

Introduction

Coral reefs play an important role in coastal ecosystems, such as providing marine habitats and natural hatcheries, recording ocean changes, and protecting coastlines from erosion by waves. When hermatypic corals grow, they accumulate calcium carbonate skeletons to form coral reefs, but the process is very long and will be affected by environmental changes, global warming, rising water temperature, acidification of seawater, and human activities³.

Leptoria phrygia

Leptoria phrygia, known as 密集迷紋珊瑚 or 弗利吉亞腸珊瑚 in Chinese, is a common species and widely distributed in the shallow water of the north, east, south and outlying islands of Taiwan. Most of the *Leptoria phrygia* are massive and columnar, and present in tawny or yellow-green color (Fig. 1A, 1B). The most significant difference from the similar species *Leptoria irregularis* is that the septa and grooves of *Leptoria phrygia* are neatly arranged².



Fig 1A *Leptoria phrygia*



Fig 1B *Leptoria phrygia*

Photos provided by Dr. 陳昭倫

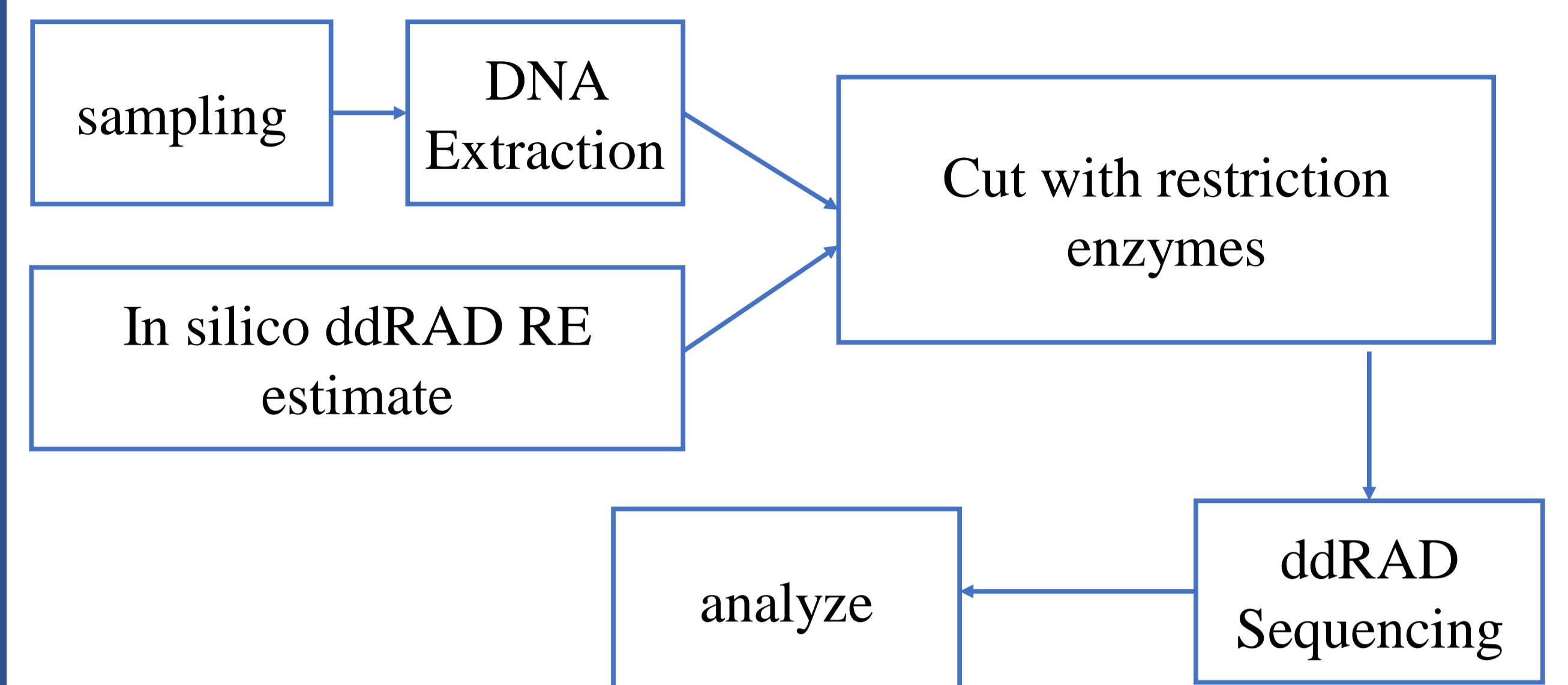
Study sites

Maanshan Nuclear Power Plant was opened in 1984 and is expected to be closed in 2025. Its operation discharges warm water, which has caused the water temperature rises and affected the ecology of the surrounding environment. We suspect that the corals near the water outlet (LDS) have been affected for a long time, so we sampled and investigated the genetic diversity of corals from 萬里桐WLT、紅柴坑HCK、合界HJ、雷打石LDS、後壁湖HBH、跳石TS、香蕉灣SJW, respectively.



Fig. 2 Study sites. Map obtained from ¹

Materials & Methods



Result: Total nucleic acid

Using ddRAD sequencing, DNA quantity larger than 1.5 µg was required. Therefore, after DNA extraction, we used Nanodrop and Qubit to measure DNA quantity.(Table 1)

萬里桐	NanoDrop (µg)	Qubit (µg)	紅柴坑	NanoDrop (µg)	Qubit (µg)
WLT1	7.065	7.92	HCK1	3.411	3.672
WLT2	11.182	13.77	HCK2	2.88	3.438
WLT3	2.25	2.547	HCK3	4.788	5.04
WLT4	7.02	7.74	HCK4	8.617	11.43
WLT5	5.895	8.73	HCK5	7.222	6.12
WLT6	5.296	4.014	HCK6	2.457	3.069
WLT7	2.2	5.67	HCK7	4.518	5.67
WLT8	6.3	5.94	HCK8	5.8	7.785
WLT9	3.645	4.338	雷打石	NanoDrop (µg)	Qubit (µg)
合界	NanoDrop (µg)	Qubit (µg)	LDS1	8.266	2.871
HJ1	5.814	6.615	LDS2	7.186	3.519
HJ2	13.545	12.96	LDS3	4.846	2.088
HJ3	7.605	10.44	LDS4	11.182	5.445
HJ4	5.148	9.54	LDS5	4.23	4.077
HJ5	5.985	6.075	LDS6	1.575	1.791
HJ6	2.808	2.862	跳石	NanoDrop (µg)	Qubit (µg)
HJ7	4.77	3.924	TS1	5.391	4.815
HJ8	5.49	7.11	TS2	3.613	3.069
HJ9	6.21	7.56	TS3	2.943	3.042
HJ10	7.461	8.685	TS4	6.39	4.05
後壁湖	NanoDrop (µg)	Qubit (µg)	TS5	4.005	3.159
HBH1	2.709	3.33	TS6	3.739	3.276
HBH2	4.14	5.04	香蕉灣	NanoDrop (µg)	Qubit (µg)
HBH3	9.00	10.71	SJW1	2.34	1.503
HBH4	4.072	2.772	SJW2	8.055	5.76
HBH5	2.61	3.069	SJW3	3.015	2.169
HBH6	20.52	10.35	SJW4	7.74	6.165
HBH7	8.10	7.29	SJW5	1.53	1.026
HBH8	5.085	6.75	SJW6	3.465	2.79
HBH9	6.273	6.435	SJW7	5.85	5.4
			SJW8	11.385	8.28
			SJW9	3.645	6.21

Table 1 Total nucleic acid

We have successfully extracted DNA from all samples. We considered that quantity larger than 2.0 µg are successful, and the success rate is as follows : WLT100%、HJ100%、HBH100%、HCK100%、LDS83%、TS100%、SJW77%.

Because *Leptoria* has no complete genome available yet, we performed in silico test with closely related species to predict restriction enzyme cutting sites. After finding the most suitable restriction enzymes, we assess the enzyme performance with extracted DNA, and ddRAD sequencing will be conducted for population genomics of *Leptoria* in different locations.

Future

To understand the adaptative mechanism of *Leptoria* from diverse regions (water outlet and others) through DNA sequence, this data will provide information such as whether there is heat resistance gene. Besides, this study will help to understand the relationships between corals distribution and environmental features.

Reference

1. 內政部國土測繪中心(2015年10月07日)。直轄市、縣市界線(TWD97經緯度)SHP格式。檢自 https://www.tgos.tw/tgos/Web/MetaData/TGOS_Query_MetaData.aspx?key=TW-01-301000100G-000017(2022/08/18)
2. 戴昌鳳、鄭有容(2020)。台灣珊瑚全圖鑑上石珊瑚。503頁
3. Reef Resilience Network, Value of Reefs(2022). Retrieved from <https://reefresilience.org/value-of-reefs/>(Aug.18,2022)