ORCHID CONSERVATION NEWS

The Newsletter of the Orchid Specialist Group of the IUCN Species Survival Commission

Issue 3 September 2021

PASSING THE TORCH

Dr. Johnson is pictured visiting a *Vanilla* plantation in Mexico in 2014. Photo credit: Dr. Andrea Porras-Alfaro

Larry Zettler: Much has been written about how to conserve our world's orchids in this Age of Extinction, but without more young people to carry on this important role in the years ahead, this work cannot succeed. Thankfully, there are many bright, driven, and creative young people throughout the world who are ready to meet the challenge. In this issue is the first article highlighting one such person – Dr. Lynnaun Johnson – my former student.

Read the full article beginning on page 3.

Editorial

This Conservation News is the first of the new Quadrennium. Time does fly, or so it seems, but orchid conservation must remain as our principal objective. Making wise use of human resources is also of pressing concern. Future planning must include preparation of young orchid conservationists: it is they who will receive the torch and continue the work of those of us whose efforts may soon draw to a close.

We mark the loss of Jim Fowler, Charter Member and former Director of the Native Orchid Conference, who passed away suddenly on June 25. Rudolf Jenny (1953–2021), had worked with orchids for more than 45 years, and was well known by orchidists worldwide. In Memory of Rudolf Jenny, the BibliOrchidea Database will remain online and freely accessible.

Larry Zettler has provided a first article, introducing Dr. Lynnaun Johnson and his interest in conservation. We have a comprehensive report from Nicola Flanagan on their conservation work with *Cattleya quadricolor* : a summary is provided in Spanish. The IV International Vanilla Congress 2021 (Colombia) will be held this year in December. Be sure to mark your calendar for this virtual event. Brent Chandler shares his first encounter with the Ghost Orchid (*Dendrophylax lindenii*). Hong Liu has provided good news out of China where, as of September 7, a large number of wild orchid taxa are now offered legal protection.

Co-Chair, Mike Fay provides insight into the challenges and opportunities of the next Quadrennium for the Orchid Specialist Group. We look forward to future orchid conservation success.

Marilyn H.S. Light, Editor

The New Quadrennium for the Species Survival Commission and the Orchid Specialist Group

Following delays due to the covid-19 situation, the rescheduled World Conservation Congress (IUCN's flagship event) took place in Marseille, France, in early September. The closing ceremony of this event represented the start of the new Quadrennium for the Species Survival Commission (SSC) and associated bodies (Specialist Groups, Red List Authorities etc.), and I thought it would be useful to give you some details about how arrangements for the new Quadrennium will work and some information about our plans.

To ensure succession planning, SSC has introduced a limit of two quadrennia for Chairs and holders of other roles. This will mean that I will stand down as Chair at the end of the new Quadrennium (although I intend to remain a member of OSG!). In response to this, we have begun to formulate a succession plan for OSG; as a first step, I am delighted to announce that Amy Hinsley (previously Co-Chair of the Trade Subgroup of OSG) agreed to be nominated as Co-Chair of OSG with me and that this has now been ratified by SSC. During the new Quadrennium, Amy and I will be working with the focal points of the thematic and regional subgroups to develop similar succession plans for each of these.

The start of the new Quadrennium means that the process of issuing invitations to people who were members of the OSG in the Quadrennium that has just finished will begin shortly. Note that membership of OSG for the new Quadrennium will only be confirmed once a response to the invitation has been received by IUCN. Following these invitations, we will be able to start sending the invitations to new members.

There is now a new data system for SSC, and we have been populating this with targets for the new Quadrennium, under the five species conservation cycle components (Network, Assess, Plan, Act, Communicate) used by SSC. The SSC writes "Our Network drives efforts to value and conserve biodiversity through three essential functions: assess, plan and act. Our results are communicated to a wide variety of audiences". These three main components are facilitated through the "network", and activity is reported under "communicate".

We have already identified 16 targets for OSG, ranging from recruiting additional Red List authorities, to developing a code of conduct for orchid hobbyist societies to discourage illegal trade. We will also be adding targets during the Quadrennium; we will be contacting contact points for each of the thematic and regional subgroups to identify additional targets representing the work of these subgroups in the coming months. Our reports for the targets will facilitate the production of the Annual Report for OSG, as required by SSC.

One of the targets was to launch the new website for OSG, and this has already been achieved. The new website (https://www.orchidspecialistgroup.com/) is still under construction, but we felt that it was developed to a point that it could be launched. It gives us much more flexibility for adding information about orchids and their conservation than the previous one. Do visit the new website and let us know what you think! If you have any items that you would like to appear on the website, let us know.

I look forward to working with you all in the new Quadrennium.
Mike Fay
Co-Chair

Spotlight on a Young Orchid Conservationist – Dr. Lynnaun J.A.N. Johnson

Lynnaun Johnson@rush.edu

Much has been written about how to conserve our world's orchids in this Age of Extinction, but without more young people to carry on this important role in the years ahead, this work cannot succeed. Thankfully, there are many bright, driven, and creative young people throughout the world who are ready to meet the challenge. In this issue is the first article highlighting one such person – Dr. Lynnaun Johnson – my former student.

Lynnaun spent the earliest part of his life growing up in Guyana (South America) before moving to St. Lucia and then to The Bahamas with his father and younger sisters at the age of two. His father had a major impact on Lynnaun's upbringing, raising his children as a single parent and working overtime to put them all through college. For reasons that I still fail to comprehend, Lynnaun decided to attend Illinois College - a small, private liberal arts institution 2,000 km from The Bahamas, secluded in the corn fields of the Midwestern U.S. In the autumn of 2005, he arrived on campus as a shy 17-year-old, eager to learn and eager to honor his father. He wasted no time. As a student in my Insects and Society course aimed at first year incoming college students, he excelled and served as a positive role model for his peers. He was respected for many attributes, but he was most known for his patience, respect for others, kindness, quiet demeanor, and his ability to get things done without saying much. I immediately identified him as someone special who would have a positive impact on society. The following summer, he worked as an intern at Starhill Forest Arboretum where he learned about oaks (*Quercus*) and other kinds of trees under the mentorship of Guy and Edie Sternberg which added to his knowledge.

During his sophomore year, I was pleased when Lynnaun asked to get involved in orchid research. Based on the outstanding manual dexterity he demonstrated while pinning tiny insects in class the year before, I offered him a project that involved growing the U.S. Federally Endangered Hawaiian endemic, *Peristylus holochila*, from seed using sterile (asymbiotic) techniques. Because many orchids, and especially terrestrials like *P. holochila*, grow very slowly on asymbiotic media, I was hoping to have seedlings large enough *in vitro* to be deflasked during Lynnaun's senior year of college. My goal was to have him transport the seedlings to Hawaii in person during his final semester before he graduated, completing the loop from start to finish. Unfortunately, the seedlings took longer to develop than we anticipated. He spent three years in my lab caring for and monitoring hundreds of seedlings only to see younger students take the trip to Hawaii during March of 2011. To this day, I am disappointed that he could not make that trip because he deserved it, but his efforts were recognized in the form of co-authorship on a peer-reviewed paper, the first of his career. I also feel better knowing that Lynnaun was able to study orchids in Florida and Costa Rica during his time at Illinois College.

After graduating with a B.S. degree from Illinois College, he earned an M.S. in Biology at Western Illinois University under the mentorship of Dr. Andrea

Porras-Alfaro where he studied fungi (*Geomyces* spp.) linked to White Nose Syndrome in bats. While doing so, he received national recognition in the form of awards and scholarships (*e.g.*, Mycological Society of America) that bolstered his impressive credentials leading to his Ph.D. work at Northwestern University and the Chicago Botanic Garden. While at Northwestern, he worked under the direction of Dr. Greg Mueller studying the micro-organisms (fungi, bacteria) associated with *Vanilla planifolia*, and *Dendrophylax lindenii*, the well-known Ghost Orchid.

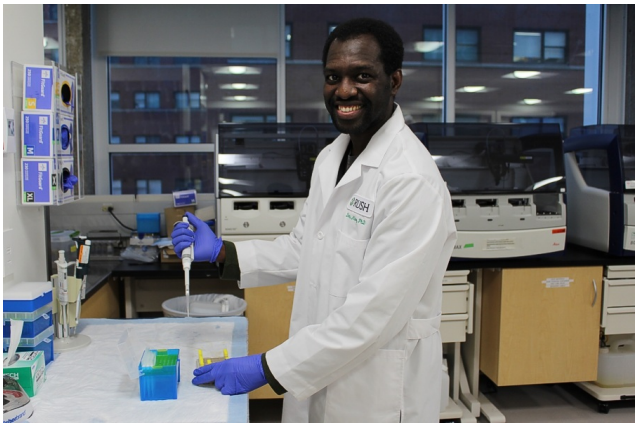
His dissertation required Lynnaun to blend different field and laboratory skills used in understanding complex ecological concepts. For example, Lynnaun's work revealed that *D. lindenii* is a fungal specialist targeting a single clade of *Ceratobasidium* representing a rare OTU (operational taxonomic unit). Such information is now being used in the assessment of Ghost Orchid populations in south Florida for management and long-term conservation of this well-known species. Unfortunately, Lynnaun's father passed away just prior to the completion of his Ph.D. work. When I last spoke with Lynnaun's father in person, it was obvious that he was extremely proud of his son and all that he had accomplished. Currently, Lynnaun and his wife, Eva, live in Chicago where he works as a postdoctoral research fellow at Rush University. His work currently focuses on RNA-sequencing methods to advance research in the field of Alzheimer's disease. Eventually he aspires to permanent employment at the college or university level where he hopes to continue studying orchids and how to conserve these remarkable plants.

In closing, I asked Lynnaun to answer several questions for the readers of this newsletter, and this one stood out:

Question: What is the most urgent aspect of orchid conservation that needs immediate attention and study, and why do you feel this way?

Lynnaun: *"I am a little biased, but I think one of the most urgent aspects of orchid conservation is their biological interactions with mycorrhizal fungi (and pollinators). We have to face the reality that severe weather due to climate change, wildfires, habitat loss, is ongoing and identifying the orchid's fungi will help with the reintroduction of the orchid. Genetically cloning orchids in a lab and asymbiotic germination can only go so far if we plan to reintroduce the orchids to their natural habitats and want their populations to increase in nature."*

Dr. Lynnaun Johnson shown adjacent to a Ghost Orchid in the Florida Panther National Wildlife Refuge during his Ph.D. research at Northwestern University and the Chicago Botanic Garden. Photo credit: Dr. Greg Mueller



His current position is at Rush University in Chicago where he is employed as a postdoctoral research fellow.
Photo credit: Dr. Denis Avey.

Lawrence W. Zettler (lwzettle@ic.edu)
Biology Department, Illinois College
1101 W College Avenue, Jacksonville, IL 62650 USA

Advances in orchid species conservation management in Colombia:

Cattleya quadricolor Lindl. as a case study.

Nhora Helena Ospina-Calderón[1], Gabriela Torres-Torres[2] & Nicola S. Flanagan[3]

[1]Herbarium HUQ, Biology Program, University of Quindío, Armenia, Colombia.
nhospina@uniquindio.edu.co

[2]MSc in Sciences - Biology, Universidad Del Valle, Cali, Colombia.
gabitorres31@hotmail.com

[3]Department of Natural Sciences and Mathematics, Pontificia University Javeriana, Cali, Colombia.
nsflanagan@javerianacali.edu.co

SUMMARY IN SPANISH

Colombia es reconocido como el país más rico en orquídeas con 4270 especies, de las cuales 1572 son endémicas. Durante los últimos seis años, se ha incrementado el número de trabajos taxonómicos, y la alta diversidad es claramente una prioridad para las acciones de conservación. Hasta la fecha en Colombia, 441 especies de orquídeas en 33 géneros han sido evaluadas para su estado de conservación, con 240 (54%) clasificadas como amenazadas y 77 como datos deficientes. Esto representa aproximadamente el 10% de la flora de orquídeas del país. La mayoría de las evaluaciones de conservación se han basado en literatura histórica y datos de herbario, permitiendo la evaluación solo bajo los criterios A (reducción del tamaño de la población) y B (rango geográfico). En cuanto a la determinación del tamaño real de la población (criterios C y D) y el análisis cuantitativo del riesgo de extinción de la población (criterio E) son menores las evaluaciones debido al trabajo de campo exhaustivo y los largos periodos de tiempo que requiere. Por lo tanto, para superar estas limitaciones, hemos conformado un equipo interinstitucional con el fin de avanzar en las necesidades de acciones de conservación de *Cattleya quadricolor* Lindl. especie endémica en peligro de extinción. Hasta el momento hemos recopilado datos de censos demográficos de 5 poblaciones silvestres (criterios C y D), aislado hongos micorrízicos en el laboratorio, estudios de código de barras de ADN y talleres con comunidades locales para promover el seguimiento demográfico. Estos avances proporcionan una línea de base para el estudio continuo de la dinámica de la población, y el diseño e implementación de acciones para la recuperación de la población.

Palabras clave: Orquídeas, conservación, *Cattleya quadricolor*, poblaciones, peligro de extinción

Conservation status of Colombian orchid flora

Colombia is now recognised as the most orchid-rich country, a consequence of its position at the junction of the South and Central American continents, and the complex Andean topography promoting diversification across ecological niches. In 2015, 4270 species were reported for the country, of which 1572 (37%) are endemic (MADS & UNAL, 2015). Over the last six years, further taxonomic work has added to this number, and this huge diversity is a clear priority for conservation action.

In fact, as early as 1977, a national resolution (INDERENA, 1977) declared a moratorium on the extraction of all epiphytic plants, including orchids, from natural habitats. A first red list for orchids in Colombia was published in 2007 (Calderón-Sáenz, 2007), treating 371 orchid species from 18 of the most prominent genera. Of these, 207 (56%) were considered as threatened (CR, EN or VU status), with 56 having insufficient data for evaluation (DD).

In 2015, the Colombian national plan for the study and conservation of orchids was published (MADS & UNAL, 2015), and these 207 threatened orchids were given formal protection two years later (MADS, 2017). Subsequently, in 2019, under the auspices of the IUCN Colombian Plant Specialist Group, the conservation status of 99 endemic orchid species was evaluated, with 29 of these being re-evaluations from the 2007 list. Of these re-evaluations, 12 increased their threat category, including *Anguloa dubia* from DD to CR, and *Phragmipedium schlimii* from NT to EN.

Thanks to these efforts, in Colombia to date, 441 orchid species in 33 genera have been evaluated for their conservation status, with 240 (54%) classified as threatened (CR - 23; EN - 84; VU - 133), and 77 as data deficient. This represents approximately 10 % of the country´s orchid flora, and although low, this proportion of species evaluated compares favourably with the global situation. As of the 23rd May 2021, 1760 orchid species have evaluations in the IUCN list (https://www.iucnredlist.org/), representing approximately 6% of the estimated 28,000 species worldwide.

With the number of orchid species endemic to Colombia being only slightly less than the total number of species evaluated so far globally, we evidently face an immense task. Furthermore, in general the conservation assessments have relied on historical literature and herbarium data, permitting evaluation only under criteria A (population size reduction) or B (geographic range). Determining actual population sizes (criteria C and D) entails exhaustive, time-consuming fieldwork. Quantitative analysis of population extinction risk (criterion E) is even more challenging, requiring multi-year census.

In addition to further advancing with conservation evaluations, the implementation of conservation management plans is urgently required for threatened species. Complementing the Colombian National Plan (MADS & UNAL, 2015), management plans have been written for some orchid species at the regional level, notably in the Departments of Cundinamarca (Castellanos-Castro & Torres-Morales, 2018), Quindío (CRQ, 2017) and Valle del Cauca (CVC-FUNAGUA, 2011). However, although these documents list extensive requirements in terms of research and practical strategies, actions are not always implemented due to a lack of resources for research and conservation within the environmental authorities. To overcome these limitations, and to take action for the endangered, endemic species *Cattleya quadricolor* Lindl., we have formed an inter-institutional team to develop an integrated conservation strategy.

Conservation monitoring and management for *Cattleya quadricolor*

This species has a distribution restricted to the middle reaches of the inter-Andean Cauca River valley in Southwest Colombia. Modelling suggests a potential distribution of roughly 4000 km^2 (CVC – FUNAGUA, 2011), however its natural habitat has been decimated. This orchid is native to tropical dry forest between 900 and 1400 m.a.s.l. which covers the Cauca river flood plain and the foothills of the bordering central and western Andean cordilleras. The former is now almost entirely planted with sugar cane monoculture, and the foothills are predominantly used for cattle grazing. In the Cauca river valley, only 19% of the original tropical dry forest ecosystem remains. More worryingly, only 2.6% of these remaining patches are within protected areas (Pizano & García 2014). In all national conservation evaluations, *Cattleya quadricolor* has been consistently catagorized as Endangered, most recently in 2019 based on criteria B1+2ab (iii,v). Neither this species, nor, surprisingly, any member of the genus, has been evaluated for the IUCN Red list.

In addition to habitat destruction over the last century, the species is also of considerable ornamental interest, and, despite being included in the 1977 list prohibiting extraction of wild plants, there is ample evidence of ongoing removal of plants from natural populations.

Fig. 1. *Cattleya quadricolor* plant *in situ*, December 2017.

Fig. 2. Five months later, this plant had been extracted. Photographs: N. S. Flanagan

Photos on Page 7.

Fig. 1. *Cattleya quadricolor* (above);

Fig. 2. Five months later, this plant had been extracted.

Although restricted, the species distribution covers four different regional political divisions - the Departments of Risaralda, Quindío, Valle del Cauca and Cauca. Each of these has a different environmental authority, which has historically made it harder to build an articulated species management plan across the whole distribution.

In 2017 we began actions for conservation monitoring and management of *Cattleya quadricolor*. To date we have collected demographic census data for five populations broadly distributed across the Valle del Cauca and in Quindío, in order to determine population size (IUCN Red list criteria C & D) and undertake a quantitative analysis of population extinction risk (criterion E). The results are not positive.

Population size varies between 90 and 213 individuals, with low recruitment of new individuals into all populations, as evidenced by low fruit set and number of seedlings. Indeed, demographic modelling reveals population growth rates below 1 for three of the five populations, indicating their trend towards extinction. The two remaining populations are on the threshold, with an estimated addition of only 1 to 3 individuals over a 12-year period. These results provide the data that support our long-held suspicion, that none of these populations is sustainable in the long-term.

Our efforts for conservation monitoring of *Cattleya quadricolor* continue. We are undertaking further exploration to identify more relict populations and update distribution maps. Multi-year census data are now being collected to obtain more robust estimates of the extinction probability of these, and other populations. These findings will provide a baseline for continued study of population dynamics, and from which to design and implement actions for population recovery.

In parallel with the demographic studies, we are also focussing on understanding the orchid mycorrhizal interactions of *Cattleya quadricolor*. Having isolated the mycorrhizal fungi in the laboratory, we can now proceed to evaluate their role in *ex situ* germination and population restoration, including establishment of new populations in protected localities. Additionally, in order to support legal protection measures, we are developing the DNA Barcode for this species to enable non-flowering material decommissioned by the authorities to be identified.

Importantly, as none of the populations studied so far occurs in protected areas, we are also working to promote community engagement in the nearby villages. Workshops held in the local schools have emphasized the importance of conserving this and other orchids in

their natural habitat, and, together with the local authority in Quindío (CRQ), we have also provided training for promote citizen science for demographic monitoring.

Key to the success of this integrated conservation program is having a strong collaborative team involving researchers with different expertise. We are based at three different universities in Cali, and Armenia, Quindío. Currently, a Master thesis (GTT) and four undergraduate theses are focused on conservation monitoring and action for *C. quadricolor*. Importantly, we also now have the support of two regional environmental corporations – the CVC in the Valle de Cauca, and the CRQ in Quindío, as well as local communities. We hope that with such an articulated, participatory approach we will eventually achieve sustainable *in situ* conservation for *Cattleya quadricolor*, and, in doing so, build a model which can be applied to other threatened species here in Colombia.

References:

Calderón-Sáenz, E. (Ed.). 2007. *Libro rojo de plantas de Colombia. Volumen 6. Orquídeas. Primer parte. Serie Libros rojos de especies amenazadas de Colombia*. Bogotá: Instituto Alexander von Humboldt, Instituto de Ciencias Naturales de la Universidad Nacional de Colombia, Ministerio de Ambiente, Vivienda y Desarrollo Territorial. Colombia. 828 pp.

Castellanos-Castro, C., & G. Torres-Morales (Eds.). 2018. *Orquídeas de Cundinamarca: conservación y aprovechamiento sostenible.* Instituto de Investigación de Recursos Biológicos Alexander von Humboldt, Pontificia Universidad Javeriana, Jardín Botánico de Bogotá "José Celestino Mutis", Corporación Colombiana de Investigación Agropecuaria Corpoica, Gobernación de Cundinamarca. Bogotá, DC, Colombia, 328 pp.

CVC – FUNAGUA (Eds.). 2011. *Planes de manejo para la conservación de 22 especies focales de plantas en el Departamento del Valle del Cauca*. Cali, Colombia. 258 pp.

INDERENA. 1977. *Resolución No. 213 de 1977. Por la cual se establece veda para algunas especies y productos de la flora silvestre*.

Ministerio de Ambiente y Desarrollo Sostenible (MADS) y Universidad Nacional de Colombia (UNAL). 2015. *Plan para el estudio y la conservación de las orquídeas en Colombia.* Textos: Betancur, J., H. Sarmiento-L., L. Toro-González & J. Valencia. Ministerio de Ambiente y Desarrollo Sostenible, Colombia; Universidad Nacional de Colombia, Bogotá D.C., Colombia. 336 pp.

Ministerio de Ambiente y Desarrollo Sostenible (MADS). 2017. *Resolución No. 1912 de 2017. Por lo cual se establece el listado de las especies silvestres amenazadas de la diversidad biológica colombiana.*

Orozco-Cardona, A.F., Román-Cano F. & E. Marín-Londoño. 2017. *Plan de Manejo de dos Especies Focales de Flora (Wettinia kalbreyeri y Cattleya quadricolor) en el Departamento del Quindío*. Corporación Autónoma Regional del Quindío- CRQ y Asociación Ambientalista FRAILEJONES, Armenia, Quindío.

Pizano, C. & H. García. (Eds.). 2014. *El bosque seco tropical en Colombia*. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt (IAvH). Bogotá, D.C., Colombia. 349 pp.

A First Encounter with the Elusive Ghost Orchid

Brent D. Chandler, Ph.D., Orchid Recovery Program,
Illinois College, Jacksonville IL, USA
brent.chandler@ic.edu

As a scientist with expertise in synthetic and medicinal chemistry with a longstanding interest in the impact of small molecules on biological systems, writing an article for the *Orchid Specialist Newsletter* is a bit out of my comfort zone, but I am eager to share my first encounter with the elusive ghost orchid, *Dendrophylax lindenii*, during my very first visit to Florida this past July.

So why would a trained chemist, born, raised, and educated in the cornfields of the Midwest (Illinois, USA), step out of an air-conditioned laboratory and into foreboding swamps of the Florida Panther National Wildlife Refuge (NWR) to study an orchid? Wearing a white lab coat provides some protection from exposure to dangerous chemicals, but certainly not mosquitoes or alligators. I did not expect I would be wearing snake boots to protect my legs from venomous snakes in south Florida swamps during my professional career! But this was the decision I made earlier this year. I am now on an exciting path to studying an aspect of orchid biology that overlaps my field of study, and I am excited about where this may all lead.

The elusive ghost orchid, *Dendrophylax lindenii*.
Photo A. Herdman

The ghost orchid is a tree dweller with no leaves, and when it is encountered appears as a delicate, luminescent white bloom floating at eye level or above in its lush, shaded, natural environment (Brown, 2005). Unfortunately, this endangered species can only be found propagating naturally in southern Florida and western Cuba (Coile and Garland, 2004). Several factors continue to threaten it including loss of habitat (DeConto and Pollard, 2016), environmental impact (Wiegand *et al*., 2013), as well as illegal poaching (Coile and Garland, 2004). As many readers may be aware, poaching *Dendrophylax lindenii* was the subject of Susan Orlean's best-selling novel, The Orchid Thief, and the Hollywood movie, Adaptation. Successful conservation of this species requires environmental protection and necessitates an understanding of its propagation via natural pollination mechanisms.

Through the course of a week in early July 2021 our group – Illinois College Hitchcock Professor of Biology, Dr. Larry Zettler; Southern Illinois University at Edwardsville Master's degree candidate, Adam Herdman; Routt Catholic High School student, Audrey Zettler; Illinois College student and research associate, Tony Ruiz; and myself - sought to find and collect data on native, naturally reproducing ghost orchids at the Florida Panther NWR in Collier county Florida. Our excursions into this protected habitat were overseen and aided by Florida Panther NWR wildlife biologist, Mark Danaher, and his capable and helpful staff, who ensured that we had both safe and productive outings each day. Following our organizational meeting we surveyed ghost orchid populations at five unique sites. Each location was accessed via truck or swamp buggy followed by a careful and sometimes lengthy hike. During these trips we encountered first-hand the great natural beauty unique to southern Florida. At our destination we located trees known to support ghost orchids, pop ash (*Fraxinus caroliniana*) and pond-apple (*Annona glabra*), followed by examination of their branches for the epiphyte. Once found, whether flowering or not, we recorded information on the state of inflorescence, fruit set, location, etc and collected nectar from each orchid in bloom.

Sampling ghost orchid nectar. Pictured (l-r) are Tony Ruiz and Brent Chandler. Photo A. Herdman

The collection and analysis of nectar is intended to contribute to long-term efforts of the Orchid Recovery Program to conserve and understand ghost orchids (Danaher *et al*., 2020) (Mujica *et al.*, 2018) (Hoang *et al*., 2017) (Sadler *et al*. 2011). Tony and I seek to contribute to this effort by studying nectar's role from a molecular perspective as a source of nutrition, and how it may aid an effective pollination event and / or

discourage a generalist or ineffective pollinator visit. We collected nectar from 13 unique ghost orchids in bloom sampling the nectary as well as the flower's labellum. All samples were frozen and are currently awaiting or undergoing analysis. We are assessing the molecular components of the collected nectar by a process of derivatization followed by gas chromatography mass spectrometry (GCMS) and aim to report our findings in due course.

Tony and I have found the orchid community to be a passionate, supportive, and knowledgeable collection of individuals, and recognize that our nascent research efforts follow the footsteps of the many researchers, conservationists, and orchid hobbyists that fill its ranks. The people that we met and continue to interact with have been extremely supportive and have inspired us to seek continued opportunities to engage and contribute. We would like to thank the Florida Panther NWR and Mark Danaher; the Naples Orchid Society - Richard Davenport, Jim Rawson, Kit and La Raw Maran; the Naples Botanical Garden - Nick Ewy and Chad Washburn. These organizations and individuals named and unnamed helped to make our visit memorable and productive. We also gratefully acknowledge the generous financial support provided by the Naples Orchid Society and Illinois College which made our research trip possible.

REFERENCES:

Brown, P. M. (2005). *Wild orchids of Florida: With references to the Atlantic and Gulf Coastal Plains*. University Press of Florida.

Coile, N. C., Garland, M. A. (2004). *Notes on Florida's endangered and threatened plants* (4th ed.). Florida Department of Agriculture and Consumer Services.

Danaher, M. W., Ward, C., Zettler, L. W., Covell, C. V. (2020). Pollinia removal and suspected pollination of the endangered ghost orchid, *Dendrophylax lindenii* (Orchidaceae) by various hawk moths (Lepidoptera: Sphingidae): Another mystery dispelled. *Florida Entomologist*, 102(4), 671–683.

DeConto, R. M., Pollard, D. (2016). Contribution of Antarctica to past and future sea-level rise. *Nature*, 531(7596), 591–597.

Hoang, N. H., Kane, M. E., Radcliffe, E. N., Zettler, L. W., Richardson, L. W. (2017). Comparative seed germination and seedling development of the ghost orchid, *Dendrophylax lindenii* (Orchidaceae), and molecular identification of its mycorrhizal fungus from South Florida. *Annals of Botany*, 119(3), 379–393.

Mújica, E. B., Mably, J. J., Skarha, S. M., Corey, L. L., Richardson, L. W., Danaher, M. W., González, E. H., Zettler, L. W. (2018). A comparison of ghost orchid (*Dendrophylax lindenii*) habitats in Florida and Cuba, with particular reference to seedling recruitment and mycorrhizal fungi. *Botanical Journal of the Linnean Society*, 186(4), 572–586.

Sadler, J. J., Smith, J. M., Zettler, L. W., Alborn, H. T., Richardson, L. W. (2011). Fragrance composition of *Dendrophylax lindenii* (Orchidaceae) using a novel technique applied in situ. *European Journal of Environmental Sciences*, 1(2), 137–141.

Wiegand, T., Raventós, J., Mújica, E., González, E., Bonet, A. (2013). Spatio-temporal analysis of the effects of hurricane Ivan on two contrasting epiphytic orchid species in Guanahacabibes, Cuba. *Biotropica*, 45(4), 441–449.

September 7, 2021: A large number of wild orchid species are offered legal protection in China

Hong Liu, Professor
Department of Earth and Environment and
International Center for Tropical Botany,
Florida International University

China released its revised List of National Key Protected Wild Plants on Sept 7, 2021, which included about 1101 species. (http://www.forestry.gov.cn/main/5461/20210908/162515850572900.html)

This is a significant event for plant conservation, especially for orchid conservation. The revision effort started more than a decade ago but was stymied by the irreconcilable opinions of different government agencies, until now. The new list quadrupled the number of species in the first list which was released in 1999. Among the new additions are 291 orchid species belonging to 23 genera, in sharp contrast to the older version, which did not list any orchids. The new list, as

in the old one, classifies listed species into two protection categories, class I and II, with species in class I enjoying more legal protection. The key difference, according to the Regulations of the People's Republic of China on Wild Plants Protection (State Department of China 1996), is that wild-sourced plant materials of species in class I are not allowed to be traded whereas those in the class II are, but only with permission and license. In addition, if collecting of wild specimens of species in class I is needed for research or other non-commercial purposes, such collecting will need the approval of an administrative branch at the national government level, while those in class II need the approval from a provincial government.

Notably, there are blanket listings, i.e. all species of a genus are listed. This included five genera that are known for containing many species traded as ornamental plants, i.e. *Cymbidium, Cypripedium, Paphiopedilum*, *Pleione*, and *Renanthera*, and two genera traded mostly for medicinal purpose, i.e. *Dendrobium* and *Anoectochilus* (Liu et al. 2020). Although not all species in these genera are being threatened by wild collecting and trade, the blanket listing of these genera is likely due to the look-alike factor among the congeners. For example, only a few species of the genus *Cymbidium*, e.g. *C. ensifolium*, *C. faberi*, *C. goeringi,* and *C. kanran*, that have been used as ornamental plants in China for more than one thousand years and play an important role in the Chinese culture. These species have been the target of unregulated wild collecting and trade in recent years but other *Cymbidium* species might have been collected due to similarity in vegetative features. The exceptions to the class II listing of *Cymbidium* are *C. insigne* (class I), *C. wenshanese* (class I), and *C. lancifolium* (not listed). These exceptions are made based on wild population numbers and size as well as wild-collecting pressure, according to Professor Xiaohua Jin of the Chinese Academy of Sciences who coordinated the listing effort.

Similarly, nearly all 96 species of *Dendrobium* native to China are listed as class II, except for *D. huoshanense* and *D. flexicaule*, which are class I species. Curiously, the critically endangered *D. catenatum* (synonym *D. officinale*) which is known for sustained high wild collecting pressure (Liu et al. 2014), was not listed as Class I. Nearly all 36 species of *Cypripedium* native to China are listed as class II. The exceptions are *C. subtropicum* (class I) and *C. plectrochilum* (not listed). The only blanket-listed class I genus is *Paphiopedilum*, with 36 species native to China. The exceptions are *P. hirsutissimum* and *P. micranthum*, which are listed as class II. The class I listing of *Paphiopedilum* is consistent with the listing of the genus on CITES Appendix I. Overall, there are 41 orchids listed as class I and 250 as class II. Most of them are classified as threatened species in the Chinese Red List of Vascular Plants and are listed on the Key Protected Wild Plants List due to concerns of over-harvest and trade. Many are also subject to threat from habitat deterioration and destruction. The inclusion of this large number of orchids on the Chinese National Key Protected Wild Plants List is no doubt a big step in the right direction. However, how the new list will be enforced remains to be seen. Perhaps, the blanket lists will make the enforcement job a bit easier in some ways, as enforcement staff need to learn to recognize the genus, instead of individual species.

References:

Liu, H., Liu Z. J., Jin, X.H., Gao, J.Y., Chen, Y., Liu, Q., and Zhang, D.Y. 2020**.** Assessing conservation efforts against threats to wild orchids in China. *Biological Conservation* 243 (page number to be determined). https://doi.org/10.1016/j.biocon.2020.108484

Liu H., YB Luo, J Heinen, M Bhat, ZJ Liu. 2014. Eat your orchid and have it too: a potentially new conservation formula for Chinese epiphytic medicinal orchids. *Biodiversity and Conservation* 23: 1215-1228.

State Council of China. 1996. Regulations of the People's Republic of China on Wild Plants Protection. http://lawinfochina.com/Display.aspx?lib=law&Cgid=15408

Food for Thought

Assédéabe, E.S.P. *et al*. (2018). Efficiency of conservation areas to protect orchid species in Benin, West Africa. *South African Journal of Botany* 116: 230–237. https://doi.org/10.1016/j.sajb.2018.02.405

Bell, T.J., Bowles, M.L., Zettler, L.W., Pollack, C.A., and Ibberson, J.E. (2018). Environmental and management effects on demographic processes in the U.S. Threatened *Platanthera leucophaea* (Nutt.) Lindl. (Orchidaceae). Plants **2021**, 10, 1308. https://doi.org/10.3390/plants10071308

Cámara-Leret, R. *et al*. (2020). New Guinea has the world's richest island flora. *Nature* 584: 579–584.https://doi.org/10.1038/s41586-020-2549-5

Kottawa-Arachchil, J.D., and R.S. Gunasekara (2020). Research priorities and future directions in conservation of wild orchids in Sri Lanka: A review. *Nature Conservation Research* 5 (Suppl. 1). https://dx.doi.org/10.24189/ncr.2020.029

Montesinos-Navarro, A., Díaz, G., Torres, P., Caravaca, F., and Roldán, A. (2019). Phylogenetic rewiring in mycorrhizal–plant interaction networks increases community stability in naturally fragmented landscapes. *Communications Biology* 2:452 | https://doi.org/10.1038/s42003-019-0700-3 www.nature.com/commsbio

Mújica, E.B., Herdman, A.R., Danaher, M.W., González, E.H., and Zettler, L.W. (2021). Projected status of the Ghost Orchid (*Dendrophylax lindenii*) in Florida during the next decade based on temporal dynamic studies spanning six years. *Plants* **2021**, 10, 1579. https://doi.org/10.3390/plants10081579

Zizka, A., Silvestro, D., Vitt, P., and Knight, T.M. (2020). Automated conservation assessment of the orchid family with deep learning. *Conservation Biology*, 35 (3) 897–908. DOI: 10.1111/cobi.13616

Mark your Calendar

IV International Vanilla Congress

1-3 December 2021

The IV International Vanilla Congress 2021 aims to provide an inclusive meeting space where we will share research advances across a broad range of topics regarding the natural vanilla crop and *Vanilla* species in the wild.

The Congress will occur in a virtual-only format, facilitating participation from around the globe. The main conference languages will be Spanish and English. There will be no cost for participation, with transmission on the YouTube channel of the Pontificia Universidad Javeriana, Cali.

Three symposia:

Vanilla cultivation and breeding in the 21st Century

Vanilla species in natural ecosystems

Conservation and use of vanilla natural capital

Two formats:

Live oral presentations

Posters in short video format

More information:
https://www.javerianacali.edu.co/eventos/iv-congreso-internacional-de-vainilla

Nicola Flanagan

nsflanagan@javerianacali.edu.co

Changes to contact information?

To maintain effective communication, we need to know of any changes in contact information.

Please inform the OSG Co-Chair, Mike Fay.

(M.Fay@kew.org)

Call for conservation news

Members are invited to provide news of their recent conservation activities for publication in the OSG Conservation News.

Please submit material in Microsoft Word, Times New Roman, 11 point. Illustrations, if any, should not be embedded in the MS Word document but provided as separate jpeg files. Please include suggested captions and photographic credits. Send news to Marilyn Light, Editor, (mslight@distributel.net)