Garden
for Botany Alumni

植物苑

No. 5 May, 2021

編輯：鄭貽生、王雅筠

行政大樓前盛開的羽扇豆

攝影：鄭貽生

目 次

植物苑編輯序

行政大樓前陽光穿透樹間

攝影：王雅筠

2020 年，全球在新冠肺炎肆虐下，截至 2021 年 4 月中，感染人數突破 1 億 4 仟萬人，死亡人數達 300 萬人，真令人憂心不已。所幸在積極的管制之下，台灣仍能維持正常的上班上課，也算得上是個幸運的好地方。但也因此許多大型聚會活動停辦或延期，所以影響到學長姐回校的安排。不過，植物苑編輯部仍秉持服務的精神，接續出刊 2021 年的植物苑，本期報導了 2021 年 3 月 16 日正式落成啟用的植科所溫室，並分享籌建數年的歷程，內容另有「王瑛的科學繪圖」,「黃增泉老師的南非旅遊記」,「曾妤馨的樓梯草植物介紹與新發現」，「蔡政修—台灣的鳥類恐龍化石」及介紹「生科院新進教師陳俊豪博士」，在截稿前夕，得知植物系系友蔡宜芳獲選美國國家科學院國際院士榮銜，特藉此園地與大家分享喜悅，期待在這緊張的日子帶給大家暖暖的訊息。

責任編輯 鄭貽生、王雅筠

發行單位：台灣大學植物科學研究所
封面照片：花朵背後的秘密 繪圖：王瑛 (詳第 5 頁)
發行時間：2021 年 5 月 1 日出刊

植物培育溫室落成啟用紀實

溫室銘牌

台大植物培育溫室啟用邀請函

2021 年 3 月 16 日(二)早上 10:30，位於基隆路、辛亥路口的臺灣大學植物培育溫室舉辦啟用典禮，當天天氣晴朗，在和煦的陽光照射下，大家一起歡樂的前來見證植科所溫室的啟用。溫室的籌建始議於植物系時代許多的教授，植物系的研究需要模式植物栽種及轉殖試驗，但在臺大卻缺乏一座可供植科所教研人員使用的精密溫室，因此在中央研究院賀端華院士及數位教師的積極與時任臺大校長李嗣涔教授建議，請學校協助校地及相關籌建經費的補助，以建立專業的植物培育溫室，遂有現在溫室的落成，詳細籌建過程留待之後另文報導。

溫室啟用典禮當天邀請植物領域相關的教研人員及系所承辦人共同參加，並邀請前校長李嗣涔教授、前教務長莊榮輝教授、生命科學院院長鄭石通教授、植物科學研究所所長謝旭亮教授、植物科學研究所前所長葉開溫教授及黃增泉教授共同剪綵。

植物培育溫室落成啟用紀實

左起：黃增泉教授、謝旭亮所長、鄭石通院長、李嗣涔前校長、莊榮輝前教務長、葉開溫教授。因新冠肺炎仍在世界各地漫延，台灣雖防疫有成，但在公開場合，仍依防疫要點，配戴口罩進行剪綵。

剪綵後，隨即開放溫室供與會人員參觀。目前溫室分為一般溫室 6 間，環境控制溫室 1 間，精密溫室 3 間及逆境精密溫室 1 間，配有不同床架設施及可控制光強度之人工 LED 燈源。為使溫室可以發揮最大效益，植科所接受生科院委託管理，分別訂定「台大植物培育溫室管理要點」及「台大植物培育溫室收費辦法」，以供有需要的研究人員在租用床架時，可以有所依循。預約及相關規定可由植科所網頁連結進入或由網址：https://www.ntuipb.info/greenhouse 進入參閱。

溫室二樓現已栽種由葉開溫教授所培育出的白花文心蘭，葉教授目前承接科技部計畫，預計將白花文心蘭進行量產並設立公司，未來將另覓場地設施作為白花文心蘭的生產基地。溫室其他床架亦已開放供研究人員租用，如栽種水稻進行非生物逆境分析、蕃茄進行生物逆境分析、綠豆進行揮發性二次代謝物分析研究，期待這個新穎的溫室，可以作為台灣在植物科學研究最重要的研究產出基地。

植物培育溫室落成啟用紀實

由葉開溫教授培育之白花文心蘭，現正進行生產方式之測試，未來將進行量產與銷售模式建立。

溫室外觀。

精密溫室內生長之綠豆及水稻植株。

左起黃增泉教授，葉開溫教授及鄭石通院長合影於白花文心蘭前。

賀 蔡宜芳系友獲選

美國國家科學院國際院士

National Academy of Sciences International Members

台灣大學植物學系學士（1983）
台灣大學植物科學研究所碩士（1985）
美國卡內基美隆大學（Carnegie Mellon University）生物科學博士（1990）
美國加州大學聖地牙哥分校博士後研究（1990-1993）

賀蔡宜芳系友獲選美國國家科學院國際院士

20210426 美國國家科學院公布最新入選的院士名單，共選出 120 位新任院士、30 位國際院士（international members），台大植物系系友蔡宜芳獲選為 2021 年國際院士，本項榮銜，得來不易，同為植物科學研究的所有教研人員都與有榮焉。新科院士蔡宜芳於 1994 年回台任職中央研究院分子生物學研究所，主要研究領域為植物對硝酸鹽的感應及在植物體內的運送，她不僅發現植物的第一個硝酸鹽轉運蛋白，改寫教科書中的硝酸鹽輸送理論，除此之外，她的研究表明植物在不同濃度的硝酸鹽會運用不同的感應策略進行轉運，此一新穎理論，有助於將基礎研究推向應用端，不僅可改進農作物的氮利用效率，減緩過量氮肥對環境的危害，並提供農業永續發展的新策略。

本刊編輯王雅筠曾受業於蔡宜芳院士門下，為此在獲悉恩師獲此榮銜時寫下的感想：

今天(4/27) lab meeting 時，看到兩位同事不約而同傳了相同的訊息給我: 美國科學院院士最新的名單。在國際院士中，看到我博士班指導教授，蔡宜芳老師的名字！

在老師的實驗室待了 10 年，有太多需要感謝的地方。但我在這邊想特別指出老師影響我最多的兩點: 正面、規律的生活作息與持續不斷地努力。

在我念博班的期間，老師生了一場大病，經過積極治療與後續追蹤後，老師已經算是完全恢復。在我看來，老師正面的態度與規律的生活作息，是讓她恢復健康很重要的原因。我相信老師心裡也會擔心、會惶恐，但是她並沒有讓這些情緒打敗她。在她恢復之後，還回來持續堅持著她熱愛的研究，甚至做得越來越好！每當我遇到挫敗時，都會想到蔡老師面對逆境的態度，然後自己再一點一點地回到正常。

自己出來獨當一面之後，常常會覺得自己在整個學術界好渺小，這麼多優秀的科學家，發表了那麼多高水準且全面性的文章，非常懷疑自己存在的價值。但蔡老師勉勵我，把自己的部分做好就是對科學界有貢獻，不用想著一定要是那位最有名的人。而蔡老師也是用這樣的態度告訴自己，並持續這樣的理念來從事她喜愛的研究。

很高興能在蔡老師的門下學習，即便現在回去跟老師討論，都可以得到滿滿的啟發與正能量。謝謝老師!

王雅筠 20210427

科學繪圖師

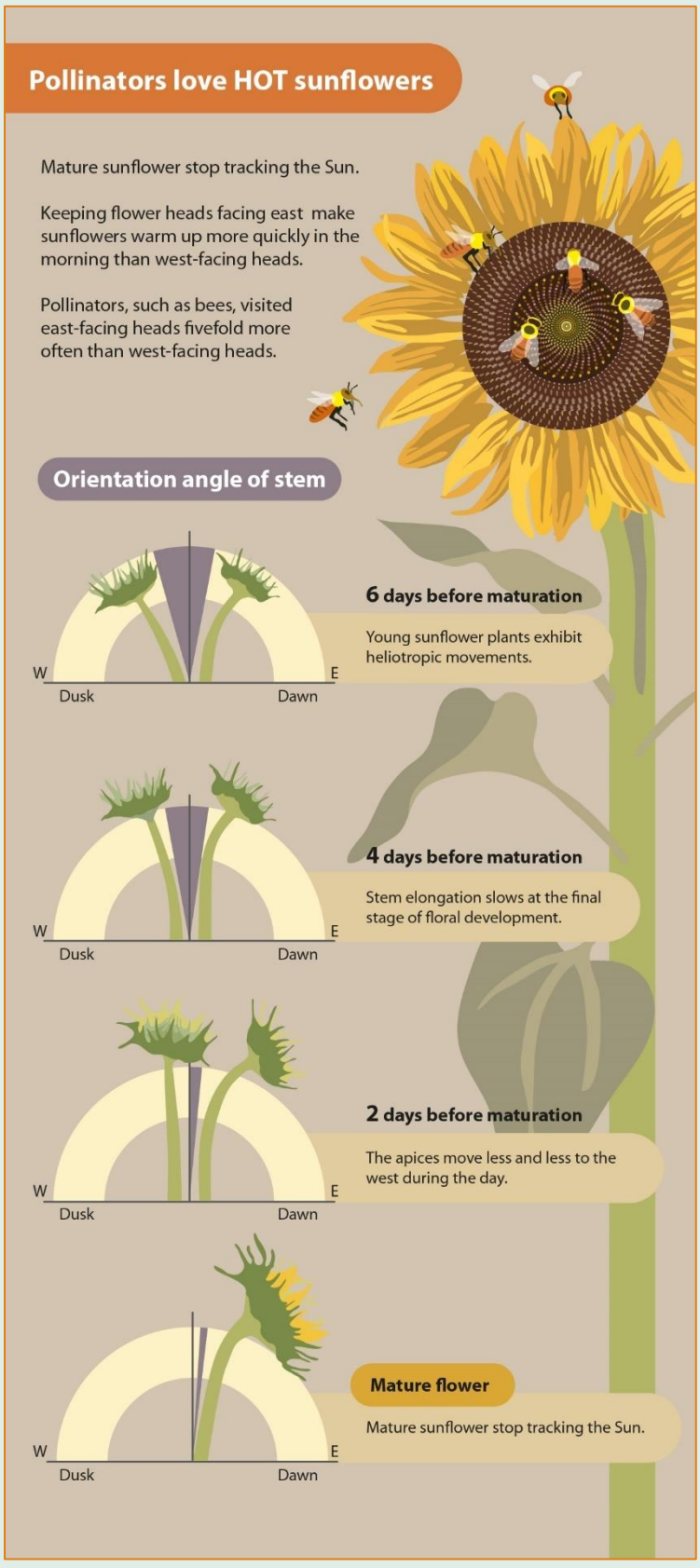
王瑛，科學繪圖師，曾經的植物分子學家。喜歡整理資料與製圖，因為對於視覺傳達設計的喜愛，博士班畢業之後開始學習設計與繪畫，同時也擔任實驗室論文發表的藝術總監。2019 前往美國加州修習科學繪圖學程，往專業之路邁進。現居台北，為自由工作者，工作內容包括了科學的資訊圖解與植物繪畫。喜歡欣賞一切美的事物，相信好的繪圖能讓科學好看又好懂。

花朵背後的秘密

這張概念式插畫呈現的是向日葵的追日行為。向日葵能追著太陽跑的秘密其實就藏在花朵背後的莖上，受光面的光受器及生長素的分泌皆參與其中。概念式的插畫常常應用在期刊封面或是作為科普雜誌的插圖，吸引讀者的注意，來增加文章的點閱率。

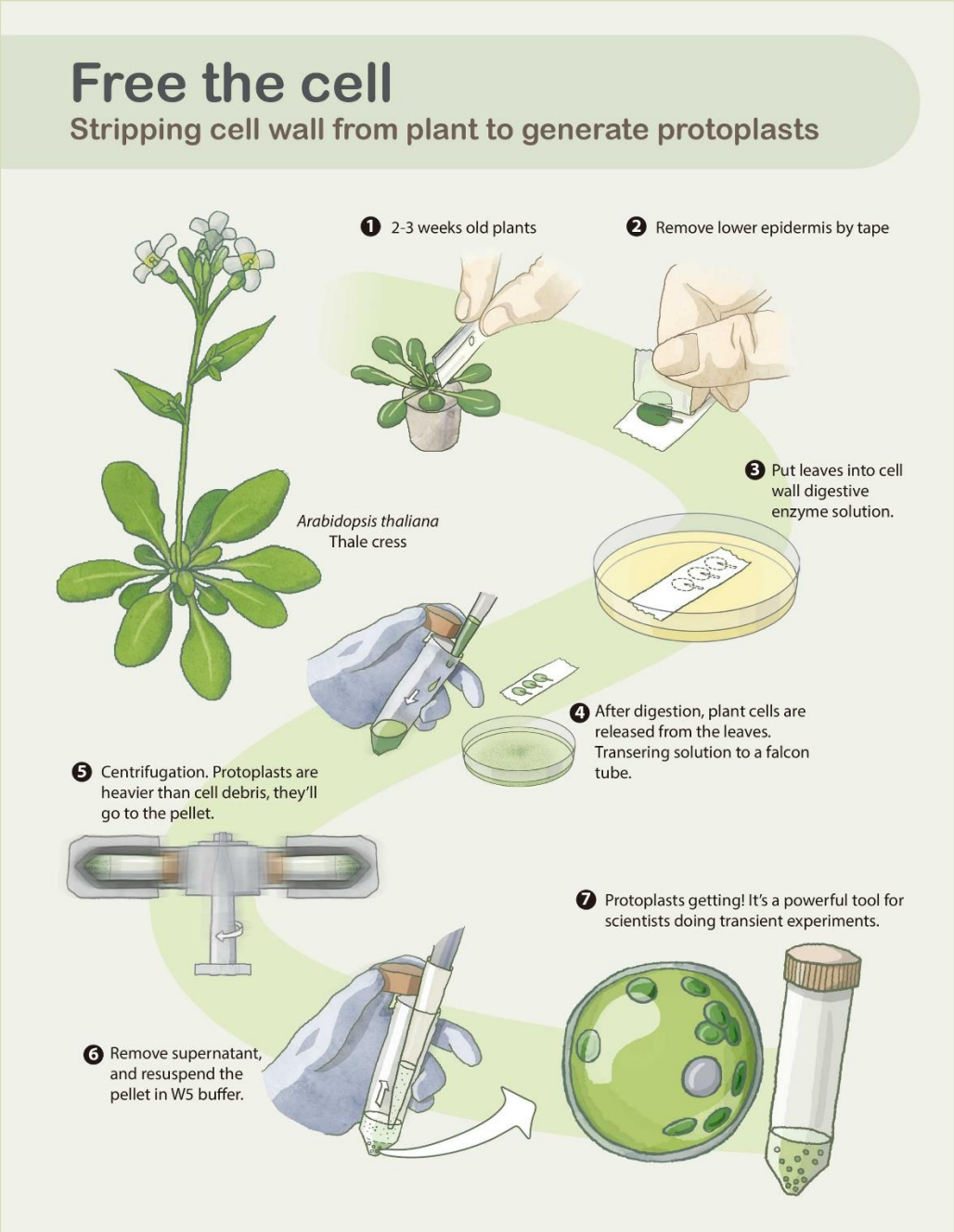
植物分子生物學中最重要的小白花

阿拉伯芥的植物體很小，不會大於手掌，但對於科學研究貢獻的力道卻無比巨大。這幅創作裡面將植物放大為主角，原本擁有主導權的研究人員則化為小似螞蟻的工作人，呈現了三種阿拉伯芥得以作為模式植物的特點。



授粉者喜歡熱（辣）一點的向日葵

年輕的向日葵會隨著日出日落擺向東邊或西邊。隨著花朵逐漸成熟，擺動的幅度越來越小，最後則是面朝東方。固定朝向東方的原因是因為，花朵能在清晨吸收更多陽光來提高溫度，研究顯示溫度較高的花朵能吸引更多的蜜蜂造訪，提高授粉機會。



阿拉伯芥原生質體的製備過程

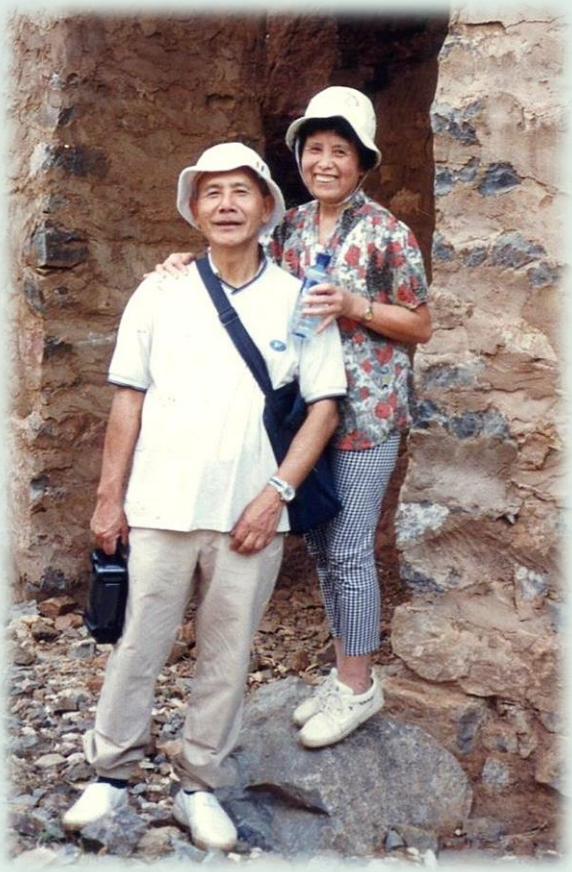
原生質體是去掉細胞壁的植物細胞。沒有了細胞壁的禁錮，植物細胞自由地變回“圓形”，就像動物學家手中的細胞株一般，可以進行短暫、快速的實驗。多年前幫科學人雜誌撰寫「模式植物—阿拉伯芥」文章時，曾想要有插圖說明科學家如何製備原生質體，可惜當時心力都花在文字撰寫，畫圖力有未逮。如今自己能作圖了，趕緊畫一張來與大家分享。

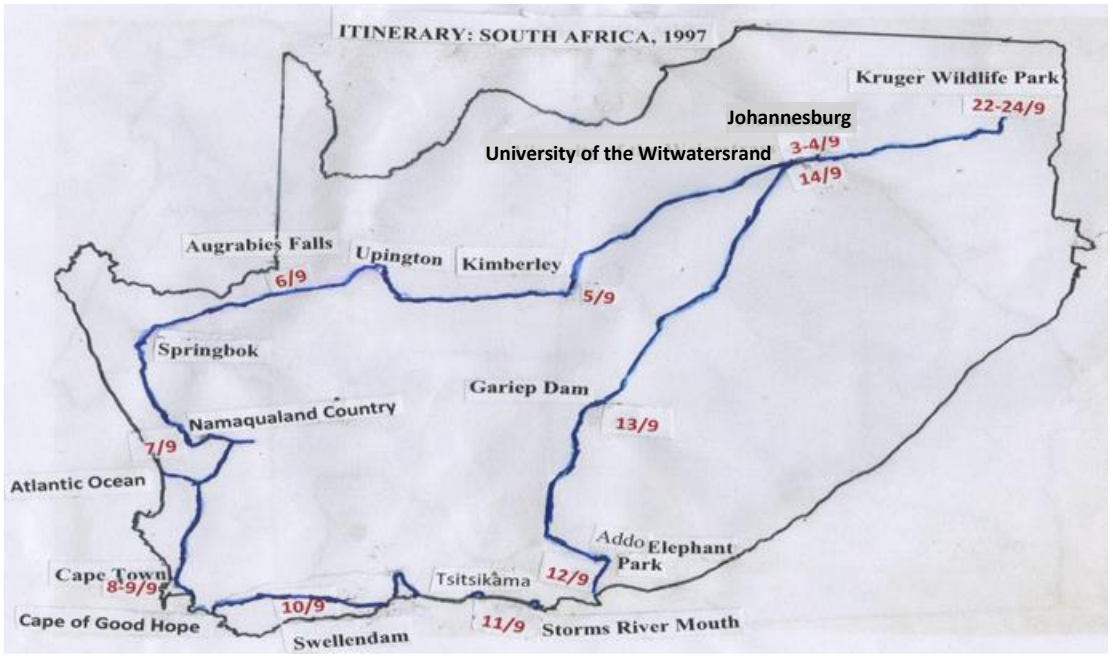
更多作品請看 https://www.ywangstudio.com/

A Memorandum of South Africa Trip

南非旅行記

黃增泉





Map 1. Itinerary Map of Cape Fynbos Tour

During August 1996, when I received a letter of invitation from Dr. Ann Cadman, Vice-President, International Association for African Palynology (Appendix 1: Cadman 1&2) to attend "The 3rd Symposium of African Palynology" which hosted by: Bernard Price Institute (Paleontology), University of the Witwatersrand (Figs. 1-3), Johannesburg, South Africa during September 14 to 19, 1997, I had accepted the invitation immediately without any consideration (see attached Appendix 1; Huang 1). Because, South Africa was one of the most attractive botanical Flora to visit so that I planned my African trip promptly. My trip to Johannesburg, South Africa begun September 2 (Tuesday) and ended at September 26 (Friday) 1997. I should acknowledge our National Science Council to offer me a grand (87-2914-1-002-091-A1) to attend this meeting. During my stay in South Africa, I had participated several excursions and dinner parties. [1. Sept 3 to 14; Cape Fynbos Tour (Figs 1-107); 2. Sept. 16. Excursion to Speritonteis Carvis and Hominid Site (Figs 108-114); 3. Sept. 18: Excursion to Gold Reef City and Conference Dinner (Figs 115-123); 4. Sept. 19. Closing Symposium and Conference Ceremony Dinner (Figs 124-136); 5. Sept. 20: Post Symposium Excursion to visit Makapansgat Site (Figs 137-150); 6. Sept.21: an appointment from Counsel of Republic of China (Taiwan) in Johannesburg City of South Africa (Figs 151-156); 7. Sept. 22-24: Kruger Wildlife Park (Figs 157-180)].

The details about these activities will mention below, and will present them by photo pictures (see Figs 1-180). The numbers of figures come first and numbers of slides follow when they are available, then the scientific names of plant and their locations will be at the last part of sentence.

I. The fieldtrip schedule of Cape Fynbos Tour (Map 1) and Figures (1-107) are presented below: I want to report here slightly details for the Cape Fynbos Flora tour (Ref. 1). The tour was organized by Dr. Ann Cadman (Tour Leader), Marion Bamford and Braam van Wyk (Tour Guiders) as the Pre-Symposium tour between September 5 and 14. More than 22 Foreign palynologists from 12 different countries had participated (see Conference Attendance List in page 14).

Wednesday, Sept. 3, 1997. (Figs. 1-2). Visit Conference Location.

On September 3, we arrived the Johannesburg Airport some around 6 am. in the early morning, we took taxi from Airport to the University of the Witwatersrand. As soon we had checked in our room, we went outside to observe the compass plants. The weather was warm neither hot nor cold through September of this year in South Africa. It was really lucky for us to take several excursions in different places in such a nice weather. Due to my convenience to arrange my Kruger National Park excursion, I had checked out the University Residence Hall and checked in Holiday Inn Garden Court Milpark from September 19 to 21.

Fig.1-0013. Witwatersrand University (Wits) compass plants *Quercus* trees.

Fig.2-0018. Witwatersrand University (Wits).

Thursday, Sept. 4, 1997. (Figs. 3-5). Meeting of organizers and participants. Final instructions and handing out of manuals. Take extra baggage to store at BPI.

Fig.3-0015. Wits club and compass plant of *Platanus* trees.

Fig.4. Johannesburg City.

Fig.5. Johannesburg City.

Friday, Sept. 5, 1997. Depart from Wits Club (Figs 6-13).

Travel SW along SW highway of Johannesburg, looking at vegetation and flora.

Observation of grassland, Savanna Biome (Kimberley Thorn Bushveld).

Lunch stop at Aventur Vaal Spa, between Bloemhof and Christiana.

Kimberley: meet tour guide at McGregor Museum: 2.30-3pm.

Tour of Cultural History Museum, tram ride to Big Hols and tour.

Dinner, bed and breakfast at the Kimberlite Hotel.

Fig.6-0048. Field observation of grassland, Savanna Biome, along SW highway of Johannesburg.

Fig.7-0053. Field observation of grassland, Savanna Biome, along SW highway of Johannesburg.

Fig.8-0061. *Celtis africana* (Ulmaceae) in Aventra Vaal Spa.

Fig.9-0065. *Salix mucrinata* (Salicaceae) in Aventra Vaal Spa.

Fig.10-0084. *Melia azedarach* (Meliaceae) in Cultural History Museum, Kimberley.

Fig.11-0089. *Ceratunia siligma* (Leguminosae) in Cultural History Museum, Kimberley.

Fig.12-0091. Kimberley Mine.

Fig.13-0093. Kimberley Mine Wall.

Saturday, Sept. 6, 7:00 am breakfast, depart 7:30 am. (Figs 14-21).

Drive to Upington: Savanna Biome (Karrold Kalahari Bushveld).

Lunch on banks of Orange River. 3 pm Augrabies Falls National Park; Dinner.

Overnight in sharedchalets and cabina.

Fig.14-0101. *Hypoxis hemerocallidea* (Hypoxidaceae) in Savanna Biome (Karrold Kalahari Bushveld) Upington area.

Fig.15-0107. *Erica irbyana* (Ericaceae) in Upington area.

Fig.16-0154. *Aloe* cf. *hereroensis* (Asphodelaceae or Liliaceae) in Upington area.

Fig.17-0171. *Argemone ochroleuca* (Papaveraceae) in Upington area.

Fig.18-0210. *Acacia* cf. *nigrescens* (Leguminosae, tree) and *Euphorbia* sp. (Euphorbiaceae, herbs) in Upington area.

Fig.19-0280. *Pachypodium namaquanum* (Apocynaceae) in Augrabies Falls National Park.

Fig.20-0282. *Pachypodium namaquanum* (Apocynaceae) in Augrabies Falls National Park.

Fig.21-0283. *Acacia* sp. (Leguminosae) in Augrabies Falls National Park.

Sunday, Sept. 7, Depart 7:30 am. (Figs 22-27).

Drive to Springbok, stop at Springbok Cafe to see gem collection.

Goegap Reserve and Hester Malan Botanical Garden: Potjie lunch

Drive through flowers to Vanrhynsdorp.

Dinner, bed and breakfast at the Namaqualand Country Lodge.

Fig.22-0337. *Portulaca* sp. (Portulacaceae) in Springbok (Succulent Karoo Biome).

Fig.23-0368. *Hypericum* sp. (Guttiferae) in Springbok.

Fig.24-0408. *Pachypodium namaquamum* (Apocynaceae) in Potjie.

Fig.25-0471. *Ursinia calenduliflora* (Compositae) in Vanrhynsdorp.

Fig.26-0472. *Ursinia calenduliflora* (Compositae) in Vanrhynsdorp.

Fig.27-0479. *Ursinia calenduliflora* (Compositae) in Vanrhynsdorp.

Monday, Sept. 8. Depart 7:30 am. (Figs 28-39).

Visit Kern Succulent Nursery in Vanrhynsdorp.

Up Van Rhyns Pass to Nieuwoudtville, Calvinia, Groot Toren Farm etc.

Drive via Botterkloof and Clanvvilliam to Lambert's Bay.

Lunch at Lambert's Bay "Die Plaas Kombuis" traditional West Coast.

Food: fish or traditional sandveld menu.

Clanwilliam Wild Flower Garden.

Visit Goue Vallei [Golden Valley] Wine Cellar in Citrusdal.

Cape Town: Evening free at the Waterfront.

Bed and Breakfast at the Lady Hamilton Hotel, Gardens.

Fig.28-0632. *Aloe dichotoma* (Asphodelaceae or Liliaceae) in Kern Succulent Nursery in Vanrhynsdorp.

Fig.29-0642. Up Van Rhynus Pass.

Fig.30. *Askidiosperma nitidum* (Restionaceae) in Van Rhynus Pass.

Fig.31-0752. Table Mountain in Lambert's Bay.

Fig.32-0785. *Acacia* sp. (Leguminosae) in Lambert's Bay.

Fig.33-0786. *Aloe* sp. *(Asphodelaceae or Liliaceae) in Lambert's Bay.*

Fig.34-0790. *Carpobratus quadrifidus* (Aizoaceae) in Lambert's Bay.

Fig.35-0795. *Lampranthus* cf. *aureus*. (Aizoaceae) in Lambert's Bay.

Fig.36-0807. *Liparia splendens* (Leguminosae) in Lambert's Bay.

Fig.37-0825. *Leipoldtia* sp. (Aizoaceae) in Lambert's Bay.

Fig.38-0831. *Restio multiflorus* (Restionaceae) in Lambert's Bay.

Fig.39-0835. *Zantedeschia aethiopica* (Araceae) in Kerr kwekery.

Tuesday, Sept. 9. Depart 7:30 am. (Figs 40-59).

Morning at Kirstenbosch National Botanical Garden and Compton Herbarium.

Lunch at Kirstenbosch. Afternoon at Cape Point Nature Reserve.

Dinner at Brass Bell Restaurant, Fish Hoek; overlooking False Bay [6:30 pm].

Overnight at Lady Hamilton Hotel.

Fig.40-0854. *Agapanthus inapertus* (Alliaceae) in Kirstenbosch National Botanical Garden.

Fig.41-880. *Pelargonium betulinum* (Geraniaceae) in Kirstenbosch National Botanical Garden.

Fig.42-881. *Dimorphotheca pluvialis* (Compositae) in Kirstenbosch National Botanical Garden.

Fig.43-0876. *Sutherlandia frutescens* (Leguminosae) in Kirstenbosch National Botanical Garden.

Fig.44-884. *Schotia brachyperatada* (Leguminosae) in Kirstenbosch National Botanical Garden.

Fig.45-0903. *Aloe plicatus* (Asphodelaceae or Liliaceae) in Kirstenbosch National Botanical Garden.

Fig.46-0910. *Leucospermum cordifolium* (Proteaceae) in Kirstenbosch National Botanical Garden.

Fig.47-0928. *Erica regina* (Ericaceae) in Kirstenbosch National Botanical Garden.

Fig.48-0951. *Leucadendron daphnoides* (Proteaceae) in Kirstenbosch National Botanical Garden.

Fig.49-0959. *Protea coronata* (Proteaceae) in Kirstenbosch National Botanical Garden.

Fig.50-0972. cf. *Mimetes fimbrifolius* (Proteaceae) in Kirstenbosch National Botanical Garden.

Fig.51-0973. *Leucospermum* cf. *oleifolium* (Proteaceae) in Kirstenbosch National Botanical Garden.

Fig.52-1001. *Acacia* sp. (Leguminosae) in Kirstenbosch National Botanical Garden.

Fig.53-0917. *Askidiosperma nitidum* (Restionaceae) in Kirstenbosch National Botanical Garden.

Fig.54-0922. *Elegia capensis* (Restionaceae) in Kirstenbosch National Botanical Garden.

Fig.55-1014. Table Mountain in Cape Town.

Fig.56-1025. Cape Point Nature Reserve (Fynbos Biome).

Fig.57-1034. *Vitsenia maura* (Iridaceae) in Cape Point Nature Reserve (Fynbos Biome).

Fig.58. Cape Tower.

Fig.59. Nearer to Cape Tower.

Wednesday, Sept. 10. Depart 7.30 am. (Figs.60-83)

Harold Porter Nature Reserve: lunch and walk.

Drive along coastal road looking at fynbos and whales, Strand, Gordon's Bay, to Hermanus if whales not already see.

Swellendam: Swellengrebel Hotel for dinner, bed and breakfast.

Visit Prof. Dr. E. M. Van Zinderen Bakker.

Fig.60-1075. Costal Fynbos along coastal road of Cape Town.

Fig.61-1109. *Erica mammosa* (Ericaceae) in Coastal Fynbos.

Fig.62-1101. *Leucodendron* cf. *floridus* (Proteaceae) in Coastal Fynbos.

Fig.63-1114. *Leucodendron* cf. *floridus* (Proteaceae) in Coastal Fynbos.

Fig.64-1115. *Leucodendron* cf. *floridus* (Proteaceae) in Coastal Fynbos.

Fig.65-1116. *Leucodendron* cf. *floridus* (Proteaceae) in Coastal Fynbos.

Fig.66-1110. *Leucodendron* cf. *floridus* (Proteaceae) in Coastal Fynbos.

Fig.67-1135. Coastal Fynbos.

Fig.68-1153. *Felicia amoena* (Compositae) in Coastal Fynbos.

Fig.69-1142. *Restio subverticillatus* (Restionaceae) in Coastal Fynbos.

Fig.70-1147. *Aloe* cf. *hereroensis* (Asphodelaceae or Liliaceae) in Coastal Fynbos.

Fig.71-1189. *Podocarpus latifolius* in Harold Porter Nature Reserve.

Fig.72-1204. *Leucospermum* cf. *pleuridens* (Proteaceae). in Harold Porter Nature Reserve.

Fig.73-1206. *Erica regina* (Ericaceae) in Harold Porter Nature Reserve.

Fig.74-1162. *Leucospermum* cf. *oleifolium* (Proteaceae) in Coastal Fynbos.

Fig.75-1233. Hermanus Town in the southern coast of the Western Cape.

Fig.76-1244. *Drosera cistifolia* (Droseraceae) in Hermanus Town.

Fig.77-1305. Hermanus Town in the southern coast of the Western Cape.

Fig.78-1318. *Leucodendron* cf. *floridus* (Proteaceae) in Hermanus Town.

Fig.79-1336. *Ixis* sp. (Iridaceae) in Hermanus.

Fig.80. Dr. E. M. Van Zinderen Bakker and Dr. A. Coetzee.

Fig.81. Dr. E. M. Van Zinderen Bakker and others.

Fig.82. Dr. E. M. Van Zinderen Bakker and others.

Fig.83. Dr. E. M. Van Zinderen Bakker and others.

Thursday, Sept, 11. Depart 7.30 am. (Figs 84-93.)

Visit aloe farm in Albertinia 9:30 am. I bought some aloe products there. As aloe derivatives used to care many functions, such as hair and skin care from products of *Aloe ferox* and anti-inflammatory effect, anti-aging and anti-fungal effect, and inhibitory effect on cancer, etc (Ref. 5).

Tour and lunch at Safari Ostrich Farm, Oudtshoorn. Tsitsikamma National Park: Snoek braal.

Overnight here in shared cabins and chalets, Storms River Mouth Camp.

Fig.84-1392. *Aponogeton distachyas* (Aponogetonaceae) in Albertinia.

Fig.85-1415. *Restio subverticillatus* (Restionaceae) of Fynobos vegetation in Albertinia.

Fig.86-1416. *Aloe* Farm in Albertinia.

Fig.87-1932. Diving Bridge in Albertinia.

Fig.88-1942. Diving Bridge in Albertinia.

Fig.89-1990. Two ostriches playing around Fynbos vegetation nearby Diving Bridge.

Fig.90-1957. cf. *Protea cynanoides* (Proteaceae) nearby Diving Bridge in Albertinia.

Fig.91-2021. *Acacia* sp. (Leguminosae) nearby Diving Bridge in Albertinia.

Fig.92-2046. *Crassula ovata* (Crassulaceae) nearby Diving Bridge in Albertinia.

Fig.93-2054. Safarin Ostrich Farm in Albertinia.

Saturday, Sept. 12. Depart 7:30 am. (Figs 94-100)

Storms River mouth and Big Tree, Van Staden's River Bridge to Addo Elephant National Park for lunch.

Drive around game park with Guide, looking at game and flora.

Dinner and overnight in shares cabins and chalets.

Fig.94-2114. Prof. A.E. Van Wyk, at right side in Tsitsikamma National Park.

Fig.95-2127. Mrs Huang and swimming pool in Tsitsikamma National Park.

Fig.96-2163. *Ruhmora adiantiformis* (Dryopteridaceae) in Big Tree.

Fig.97-2186. Van Staden City of Cape Town.

Fig.98-2242. *Aloe arborescens* (Asphodelaceae or Liliaceae) in Addo Elephant National Park.

Fig.99-2263. Sika deer in Addo Elephant National Park.

Fig.100-2272. *Ficus* sp. (Moraceae) in Addo Elephant National Park.

Saturday, Sept. 13. Depart 7:30 am. (Figs 101-107)

Drive via Zuurberg, Jansenville, Noorsveld vegetation to the Karoo.

Lunch at the Drosddy Hotel, Graaff-Reinet.

Naude's Nek stop to see high altitude karoid grassland.

Dinner, Bed and Breakfast at Verwoerd Dam Motel, Gariep Dam.

Fig.101-2252. *Crassula ovata* (Crassulaceae) in Noorsveld Karoo vegetation.

Fig.102-2306. Lunch at the Drosdy Hotel, Graaff Reinet.

Fig.103-2309. *Podocarpus falcatus* (Podocarpaceae) at the Drosdy Hotel in Graaff-Reinet.

Fig.104-2319. Graaff-Reinet, a town in the Eastern Cape Province of South Africa.

Fig.105-2321. High altitude's karroid grassland in Naude's Nek.

Fig.106-2323. High altitude's karroid grassland in Naude's Nek.

Fig.107-2325. High altitude's of Table Mountain karroid vegetation in Naude's Nek.

Sunday, Sept. 14. 7:30 am.

Long Day with few stop: more or less 800 km long.

Tour of, and lunch at University of the orange Free State, Bloemfontein, with Prof. Louis Scott.

Arrive in Johannesburg about 5 pm for registration at the Wits Club.

II. Sept. 16: Excursion to Speritonteis Carvis and Hominid Site. (Figs 108-114 & Ref. 4)

We took pictures with the statue of Dr. Robert Brown who was the author of world renowned home of Mrs. Ples *(Australopitheus africans*).

Fig.108. Pictures of Conference attendance palynologists.

Fig.109. Anglo Boer War Museum, Sterkfontein.

Fig.110. Sterkfontein Caves entrance.

Fig.111. Sterkfontein Caves entrance.

Fig.112. with Statue of Dr. Robert Broom.

Fig.113. with Statue of Dr. Robert Broom.

Fig.114. Sterkfontein Caves inside view.

III. Sept. 18: Symposium (see Ref. 3) for my presentation in the morning. At afternoon, we took the Excursion to Gold Reef City where we had visited the actual site of Gold mine in Kimberley (Ref. 4) and then shared the Conference Dinner at night. (Figs 115-123)

Fig.115. Gold Reef City.

Fig.116. Gold mine in Kimberley.

Fig.117. Gold mine in Kimberley.

Fig.118. Gold mine in Kimberley.

Fig.119. Gold mine in Kimberley.

Fig.120. Gold mine in Kimberley.

Fig.121. Conference Dinner (Huang and others).

Fig.122. Conference Dinner (Mrs. Huang and others).

Fig.123. Conference Dinner (Huang, Sa'id and others).

IV. Sept. 19: Closing Symposium and Conference Ceremony Dinner. (Figs 124-136)

Dr. Ann Cadman delivered the closing address and held Conference Ceremony Dinner.

Fig.124. Conference Ceremony Dinner. Dr. Cadman address.

Fig.125. Conference Ceremony Dinner: Cadman and others.

Fig.126. Conference Ceremony Dinner: Cadman and others.

Fig.127. Conference Ceremony Dinner: Kedves and Nilsson.

Fig.128. Conference Ceremony Dinner: Huang couple and others.

Fig.129. Conference Ceremony Dinner: Huang, Sa'id and others.

Fig.130. Conference Ceremony Dinner: Cadman and others.

Fig.131. Conference Ceremony Dinner: Huang couple.

Fig.132. Conference Ceremony Dinner: Weiss couple and others.

Fig.133. Conference Ceremony Dinner: Spieksma Fritz and Marise.

Fig.134. Conference Ceremony Dinner; Kedves & Huang.

Fig.135. Conference Ceremony Dinner; Nilsson and others

Fig.136. Conference Ceremony Dinner: Roasting Pig

V. Sept. 20: Post Symposium Excursion to visit Makapansgat Site. (Figs 137-150 & Ref. 4)

We had traveled from Highveld Grassland through Thornveld to the lush vegetation of

Makapansgat Valley and also had viewed the historic Caves.

Fig.137. Prof. Huang wandering among Fynbos forest.

Fig.138. Prof. Huang wandering among Fynbos forest.

Fig.139. Mrs. Huang wandering among Fynbos forest.

Fig.140. Mrs. Huang wandering among Fynbos forest.

Fig.141. Mrs. Huang wandering among Fynbos forest.

Fig.142. Mrs. Huang wandering among Fynbos forest.

Fig.143. Lunch time.

Fig.144. Group palynologists visit Historic cave.

Fig.145. Prof. and Mrs. Huang visit historic cave.

Fig.146. Mrs. Huang visit historic cave.

Fig.147. Group palynologists wandering along Makapansgat Valley.

Fig.148. Group palynologists wandering along Makapansgat Valley.

Fig.149. Prof. Weiss wandering along Makapansgat Valley.

Fig.150. Drs. Cadman and Weiss wandering along Makapansgat Valley.

VI. Sept. 21: Johannesburg City. (Figs 151-156)

Wandering around Johannesburg City and attend an appointment of Dr Fang Tai (Consul General) and Dr. Shui-yung Chang (Consul Vice General) in Johannesburg City of Republic of China (Taiwan) in Republic of South Africa.

Fig.151. Dr. and Mrs Fang Tai (Consulate General), Prof. and Mrs. T.C. Huang and Mrs. Shui-Yung Chang from left to right.

Fig.152. Dr. and Mrs Fang Tai (Consulate General), Prof. and Mrs. T.C. Huang and Dr. and Mrs. Shui-Yung Chang from left to right.

Fig.153. Prof. and Mrs. T.C. Huang and Dr. and Mrs. Shui-Yung Chang (Consulate Vice-General in Johannesburg, RSA).

Fig.154. Prof. and Mrs. T.C. Huang and Dr. and Mrs. Shui-Yung Chang (Consulate Vice-General in Johannesburg, RSA).

Fig.155. Prof. and Mrs. T.C. Huang in Johannesburg, RSA.

Fig.156-2333. Garden Court Milpark Hotel in Johannesburg City (Left Building).

VII. Sept. 22-24: Kruger Wildlife Park. (Figs 157-178 & Fig. 6)

On 22 September Anti-Malaria precautions had done before tour started. We departed Johannesburg City by air-conditioned microbus and traveled east to Mohololoholo Forest Camp for overnight. Next morning, we proceed into the Internationally well-known Kruger National Park to

view Game for the rest of the day. Our vehicle was driving among the thickets or bushes to hunt our interest game in all day long. Finally, only eight kinds of animals were caught for pictures (see Figs. 157-180). We took dinner and overnight at Mohi Abetsi Safari Lodge. Delicious food was served and Folk song gave me some different feeling. On 24 September, we traveled back through Blyde River Canyon to Johannesburg City and arrived approximately 18:00.

Fig.157-2314. Sika deer.

Fig.158-2388. Sika deer.

Fig.159-2391. Sika deer.

Fig.160-2462. Sika deer.

Fig.161-2318. Giraffe.

Fig.162-2455. Giraffe.

Fig.163-2334. Giraffe.

Fig.164-2295. Giraffe.

Fig.165-2395. Giraffe and Zebra.

Fig.166-2328. Zebra.

Fig.167-2337. Zebra.

Fig.168-2395. Zebra.

Fig.169-2458. Wildebeest.

Fig.170-2460. Wildebeest.

Fig.171-2345. Zebra and Wildebeest.

Fig.172-2372. Zebra and Wildebeest.

Fig.173-2448. Monkey.

Fig.174-2437. Elephant.

Fig.175-2467. Elephant.

Fig.176-2482. Coyotes.

Fig.177-2496. Ostrich.

Fig.178. Dinner at Mohi Abetsi Safari Lodge.

Fig.179-2576. Blyde River Canyon.

Fig.180-2584. Blyde River Canyon.

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1. Cadman A. Field Guide, Cape Fynbos Tour. Bernard Price Institute (Paleontology), University of the Witwatersrand, Johannesburg, South Africa. 5-14 September 1977, 88pp.

2. Cowling R and Richardson D. 1995. Fynbos. Fernwood Press, 156pp

3. Huang T.C. 1977. The Legume History of Taiwan from Pollen records. IAAP, Abstracts p.22; The Pollen History of *Caesalpinia* (Fabaceae) in Taiwan. Harvard Papers in Botany, 1999: 4(2):489-504.

4. International association for African Palynology, Second Circular, Programme and Excursions

5. Alcare, Albertinis, Aloe Factory, P.O. Box 278, Albertinia 6795.

6. Game Encounter Itinerary for 3 days Tour to Kruger National Park and Mpumalanga.

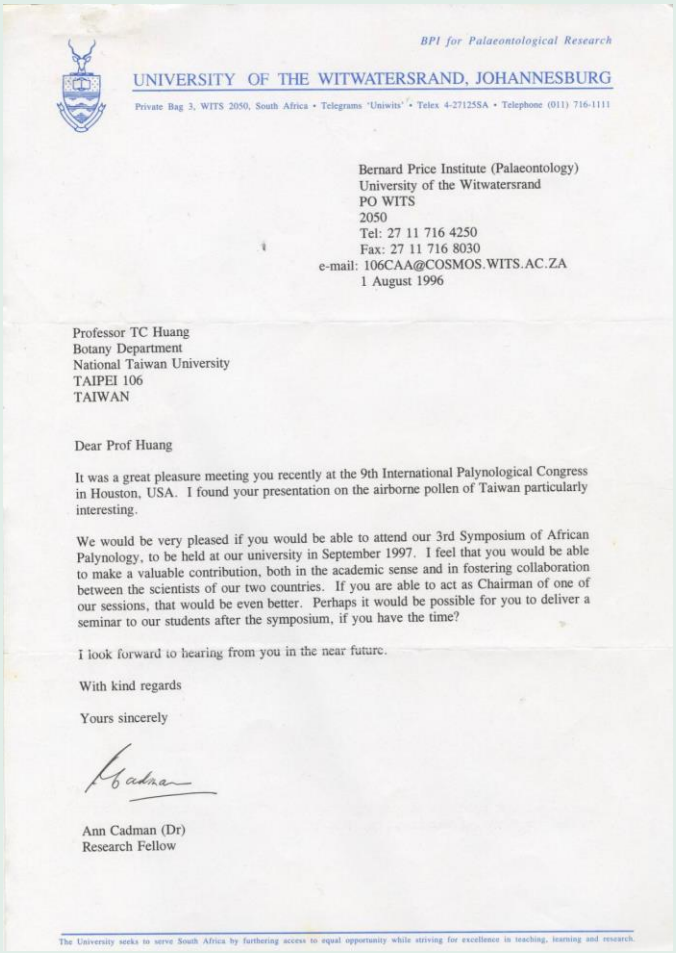
ACKNOWLEGEMENTS

I want to express my gratitude to Dr. Ann Cadman, Vice-President, International Symposium of African Palynology where I had learned the special African Flora, *i.e.,* Fynbos (The characteristic shrubland vegetation of southwestern and southern Cape of South Africa for the first time; it comprises Proteaoid, Ericoid, Resticoid and Genophyte growth Biome cited from Cowling R and Richardson D. 1995) and Karoo (semi desert natural region of South Africa) and also specific landscape such as Table mountain and bluish ocean coastal area of Cape Town. These Vegetation types and floristic components are quite different from those of Taiwan. Additional interest should be mentioned that I had an opportunity to renew our friendships with old friends such as Prof. Dr. E. M. Van Zinderen Bakker (Fig.80) who was recognized as a pioneer palynologist of S. Africa, also Dr. Johanna A. Coetzee (Fig.80), and Dr, Siwert Nilsson (Fig.135) of Stockholm, Sweden and Prof. Dr. M. Kedves (Fig.134) of Szeged Hungary etc. Unfortunately, Friends of above mentioned cannot share this article now.

Prof. A.E. [Braam] Van Wyk (Fig.94)., Botany Department, Prestoria University who had successfully guided us a very informative field observations. Some figures converted from slides in this paper by Prof. Cheng, Yi-Sheng and Cheng, Shiuan are very helpful. Any suggestions, especially the misidentification of photographic pictures from Readers will be deeply appreciated. I hope this short floristic data might be useful reference to botanists in Taiwan particular when they visit the South Africa.

APEENDIX 1

Cadman1



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1 August 1996

Professor TC Huang
Botany Department
National Taiwan University
TAIPEI 106
TAIWAN

Dear Prof Huang

It was a great pleasure meeting you recently at the 9th International Palynological Congress in Houston, USA. I found your presentation on the airborne pollen of Taiwan particularly interesting.

We would be very pleased if you would be able to attend our 3rd Symposium of African Palynology, to be held at our university in September 1997. I feel that you would be able to make a valuable contribution, both in the academic sense and in fostering collaboration between the scientists of our two countries. If you are able to act as Chairman of one of our sessions, that would be even better. Perhaps it would be possible for you to deliver a seminar to our students after the symposium, if you have the time?

I look forward to hearing from you in the near future.

With kind regards

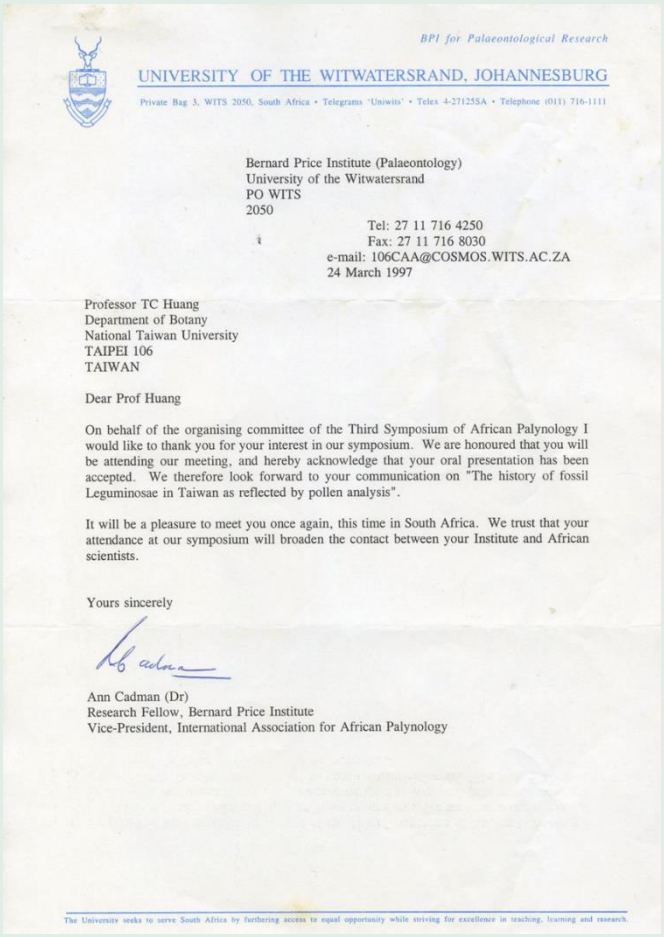
Yours sincerely

Cadman

Ann Cadman (Dr)
Research Fellow

The University seeks to serve South Africa by furthering access to equal opportunity while striving for excellence in teaching, learning and research.

Cadman 2



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24 March 1997

Professor TC Huang
Department of Botany
National Taiwan University
TAIPEI 106
TAIWAN

Dear Prof Huang

On behalf of the organising committee of the Third Symposium of African Palynology I would like to thank you for your interest in our symposium. We are honoured that you will be attending our meeting, and hereby acknowledge that your oral presentation has been accepted. We therefore look forward to your communication on "The history of fossil Leguminosae in Taiwan as reflected by pollen analysis".

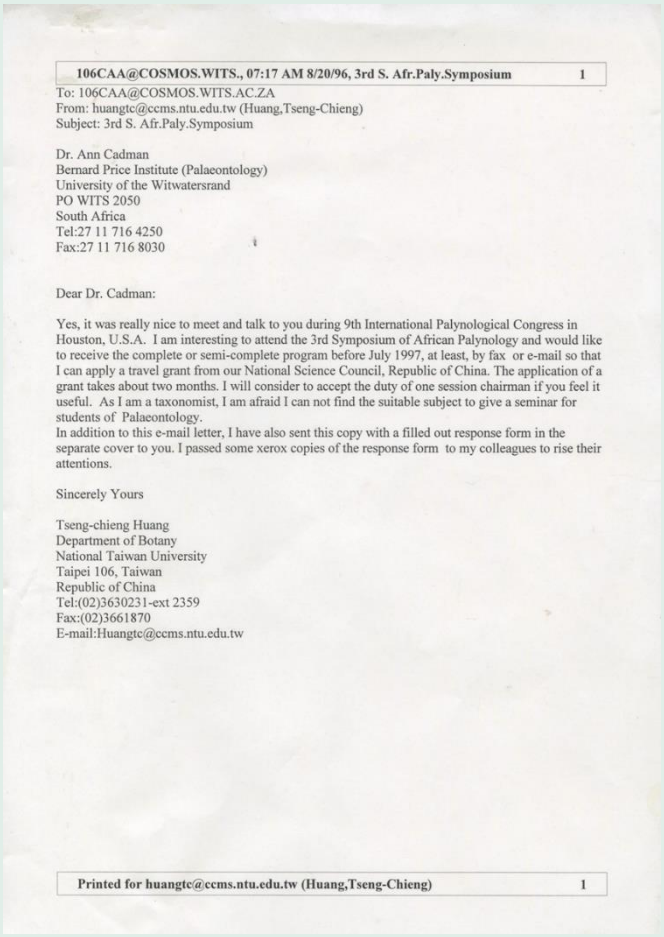
It will be a pleasure to meet you once again, this time in South Africa. We trust that your attendance at our symposium will broaden the contact between your Institute and African scientists.

Yours sincerely

Ann Cadman (Dr)
Research Fellow, Bernard Price Institute
Vice-President, International Association for African Palynology

The University seeks to serve South Africa by furthering access to equal opportunity while striving for excellence in teaching, learning and research.

Huang 1



106CAA@COSMOS.WITS., 07:17 AM 8/20/96, 3rd S. Afr.Paly.Symposium 1

To: 106CAA@COSMOS.WITS.AC.ZA
From: huangtc@ccms.ntu.edu.tw (Huang,Tseng-Chieng)
Subject: 3rd S. Afr.Paly.Symposium

Dr. Ann Cadman
Bernard Price Institute (Palaeontology)
University of the Witwatersrand
PO WITS 2050
South Africa
Tel:27 11 716 4250
Fax:27 11 716 8030

Dear Dr. Cadman:

Yes, it was really nice to meet and talk to you during 9th International Palynological Congress in Houston, U.S.A. I am interesting to attend the 3rd Symposium of African Palynology and would like to receive the complete or semi-complete program before July 1997, at least, by fax or e-mail so that I can apply a travel grant from our National Science Council, Republic of China. The application of a grant takes about two months. I will consider to accept the duty of one session chairman if you feel it useful. As I am a taxonomist, I am afraid I can not find the suitable subject to give a seminar for students of Palaeontology.
In addition to this e-mail letter, I have also sent this copy with a filled out response form in the separate cover to you. I passed some xerox copies of the response form to my colleagues to rise their attentions.

Sincerely Yours

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Printed for huangtc@ccms.ntu.edu.tw (Huang,Tseng-Chieng) 1

Conference Attendance List

1. Nilsson Siwert: Sweden
2. Roche Emile: Belgium
3. Roche Catherine: Belgium
4. Mucder Christian: Netherlands
5. Sa'id AL-Hajri: Saudi Arabia
6. Annick LE Thomas: France
7. Lobreau-Callen Danielle: France
8. Harley Mabeline: England
9. Dettman Mary: Australia
10. Msaky Emma: Tanzania
11. Dupont Lydie: Germany
12. Paul : Netherlands
13. Fernandez-Gonzalez Delia: Spain
14. Dela Fuente Placido: Spain
15. Seoane-Camba Juan: Spain
16. Spieksma Fritz: Netherlands
17. Spieksma Marise: Netherlands
18. Weiss Rosacine: Germany
19. Weiss Aby: Germany
20. Huang, Tseng-Chieng: Taiwan.
21. Huang-Lu, Lih-Chiueh: Taiwan
22. Kedves Miklos: Hungary
23. Isaacs Sherine: South Africa
24. Bamford Marion: South Africa
25. Van WYK Braam: South Africa
26. Cadman Ann: South Africa

Fig.1-0013. Witwatersrand University (Wits) compass plants *Quercus* trees.

Fig.2-0018. Witwatersrand University (Wits).

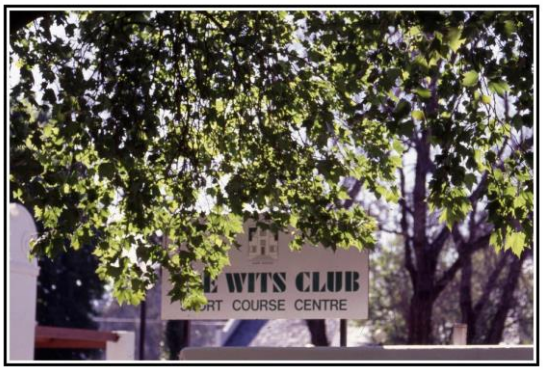


Fig.3-0015. Wits club and compass plant of *Platanus* trees

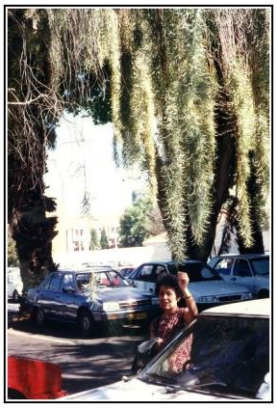


Fig.4. Johannesburg City

Fig.5. Johannesburg City

Fig.6-0048. Field observation of grassland, Savanna Biome, along SW highway of Johannesburg.

Fig.7-0053. Field observation of grassland, Savanna Biome, along SW highway of Johannesburg.

Fig.8-0061. *Celtis africana* (Ulmaceae) in Aventra Vaal Spa.

Fig.9-0065. *Salix mucrinata* (Salicaceae) in Aventra Vaal Spa.

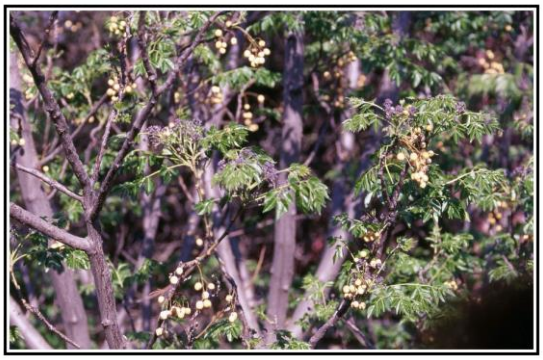


Fig.10-0084. *Melia azedarach* (Meliaceae) in Cultural History Museum, Kimberley.

Fig.11-0089. *Ceratunia siligma* (Leguminosae) in Cultural History Museum, Kimberley.

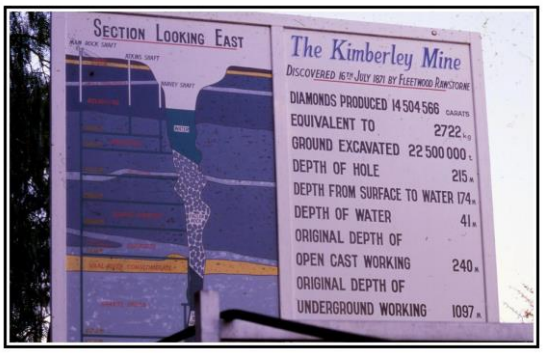


Fig.12-0091. Kimberley Mine.

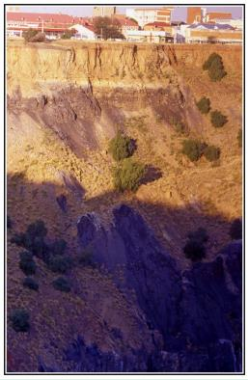


Fig.13-0093. Kimberley Mine Wall.

Fig.14-0101. *Hypoxis hemerocallidea* (Hypoxidaceae) in Savanna Biome (Karrold Kalahari Bushveld) Upington area.

Fig.15-0107. *Erica irbyana* (Ericaceae) in Upington area.

Fig.16-0154. *Aloe* cf. *hereroensis* (Liliaceae) in Upington area.

Fig.17-0171. *Argemone ochroleuca* (Papaveraceae) in Upington area.

Fig.18-0210. *Acacia* cf. *nigrescens* (Leguminosae, tree) and *Euphorbia* sp. (Euphorbiaceae, herbs) in Upington area.

Fig.19-0280. *Pachypodium namaquanum* (Apocynaceae) in Augrabies Falls National Park.

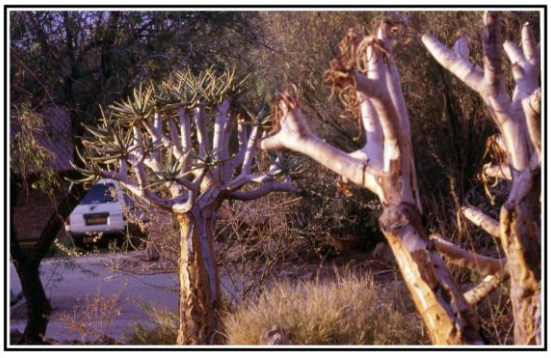


Fig.20-0282. *Pachypodium namaquanum* (Apocynaceae) in Augrabies Falls National Park.

Fig.21-0283. *Acacia* sp. (Leguminosae) in Augrabies Falls National Park.

Fig.22-0337. *Portulaca* sp. (Portulacaceae) in Springbok (Succulent Karoo Biome).

Fig.23-0368. *Hypericum* sp. (Guttiferae) in Springbok.

Fig.24-0408. *Pachypodium namaquamum* (Apocynaceae) in Potjie.

Fig.25-0471. *Ursinia calenduliflora* (Compositae) in Vanrhynsdorp.

Fig.26-0472. *Ursinia calenduliflora* (Compositae) in Vanrhynsdorp.

Fig.27-0479. *Ursinia calenduliflora* (Compositae) in Vanrhynsdorp.

Fig.28-0632. *Aloe dichotoma* (Liliaceae) in Kern Succulent Nursery in Vanrhynsdorp.

Fig.29-0642. Up Van Rhynus Pass.

Fig.30. *Askidiosperma nitidum* (Restionaceae) in Van Rhynus Pass.

Fig.31-0752. Table Mountain in Lambert's Bay.

Fig.32-0785. *Acacia* sp. (Leguminosae) in Lambert's Bay.

Fig.33-0786. *Aloe* sp. (Asphodelaceae or Liliaceae) in Lambert's Bay.

Fig.34-0790. *Carpobratus quadrifidus* (Aizoaceae) in Lambert's Bay.

Fig.35-0795. *Lampranthus* cf. *aureus*. (Aizoaceae) in Lambert's Bay.

Fig.36-0807. *Liparia splendens* (Leguminosae) in Lambert's Bay.

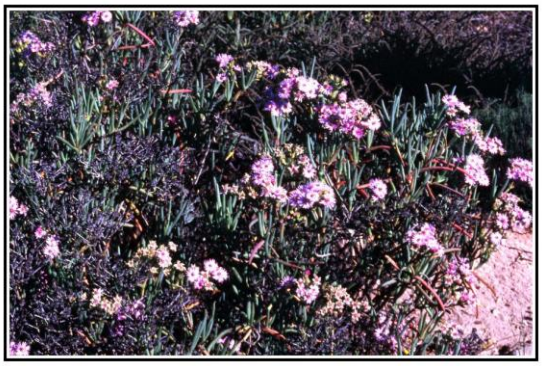


Fig.37-0825. *Leipoldtia* sp. (Aizoaceae) in Lambert's Bay.

Fig.38-0831. *Restio multiflorus* (Restionaceae) in Lambert's Bay.

Fig.39-0835. *Zantedeschia aethiopica* (Araceae) in Kerr kwekery.

Fig.40-0854. *Agapanthus inapertus* (Alliaceae) in Kirstenbosch National Botanical Garden.

Fig.41-880. *Pelargonium betulinum* (Geraniaceae) in Kirstenbosch National Botanical Garden.

Fig.42-881. *Dimorphotheca pluvialis* (Compositae) in Kirstenbosch National Botanical Garden.

Fig.43-0876. *Sutherlandia frutescens* (Leguminosae) in Kirstenbosch National Botanical Garden.

Fig.44-884. *Schotia brachyperatada* (Leguminosae) in Kirstenbosch National Botanical Garden.

Fig.45-0903. *Aloe plicatus* (Asphodelaceae or Liliaceae) in Kirstenbosch National Botanical Garden.

Fig.46-0910. *Leucospermum cordifolium* (Proteaceae) in Kirstenbosch National Botanical Garden.

Fig.47-0928. *Erica regina* (Ericaceae) in Kirstenbosch National Botanical Garden.

Fig.48-0951. *Leucadendron daphnoides* (Proteaceae) in Kirstenbosch National Botanical Garden.

Fig.49-0959. *Protea coronata* (Proteaceae) in Kirstenbosch National Botanical Garden.

Fig.50-0972. cf. *Mimetes fimbrifolius* (Proteaceae) in Kirstenbosch National Botanical Garden.

Fig.51-0973. *Leucospermum* cf. *oleifolium* (Proteaceae) in Kirstenbosch National Botanical Garden.

Fig.52-1001. *Acacia* sp. (Leguminosae) in Kirstenbosch National Botanical Garden.

Fig.53-0917. *Askidiosperma nitidum* (Restionaceae) in Kirstenbosch National Botanical Garden.

Fig.54-0922. *Elegia capensis* (Restionaceae) in Kirstenbosch National Botanical Garden.

Fig.55-1014. Table Mountain in Cape Town.

Fig.56-1025. Cape Point Nature Reserve (Fynbos Biome).

Fig.57-1034. *Vitsenia maura* (Iridaceae) in Cape Point Nature Reserve (Fynbos Biome).

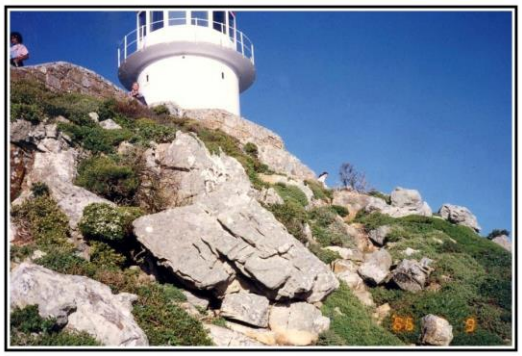


Fig.58. Cape Tower.

Fig.59. On Cape Tower ground.

Fig.60-1075. Coastal Fynbos along coastal road of Cape Town.

Fig.61-1109. *Erica mammosa* (Ericaceae) in Coastal Fynbos.

Fig.62-1101. *Leucodendron* cf. *floridus* (Proteaceae) in Coastal Fynbos.

Fig.63-1114. *Leucodendron* cf. *floridus* (Proteaceae) in Coastal Fynbos.

Fig.64-1115. *Leucodendron* cf. *floridus* (Proteaceae) in Coastal Fynbos.

Fig.65-1116. *Leucodendron* cf. *floridus* (Proteaceae) in Coastal Fynbos.

Fig.66-1110. *Leucodendron* cf. *floridus* (Proteaceae) in Coastal Fynbos.

Fig.67-1135. Coastal Fynbos.

Fig.68-1153. *Felicia amoena* (Compositae) in Coastal Fynbos.

Fig.69-1142. *Restio subverticillatus* (Restionaceae) in Coastal Fynbos.

Fig.70-1147. *Aloe* cf. *hereroensis* (Asphodelaceae or Liliaceae) in Coastal Fynbos.

Fig.71-1189. *Podocarpus latifolius* in Harold Porter Nature Reserve.

Fig.72-1204. *Leucospermum* cf. *pleuridens* (Proteaceae) in Harold Porter Nature Reserve.

Fig.73-1206. *Erica regina* (Ericaceae) in Harold Porter Nature Reserve.

Fig.74-1162. *Leucospermum* cf. *oleiofolium* (Proteaceae) in Coastal Fynbos.

Fig.75-1233. Hermanus Town in the southern coast of the Western Cape.

Fig.76-1244. *Drosera cistifolia* (Droseraceae) in Hermanus Town.

Fig.77-1305. Hermanus Town in the southern coast of the Western Cape.

Fig.78-1318. *Leucodendron* cf. *floridus* (Proteaceae) in Hermanus Town.

Fig.79-1336. *Ixis* sp. (Iridaceae) in Hermanus.

Fig.80. Dr. E. M. Van Zinderen Bakker and Dr. A. Coetzee.

Fig.81. Dr. E. M. Van Zinderen Bakker and others.

Fig.82. Dr. E. M. Van Zinderen Bakker and others.

Fig.83. Dr. E. M. Van Zinderen Bakker and others.

Fig.84-1392. *Aponogeton distachyas* (Aponogetonaceae) in Albertinia.

Fig.85-1415. *Restio subverticillatus* of Fynobos vegetation in Albertinia.

Fig.86-1416. *Aloe* Farm in Albertinia.

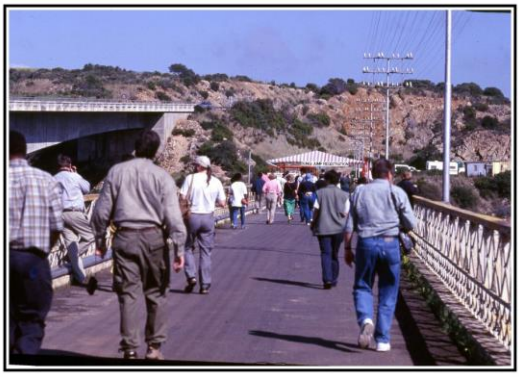


Fig.87-1932. Diving Bridge in Albertinia.

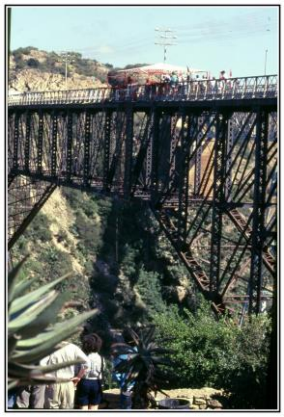


Fig.88-1942. Diving Bridge in Albertinia.

Fig.89-1990. Two ostriches playing around Fynbos vegetation nearby Diving Bridge.

Fig.90-1957. cf. *Protea cynanoides* (Proteaceae) nearby Diving Bridge in Albertina.

Fig.91-2021. *Acacia* sp. (Leguminosae) nearby Diving Bridge in Albertina.

Fig.92-2046. *Crassula ovata* (Crassulaceae) nearby Diving Bridge in Albertina.

Fig.93-2054. Safarin Ostrich Farm in Albertina.

Fig.94-2114. Prof. A.E. Van Wyk, at wright side in Tsitsikama National Park.

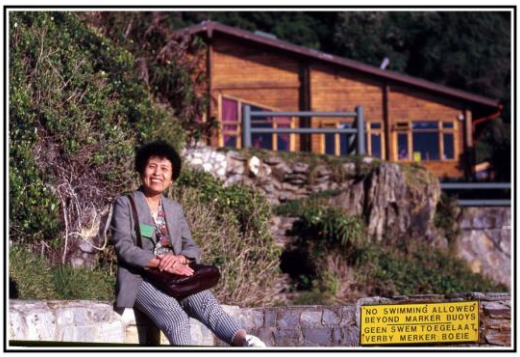


Fig.95-2127. Mrs Huang and swimming pool in Tsitsikama National Park.

Fig.96-2163. *Ruhmora adiantiformis* (Dryopteridaceae) in Big Tree.

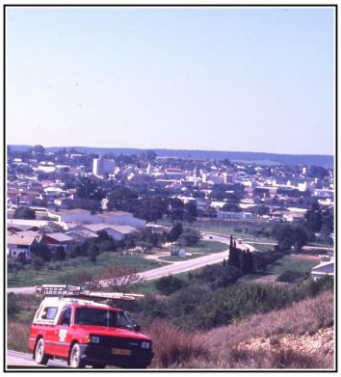


Fig.97-2186. Van Staden City of Cape Town.

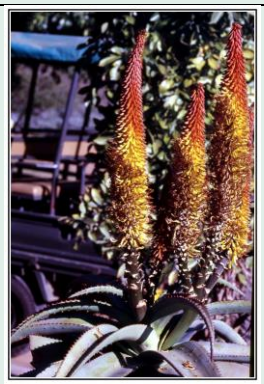


Fig.98-2242. *Aloe arborescens* (Asphodelaceae or Liliaceae) in Addo Elephant National Park.

Fig.99-2263. Sika deer in Addo Elephant National Park.

Fig.100-2272. *Ficus* sp. (Moraceae) in Addo Elephant National Park.

Fig.101-2252. *Crassula ovata* (Crassulaceae) in Noorsveld Karoo vegetation.

Fig.102-2306. Lunch at the Drosdy Hotel.

Fig.103-2309. *Podocarpus falcatus* (Podocarpaceae) at the Drosdy Hotel in Graaff-Reinet.

Fig.104-2319. Graaff-Reinet, a town in the Eastern Cape Province of South Africa.

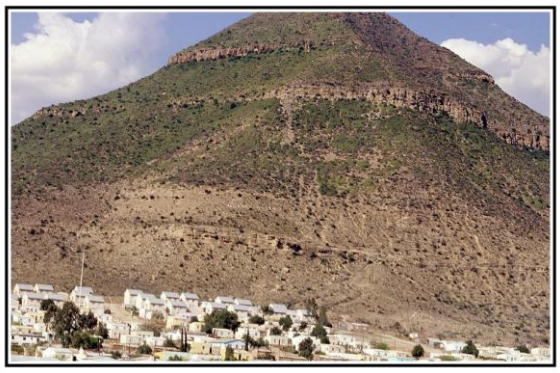


Fig.105-2321. High altitude's karroid grassland in Naude's Nek.

Fig.106-2323. High altitude's karroid grassland in Naude's Nek.

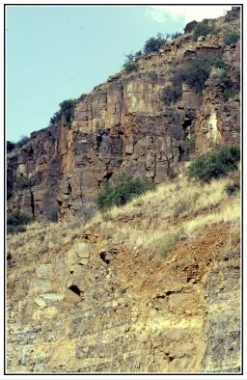


Fig.107-2325. High altitudes of Table Mountain karroid vegetation in Naude's Nek.

Fig.108. Conference attendance palynologists.

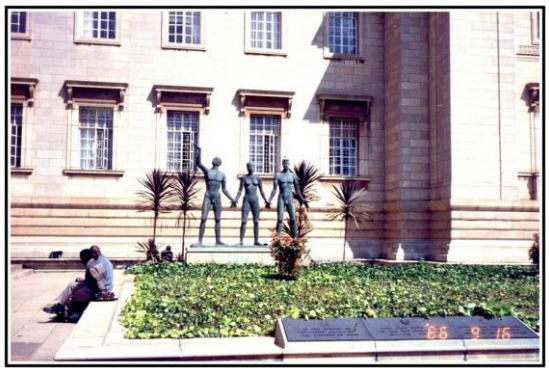


Fig.109. Anglo Boer War Museum, Sterkfontein.

Fig.110. Sterkfontain Caves entrance.

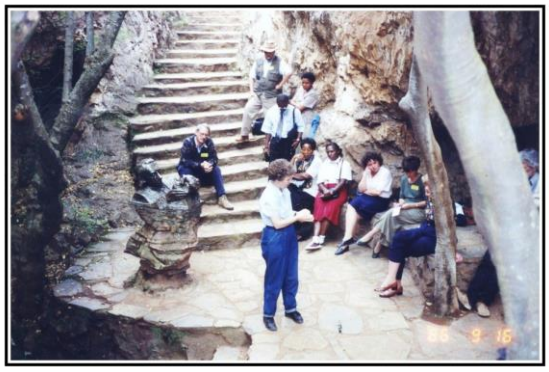


Fig.111. Sterkfontain Caves entrance.

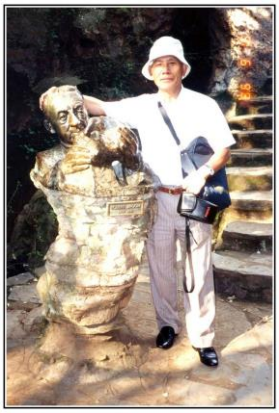


Fig.112. with Statue of Dr. Robert Broom.

Fig.113. with Statue of Dr. Robert Broom.

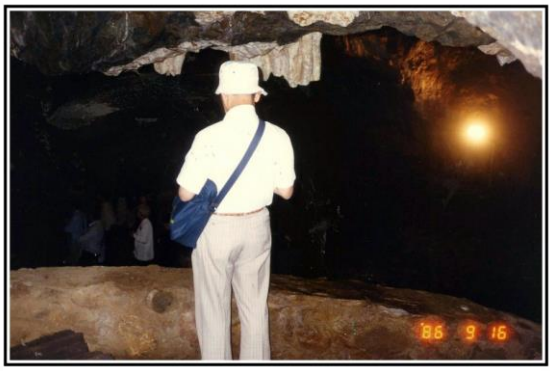


Fig.114. Sterkfontain Caves inside view.

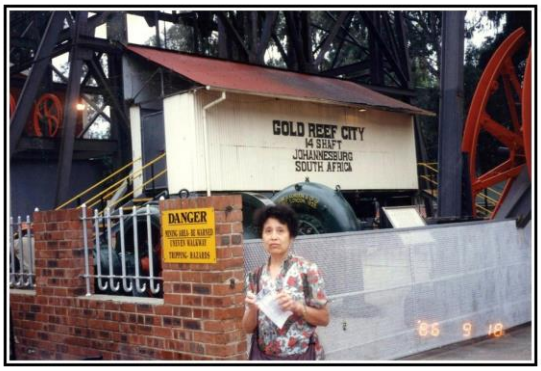


Fig.115. Gold Reef City.

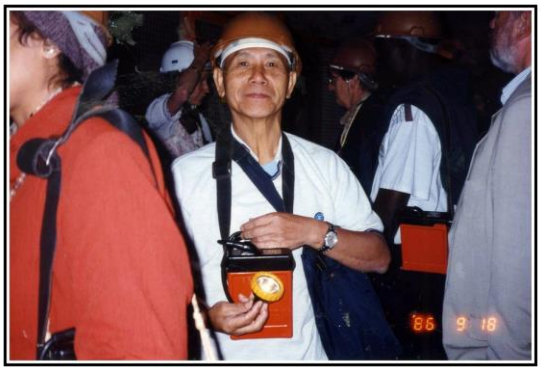


Fig.116. Gold mine in Kimberley.

Fig.117. Gold mine in Kimberley.

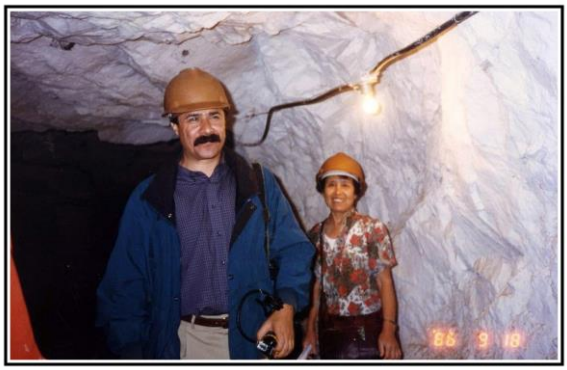


Fig.118. Gold mine in Kimberley.

Fig.119. Gold mine in Kimberley.

Fig.120. Gold mine in Kimberley.

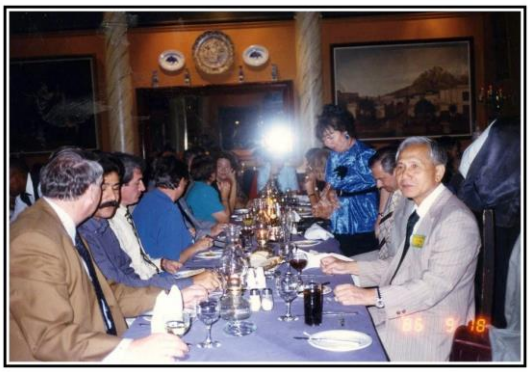


Fig.121. Conference Dinner (Huang and others).

Fig.122. Conference Dinner (Mrs. Huang and others).

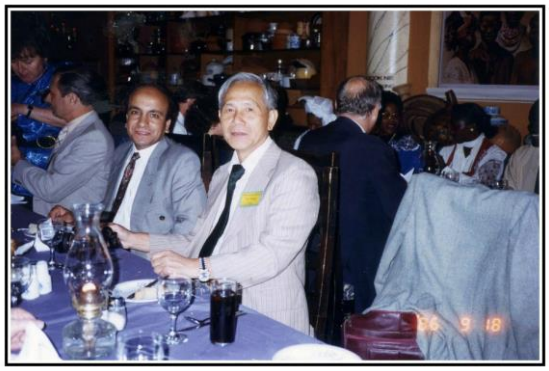


Fig.123. Conference Dinner (Huang, Sa'id and others).

Fig.124. Dr. Cadman address.

Fig.125. Cadman and others.

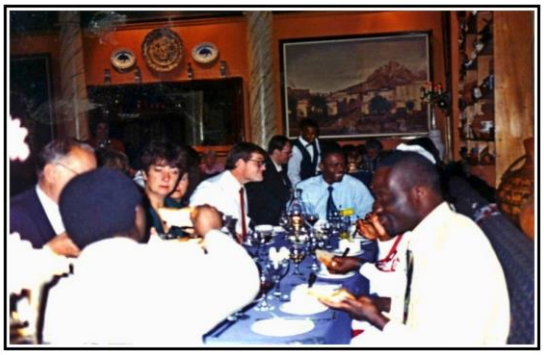


Fig.126. Cadman and others.

Fig.127. Kedves and others.

Fig.128. Huang couple and others.

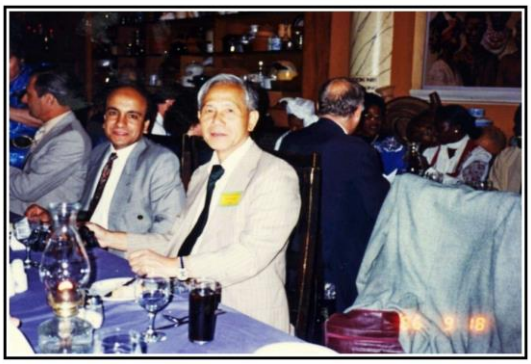


Fig.129. Huang, Sa'id and others.

Fig.130. Cadman and others.

Fig.131. Huang couple.

Fig.132. Weiss couple and others.

Fig.133. Spieksma Fritz and Marise.

Fig.134. Kedves and Huang.

Fig.135. Nilsson and others.

Fig.136. Roasting Pig.

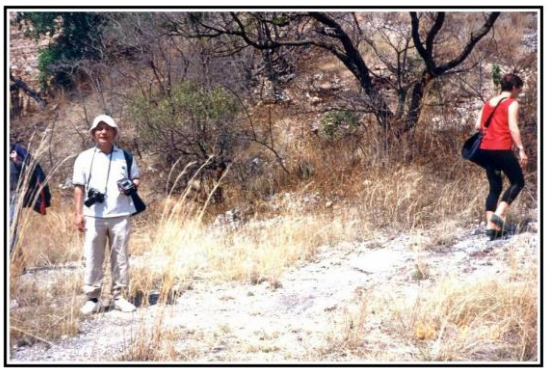


Fig.137. Huang wandering among Fynbos forest.

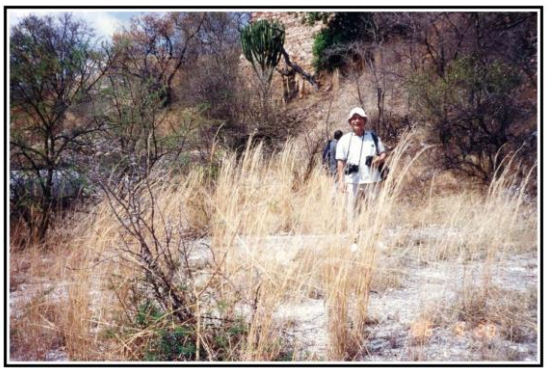


Fig.138. Huang wandering among Fynbos forest.

Fig.139. Mrs. Huang wandering among Fynbos forest.

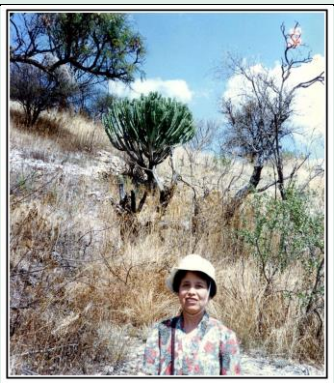


Fig.140. Mrs. Huang wandering among Fynbos forest.

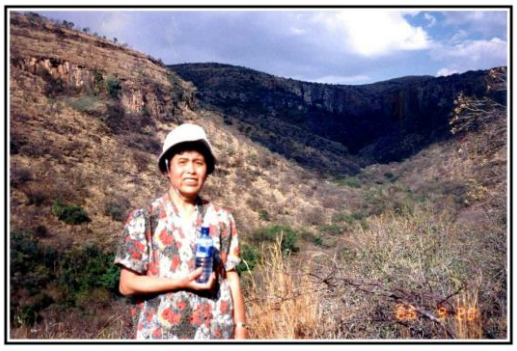


Fig.141. Mrs. Huang wandering among Fynbos forest.

Fig.142. Mrs. Huang wandering among Fynbos forest.

Fig.143. Lunch time.

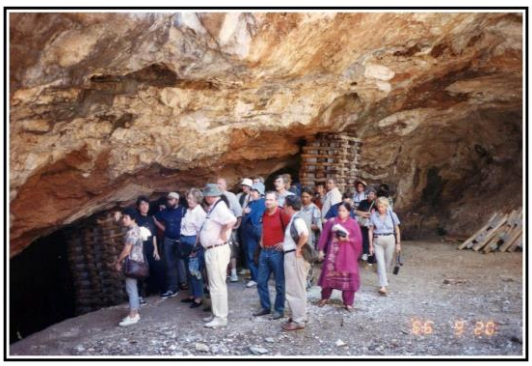


Fig.144. Historic cave.

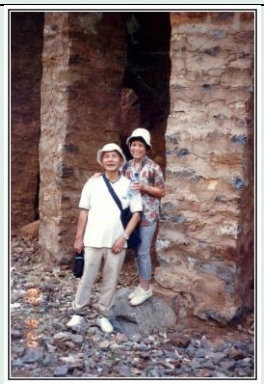


Fig.145. Mr. & Mrs. Huang visit historic cave.

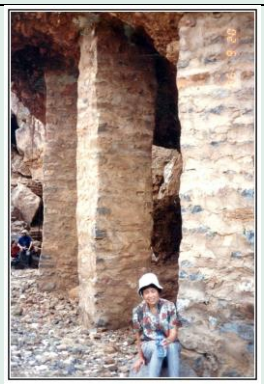


Fig.146. Mrs. Huang visit historic cave.

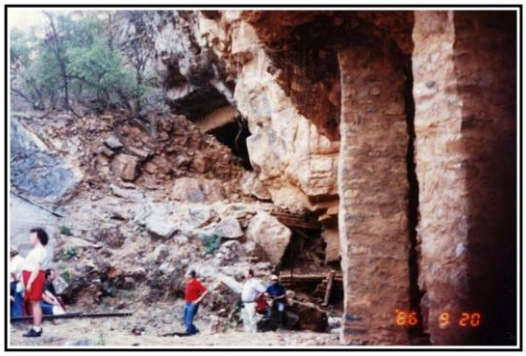


Fig.147. Group palynologists wandering along Makapansgat Valley.

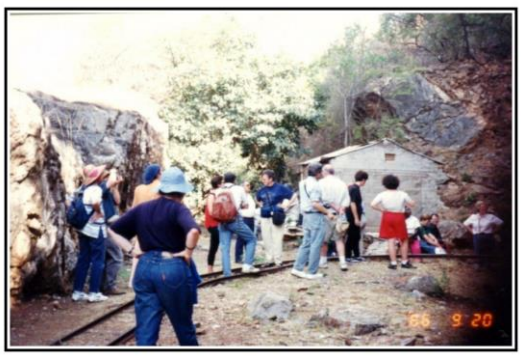


Fig.148. Group palynologists wandering along Makapansgat Valley.

Fig.149. Prof. Weiss wandering along Makapansgat Valley.

Fig.150. Drs. Cadman and Weiss wandering along Makapansgat Valley.

Fig.151. Dr. and Mrs Tai, Prof. and Mrs. Huang and Mrs. Chang from left to right.

Fig.152. Dr. and Mrs Tai, Prof. and Mrs. Huang and Dr. and Mrs. Chang from left to right.

Fig.153. Prof. and Mrs. Huang and Dr. and Mrs. Chang.

Fig.154. Prof. and Mrs. Huang and Dr. and Mrs. Chang.

Fig.155. Mrs. Huang in Johannesburg, RSA.

Fig.156-2333. Garden Court Milpark Hotel in Johannesburg City (Left Building).

Fig.157-2314. Sika deer.

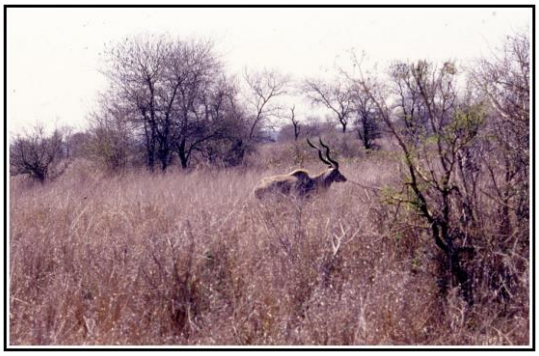


Fig.158-2388. Sika deer.

Fig.159-2391. Sika deer.

Fig.160-2462. Sika deer.

Fig.161-2318. Giraffe.

Fig.162-2455. Giraffe.

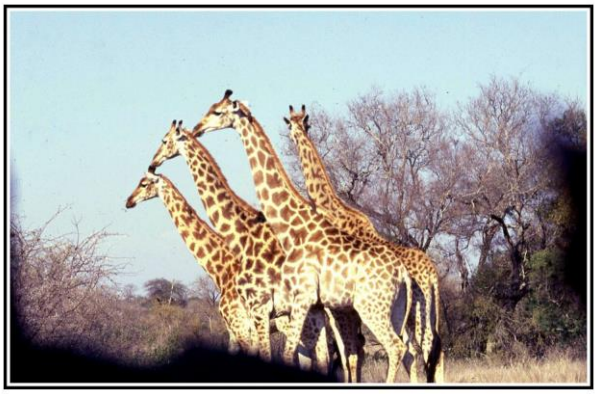


Fig.163-2334. Giraffe.

Fig.164-2295. Giraffe.

Fig.165-2395. Giraffe and Zebra.

Fig.166-2328. Zebra.

Fig.167-2337. Zebra.

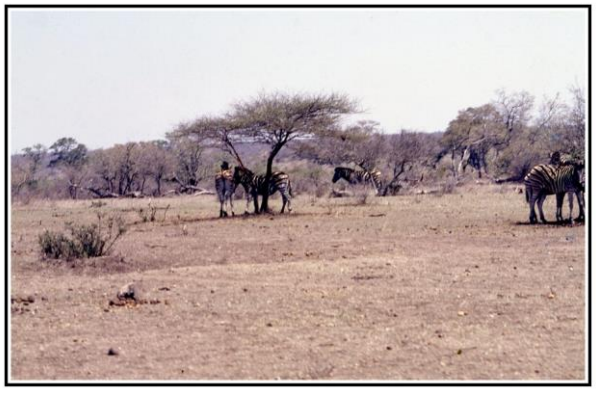


Fig.168-2395. Zebra.

Fig.169-2458. Wildebeest.

Fig.170-2460. Wildebeest.

Fig.171-2345. Zebra and Wildebeest.

Fig.172-2372. Zebra and Wildebeest.

Fig.173-2448. Monkey.

Fig.174-2437. Elephant.

Fig.175-2467. Elephant.

Fig.176-2482. Coyotes.

Fig.177-2496. Ostrich.

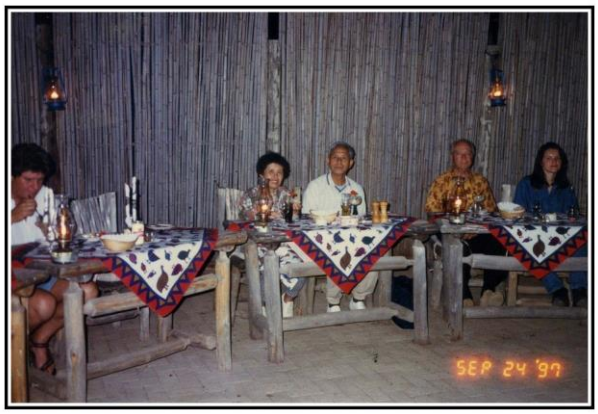


Fig.178. Dinner at Mohi Abetsi Safari Lodge.

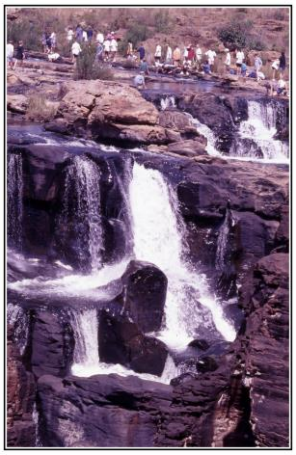


Fig.179-2576. Blyde River Canyon.

Fig.180-2584. Blyde River Canyon.

®

落花時，夕陽誰喚“樓梯草”
樓梯草植物介紹及新發現

曾妤馨 博士

中央研究院生物多樣性研究中心

博士後研究員

記得我在博士班開始之初，正苦思著適合的研究方向，隨意地打開電腦裡的檔案，希望可以從中尋找靈感。一份幾年前所整理的台灣被子植物性別資料，無意間吸引我的注意。當時我透過文獻、歷年的碩博士論文及各地植物誌等資料，依照對物種生殖系統的描述，一一記錄下台灣近四千種開花植物的性別系統。根據這份紀錄，在台灣僅有 17 種的樓梯草屬植物，是開花植物中性別系統變化最大的一群。不僅如此，再深入爬梳了相關文獻，才發現樓梯草的屬階分類問題百年來懸而未決，一直困擾著分類學家。我心想，身為台灣的植物學家，在這個遍地皆可見到樓梯草的地方，來挑戰一個如此特別的類群，應該是適合的研究方向。就這樣，我與樓梯草的一趟研究旅程就此展開...

惡名昭彰的親戚們

樓梯草屬植物爲蕁麻科的成員，看到"蕁麻"二字，大部份的人都會馬上聯想到常見的皮膚疾病-蕁痲疹。事實上，這個疾病名稱的由來與這群植物有著密切的關係。有些人可能有這樣的經驗，當在野外不小心觸碰到一些蕁麻科的植物，皮膚會即刻感受到刺痛灼熱感，隨後造成局部的紅腫，這個感覺往往會持續幾十分鐘甚至數小時。此反應是因為這群植物的葉與莖表面常遍布有燫毛（圖一），燫毛裡面有許多酒石酸與草酸等刺激

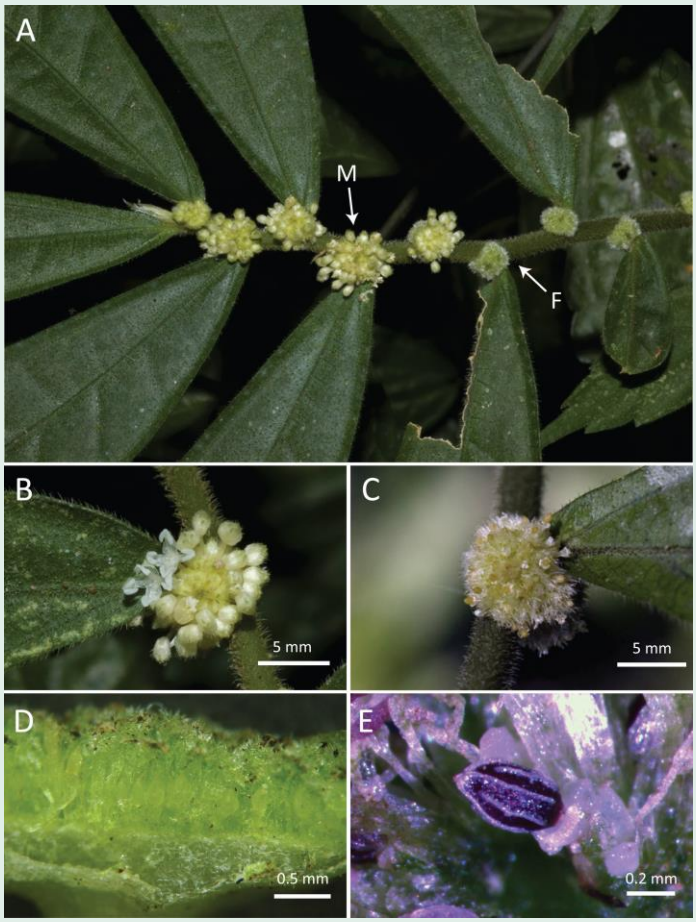
圖一、具有燫毛的咬人貓

性物質，當我們觸碰到植物體，細胞裡面的刺激物質會隨著燉毛的斷裂而釋放到皮膚中，使得皮膚馬上感受到刺痛，甚至發生腫脹。醫學界注意到這個皮膚的反應，於是就把發生在皮膚上類似的症狀，稱呼為“蕁麻疹”。在野外看到蕁麻科的成員，像是咬人貓（圖一）或是咬人狗，最好遠遠欣賞就好，以避免觸碰到它們。但萬一真的不小心碰到，也不用太過擔心，最好方法的就是將燉毛拿鑷子或膠帶移除，減少燉毛與皮膚接觸的時間。

樓梯草的形態與特殊技能

全世界的樓梯草約有 600 種，廣泛分佈在熱帶與亞熱帶的非洲與亞洲，喜好生長在潮濕的森林底層、溪澗、山溝、山洞或是瀑布一帶。台灣的樓梯草屬植物通常生長在中低海拔森林，其中分佈最廣泛的冷清草及巒大樓梯草，是森林底層的優勢物種，常可見到它們滿山遍野地生長（圖二）。樓梯草的外型並不顯眼，在開花時期也因為花朵太過微小而不容易觀察，所以樓梯草雖然常見，卻也是最為人視而不見的植物。對於植物

圖二、樓梯草屬植物在台灣中低海拔森林底層經常可見

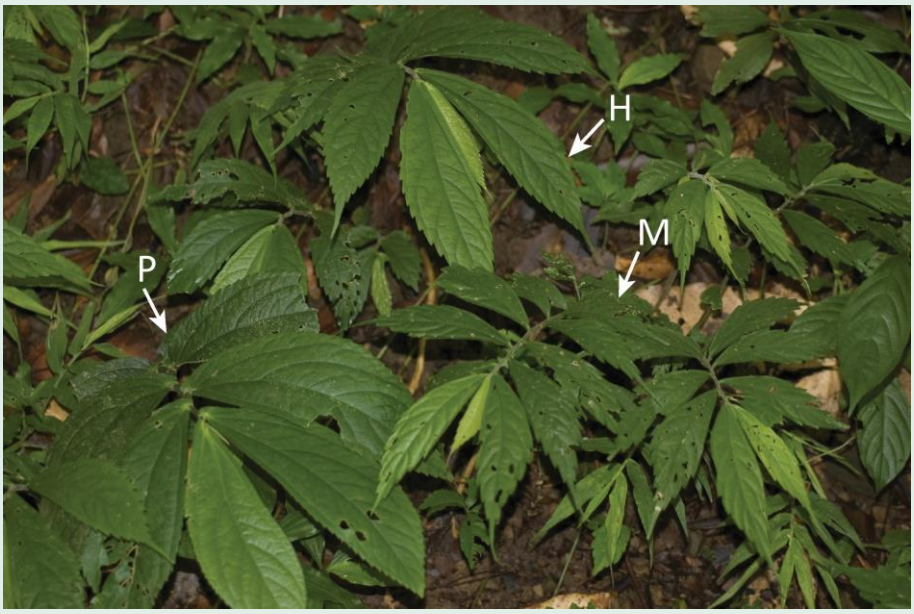


圖三、樓梯草屬植物形態

（A）冷清草的雄花序（M）與雌花序（F），（B）冷清草的雄花，（C）冷清草的雌花序與未成熟的果，（D）台灣樓梯草的雌花序橫切，（E）稀齒樓梯草的瘦果。

愛好者來說，想要輕易地辨識這類的植物，也不是容易的事。主要是因為不同的樓梯草物種，彼此外型有時會長得很像，而有些物種內的變異卻可能非常大，要能夠正確的分辨物種，需要有長期的野外觀察經驗。

雌雄異花的樓梯草（圖三Ａ），花朵構造非常簡單，它的雌雄花都沒有明顯的花瓣與花萼，雄花僅具有花絲與花藥（圖三Ｂ），雌花也只有



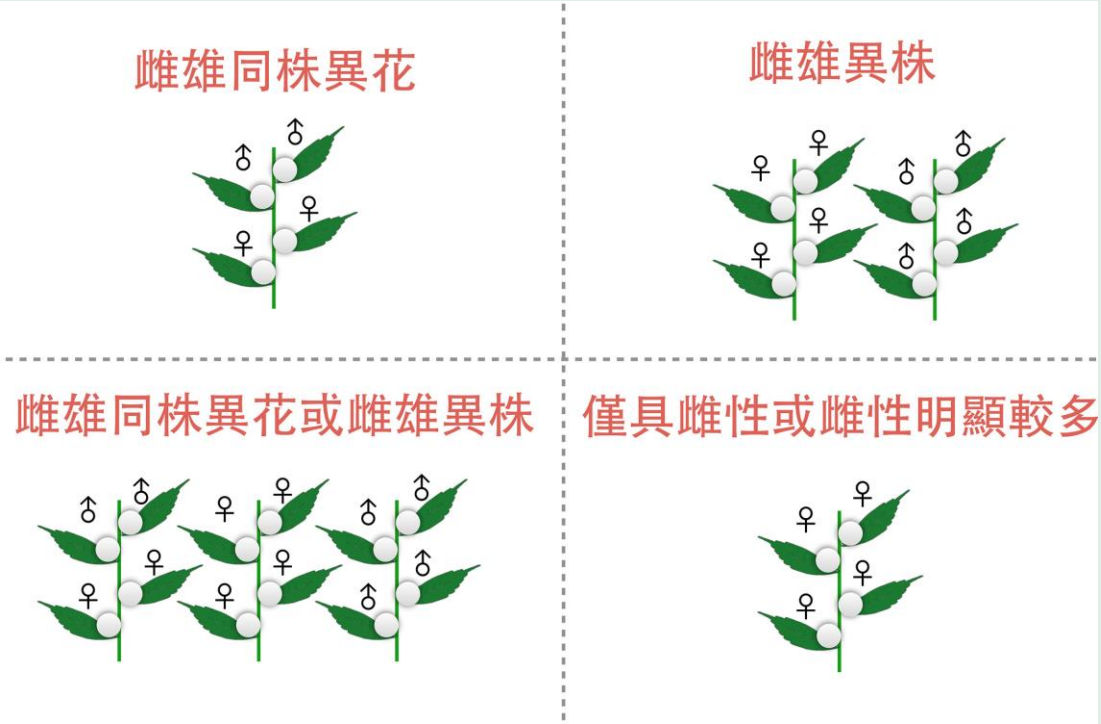
圖四、雜交樓梯草（H）與其母本（冷清草，M）及父本（巒大樓梯草，P）

子房與柱頭（圖三 C 及 D），這些單性的小花會緊密地排列在盤狀的花托上，形成類似菊花的花序構造（圖三 D）。一般來說，樓梯草的花序約 0.5–1 公分，但在這個如同指甲大小的範圍裡，竟深藏著 50–200 朵小花。這些小花又深埋在層層包覆的小苞片中（圖三 D），若沒有把花序切開，一般很難觀察到這些極小的花朵。

樓梯草花粉的傳播方式非常特殊。在雄花花苞內，所有的花絲會向內折曲，隨著雄蕊逐漸成熟，花藥越長越大，花苞內的空間也會越來越擁擠，當環境中一旦有外力發生或是溫濕度的變化，原本彎曲的雄蕊會急速地從花苞中彈射開來，花粉也會隨之飛散。將來若有機會在野外看到樓梯草的雄花，不妨停下來等待一陣微風吹來，成熟的雄花會一朵朵地逐漸彈射開來，飄散出的花粉如同一縷縷的白煙，甚是美麗。樓梯草的種子傳播方式也是採取類似的彈射機制，坐落在假雄蕊上的種子（圖三 E），當成熟之時，彎曲的假雄蕊會透過彈射的方式，就像是發射子彈般，將成熟的種子快速地彈射出去，以達到傳播的目的。

新雜交種的發現

根據目前最新的分類研究，台灣共有 17 種樓梯草植物，其中包含一個新發表的雜交種，這個雜交種的發現，算是一個意外的驚喜。有天，我與家人一同到三貂嶺古道健行，一路上走走停停，出遊不忘沿路欣賞及研究的植物，是身為植物學家的天性。就在佈滿冷清草與巒大樓梯草的轉角處，看到一群從未見過但外型有點熟悉的樓梯草，它的葉子如同冷清草的狹長，比冷清草的葉子大，鋸齒形態類似巒大樓梯草，但是鋸齒數目比較少，整體而言，這群植物的形態特徵介於冷清草與巒大樓梯草之間（圖四），這暗示了此物種雜交起源的可能性。經由幾年的野外調查，陸陸續續在其他地點發現此種的分布，同時我也



圖五、台灣產樓梯草的性別系統

注意到，在同個地點總會見到冷清草及巒大樓梯草的蹤跡。進一步透過形態學及細胞核序列分析，證實此種確實是由冷清草與巒大樓梯草雜交而來。而葉綠體的分子親緣關係則顯示此雜交種與冷清草歸屬於一群，基於葉綠體母系遺傳的特性，進一步推測冷清草可能是此雜交種的母本，再加上冷清草的雌花與巒大樓梯草的雄花，在開花時間上有高度的重疊，也再次證實了父母本的來源。這種單一方向的雜交事件，可能是導致此雜交種發生的成因。基於以上的研究，我將此雜交種正式發表，並且命名為“雜交樓梯草”。這個意外的發現，是在全世界近三千種的蕁麻科中，第一筆有關天然雜交種的報導。

複雜的性別系統

大家都知道動物有雌雄之分，植物也有性別嗎？不會移動的植物為了成功繁衍下一代，具有各種的生殖模式，而植物的性別系統，甚至比動物更還要複雜。以開花植物來說，約有七成以上的花都同時具有雄蕊與雌蕊，但在自然界中，也可以觀察到雌雄同株異花，雌雄異株和一般被稱為雜性花的各種類型。根據先前文獻指出，台灣所產的樓梯草具有四種不同的性別系統：雌雄異株，雌雄同株異花，同時具有雌雄異株與雌雄同株異花以及只具有雌花的物種（圖五）。這些僅具有雌花的物種，引起我一連串的疑問：這些物種在野外真的沒有雄花嗎？假如真的只具有雌花，是否可以產生種子？而種子又是如何生成的？這些植物是不是具有無融合生殖的能力呢？無融合生殖是指未經過精卵結合的過程，而產生有活性的種子，全世界約有 400 種無融合生殖的植物。

為了了解樓梯草物種是否具有無融合生殖的能力，我透過野外套袋的實驗，來觀察三種僅具有雌花的台灣樓梯草、長圓樓梯草及溪澗樓梯草的結實情況。結果顯示這三個物種皆可成功產生有活性的種子，證實它們都具有無融合生殖的能力。但既然種子可以無性形成，胚與胚乳的發育是從何而來呢？一般有性生殖的被子植物，經授粉作用後，會產生雙重受精的現象，也就是一個精核會與卵細胞結合形成二倍體的合子，另一個精核會與胚囊中含有兩個核的極核結合，逐漸形成三倍體的胚乳，因此種子的 DNA 含量比例會是 2：3。一般會透過分析種子的 DNA 含量，來推斷種子形成的生殖途徑，這是在生殖生物學中常使用的研究方法。因此，我進一步藉由流式細胞儀來分析種子的 DNA 含量，結果顯示，無融合生殖的三種樓梯草在沒有雙重受精的情況下，種子 DNA 含量的比例為 1：2。這表示這三個物種在種子發育的過程中，會直接由卵（n）發育成胚，由極核（$2n$）發育成胚乳，從頭到尾都沒有精子的貢獻。另外，我也仔細地觀察樓梯草的胚胎發育過程，再次確定在胚胎發育的過程中，完全沒有花粉的參與及花粉管的形成。由此可以推論，僅具有雌花的三種樓梯草，可以在沒有任何花粉的參與下，完成種子的發育，這是在被子植物中少見的絕對無融合生殖。是什麼樣的原因導致這種情況發生呢?染色體的觀察結果告訴我們可能的推論。目前已知的有性生殖樓梯草都是二倍體（$2n = 26$），但是僅具雌花的台灣樓梯草與長圓樓梯草是四倍體（$2n = 4x = 52$），溪澗樓梯草是三倍體（$2n = 3x = 39$）。這些多倍體可能由雜交而來，雜交後所生成的異質基因體，會使參與有性生殖的基因發生調節不同步或是表達錯誤的現象，造成植物失去有性生殖的能力，多倍體的無融合生殖物種也就因此生成。

結語

隨著這幾年的研究，我越是深入瞭解樓梯草，就發現越多的驚喜，同時也挖掘到更多未解之謎。有朋友問過我，“為什麼妳要研究這麼醜的植物？”義大利的作家 Umberto Eco 曾說，**“美麗有時很無聊，美麗的事物總是遵循著一定的標準…醜陋卻無可預計，帶有無限可能”**。雖然我一點也不覺得樓梯草醜陋，但或許就是因為它的不起眼，才會藏有這麼多的無限可能，等待我們繼續發掘...®

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台灣的鳥類恐龍化石

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生活在台大校園裡，即使不會特別外出賞鳥，相信不少人也都可以說出幾種每天在我們周圍翱翔或漫步的鳥類，像是麻雀或是黑冠麻鷺等。但如果仔細觀察、細數的話，光是台大校園裡曾經出現的鳥類紀錄就超過 100 種！而台灣鳥類名錄也從 19 世紀下半葉開始有正式記載的 200 種左右一路攀升到現在所知的 600 多種。

物種名錄在特定地區的收錄、刪減等，都需要龐大的人力、時間和經費的投入。但每次的發現都有機會改寫我們對於自己生活環境的認知，這也或許就是為什麼從事基礎研究工作如此迷人的原因之一。對於大多數人來說似乎會感到有點遙遠，但這數十年來的古生物研究、尤其是 1993 年「侏羅紀公園」的電影上映後所造成的全球恐龍熱潮、和所引領出來大規模的挖掘、研究工作等，現今已經完全顛覆了我們對於恐龍的認知和定義 — 目前恐龍在科學上的定義是由滅絕三角龍和現生麻雀的最近的共同祖先和其所有的後代所組成，換句話說，我們不只在校園裡就可以看到貨真價實、活生生的恐龍，定義恐龍的主角之一：麻雀，也就在我們的眼前自由自在的飛翔。

在全球古生物學研究的突破、進展之下，似乎一夕之間世界全改觀了：因為恐龍並沒有滅絕，身為中生代恐龍演化的其中一個支系、大家習慣稱呼他們為鳥類的生物類群，不只是真正的、活生生的恐龍，也讓更多的研究人員轉而好奇的想要知道鳥類恐龍是如何存活過當時中生代白堊紀末期的大滅絕事件。

中生代結束那長達將近 2 億年的時間軸（大約從 2 億 5 千萬年到 6 千 5 百萬年前），開始進入到地質年代被稱呼為新生代的時期後，鳥類佔據了當時沒有其他脊椎動物類群所能開拓的生態區位（和我們人類同樣歸屬於哺乳動物的蝙蝠還要超過一千多萬年後才開始起源及後續的演化）：天空，並且開啟了陸域脊椎動物驚人的輻射演化歷程之一 — 到現在有 1 萬種左右的現生鳥類恐龍。換句話說，古生物學的基礎研究工作不只讓我們重新認識恐龍及其相關的大尺度演化歷程，回到台灣，我們現在也可以大聲的說出台灣有真正的恐龍！

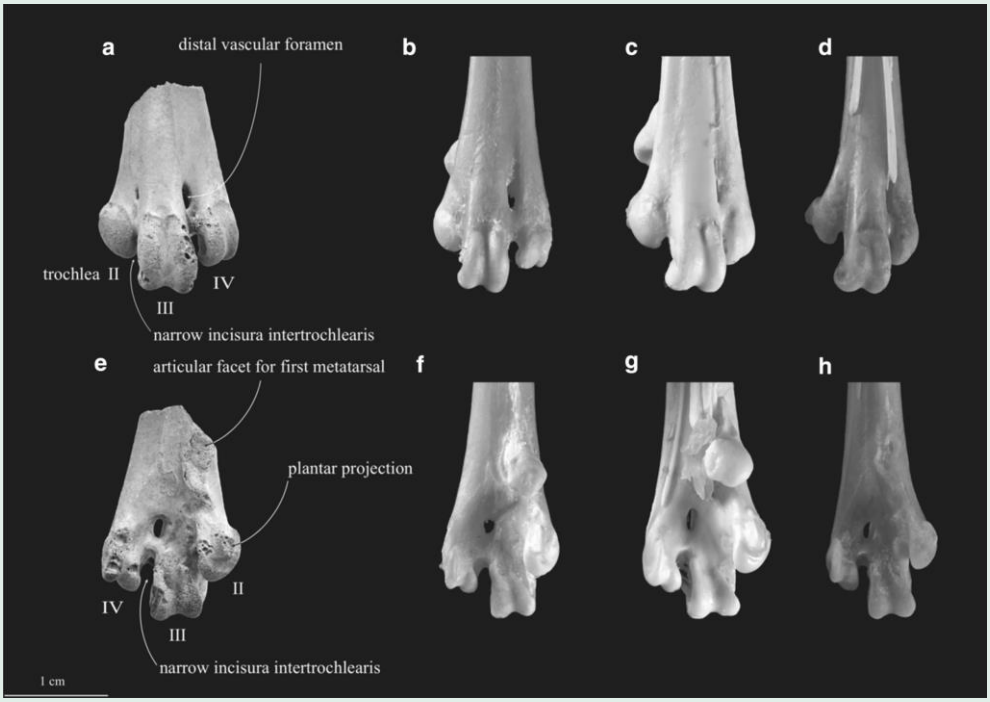
不過，我們對於特定的詞彙似乎總是會有點先入為主的想像。就好像是「恐龍」這兩個字的組合難以避免的就是會讓大多數的人覺得應該是跟化石相關的古生物研究。而台灣目前有超過 600 種的現生鳥類恐龍，卻是一件化石都沒有被發現過，也就更不訝異基本上幾乎每一個人都會

認為台灣沒有恐龍化石可以尋找、挖掘、研究了。就好像當我在 2018 年從日本搬回台灣時，許多人都會劈頭就問我說：從事古生物學研究，在台灣能找到恐龍化石嗎？

從今年（2021 年）開始，台灣的恐龍化石紀錄不會再高掛著一顆大鴨蛋。今年 4 月中時，台灣第一件鳥類恐龍化石的紀錄終於被正式發表在鳥類學期刊（Journal of Ornithology）中。標本雖然沒有很完整，只有左腳跗蹠骨遠端的一部分，但其保存的化石骨骼有著在跗蹠骨（tarsometatarsus）第三滑車不對稱的接合面，讓我們能判斷這是雞形目（Galliformes）的物種。再加上那跗蹠骨化石標本的遠端滑車間距都不大、還有第二滑車向足底面彎的形態，足夠能指出台灣這第一件鳥類恐龍化石標本是隸屬於雉科（Phasianidae）的成員。

化石標本即使很有限，只有左腳跗蹠骨的一小段，但透過骨骼形態的研究和分析，我們仍可以像是利用魔法一樣的判定手上這一小塊化石的主人是雉科的一員、生存在台灣更新世（Pleistocene）中期大約介於 40 萬到 80 萬年這一段時間的台南。台灣目前的原生雉科成員有七種，更有趣的是，其中有四種是台灣的特有種：帝雉、藍腹鷴、台灣竹雞、台灣山鷓鴣 — 換句話說，一定要有化石紀錄來呈現出他們在台灣形成特有種的獨特演化歷程。

第一件台灣的鳥類恐龍化石或許看似不起眼，但這一個發現不僅可以讓更多人感受到台灣生物多樣性起源與演化歷程的研究可能性、讓大家知道台灣也真的是有恐龍化石可以尋找、挖掘、研究。更迷人的或許是，目前手上的化石標本看起來很小（整個化石保存的長度也只有 2 公分多



最左邊為台灣第一次發現的鳥類化石標本：左腳的跗蹠骨，依序為右邊看的話是：帝雉、藍腹鷴、環頸雉的左腳跗蹠骨。（取自 Tsai and Mayr 2021）

一點)，但事實上這樣的跗跖骨和大多數的鳥類、或是雉科成員一相比的話，其實是蠻巨大的，讓我們可以進一步的鎖定在大型的雉類：帝雉、藍腹鷴和環頸雉。

帝雉在超過一百年前的 1906 年被發現、命名時也只有 2 根尾羽，但後續投入的研究人力、資源，不只讓帝雉廣為人知，也成為了我們現在在台灣每天幾乎都會使用到的千元大鈔上的封面人物之一。台灣的第一件鳥類恐龍化石直到現在的 2021 年才有正式紀錄，但我們如果願意長期持續的投入探索那未知遠古世界的面貌，我相信我們不用耗費像是恐龍在 1842 年被命名、1993 年拍了引領世界古生物研究風潮的「侏羅紀公園」隔了 151 年 — 給我們短短的十分之一，也就是大概 15 年的時間，就可以呈現出初步的、以台灣特有的遠古生物結合全球視野的「更新世公園」。

真的很希望大家願意藉由台灣大學的捐款系統來支持台灣的古生物基礎研究工作，捐款網址：https://my.ntu.edu.tw/donation2/ 或洽台大生科系蔡政修博士。®

蔡政修博士，古生物學家。目前任職於台灣大學生命科學系、生態學與演化生物學研究所的助理教授，也在校內的動物博物館服務。希望藉由古生物學的研究工作提供現生生物多樣性起源與迷人的演化歷程，也期待這一次台灣首次鳥類恐龍化石的發表給予大家對於在台灣發展古生物基礎研究更多的信心 — 因為台灣雖然看似不大，卻也是真的有恐龍化石可以挖掘和研究，從而呈現出全球生物演化更完整的面貌。

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分子與細胞生物學研究所新進教師-陳俊豪博士

圖一、出國參與德國林道諾貝爾獎得主會議

研究專長

神經科學 (Neuroscience)

遺傳學 (Genetics)

分子生物學 (Molecular Biology)

近年研究主題

本實驗室是利用秀麗線蟲(*Caenorhabditis elegans*) 做為模式生物，研究生物如何建立神經系統以及如何處理神經訊號來控制動物的行為模式。

研究方向簡介

在神經科學領域裡，如何透過神經訊號傳遞而做出決定，是一個重要且複雜的問題，雖然科學家們努力地尋找其中的奧妙，但我們對於要如何做決定的神經機制以及在細胞及分子階層所發生的事情，並不是完全瞭解。最主要的問題是，在大多數的多細胞模式生物中，很難研究每一個神經細胞在進行決策時所產生的變化，像是單一個神經訊號的強度改變或是細胞內不同蛋白的產生或者降解(Degradation)，甚至是不同蛋白或者核酸在細胞內的作用位置。詳細分析這些分子層面的改變，會讓我們對於神經細胞如何處理訊息並精準的傳遞訊號的過程更加瞭解，並進而理解大腦如何運作。

在近年研究中，科學家們已經發現這些細胞及分子層級的變化可以影響大腦的認知功能，有一些改變可以讓神經的訊號有持久性的變化來影響神經狀態(Neural state)。像是對於高階的動物體，認知功能會受到不同的神經狀態而被影響，生活上最常見的神經狀態變化是情緒反應，我們會在不同情緒下，對於相同的感官訊息而做出不同反應 (例如在父母生氣或開心時，小孩子要糖

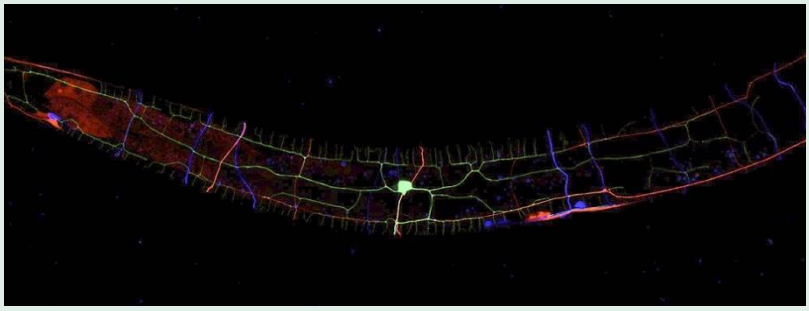
圖二、在交配中的秀麗線蟲雄性及雌雄同體

果吃的成功率是不一樣的）。而這種感官功能的變化，會持續一段時間，並在外界或者內在刺激消失後而逐漸褪去。這些神經狀態變化造成行為的持續性，可以有效率的縮短生物體對於外在環境的反應時間，預備未來可能會發生的各種挑戰。一個有趣的問題是生物如何讓自己在接受刺激後進入持續性的行為，這也伴隨著這些持續性行為如何逐漸消散，回復到初始的狀態。

為了回答這些問題，我們研究線蟲交配行為的決策與持續性。主要是在實驗室先前的研究中發現到雄性線蟲可以有效率的透過物理性接觸來辨認不同的交配對象，並且當雄性線蟲短暫碰觸雌雄同體(hermaphrodites)時會改變其行為模式，而這種行為改變會維持至少數分鐘來增加交配的機率，若是沒有成功的交配行為，此種行為變化會回復到先前的狀態。這樣的神經狀態變化，可以讓我們研究哪些神經細胞及分子機制參與在伴侶辨識(mate recognition)以及之後的持續性的行為變化。我們想藉由系統性的搜索，找出參與的神經細胞並研究這些神經細胞在伴侶辨識中的個別功能。目前已經鎖定幾個神經細胞可能參與行為的決策和神經狀態的變化，另外也分別發展更多面向的研究，希望能利用遺傳學與新穎的系統神經學研究方式，發現線蟲行為決策及持續神經狀態的分子與細胞機制。

投入到線蟲研究的原因

一開始選擇線蟲作為研究的原因相當簡單—我很害怕血，另外在個性上我也比較急躁，每當有一個想法，就想要立刻試試看。所以觀察大多數的模式生物後，選擇一個相對簡單且又是多細胞生物的線蟲來作為研究對象，對我來說是很自然的選擇。且在經歷多年的研究後，我越來越發現線蟲可以研究的現象比我當初想像的多很多。秀麗線蟲生活在土壤裡，依靠吃細菌維生，雖然有兩個不同性別(雄性和雌雄同體)，但大部分時間是以雌雄同體的形式依靠自體受精繁衍後代。牠們的發育非常的固定，像是在每一隻雌雄同體內都只有 959 顆體細胞，其中 302 個細胞為神經細胞。因為是自體受精的關係，一隻雌雄同體可以產生接近 300 個後代，生長到成蟲只需要三天，所以在很短的時間內就可以拿到許多成體的線蟲做為實驗材料。許多研究線蟲的基因體和遺傳學方法已經被發展出來，加上牠的透明軀體和完整的細胞族譜，科學家可以利用光、溫度和化學性的方法控制基因的活性和功能。更有趣的是，所有的神經細胞連結都已經透過電子顯



圖三、秀麗線蟲的神經系統

綠色螢光標記 PVD 神經細胞，紅色及藍色螢光則標記運動神經元。

微鏡解析，並由電腦建構成虛擬的神經網路，所以我們可以大致預測神經訊號的傳遞路徑。因此，利用線蟲來研究神經科學，是站在相當有利的位置。綜觀上述，這也是我選定秀麗線蟲作為模式生物做研究的原因。

回國任教的原因

在潘俊良老師實驗室獲得博士學位後，所面臨的下一個選擇—該繼續往學術界發展或者要轉往生技業。老實說，我一開始非常地徬徨，雖然我很喜歡做研究所帶來的自由和快樂，但也知道在國內或國外拿到教職其實非常的競爭，當時並沒有太多的想法。真正讓我下定決心繼續往學術界發展的是和當時分醫所的劉雅雯老師交談後，她提到人生就應該為自己想做的事情努力一把，即使失敗了也不會愧對自己。有了這樣的信念後，我首先在潘老師實驗室做博士後訓練兩年，並著手準備科技部赴國外博士後研究計畫，之後順利拿到計畫前往加州理工學院 (California Institute of Technology) 做研究。加州理工學院的訓練的主要理念是博士班學生和博士後研究員要獨立自主，自己找資源和解決的方法，所以要把自己當成一個實驗室主持人來規劃自己的生涯，並且和外界溝通和合作，在這樣環境的薰陶下，我慢慢興起建構屬於自己實驗室的想法。雖然博士後才剛剛起步，但我把這樣的想法和當時的指導教授 Paul Sternberg 分享時，他非常的支持和鼓勵。其間也遇到許多海外的台灣學子，在和他們的相處中，感受到台灣的大學教育，一直在快速的進步中。並且在準備的過程裡，回想起在國內受到潘老師的指導，我覺得如果能複製自己的經驗，分享給更多的台灣學生，或許能夠幫助台灣的下一代，在世界的舞台上看到更閃耀的自己。另外也是家庭的因素，因此就決定專注在台灣的大學職缺，很幸運地在台

圖四、加州理工學院校園

生科院新進教師陳俊豪博士

灣大學分子與細胞生物學研究所找到一個職位，也希望能透過自己的經驗提供一個實例，即使在台灣我們也能有很適合的環境，讓奮鬥的學子們找到自己的一片天。®

代表著作

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學歷

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國立彰化師範大學 生物學系 學士

懷念林秋榮教授(Chu-Yung Lin, 1928~2015)

王雅筠

植物苑編輯、台大生科系助理教授

2016 ASPB News 有一篇由斯海文、吳素幸與賀端華三位優秀的研究學者共同撰文懷念林秋榮教授的文章，表彰林老師在科學研究、科學教育的貢獻及在退休後仍持續不斷的新知探索(https://aspb.org/newsletter/archive/2016/)。小編在此也以過往的經歷來懷念林秋榮老師。

記得在唸碩士班時上林老師的第一節課，就讓我感受到無比的震撼。當時已屆古稀之年的林老師，以簡單的辭彙清楚地解釋植物生理中的化學反應，整節課下來，讓人一點睡意都沒有!也啟發我由完全不同的角度重新認識植物生化反應。

在攻讀博士期間，某一年和實驗室同事到芬蘭參加植物研究相關會議時巧遇林老師。我們上前自我介紹，林老師非常親切地跟我們聊天，詢問並與我們討論正在進行的研究。那時發現林老師很重視生活品質，並享受生活。往後，也不時在國內的學術研討會上，看到林老師的身影。林老師退休後還是持續不斷學習與交流，保持著一顆好學、好奇的心。

雖然我沒有在林老師的實驗室學習過，也沒有長時間受到林老師的教導訓練，但經由這些短暫但深刻的片段，足以讓我感受到林老師看待科學與對待後進的態度，以及抱持著尊重、好奇與享受的生活哲學。我想，這樣身影也著實影響了許多他的學生們。謝謝林老師! ®

Obituary

Remembering Chu-Yung Lin

1928–2015

BY HEVEN SZE, University of Maryland, SHU-HSING WU, Academia Sinica, Taiwan, and TUAN-HUA DAVID HO, Academia Sinica, Taiwan

Chu-Yung Lin (林秋榮) passed away peacefully in Taipei on October 22, 2015. He was 87. Chu-Yung was instrumental in introducing biochemistry and molecular biology to the study of plant physiology in Taiwan starting in the mid-1960s until his retirement in 1999. Consequently, many undergraduates he taught were well equipped to enter graduate schools in the United States and elsewhere and have become successful in various science professions, including as leaders in academia, research, and industry. Chu-Yung continued to be active as professor emeritus at the National Taiwan University (NTU) until two weeks before his passing. His beloved wife had passed away two years earlier.

Born in Taiwan in August 1928, Chu-Yung received his undergraduate education at NTU majoring in chemistry. He became a teaching assistant in the Department of Botany, where he was first exposed to plant biology, before going abroad for graduate studies. He received a PhD at the University of Oklahoma in the Department of Botany and Microbiology and carried out postdoctoral research with Joe Key at Purdue University.

He started his academic career in 1966 at NTU, where he offered the first course in biochemistry at the university. He continued to teach courses related to biochemistry and molecular biology and

Chu-Yung Lin

plant physiology to life science students until his retirement. In addition, he served as chair of the Department of Botany (1976–1982) and dean of the College of Science (1990–1993). After retirement, he remained active, taught graduate-level seminar courses, attended international meetings, and never ceased to enhance education and research in plant biology.

Research Highlights and Contributions

With a strong background in biochemistry, Chu-Yung pioneered investigations to study the molecular basis of protein biosynthesis in plants and the molecular action of the hormone auxin. These studies opened the way to the beginning of plant molecular biology. As early as 1966, he showed that soybean root tips had a high proportion of polyribosomes that were dissociated by ribonuclease treatment, suggesting ribosomes were held together by RNA, later shown to be mRNA. Initially it was thought that auxin stimulated RNA expression by enhancing RNA polymerase I. These studies laid the groundwork for later discoveries of small auxin up-regulated RNAs and their promoters by Tom Guilfoyle and colleagues.

Chu-Yung's laboratory later studied the basis of heat stress in plants. His group found that many small proteins were induced by heat in soybean and rice seedlings and confirmed that these small heat shock proteins are required for the establishment of thermotolerance. Chu-Yung has a long record of publications in journals such as *Plant Physiology*, *Proceedings of the National Academy of Sciences*, and *Journal of Molecular Biology*. This record is remarkable as the facilities, resources, and research environment in Taiwan were considerably limited in the early stages of his professional career. In recognition of his accomplishments, he was elected as an Academician of the Academia Sinica in 1998, and in 2008 he became a corresponding member of ASPB, the first Taiwanese scientist to receive this honor.

Teaching and Mentoring: Impact on Students

Perhaps Chu-Yung's most exceptional achievement has been through the education and mentoring of his students, trainees, and colleagues. This contribution is relatively invisible to the international community.

Many of us were fortunate to be among the first undergraduates in Chu-Yung's courses. His lectures were clear, logical, and stimulating. More importantly, he brought the topics to life through his knowledge of the scientists and his clear descriptions of the experiments and evidence supporting the concepts, including for DNA replication, transcription, and translation. His exams were refreshing as they tested our ability to solve problems, to reason, and to deduce. No doubt he stimulated much interest in biochemistry and molecular biology. Some students got their first taste of research in his laboratory. Although laboratory equipment was limited then, the future of biochemistry and molecular biology was bright and promising. Chu-Yung's lectures and laboratory training continued to make a strong impact on countless young minds until his retirement and beyond.

Chu-Yung was approachable and enjoyed many laughs with students who sought advice. He predicted that some of us had potential and encouraged many to pursue graduate degrees. He directed us to some of the best

continued on page 30

林秋榮老師獲選為 ASPB Pioneer Members，ASPB 先驅院士係表彰對科學教育與訓練上有卓越貢獻的科學家。他們的成就被學生、同事、家人或朋友所景仰與懷念。
https://aspb.org/aspb-pioneer-members/

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台大小吃部-小小福 攝影：鄭貽生

已列為歷史建築的鹿鳴堂一隅 攝影：鄭貽生