教育部補助大專校院延攬國際頂尖人才執行成果簡介

請依下列標題提供中英文版本，影音、照片及檔案若無，可免填。*為必填。

*標題	溫泉紅藻的光合作用調節機制 Regulatory mechanisms in photosynthesis of extremophilic red algae
*計畫成果簡述	1. 進行溫泉紅藻光合作用保護機制分析。 2. 利用電致變色量測探討溫泉紅藻光合作用調節機制。 3. 發表光系統二生合成機制的研究論文。 4. 發表光系統二突變株恢復光自營能力機制的研究論文。 1. Analysis of protective mechanisms in photosynthesis of extremophilic red algae. 2. Investigating the photosynthetic regulatory mechanisms of the acidothermophilic red algae using the electrochromic shift-based measurements. 3. Publishing a research paper concerning the biogenesis mechanism of photosystem II. 4. Publishing a research paper concerning the mechanism underlying the recovery of photoautotrophic capacity in photosystem II mutants.
*成果說明	本計畫運用玉山青年學者計畫經費與學校提供之經費，購置專門儀器設備，完成光合作用實驗室之建置，實驗室的研究主題為溫泉紅藻的獨特光合作用系統結構，探究在臺灣分離純化所得、具備嗜熱嗜酸特性之紅藻的光合作用調節機制，為未來生技應用和發展奠定基礎。第三年成效包括：針對能保護光系統的非光化學淬滅進行分子機制的分析，得知溫泉紅藻的螢光淬滅過程可能兩種現象有關：一是藻膽體與光系統二之間的能量解耦，二是能量外溢至光系統一。此外亦發現在溫泉紅藻中，光誘發電致變色量的強度會隨膜電位變化，此結果有助於作為後續有關光合作用調節機制的研究基礎。先前與德國研究團隊合作，發現光系統二的次單元表現量並非光系統二生合成的限制因子；另外與中研院研究團隊合作則發現，具有功能缺陷的光系統二次單元突變基因在重複擴增的情況下，突變株的光自營能力可因此恢復，兩者研究皆發表於植物學頂尖期刊。 Benefiting from the funding and support of the Yushan Young Scholar Project and of NSYSU, the photosynthesis

	laboratory has been established with the installation of specialized instruments. The laboratory aims at understanding the regulatory mechanisms in photosynthesis of extremophilic red algae under different light conditions, focusing on cyanidiophytes isolated in Taiwan and containing unique photosynthetic apparatus. During the third year of the project, the molecular mechanisms underlying the photoprotective nonphotochemical quenching has been investigated, and their possible involvement with energetic decoupling of phycobilisomes from photosystem II and with energetic spillover to photosystem I was explored. The amplitude of light-induced electrochromic shift was dependent on the existing membrane potential in cyanidiophytes, and this result provides the basis for further research on the photosynthetic regulatory mechanisms of the acidothermophilic red algae. Two research papers were published in high-impact journals in the field of plant biology. One paper involves collaborative work with German research groups and demonstrates that the availability of two photosystem II subunits did not limit the biogenesis of photosystem II. The other paper, accomplished through the collaboration with a research group at Academia Sinica, reveals that tandem amplification of the functional deficient mutated genes encoding photosystem II subunits recovered photoautotrophic capability of the mutant strains.	
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