring respiration and respiratory electron transport system (ETS) in *Ulva spp.*

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Introduction

As an index of metabolic status and stress we used the electron transport system (ETS) to differentiate between different growing conditions in the natural environment. This technique has been successfully applied to study many different organisms in the ocean including bacteria, phytoplankton and zooplankton, and now in marine macroalgae. These neritic and littoral macrophytes have major ecological and industrial importance, yet little is known about their respiratory physiology. Such knowledge would strengthen our understanding of the resources of the coastal ocean and facilitate its development and best use.

Material and Methods

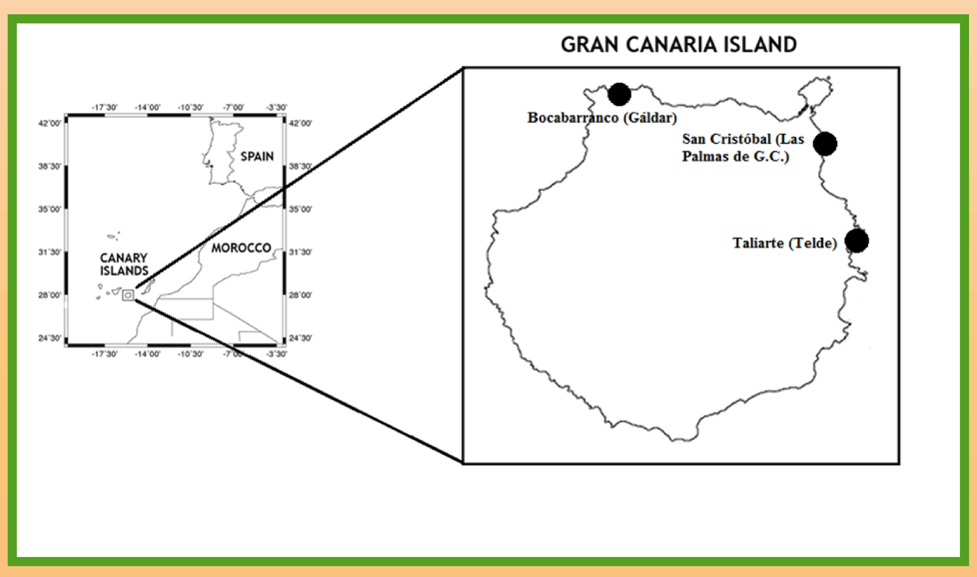


Figure 1: Map of the Canary Islands. Samples were collected at San Cristobal, Bocabarranco and Taliarte in Gran Canaria.

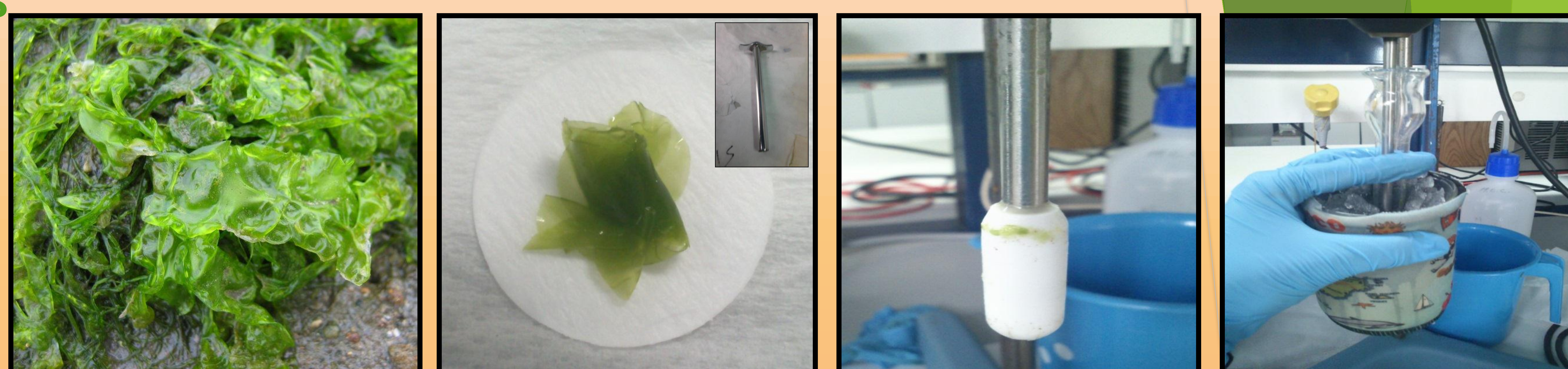
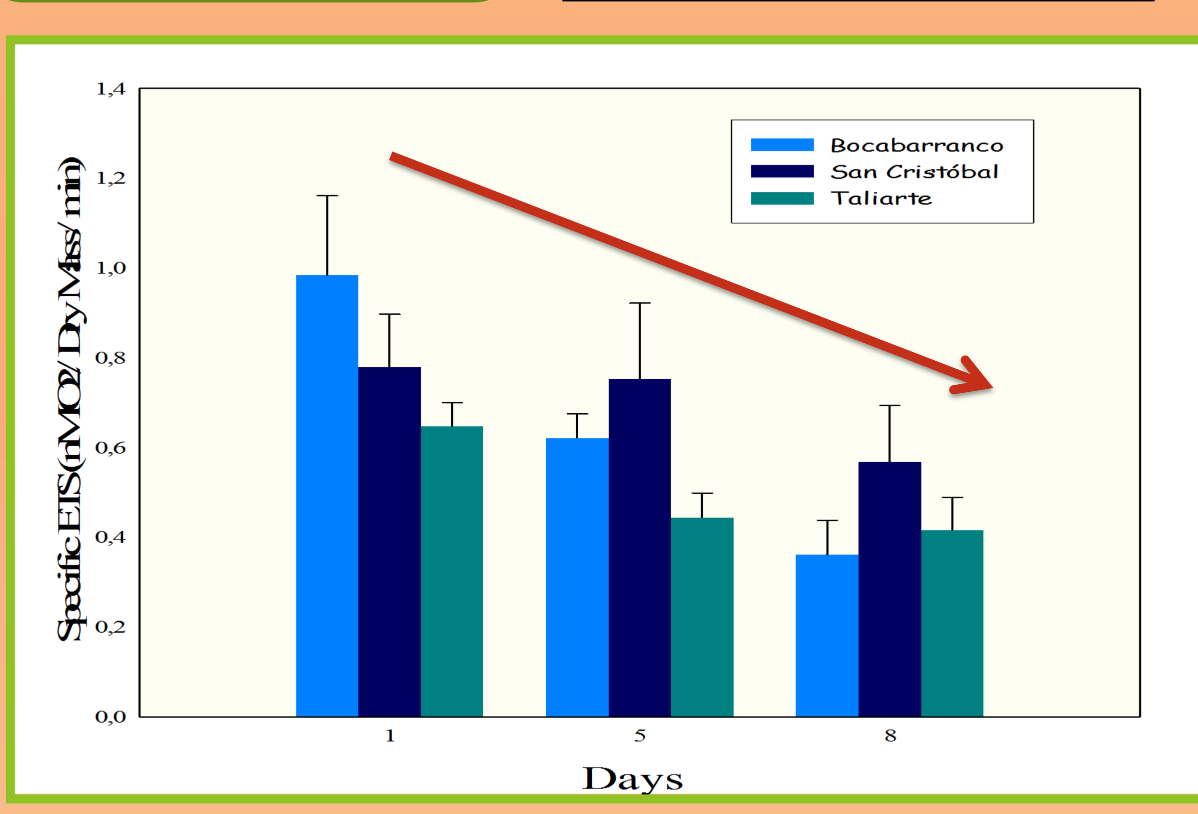


Figure 2: **Homogenization method**. Algal disks were cut with a cork borer and a homogenate was prepared with a teflon-glass tissue grinder using a disintegrated glass microfibre filter (GF/C Circle, 25mm) as the abrasive. We followed the Kenner and Ahmed (1975) ETS method with the modifications of Gómez et al., 1996.

Results

1. Time-course over a week of metabolism in aquaria with filtered sea water.



Time (days)	Ulva rigida (Taliarte)	Ulva rotundata (Bocabarranco)	Ulva rotundata (San Cristobal)
1	0,6481 ± 0,0526	0,9844 ± 0,1765	0,7805 ± 0,1171
5	0,4447 ± 0,0543	0,6220 ± 0,0533	0,7532±0,1692
8	0,4159 ± 0,0735	0,3612 ± 0,0771	0,5688 ± 0,1256

Figure 3, Table 2: Specific ETS time-course in Ulva from three different locations.

2. Variability of the ETS activity, Dry Mass , nutrients and Chlorophyll in three different locations around Gran Canaria.

	Ulva rigida (Taliarte)	Ulva rotundata (Bocabarranco)	Ulva rotundata (San Cristóbal)
Specific potential respiration (nmols O_2/ dry mass/ min)	0,65 ± 0,05	0,98 ± 0,18	0,78 ± 0,12
Dry Mass (mg)	49,65 ± 5,93	23,44 ± 5,51	32,33 ± 7,31
Chlorophyll a (µg/ sample)	1,60 ± 0,0018	1,59 ± 0,0016	1,59 ± 0,0022
Ammonium (mg/l)	1,23	2,78	1,58
Nitrate (mg/l)	1,2	2,4	2,7

Table 1:Comparation of the Specific ETS, Dry Mass and Chlorophyll measures on the sampling day in the three locations.

3. Use of Optodes for measuring respiration

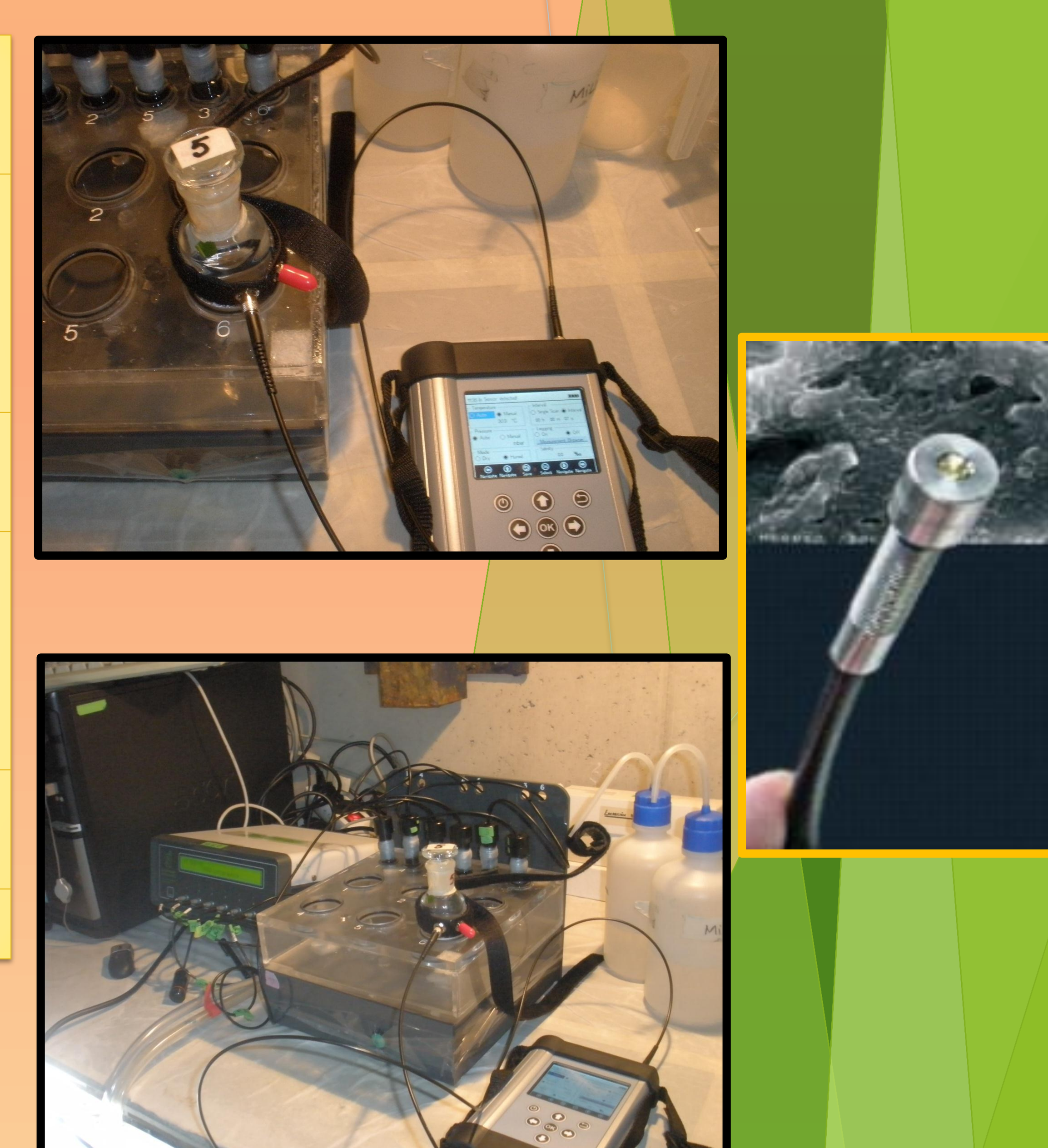


Figure 4. We are studying respiration using optodes (Fibox 4, Presens) in order to describe the impact of light and darkness on metabolism.

CONCLUSIONS:

1. The differences in the 8-day ETS time courses for the three areas were statistically significant.
2. *Ulva rotundata* from Bocabarranco had the highest potential respiration consistent with high levels of nutrients. *Ulva rigida* from Taliarte has the lowest potential respiration coinciding with the lowest level of nutrients in the area. However, *Ulva rigida* from Taliarte has the highest dry mass.
3. There was a loss between 25 to 60% of the initial potential respiration over this time period.

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