

活躍

在盛夏的季節中

楊懿如教授談溪流精靈——蛙

The Star of the Summer Season

Prof. Yi-ru Yang on Frogs, the Fairies in the Streams

採訪員編 Interview & Text / 桂竹齋 Chu-chun Kuo
圖片提供 Photo provided /
攝影師 Yi-ru Yang - 盧學人 Luarn Lu
翻譯 Translator / 張詩白 James Chang

翡翠樹蛙是台灣特有種，因顏色而得名 / 李勝邦攝
Rhacophorus smaragdinus are unique to Taiwan and named after its color /
By Peng-hsiang Li



換上了輕鬆的短袖T恤，四處而起的蟬鳴彷彿向大家宣告著夏天的來臨，雖然身在冰冷的鋼筋水泥城市裡，還是不禁令人想跳進清澈的溪水中，洗滌一身的暑氣。然而，屬於盛夏樂章的除了潺潺水流聲、蟬鳴鳥叫外，這部夏夜交響樂裡面還有種聲音絕對不能遺忘，那就是陣陣「呱～呱～呱～」的小青蛙奏鳴曲。

You just know summer is here when everyone is wearing T-shirts and the sound of cicadas can be heard everywhere. Even though we live in cold concrete buildings, jumping into a cool stream is still a tempting idea. Besides the sound of water, cicadas, and birds, don't forget another sonata that can only be heard in summer – the croaking of frogs.



番樹蛙是台灣特有種，夏天涼涼常見的蛙類／盧琳人攝
Everglades robustus are unique to Taiwan and commonly seen in dreams in summer / by Le-lin Lu

「青蛙」是蛙類的一種統稱，由於青蛙不像毛茸茸的貓狗等哺乳類動物那樣溫暖可愛，也沒有鳥類鮮豔的羽毛和優美的體態，外表濕濕黏黏的兩棲類不容易被人類接受和關心的，所以較少有人注意到蛙類的生存環境及保育問題。

但其實在清涼的淡水邊，這一群瞪著黑黑大眼睛、穿著綠衣的小嬌客們，也正忙著迎接夏天呢！本文便請蛙類研究和保育學者——花蓮教育大學生態與環境教育研究所所長楊如教授，帶領讀者認識這群綠色小精靈。

Known generally as "frogs," these little creatures aren't as cute as mammals such as cats or dogs and aren't feathery or elegant as birds. Wet and sticky amphibians don't receive as much care and acceptance from us, thus their survival and conservation also tend to be overlooked.

Actually, these little green creatures with big, dark eyes are busy getting ready for summer, too! In this article, Prof. Yi-ju Yang, the dean of the Graduate Institute of Ecology and Environmental Education in NHLUE, will help you understand more about these little green faires.



溪流邊出沒的交警樂羣

楊教授說，研究蛙類是需要具備耐心的，研究人員經常在夜裡靜靜的守候，等待蛙蹤。楊教授說，當你投入入耐心毅力，終於觀察到蛙兒靈巧的身影時，除了欣賞他們獨特的外表，並仔細追查蛙兒的身世血緣，就會發現許多小青蛙可是台灣特有種，像莫氏樹蛙就是一種體型約3到5公分的小型樹蛙，由於牠的大腿內側有鮮豔的橘紅色，「就像是穿著一條紅內褲呢！」楊教授有趣的形容詞，是不是讓人很快就能記住莫氏樹蛙的特色呢？下次你在水邊的樹上或泥濘裡，聽到蛙兒高歌，仔細觀察牠的「穿著打扮」，說不定你就能巧遇莫氏樹蛙。

而褐樹蛙顧名思義，就知道牠有著褐色的外表。褐樹蛙的體型稍大，身長大約4到7公分，有趣的是，牠們的外表像是戴手套一樣，趾端有著明顯的白色吸盤狀，可以讓牠們在溪流石頭上面端坐著。春夏是褐樹蛙的繁殖季節，牠們會大量遷移到溪流裡，所以，在晝夜遍遊於溪流中的橋樑，經常成群出沒在石頭上一同高叫的，可能就是褐樹蛙囉！

Symphony by the Creek

Prof. Yang stressed that studying frogs requires patience, and researchers often wait patiently and quietly for frogs in the night. Prof. Yang said that you will be able to see little frogs after waited patiently, and besides their unique appearances, you should also learn about their origins. Many of them are actually unique to Taiwan, for example, *Rhacophorus molrechi Boulenger* is a 3cm~ 6cm long tree-frog, and because it has bright orange/red stripes on the insides of its thighs, "it looks like it's wearing red underpants," said Prof. Yang, whose words would surely help you memorize the creature! Next time when you are near trees or mud and hear frogs croaking, try to pay attention to their "outfits" and see if it's a *Rhacophorus molrechi Boulenger*.

Buergeria robustus is a larger, brown frog between 4 and 7cm long. The funny thing is it looks like it wears gloves since the tips of its toes have white sucking discs that help it sit on boulders in streams without a problem. They procreate in spring and summer and move to streams. So, if you hear croaking from boulders in a summer night, perhaps it is *Buergeria robustus*.

而翡翠樹蛙也是知名度很高的蛙類之一，從名字就可以知道，牠們周身鮮綠宛如翡翠般漂亮，體側有條白線是牠們的特徵，叫聲是短促的「呱啊」聲。翡翠樹蛙主要分布於台灣北部南北勢溪流域、宜蘭及石門水庫等低海拔山區，在夏夜裡往這些地方走，就有機會親見翡翠樹蛙。

據教授說，聆聽各式各樣的青蛙叫聲，十分有意思，說是夜裡的文藝樂團，可是一點也不誇張。有別於上述蛙類，諸羅樹蛙的叫聲就很另類，每年4到8月的繁殖期，在溪畔的竹林裡可以聽到牠「登、登、登」的鳴叫聲，而外型看起來像隻小蟻蛛，但牠腳卻有著膨大吸盤的圓面樹蛙，牠們會趁著夜晚聚集到水邊的植物上，一起高歌，叫聲宛如像哨音一樣，是短促的「逼、逼、逼」。

經過楊教授的解說，原以為寧靜的夏夜溪畔，竟是如此熱鬧非凡。

Rhacophorus smaragdinus is also a famous frog. Known as "emerald tree frogs" in Chinese, its body has a beautiful green hue with white stripes on the sides, and it makes short bursts of "ku-ah" sounds. They are mostly found in low-elevation mountains such as northern Taipei, Yilan, and Shih men Reservoir, and you should be able to find them in summer nights.

Prof. Yang said it's fun to listen to different types of frog croaking, and referring to their croaking as "night symphonies" is no exaggeration at all. Different from the above mentioned frogs, the croaking of *Rhacophorus arvensis* is quite unique. From April to August (their breeding period), you can hear its "deng, deng" sound in bamboo forests. As for *Chirixalus idiootocus*, although it looks like a small toad, it actually has big sucking discs at the tips of its toes. Their croaking sound is short bursts of "beep beep" that resemble a whistle.

Prof. Yang's words have helped us realize how exciting the river banks could get in summer.



1. 日本樹蛙又稱為溫泉蛙，可耐溫至攝氏43度，是十分特別的蛙類／李勝瑛攝

Sylvia japonica also known as the hot spring frog, being able to withstand temperature up to 43 degree Celsius, is a special kind of frog. / Photo provided by Peng-hsiang Li

2. 斯文豪氏赤蛙是溪流常見蛙類／李勝瑛攝

Rana swinhoensis are common only seen in streams. / by Peng-hsiang Li

3. 莫氏樹蛙是台灣特有種，廣泛分佈於全省中低海拔的山區／李勝瑛攝

Rhacophorus mollebrachi Boulenger are unique to Taiwan and are found in Taiwan's low/mid elevation mountains. / by Peng-hsiang Li



夏夜賞蛙總是處處充滿驚喜：水中溪蝦的雙眼會被手電筒照得閃閃發亮，或是遇見張著雙螯示威的拉氏青蟹，當您還沉浸在和野生動物巧遇的興奮中，一回身，卻見大石頭上正有隻褐樹蛙正在偷窺你的一舉一動，再定神一聽，是誰發出鳥叫般的啾啾聲？原來是斯文豪氏樹蛙也來參一腳。蛙鳴襯著淙淙水聲，交織成天籟般的大自然交響樂章，而這些美妙的經驗，也是讓楊教授等站在保育蛙類最前線的專家學者們，熱情不減的原動力。

理性堅定從事教育

早年，楊教授在從事蛙類研究時，經常遇到脆弱蛙群遭遇消滅的厄運。她很感慨的說，她曾花了很長一段時間，全心埋首在台北樹蛙的某處棲地進行研究，儘管研究所在處是台北樹蛙的重要棲地，但畢竟是私人土地而非保育地，有幾次研究進行到一半，或因業者決定開發土地，或因地主施灑藥劑除蟲除草，轉瞬間，那片區域原本生意盎然的蛙群，就變成了一片死寂。

Observing frogs in a summer night is always full of surprises: the shrimps in the water, *Scylla serrata* waving its scissors, *Buergeria robustus* lurking behind you, and *Rana swinhoana* making bird-like noises... With the sound of water flow, the frogs perform nature's symphonies that sound like melodies from Heaven, and these beautiful experiences are what keep frog conservation specialists such as Prof. Yang to keep at their efforts.

Determined in Her Mission

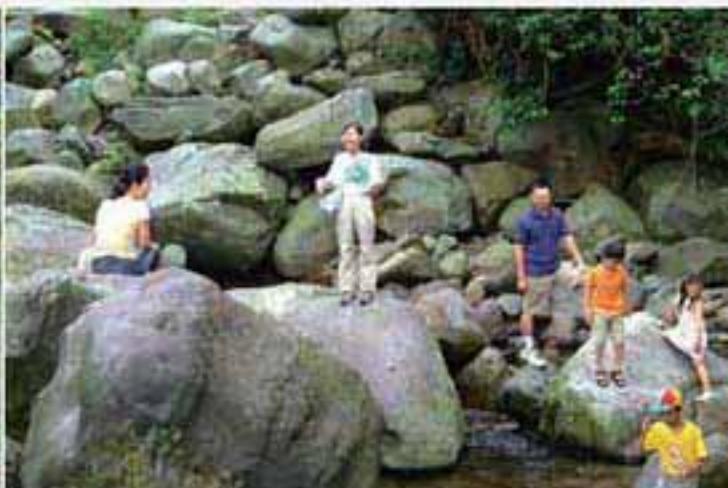
Prof. Yang had an experience of a group of fragile frogs being completely killed during her earlier efforts. Sighed with sadness, she said that she once spent a lot time studying *Rhacophorus taipeianus* (Taipei Tree-frogs) in a certain location. Although the area where she conducted studies was an important habitat for the frogs, it was a privately owned land rather than a conservation area. Somehow, perhaps the owner decided to cultivate the land and used pesticides; all the frogs were suddenly killed, turning this land into a lifeless, silent space.

這些慘痛的回憶並未消滅楊教授研究的決心，多年來，她持續努力，在台北樹蛙的研究上亦交出亮眼的成績單。如今，楊教授的研究區域在太魯閣國家公園的保護範圍內，有了國家公園的環境及法令的保護，研究較為順利。不過楊教授仍強調，影響蛙類生存的因素有許多，蛙是脆弱的族群，其棲地的要求頗高，稍微受到污染，或是人類的干擾，可能就會使蛙類活不下去，因此，蛙類是處於非常需要保護的弱勢。

而談起保育工作，楊教授也諸多感慨。熱愛蛙類、長年進行研究她，因著科學家與生俱來的理性和冷靜，常常讓同樣熱中生態保育活動的學者或志工朋友認為不夠積極。有時得知土地開發案即將毀掉某些蛙類的棲地時，總會有人期待她站出來振臂疾呼。「確實有很多稀有物種需要被保護，但基於種種因素，有時心有余而力不足，有時受到責難，心中難過之餘，還是要說明一個觀念：我認為針對單一個案抗

Painful memories such as this have not eliminated Prof. Yang's determination. For years she has continued to work hard and achieved great results in her studies on *Rhacophorus taipeianus*. Today, her research is within Taroko and is smoother thanks to the environment and regulation. However, Prof. Yang stressed that there are many factors that affect frogs' survivability. Frogs are fragile and have high requirements for their habitats; they may die due to pollution or human interference, making them in need of protection.

Prof. Yang has many feelings towards her conservation efforts. She loves frogs and has studied them for years, but her colleagues and volunteers often think she isn't active enough because of her rational mind and calmness as a scientist. When certain frog habitats are about to be destroyed due to land developments, some people looked up to her and wanted her to take actions. "It's true that many rare species need to be protected. But there are many factors involved,



1

2

3

1. 圓背樹蛙是台灣特有種，以發現地點原明山圓背山區做為中文名／李靜瑋述
Chirostus idiootocus are unique to Taiwan, and its Chinese name, "Man-ten," is based on the location it was discovered / by Peng-hsiang Li
2. 帶領兒童生態營隊活動／李靜瑋述
Leading children's ecological camp / by Peng-hsiang Li
3. 夏日溪流戲水，老少咸宜／李靜瑋述
Families having fun by the stream in summer / by Peng-hsiang Li



爭的成效有限，長遠來看，應從理性的教育面著手，改變大家的認知，喚起大家珍惜土地和疼惜自然的心」。

楊教授十分重視環境教育，希望家長和孩子們可以多多參與生態保育活動，讓孩子從活動中得到啓發，透過接觸更多不同的生物的活動，不僅養成敬親體貼的心，更讓孩子的思考更多元化。

人蛙共存新希望

楊教授認為，很多學者的職志是在發表論文或發現新物種，但她卻把溪流保育和蛙類生態常識普及化，視為願景。台灣的水系豐沛，傍水而居的物種多元豐富，的確值得專家學者用心關注。楊教授從事研究工作1、20年，從一開始的不被重視，經過努力終於有了成果，從事溪流生態保育和研究的同好變多了，「最明顯的是，蛙類研究大多都在夜視工作，如今，許多對青蛙研究有興趣的朋友會主動共襄盛舉，在夜裡同好有情相陪一同研究，備感溫馨呢。」楊教授欣慰的說。

and I am too powerless to change things. I must point out that the true way to fix the problems is with education. We need to change how people think and teach them about cherishing our land and nature."

Prof. Yang cares very much about environmental education and wishes parents and children to participate in ecological conservation activities, through which children will come in touch with different species, learn to cherish life, and think diversely.

New Hope for Mankind and Frogs to Coexist

Prof. Yang believes many scholars focus on publishing research or discovering new species, but her own goal is to teach stream conservation and frog ecology to everyone. Taiwan has rich water resources and species that live by water, deserving attention from scholars. Prof. Yang has worked on her domain for about 20 years, and her work was ignored initially. Now, she is seeing results as well as more colleagues. "The most significant thing is that I have more colleagues to

或許是跟溫和的蛙類相處久了，楊懿如教授笑說，她的研究角度也有了修正。她發現自己的研究報告發表，都是非常專業學術化，當然，這些研究報告有其學術價值，然而，在這樣的報告常會讓非研究人員看不懂。但是棲地保育與商業行為衝突時，不會因為一紙報告就停止興建計畫，所以，楊教授希望把研究方向從專業學術，轉向「告訴大家怎麼做」。也就是說，不單是告訴地主或政府這塊土地有多少生物資源，而是進而研究，找出兼顧開發與保育的雙贏法。

理性的科學家們，為了看似微不足道的小蛙兒努力著，充滿了感性與細膩的愛心。正如同溫柔環抱台灣的水系，這些河川與溪流給予台灣生生不息的動力，更孕育出多元廣袤的生態物種，讓你我居住在這蕩漾小島上，依舊感受到無窮無盡的生命律動。河畔跳出一隻蛙，當牠對著你歌嘯，請記得這美妙的樂章、滿心的感動，還有默默付出的專家學者所做的努力。

observe frogs with me at night. It sure feels really nice to have people studying the same thing with you," said Prof. Yang happily.

With a smile, Prof. Yang said her research direction has changed probably because she spends so much time with the gentle frogs. She realized her studies are often very professional, making them incomprehensible to laymen. However, development projects do not just go away when there are conflicts between conservation and commercial activities. Therefore, Prof. Yang wishes to change her direction to "telling the public what to do." In other words, rather than telling land owners or the government how much life resources are in a land, we should find ways to create a win-win situation.

With knowledge and love, the rational scientists work hard for the tiny frogs, just like how the water systems in Taiwan that nurtures the land and nourishes life forms, making it possible for us to experience so much rhythm of life on this tiny island. When a frog jumps out of the river and sings to you, please remember its delightful melody, the feelings you have, and the efforts from the scholars whose hard work is going unnoticed.

楊懿如教授小檔案 About Professor Yi-ju Yang



楊懿如因為研究青蛙，進而喜愛及保育青蛙，並有許多青蛙收藏品／李靜環攝
Yi-ju Yang studies, loves, and protects frogs, and here are her frog collections / by Feng-hsiang Li

國立台灣大學動物研究所動物學博士，目前任教於花蓮教育大學生態環境教育研究所，職務為副教授兼所長，非常喜歡青蛙研究，每年至全國各地演講及帶領戶外環境教育活動超過40場以上，從1999年設立「楊懿如的青蛙學堂」網站(www.froghome.idv.tw)，免費提供蛙類生態保育教學資源及諮詢，已成為中小學蛙類環境教育的最佳教材之一。

Dr. of Zoology, NTU, currently working as the associate professor and dean in the Graduate Institute of Ecology and Environmental Education in NHLUE. Yang has a fondness for frog research and conducts more than 40 lectures and outdoor education activities each year. "Yi-ju's Frog Classroom" was established in 1999 (www.froghome.idv.tw) that provides free frog-related education and consultations, making it one of the important materials for frog education in elementary and junior high.