

Editorial

There has been some controversy recently about organisms named after people who, it is widely agreed, were not exactly admirable. An example that is inevitably brought up in these discussions is that of a beetle named after Adolf Hitler*¹. Apparently, attempts to get its name changed have failed so far because the rules of zoological nomenclature have no provision to challenge eponyms (species names that commemorate people) on the ground that the person so honoured was objectionable. The rules governing the naming of plants also lack such a provision. Article 51.1 of the *International Code of Nomenclature for algae, fungi, and plants* states: “A legitimate name must not be rejected merely because it, or its epithet, is inappropriate or disagreeable, or because another is preferable or better known (but see Art. 56.1 and F.7.1), or because it has lost its original meaning.” Fortunately, no orchid species have been named after Hitler or Stalin (although there is an artificial *Dendrobium* hybrid named after Kim Il Sung), but questionable orchid eponyms do exist. Please note that the following is my opinion and does not necessarily reflect the position of the Royal Botanic Gardens, Kew.



Phragmipedium kovachii. Photo Henry Oakeley

In 2004, a judge in Florida ordered Mary Selby Botanical Gardens to try to get the name *Phragmipedium kovachii* rescinded, because the species was named by Selby staff after the person who had brought specimens from Peru to Florida in breach of the Endangered Species Act. The name has not been rescinded and the species is still known, and by now widely cultivated, as *P. kovachii*. Why? Because the rules of botanical nomenclature did not allow the name to be changed (see Art. 51.1 above). While a legitimate discussion could be had on such cases, this discussion has sadly been hijacked, as so often happens, by extremists who now demand that all eponyms be banned. Guedes et al. (2023) recently published a piece titled “Eponyms have no place in 21st-century biological nomenclature”. Their article is peppered with anti-scientific statements such as the following:

Attributing eponyms to species extends beyond the act of naming; it attaches the societal value system to which these individuals belong. It stakes a claim as to which knowledge system provides legitimacy to the existence of the species, while simultaneously diminishing the value and knowledge of the species within the context of those who may have interacted with it the most.

Where to begin with such an extraordinary strawman argument? When we name species X after person Y, we do nothing more or less than that. We give a species a label. We do not attach to species X the value system of society Z of which person Y is a member. This strange assertion is apparently made because it enables one to fulminate against societies rather than individuals. The statement about knowledge systems and the value of species is hardly less far-fetched. By simply bestowing a name, we do not make any judgement about indigenous knowledge and values that may pertain to that species. How could we even make such judgements when most taxonomists are, almost necessarily, unaware of those aspects? Science-based taxonomy simply looks objectively at morphology, ecology, genetics, etc. When this is portrayed in such a negative way as in this statement one can genuinely speak of an anti-science attitude.

We are dealing with a biodiversity crisis, an extinction event of geological proportions, while there is a huge shortage of taxonomists, who are struggling to describe or understand species before they are wiped out by habitat destruction and climate change. At the same time, Guedes et al. think it is a good idea to waste the time of those few taxonomists on changing the names of potentially hundreds of thousands of organisms, in the process creating a mountain of synonyms that will clutter up the literature forever. This is like wanting to change the paint on the cabin doors of the Titanic while it is steaming towards the iceberg. No, it is worse than that. It is like taking the captain of the Titanic away from the helm to let him do the painting*².

I did some counting. Of 1,623 accepted names of *Dendrobium* species, 380 are eponyms (e.g., *D. devonianum*), 212 are named after localities (e.g., *D. bismarckense*), 973 refer to some morphological property (e.g., *D. pendulum*), and 58 fall in a different category (e.g., *D. hamadryas*). The proposal by Guedes et al. would require 380 name changes (or 23%) in *Dendrobium* alone. It is interesting to note that Guedes et al. find a similar percentage in African vertebrates. In the case of eponyms in *Dendrobium*, it is questionable that, as Guedes et al. put it, “those commemorated [in the 19th and 20th centuries] were almost universally white, male upper-class Europeans”. This is probably true for names given in the 19th century, but in the 20th and 21st centuries many species were named after residents of the countries of origin, and while women are underrepresented, I consider it unlikely that the majority of those honoured with an eponym were upper class people. Given that there are still many undescribed orchids waiting to be named, there is ample opportunity to name species after non-white, non-male, non-upper-class, non-European people. Guedes et al. want to take away that opportunity, which is like solving the problem of income inequality by making everybody poor.

I mentioned *Dendrobium devonianum* on purpose because this is the most controversial name in *Dendrobium* that I can think of*³. It was described in 1840 by Joseph Paxton and named after his employer, the 6th Duke of Devonshire, who had a famous orchid collection at Chatsworth, England. The species had been collected in the Khasi Hills of North-East India by one of the Duke’s gardeners, John Gibson (there is also a *D. gibsonii*). It doesn’t get any more white, male upper-class European than the 6th Duke of Devonshire. There is also no doubt that the colonial system of the day allowed the 19-year-old Mr Gibson to travel to the Khasi Hills and come back a few years later with hundreds of living orchids to adorn the Duke’s glasshouses. One could say: perhaps it would have been better if the species had been named after or by an Indian person. But when we consider that this is an orchid that occurs not only in India but also in Bhutan, China, Laos, Myanmar, Thailand, Tibet, and Vietnam, then it is not obvious that it would have been preferable if someone from one of these countries had named

it. Who has naming rights for an orchid that does not observe national or ethnic borders? Who can stake claims on a species if it occurs beyond the limits of a single village? Who would get the honour of giving *D. devonianum* a new name? Or would we use one of its synonyms, in this case *D. moulmeinense*? What if there hadn't been a synonym already that could be resurrected? In science, we tend to observe the principle of priority. Whoever publishes first gets the credit. The principle of priority is also fundamental in nomenclature.



Dendrobium devonianum. Photo André Schuiteman

A very clever person may independently discover and prove the Theorem of Pythagoras today, but we will not rename the theorem after this person. Joseph Paxton was the first to notice that a particular *Dendrobium* was different from all the others already known, and he decided to name it after someone who happened to be his boss. The rule of priority demands that this name must be used for the species. The main beneficial effect of this rule is that it creates stability. It is usually easy to tell which name was published first. Most other criteria by which to decide which name should be used would lead to debates; stability would be much harder, if not impossible, to achieve.

I am sure that to most people who have a reason to mention *D. devonianum*, the name is little more than a meaningless collection of syllables. They have never heard of the Duke of Devonshire, 6th or otherwise, and even if they had, they wouldn't know anything about His Grace, as Paxton called him. Species epithets are just labels, some of which refer to individuals who are usually all but forgotten. Is it such a bad thing that we allow people who are somehow associated with an organism to live on in a minor way in the scientific name of that organism? The great majority of eponyms don't offend anyone except those who seek to be offended, and many species were justifiably named after people who risked life and limb to collect specimens for science. Not so, write Guedes et al.: "In conclusion, we believe that naming a biological species after a human was and is never right (...)." In that case, perhaps we should also stop naming mathematical theorems after "humans"? To be frank, this purging of eponyms, when put this way, sounds a bit dehumanizing to me. It leads to a somehow colder, more anonymous world, where the memories of individual, named people are not allowed to linger.

Still, let's say we ban and change all eponyms. How about toponyms, names that refer to localities? These can be "problematic" too. I just mentioned *D. bismarckiense*, named after the Bismarck Range of Papua New Guinea and so designated in German colonial times. The mountain range, commemorating a German chancellor, still bears this name in PNG (there is

also a Bismarck Archipelago) and I am not aware of calls to get it renamed. But this could change in the future. Would *D. bismarckiense* then become offensive? *Dendrobium moulmeinense* was named after a region in Burma, present-day Myanmar; is that fair to the other parts of Asia where the species occurs? What about the name Moulmein itself, which is currently spelled Mawlamyine? Should we outlaw toponyms as well?

Let those who want to change plant names abide by the rules of the *International Code of Nomenclature for algae, fungi, and plants*, or follow the proper, established procedures to get these rules amended. Of course, to be able to do so, they must first become practicing taxonomists, who know what they are talking about. That may be a problem.

Notes

*¹ Whether Hitler should have been flattered by having a cave-dwelling insect named after him is another matter.

*² Admittedly, it appears that the actual captain of the Titanic might as well have been painting doors.

*³ A possible contender is *D. victoria-reginae*, but this is a species from the Philippines, which was not part of the British Empire at the time of its description, and besides, Queen Victoria was a woman.

Reference

Guedes, P., Alves-Martins, F., Arribas, J.M., Chatterjee, S., Santos, A. M. C., Lewin, A., Bako, L., Webala, P. W., Correia, R. A., Rocha, R. and Ladle, R. J. 2023. Eponyms have no place in 21st-century biological nomenclature. *Nature Ecology & Evolution* (<https://doi.org/10.1038/s41559-023-02022-y>)

André Schuiteman
a.schuiteman@kew.org
 Kew

Please click [here](#) for the Repository of past issues of the Orchid Research Newsletter, starting with issue 39 (2002).

Upcoming Conferences

We welcome any news about future orchid conferences for promotion here. Please send details to the editor as far in advance of the event as possible, remembering that the *Orchid Research Newsletter* is published only in January and July of each year.



IOCC VIII PERTH 2024
a minute to midnight

The 8th **International Orchid Conservation Congress (IOCC8)** will be held in Perth, West Australia, from 12 to 14 September 2024. See <https://iocc8.com>



WOC
TAINAN 2024

The 23rd **World Orchid Conference** will be held in Tainan, Taiwan, from 25 to 28 February 2024. See <https://en.woc23.com>

Jobs

We will be happy to announce job opportunities, provided they explicitly involve orchid research or conservation. Please send details to the editor.

Funding Opportunities

We will be happy to announce funding opportunities, provided they explicitly involve orchid research or conservation. Please send details to the editor.

The **American Orchid Society** is soliciting grant proposals for orchid research. Deadline is 1 March of each year. For application instructions see <http://www.aos.org/about-us/orchid-research/application-guidelines.aspx>

World Orchid Conference Trust (<https://www.woctrust.org/>)



Announcement for Student Lectures and Posters

As part of its mission, the WOC Trust is pleased to announce that it will sponsor grants for outstanding young orchid researchers at WOCs.

The 23rd WOC grants will be offered to students to present their research to the general orchid public either as a lecture and/or as a poster at the WOC. Students are encouraged to compete for the grants established according to their educational status.

These grants recognize young, promising researchers whose studies advance the field of Orchidology. These studies will demonstrate the latest trends in the following categories:

- Basic and Applied Research in Orchidology
- Orchid Conservation
- General Horticultural Education in Orchids

Eligibility

1. Applicants must currently be enrolled in a high school, college, graduate school, or postdoctoral fellowship within an academic program.
2. Applicants must be the primary researcher for the study at the time of submission and be primarily responsible for the research described.
3. Applicants wishing to compete must provide a letter affirming their academic qualifications from their academic advisor/sponsor/institution. This letter must accompany their presentation application. For further information, contact Dr. Yin-Tung Wang at yintung.wang@gmail.com.
4. The research must be presented by its applicant at the 23rd WOC to receive the grant.

Research Description

Abstracts, Papers, Posters, and Lectures should be clear and concise. They must demonstrate the scope of the presenters'/applicants' research.

All applications must be accompanied by a letter from the presenter's scientific advisor confirming the presenter's academic status. The letter will note specific contributions, significance, and distinguishing work meriting grant consideration.

Details & Conditions

Successful presenters will be selected by a panel of host organizers and the WOC Trust Science and Education Committee members. They are expected to present their posters and/or lectures at the conference. Their submitted abstracts will be in the 23rd WOC handbook and published in the Proceedings. Successful applicants will have their conference registration fees waived. The host organizers and WOC Trust Science & Education Committee will request permission

to publish the research as a full paper in the WOC Proceedings and the WOC Trust's website. Recipients will be listed on the website. This will include those who do not want their research published.

Whether to award grants rests with host organizers and the WOC Trust Science & Education Committee.

A maximum of two grants within each category may be awarded. When warranted, all of the grants may not be given. The WOC Trust will invite a Keynote speaker.

Deadline for Submission

Application Deadline: January 19, 2024. Applications that are received after the deadline will not be considered for grants. (Abstracts must be submitted by the Organizer's deadline.)

Grants

Posters	Grant Amount (USD\$)
Category 1 – Secondary Degree Students under 18 in full-time education	\$125
Category 2 – BS, BSc or MS, MSc Students completing a bachelor's or master's program	\$250
Category 3 – PhD, DSc Students completing a doctoral degree	\$375
Category 4 – Post-Doctoral Fellows Students working in a doctoral fellowship program	\$500

Lectures

Category 1 – Secondary Degree Students under 18 in full-time education	\$125
Category 2 – BS, BSc, MS, MSc Students completing a bachelor's or master's program	\$250
Category 3 – PhD, DSc Students completing a doctoral degree	\$375
Category 4 – Post-Doctoral Fellows Students working in a doctoral fellowship program	\$500
Keynote Speaker (Invited by the WOC Trust)	\$1000

News from Correspondents

Please submit any news about recently completed research, future research plans and needs, change of address, upcoming or recent fieldwork, etc. to the editor. Graduate students are especially encouraged to share the subjects of their thesis or dissertation with the international community.

Shan Wong is a PhD candidate at the Department of Plant and Soil Science, Texas Tech University (TTU), in Lubbock, Texas. Her PhD projects are centered around conservation genetics and orchid mycorrhizal fungi (OMF) associated with several co-occurring species within the genus *Vanilla* in Costa Rica and the functional roles of OMF in germination and development of protocorms in *Platanthera cooperi* in the USA. Shan was awarded the TTU Presidential Graduate Fellowship to fund her program under the supervision of Prof. Jyotsna Sharma (TTU) in collaboration with Dr. Adam Karremans (Lankester Botanical Garden, University of Costa Rica, Costa Rica) and staff members from the Osa Conservation (Costa Rica). There are three major objectives of her study:

- (1) To reveal the patterns of taxonomic diversity and patterns of the OMF community in the roots of the three co-occurring *Vanilla hartii*, *V. pompona*, and *V. trigonocarpa* in tropical forests of Costa Rica

Vanilla is a group of orchids with the highest economic value in the world, and most of the wild species of this genus are rare and threatened with loss of habitat and unsustainable collection. Like other orchids, the members of this genus are also dependent on orchid mycorrhizal fungi (OMF) for seed germination and growth, however, evidence for OMF diversity remains scant. In this study, Shan sought to compare orchid mycorrhizal fungal (OMF) communities of three co-occurring hemi-epiphytic *Vanilla* species in tropical forests of Costa Rica by addressing the identity of their OMF communities across species, root types, and populations, using high-throughput sequencing. Her hypotheses were: (i) the three co-occurring *Vanilla* species will host distinct OMF communities; (ii) terrestrial roots of *Vanilla* species are enveloped by organic matter and mineral-rich soil in comparison to epiphytic roots that are partly exposed with one side attached to the phorophyte host, hence the terrestrial roots will host different OMF communities than the epiphytic roots of *Vanilla* species; (iii) the four widely separated populations of *V. trigonocarpa* (populations in the Pacific region vs. Atlantic region) will show spatial segregation of their OMF communities.



Vanilla trigonocarpa in situ, near the Osa Conservation Campus (former name: the Piro Biological Station) in Costa Rica. Photo Shan Wong



Vanilla hartii. Photo Adam Karremans

To support these hypotheses, the nuclear ribosomal internal transcribed spacer (*nrITS*) was sequenced which yielded 299 OMF Operational Taxonomic Units (OTUs) from 193 root samples. The result showed distinct segregation of the OMF communities of the three coexisting *Vanilla* hosts. Altogether, Tulasnellaceae and Ceratobasidiaceae were identified as dominant OMF families in the terrestrial roots of the three *Vanilla* species. In contrast, the epiphytic roots were mainly dominated by OTUs belonging to the Atractiellales and Serendipitaceae. Furthermore, the OMF communities differed significantly across populations of the widespread *V. trigonocarpa* and showed patterns of distance decay in similarity.



Vanilla pompona. Photo Adam Karremans



Vanilla trigonocarpa. Photo Adam Karremans

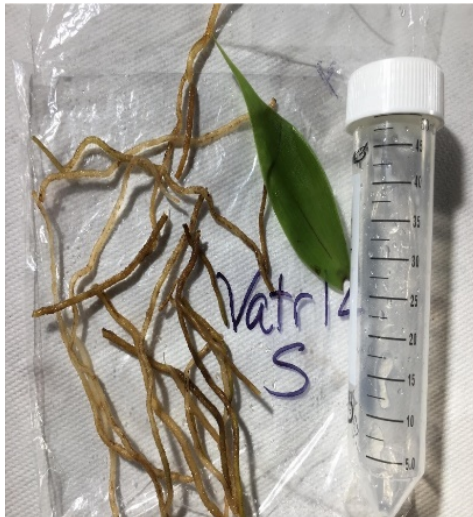
This is the first report of diverse OMF communities detected in wild *Vanilla* species providing evidence that three coexisting *Vanilla* species and their root types exhibited OMF niche

partitioning. The result of this study sheds light on understanding the growth and the distribution pattern of *Vanilla* species (https://www.depts.ttu.edu/pss/sharma-lab/Files/2021_poster.pdf).

(2) To understand whether the sampled *Vanilla trigonocarpa* largely represent clones, especially within the smaller isolated population

Shan's second project is focused on the population genetics of *Vanilla trigonocarpa*, which consists of vines that can presumably occupy large areas of the Costa Rican tropical forests by reproducing clonally. As such, vines can grow in high densities attached either to a single phorophyte host, or to several phorophytes while connected via stems on the ground. Yet, the genomic mechanisms of the populations of this wild *Vanilla* are rarely studied. In this study, she compared allelic frequencies to determine the genetic variation in 371 individuals of *V. trigonocarpa* from three populations using Restriction-site Associated DNA Sequencing (RADSeq). By sampling a metapopulation and two isolated populations representing geographic distances ranging from almost none (stems growing entwined with each other) to 217km, she is also examining the patterns of isolation by distance. The hypotheses were (i) *V. trigonocarpa* primarily expands its populations via clonal reproduction, and will show overall low genotypic diversity within and among sampled populations; (ii) genetic distance between samples increases significantly with geographical distance.

While the data analyses of this project are on-going, Shan expects that the findings of the genetic structure, including fine-scale spatial analyses, within and among populations could inform the most suitable approaches for direct examination of the reproductive mechanisms in *Vanilla*.



Soil roots and leaf samples of *Vanilla trigonocarpa*. Photo Prof. Jyotsna Sharma

(3) To examine whether the fungi dominating the roots of *Platanthera cooperi* in large and small populations, combined with the native temperature, providing a competitive advantage to the seeds belonging to the respective populations.

The third objective of Shan's project is focused on the symbiotic seed germination and protocorm development of a rare terrestrial *Platanthera cooperi*, which is native to the California Floristic Province. We already know that orchid seeds require biotic components such as the orchid mycorrhizal fungi (OMF) for seed germination, however, abiotic factors, such as temperature and edaphic factors also play an important role and in fact, are determining

factors in seed germination and development. Previous studies have shown that the OMF communities associated with *P. cooperi*, varied across populations and during ontogeny. In roots of plants from the larger populations, the OMF Operational Taxonomic Units (OTUs) belonging to the family Tulasnellaceae (LT) were dominant while Ceratobasidiaceae (LC) OTUs were rare. Conversely, smaller populations showed the opposite pattern. In this study, the hypothesis is that the native fungi and native temperature will enhance seed germination and protocorm development.

To support the hypothesis, fungi were isolated and used representing the dominant and rare OTUs from large and small populations to test whether the fungi dominating the roots of plants in large and small populations, combined with the native soil temperature, provides a competitive advantage to the seeds belonging to the respective populations. Seeds from the large and small populations were exposed to the four fungal isolates (LC, LT, SC, ST: L-large, S-small, C-Ceratobasidiaceae, T-Tulasnellaceae) in combination with two temperature treatments (22°C, 15.5°C). Un-inoculated controls were also used to compare with inoculated treatments. Consequently, the experiments included 20 treatment combinations, each of which was replicated 10 times. After 124 days of incubation, seed germination and protocorm development were recorded. The results showed three-way interactions among the seed provenance, OMF, and incubation temperature on germination and protocorm development of *P. cooperi*. Seeds from either population inoculated with LT at 22°C showed the highest germination, while seeds from the large population inoculated with either isolate (i.e., LC and SC) or ST at 16°C showed the highest protocorm development.



Platanthera cooperi: Protocorm with rhizoids after 124 days in vitro. Photo Shan Wong

The hypothesis is rejected as the seed germination in this species was dependent on the nativity of OMF but independent of native temperature, while the protocorm development was independent on the nativity of OMF and dependent on the native temperature.

Apart from her Ph.D. work, Shan is an active member of the IUCN SSC Orchid Specialist Group and Global Trade Group, and she is a coordinator at the Botanical Society of America's 'PlantingScience' program. She is also a fellow of the Directorate Fellows Program in the U.S. Fish and Wildlife Service, Office of Law Enforcement.



Shan Wong processing leaf samples of *Vanilla* at the Osa Conservation Campus in Costa Rica. Photo Prof. Jyotsna Sharma

Digitising Kew's Orchid Herbarium

Marco O. O. Pellegrini

M.Pellegrini@kew.org

Kew's bigger-than-life [Science Collection Digitisation Project](#) has officially completed its first anniversary this May, having already managed to digitise over a million specimens. However, a project of this magnitude requires an awful lot of planning, and we have adopted the divide-and-conquer approach by having specific branches to the core project. One of these branches is the In-House Digitisation of the Orchid Herbarium.

Our current estimates suggest that Kew's Orchid Herbarium (discounting the Lindley Herbarium) houses around **209,000 specimens**, which range from traditional press-dried plants to illustrations, photographs and slides. So far, we have imaged a total of **59,821 specimens** (around 28% of the collection) and expect to have far surpassed the 60k images mark by the time this correspondence is published.



Fig. 1. Inside Kew's Orchid Herbarium. The dried specimens are kept in folders inside metal cupboards. Type specimens are in folders with red borders. Photo André Schuiteman

The Orchid Herbarium and its Peculiarities

With the chance of preaching to the choir, I'll provide some information and background about the collection. Unlike most plant groups, the orchid specimens housed at Kew have a private home in the Herbarium Building, appropriately named the Orchid Herbarium. This large room is shared with the Lindley Herbarium and some other smaller collections associated with orchids, like the Orchid Illustration Collection and the Orchid Slide Collection (Fig. 1). The Orchid Herbarium is physically connected to the Orchid Library, which hosts an impressive collection of different orchid-centred publications and currently also houses one of the projects cameras where the Orchid specimens are digitised.

As expected from most dry plant collections (see Editorial in Orchid Research Newsletter 80), herbarium specimens generally become very brittle and fragile with time. Not surprisingly, a group with such baffling morphological diversity and intricate flowers as the orchids can produce some of the most delicate and logistically challenging specimens. Despite presenting morphologically simpler flowers, Apostasioideae tend to dry very dark and become very brittle. The specimens require delicate and careful handling and pose a particular challenge when trying to guarantee focus on such minute flowers.



Fig. 2. Specimen of *Paphiopedilum micranthum* showing how unconventional some specimens can be, consisting of a mail envelope with the collection data that holds inside photos of the living plant and a pressed flower. Photo RBG Kew

Despite the Cypripedioideae having very complex flowers, these tend to dry fairly well, producing some very charming specimens. These might require special attention regarding more than one specimen per sheet and/or additional notes, illustrations, photos, and fragment capsules (Fig. 2). As most of you are aware, Vanilloideae and Orchidoideae are not only taxonomically challenging but consistently produce some of the most awkward herbarium specimens in the family. These plants have the propensity to have well-developed underground organs, fleshy and sometimes delicate stems and leaves, and complex flowers with very delicate but taxonomically important lips and columns. For those reasons, the specimens in these groups are commonly accompanied by detailed annotations, complex illustrations, and sometimes several capsules with dissected and mounted floral cards.

We have just started digitising Epidendroideae, which have already presented well-known challenges like minute specimens and sometimes microscopic and very complex flowers for the Pleurothallidiinae. These micro-orchids have required our Digitisation Officers (DOs) to remain at the top of their games, checking the focus and framing of each specimen they photograph to ensure crisp and high-resolution images. A common scenario with orchid specimens is what we call multispecimen sheets, which are herbarium sheets that contain more than a single specimen and will require additional barcodes and images.

These multispecimen sheets can range from the common two specimens in a sheet originally collected as a single specimen to several specimens mounted together to save space, but also too many specimens on the same sheet. The last scenario can be perfectly illustrated by this herbarium sheet with 28 specimens mounted on it, each of them consisting of a single flower inside a fragment capsule (Fig. 3).

Behind the Scenes

In this section, I'll try to provide a bit more detail on the step-by-step digitisation process of the Orchid Herbarium. Because of the abovementioned peculiarities, among many others, we had to devise a specific workflow to digitise Kew's orchid specimens. A marking peculiarity of many Petaloid Monocot groups, including Orchidaceae, is that the flowers are very showy, complex, delicate and taxonomically important. Because of this unfortunate combination, taxonomists have traditionally relied heavily on floral dissections and flower cards in the taxonomy of these groups. Thus, flowers are very commonly removed from the specimen mounted on the actual sheets and safely stored inside envelopes/fragment capsules. This tradition results in many species requiring additional images to ensure that specimens can be virtually analysed. However, additional images mean extra steps and time during the digitisation process.

So, in April 2022, the Digi Team sat down with André Schuiteman to ensure we would try to have the best of both worlds, meeting deadlines and targets but ensuring the images were actually high-quality and useful to taxonomists and other researchers. During that meeting, we all agreed that in case a specimen did not present flowers or fruits on the sheet but a capsule was present, we would check the capsule and image its content. With that decided, we started working on our Orchid Workflow, which would serve as a blueprint for all our In-House Digitisation procedures.

How we do it

Our Orchid Workflow consists of step-by-step guidelines on locating, collecting, digitising and returning specimens to the Orchid Herbarium. We provide our DOs with a list of materials they need to carry with them, ranging from storage boxes to a transport trolley, paper tags, pencil, etc. The first steps consist of showing the DOs how to properly collect and annotate the specimens and boxes to ensure they will be correctly returned to their places. Together with the paper slips we place inside the cupboards, we also came up with a nifty colour-coded magnet system that we place on the cupboard doors, allowing us and any other herbarium users to know exactly the digitisation status of that cupboard and its specimens.



Fig. 3. Herbarium sheet of *Habenaria* with 30 fragment capsules, 28 of which had plant specimens inside. Photo RBG Kew

After specimens are removed from the collection and the necessary tagging and labelling have been done, they are placed in green storage boxes (visible in Fig. 1) so they can be safely transported to our Digi Suite. Once there, we start barcoding the specimens and collecting what we call minimal data, using an MS Access Hub designed by our team to meet our needs. This data consists of the filing information, i.e., the information used to file and store specimens in the collection. This consists basically of the current taxonomic ID, locality information (area codes and localities annotated on the folders), annotations found on both genus and species folders, and the barcode numbers of the specimens to be digitised. Additional data we collect consist of the date, name of the DO, project name, and box name (our transport boxes are labelled to facilitate tracking any issues).

After the specimens have been barcoded and databased, DOs move on to imaging them. The imaging is generally done using either a Leaf Aptus (with an 80mp resolution) or a Fuji GFX100s (with a 100mp resolution) camera. The camera rooms require a darker environment to allow us to have greater control of the lighting of the specimen and the one recorded in the final picture. Each barcode is imaged at least once, but some specimens might require additional images to be taken to depict capsule content, folded labels, illustrations, etc. Aside from that, multispecimen sheets will have their own requirements depending on how they were mounted. After the images have been taken, they are processed and converted from RAW to TIF files.



Fig. 4. One of our Digitisation Officers (DO) imaging specimens of *Cynorchis*. Photo Jeff Eden

The final step of our digitisation process consists of connecting the images' metadata to the minimal data we gathered during the first stage of this process. This is done using the same Access Hub we use to collect the minimal data. Once the Excel spreadsheet with the metadata is uploaded to our Hub, Access is able to use the barcodes to connect the images to the minimal data and the metadata. After that, the images are ready to be copied to the upload drive, which will ingest the images into Kew's virtual image repository. Once this step has been completed, the specimens are ready to be safely returned to their cupboards in the Orchid Herbarium. Then,

our DOs are ready to collect a new batch of specimens to be digitised.

Quality Control

After the DOs portion of the process is completed, the following step is under the responsibility of our Quality Control & Team Leader team, myself included. We carry out three distinct types of quality control (QA): 1) data and metadata QA; 2) image QA; and 3) physical QA and curation. The data and metadata QA is the most technical of all three, with us having to check and cross-check all the data included in our Access database to ensure there are no duplications, errors, or anything missing. The image QA has a technical aspect to it, with us having to check image parameters like RGB values, resolution, name format, etc. However, it also includes an interesting artistic aspect to it when we also need to assess more visual and artistic aspects of the image, such as composition (especially with specimens that require additional images). Finally, it also has a curational aspect, with us checking for signs of active pest and mold damage.

The third type of quality control we perform is called spot-checking, where we physically inspect the specimens in the herbarium to ensure they have been appropriately digitised, but also that they have been treated with the necessary care and returned to their correct place. In case issues arise in any of these quality checks, the DOs are alerted so the necessary actions can be taken and errors are corrected as soon as possible.

Fruits of labour

Despite having a still long way to go, we have been lucky enough to be able to share some of our achievements and accomplishments with the public. We have published some nice blogs ([Digital séance: Bringing the ‘ghost orchids’ to life](#), [From pods to puddings: Vanilla and other sweet-tasting orchids](#), [Valentine’s Day: the stories behind the flowers](#), and [The science behind the festival: orchids of Cameroon](#)) providing updates on our work on the orchids but also using them as an opportunity to explain to the general public the importance of our work and how amazing orchids are. Another excellent example of us making good use of the general public’s interest in orchids is the staggering success of our orchid DigiVol expeditions ([The Bee Orchids of Europe at the Kew Herbarium](#), [Fantastic Beast-Orchids](#) and [Where to Transcribe Them](#) & [From Pods to Puddings - The Vanilla Orchids at the Kew Herbarium](#)), which rely on volunteers to transcribe label data from the images we have produced so far.

We also have shared other blogs associated with the Digi Project, two focusing on Kew’s Fungarium ([Digitising Kew’s fungi collection](#) & [How a golf ball fooled scientists to become the world’s rarest fungus](#)) and many others providing different updates and perspectives from this monumental project ([Kew’s vast and unique collections move online](#) & [5 ways digitising Kew’s specimens can help save the world](#)). In case you have any inquiries or want to know more about the project, visit our [website](#) or contact us at DigitisationProject@kew.org.

Review

Karremans, A. P. 2023. *Demystifying Orchid Pollination: Stories of Sex, Lies and Obsession*. 440 pp. Kew Publishing, Royal Botanic Gardens, Kew. ISBN 9781842467848. Price £39.99.

I don't remember many occasions when the audience during a lecture at an orchid conference were laughing out loud. One of the few was when Ong Poh Teck showed a video of a *Bulbophyllum* being pollinated. We saw a fly landing on the red-purple lip and tiptoeing towards the interior of the flower, when suddenly the delicately balanced and pivoted lip, like a seesaw, gave way and pressed the startled fly against the column. If a fly could think, it would say to itself, "What was that", or words to that effect. It was pure slapstick. The world of orchid pollination is full of such amusing mechanisms. Do I need to mention the bucket orchids (*Coryanthes*) or the sexually deceptive bee orchids (*Ophrys*)? Even Darwin, who wrote the first book on orchid pollination, didn't guess the truth about *Ophrys* pollination.



We have learned a lot about orchid pollination since Darwin, and an accessible yet scientifically accurate and up-to-date book about this fascinating topic was long overdue. The Costa Rican botanist Adam Karremans, a well-known expert on neotropical orchids, especially Pleurothallidinae, has stepped in and filled this gap. With its frequent references to popular culture (most chapters bear the titles of pop songs), Karremans has certainly tried to make the subject appealing to a broader audience. However, this is much more than an account of the greatest hits. There is, of course, the story of Darwin's prediction of the long-tongued moth that pollinates *Angraecum sesquipedale*, but there are also many references to recent studies that may be unknown to those who do not follow the pollination literature closely. As a result, even most orchid experts will find something new in this book.

It is perhaps inevitable, given how little we still know about the pollination of, especially, tropical epiphytic orchids, that the book is organised like a collection of anecdotes, without an overarching theoretical framework. Had this book been written for an audience of scientists, I suspect that pollination syndromes or the taxonomy of the pollinators would have been used to make a more systematic narrative. However, that could have made the book less appealing to the general reader, who must be kept entertained on every page.

The book is well written, striking a good balance between scientific accuracy and readability, and, what's crucially important, it is very well illustrated. There are even QR codes to YouTube videos throughout. This is almost as good as having a digital book with links to multimedia.

If I am forced to find something to criticize, I would say that it would have been nice if the author had emphasized the huge gaps in our knowledge a bit more (check the index and see how many well-known genera aren't listed). Maybe a chapter "What pollinates this?" would have been nice. This is a field where amateur and professional naturalists in the countries of origin can still make original contributions. I hope and expect that this excellent book will stimulate more of these.

André Schuiteman

Recent Orchid Nomenclature

New orchid names may be retrieved from the revamped IPNI website: <https://www.ipni.org/>. Click on “Advanced search”; after the search page appears, type in **Orchidaceae** under family name and select a date in “Recorded after”. This will pull up a list of all orchid names added to the IPNI database since that date. Also be sure to check the Plants of the World Online website (<https://powo.science.kew.org/>) which provides similar information with added maps and illustrations.

Recent Literature

If you are aware of any relevant and recent citations that should have been listed here or in the previous issues, please send them to the editor for publication in the next issue (January 2024). Book citations should include author(s), year of publication, title, publisher, and place of publication (in that order). Journal titles should be spelled out in full.

Anatomy and morphology

Apriliani, P. and Pharmawati, M. 2023. Keragaman beberapa koleksi anggrek di Kebun Raya Eka Karya Bali berdasarkan karakter morfologi dan stomata. *Floribunda* 7(2): 85–91 (<https://doi.org/10.32556/floribunda.v7i2.2023.412>).

Arditti, J. 2022. Resupination. Early illustrations and descriptions and possible functions. *Orchids, the Bulletin of the American Orchid Society* 91(11): 848–853.

Casique, J. V., Soares, M. V. B., Da Silva, E. F., Kikuchi, T. Y., Andrade, E. H. D. A., and Mastroberti, A. A. 2022. *Coryanthes macrantha* (Orchidaceae: Stanhopeinae) and their floral and extrafloral secretory structures: an anatomical and phytochemical approach. *AoB PLANTS* 14(5): art. plac039 (<https://doi.org/10.1093/aobpla/plac039>).

Collier, M. H., Fisher, J. S., Gribbins, K. M., Yoder, J. A., and Zettler, L. W. 2023. Differences in seed morphometrics of representative orchids native to North America and Hawaii using scanning electron microscopy. *South African Journal of Botany* 152: 222–229 (<https://doi.org/10.1016/j.sajb.2022.11.049>).

Giraldo, G. and Cameron, K. M. 2021. *Vanilla* as a “model system” in orchid biology: Leaf venation and eco-physiology among Vanilloid orchids. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 393–397. Taiwan Orchid Growers Association, Tainan City.

Giri, T. K., Beura, S., Jagadev, P. N., and Palai, S. K. 2022. *Eulophia graminea* Lindl.: a report of keikis on its leaves. *Journal of the Orchid Society of India* 36: 91–94.

Jaryal, P. and Pathak, P. 2021. Morphological variations amongst populations of *Dactylorhiza hatagirea* D. Don Soó[sic] in northwestern Himalayas of India. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 267–272. Taiwan Orchid Growers Association, Tainan City.

Kolomeitseva, G., Koval, V., and Ryabchenko, A. 2023. The structural–rhythmological organization of *Coelogyne* (Orchidaceae Juss.) inflorescences. *International Journal of Plant Biology* 14(1): 286–298 (<https://doi.org/10.3390/ijpb14010024>).

Mallikarjuna, B. P., Alam, B. K., Pal, R., and Ngangom, N. M. 2022. Identification and characterization of long-stalked *Paphiopedilum insigne* (Wall. ex Lindl.) Pfitzer from Sikkim Himalaya, India. *Journal of the Orchid Society of India* 36: 45–50.

Ortúñez, E. and Gamarra, R. 2023. Seed morphology, life form and distribution in three *Bromheadia* species (Epidendroideae, Orchidaceae). *Diversity* 15(2): art. 195 (<https://doi.org/10.3390/d15020195>).

Schvambach, M. I., dos Santos, C. M. R., de Souza, P. F., Cabral, N. N., Suzuki, R. M., and Pescador, R. 2022. Anatomical and histochemical characterization of seeds of *Cattleya intermedia* subjected to different storage conditions. *Rodriguesia* 73: art. e01632021 (<https://doi.org/10.1590/2175-7860202273111>).

Yeung, E. C. and Lee, Y.-I. 2021. The absence of endosperm formation in orchid seeds—Possible causes and consequences. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 277–282. Taiwan Orchid Growers Association, Tainan City.

Bioinformatics

Hu, W. C., Huang, G. Z., Huang, X. R., Wang, W. C., and Chen, L. B. 2022. A self-supervised learning-based computer recognition platform for Orchidaceae classification. *GCCE 2022–2022 IEEE 11th Global Conference on Consumer Electronics*: 553–554 (<https://doi.org/10.1109/GCCE56475.2022.10014369>).

Ismayanti, R., Alameka, F., Mirwansyah, D., Sari, N. W. W., Rahim, A., and Riyayatsyah. (2022). Identification of pests on black orchid plants using naïve Bayes method based on leaf image texture. *International Conference of Science and Information Technology in Smart Administration, ICSINTESA 2022*: 167–172.

Tao, L.-D. and Sun, W.-B. 2023. Applying image clustering to phylogenetic analysis: A trial. *Plant Diversity* 45(2): 234–237 (<https://doi.org/10.1016/j.pld.2022.11.001>) [Corybas].

Tomar, A., Pal, R., and Kalaivanan, N. S. 2022. Orchid man—an Android based digital field book for orchid explorers. *Journal of the Orchid Society of India* 36: 35–39.

Tomar, A., Pamarthi, R. K., Pal, R., De, L. C., Biswas, S. S., and Singh, D. R. 2022. Orchidopedia app—A tool for exploration and collection of orchid species. *Indian Journal of Plant Genetic Resources* 35(1): 73–79 (<https://doi.org/10.5958/0976-1926.2022.00011.0>).

Books

Backhouse, G. N. 2023. *Guide to Native Orchids of Victoria*. CSIRO Publishing, Clayton.

Djordjević, V. 2022. *Orhideje Nacionalnog parka Tara [Orchids of the Tara National Park]*. PE Tara National Park, Serbia [in Serbian].

Hermans, J. and Cribb, P. J. 2023. *Flore des Mascareignes—La Réunion, Maurice, Rodrigues. 170. Orchidées*. 2 vols. IRD Éditions, Marseille [in French].

Karremans, A. P. 2023. *Demystifying Orchid Pollination: Stories of Sex, Lies and Obsession*. Royal Botanic Gardens, Kew (see [review](#)).

Pridgeon, A. M. and Arosemena R., A. 2019. *22nd World Orchid Conference, Guayaquil, Ecuador, 8–12 November 2017. Conference Proceedings*. 2 vols. Asociación Ecuatoriana de Orquideología, Ecuador.

Szlachetko, D. L., Kolanowska, M., and Olędrzyńska, N. 2022. *Diversity and Taxonomy of Telipogon (Orchidaceae) in Colombia and Adjacent Areas*. Monographiae Botanicae 109. Polish Botanical Society, Wrocław (open access e-book: <https://pbsociety.org.pl/journals/index.php/mb/article/view/978-83-963503-5-0/8416>).

Ulloa Ulloa, C., Dressler, R. L., Arbeláez Álvarez, A. L., Bilborrow, T., Gómez-Hinostrosa, C., Zaldívar, A., and Bain, J. H. (eds.) 2023. *Flora mesoamericana. Volumen 7, Parte 2, Orchidaceae*. Universidad Nacional Autónoma de México, México D.F., Missouri Botanical Garden Press, St. Louis, and Natural History Museum, London [in Spanish].

Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.) 2021. *Proceedings of the 2021 Virtual World Orchid Conference*. Taiwan Orchid Growers Association, Tainan City.

Conservation

Bashyal, R., Paudel, K., Hinsley, A., and Phelps, J. 2023. Making sense of domestic wildlife and CITES legislation: The example of Nepal's orchids. *Biological Conservation* 280: art. 109951 (<https://doi.org/10.1016/j.biocon.2023.109951>).

Benavides, A. M., Calderón-Caro, J., and Canal, D. 2023. Surviving in a new host: Eight years of monitoring translocated aroids, bromeliads, and orchids in the Andean forests in Colombia. *Frontiers in Forests and Global Change* 6: art. 834669 (<https://doi.org/10.3389/ffgc.2023.834669>).

Bijaya Pant, B. B. T., Krishna Chand, Laxmi Sen Thakuri, Manju Kanu Baniya. 2021. Ex situ conservation of *Bulbophyllum leopardinum*, a threatened medicinal orchid of Nepal. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 434–439. Taiwan Orchid Growers Association, Tainan City.

Coffey, E. E. D., Uzzell, L., Ligon, J., and Eserman, L. 2021. Safeguarding imperiled orchid species in the Southeastern United States and Caribbean. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 58–61. Taiwan Orchid Growers Association, Tainan City.

de Palmieri, S. 2021. Project for reintroduction of *Guarianthe aurantiaca* and conservation of orchid species at the municipal park of Puente La Asunción in Guatemala City. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 475–477. Taiwan Orchid Growers Association, Tainan City.

Downing, J. L., Padolf, A., and Lewis, C. E. 2021. The Million Orchid project—A non-traditional approach to orchid conservation. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 53–57. Taiwan Orchid Growers Association, Tainan City.

Espejo-Cruz, A. D. C., Espejo-Martínez, A., Chávez-Ángeles, M. G., Lagunez-Rivera, L., and Solano, R. 2023. Deficiencies in compliance with environmental regulation for orchid trade via social networks in Mexico. *Botanical Sciences* 101(2): 400–416 (<https://doi.org/10.17129/botsci.3159>).

Faruk, A., Papikyan, A., and Nersesyan, A. 2021. Exploring effective conservation of charismatic flora: Orchids in Armenia as a case study. *Diversity* 13: 624 (<https://doi.org/10.3390/d13120624>).

Fekete, R., Vincze, O., Süveges, K., Bak, H., Malkócs, T., Löki, V., Urgyán, R., and Molnár V, A. 2023. The role of olive groves in the conservation of Mediterranean orchids. *Global Ecology and Conservation* 44: art. e02490 (<https://doi.org/10.1016/j.gecco.2023.e02490>).

Franceschy, R. C., Menchaca, G. R., Moreno, M. D., Barreda, C. J. M., Morales, R. V., Cano, A. L., Silva, R. E., Velázquez, R. N., and Sánchez, S. O. 2021. Propagation and reintroduction of *Trichocentrum stramineum* in Chavarrillo, Veracruz, Mexico, one threatened and endemic orchid. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 466–469. Taiwan Orchid Growers Association, Tainan City.

Gao, J., Fan, X., and Yang, W. 2020. Reintroduction and assisted colonization of *Paphiopedilum spicerianum*: An orchid with extremely small populations in China. In: Ren, H. (eds.), *Conservation and Reintroduction of Rare and Endangered Plants in China*. Springer, Singapore, pp. 199–204. (https://doi.org/10.1007/978-981-15-5301-1_18).

Gee, G. Y. 2021. The Orchid Conservation Alliance. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 131–135. Taiwan Orchid Growers Association, Tainan City.

Gee, G. Y. 2021. *Dendrobium*—Is it in danger of extinction? In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 238–243. Taiwan Orchid Growers Association, Tainan City. [TCM].

Go, R., Besi, E. E., Dahalan, M. P., Ahmad, R., Ahmadni, A. S. A., and Pungga, R. S. 2021. Orchid threat and conservation initiatives in Malaysia. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 104–109. Taiwan Orchid Growers Association, Tainan City.

González-Orellana, N., Salazar-Mendoza, A., Numan, Y., and Ackerman, J. D. 2022. Understanding orchid conservation. One species at a time. *Orchids, the Bulletin of the American Orchid Society* 91(12): 914–919 [*Psychilis kraenzlinii*].

Hartmann, L. J. and Metz, J. 2023. Long-term data indicates positive effects of habitat size and ambiguous climate effects on population growth of the endangered wetland orchid *Dactylorhiza majalis*. *Global Ecology and Conservation* 44: art. e02483 (<https://doi.org/10.1016/j.gecco.2023.e02483>).

Haskell, J. B. 2021. The orchid collection of Dr. Cecilia Koo Botanic Conservation Center and goals for the future. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 100–103. Taiwan Orchid Growers Association, Tainan City. [Taiwan].

Hsu, R. C.-C. 2021. An effort for asymbiotic seed germination, seedling development and reintroduction of *Pleione formosana* Hayata.[sic], an endangered epiphytic orchid. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 431–433. Taiwan Orchid Growers Association, Tainan City.

Kasinja, T. and Pugh-Jones, S. 2021. Project Seedling—Global school Orchid Projects—Working with *Aerangis verdickii* in Rwanda. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 482–484. Taiwan Orchid Growers Association, Tainan City.

Köhler, M., Schmidt, A., Hölzel, N., Baasch, A., and Tischew, S. 2023. Positive long-term effects of year-round horse grazing in orchid-rich dry calcareous grasslands—Results of a 12-year study. *Frontiers in Ecology and Evolution* 11: art. 1107987 (<https://doi.org/10.3389/fevo.2023.1107987>).

Koju, L., Shrestha, N., Raskoti, B. B., Ale, R., Ghimire, N. P., and Shrestha, S. 2023. Spatial patterns, underlying drivers and conservation priorities of orchids in the central Himalaya. *Biological Conservation* 283: art. 110121 (<https://doi.org/10.1016/j.biocon.2023.110121>).

Kumar, S., Devi, R. S., Choudhury, R., Mahapatra, M., Biswal, S. K., Kaur, N., Tudu, J., and Rath, S. K. 2022. Orchid diversity, conservation, and sustainability in northeastern India. In: Furze, J. N., Eslamian, S., Raafat, S.M. and Swing, K. (eds.), *Earth Systems Protection and Sustainability*. Springer, Cham, vol. 1: 111–139. (https://doi.org/10.1007/978-3-030-85829-2_5).

Ligon, J. 2021. Long-term restoration efforts for *Tolumnia bahamensis*, a critically imperiled coastal scrub orchid. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 440–443. Taiwan Orchid Growers Association, Tainan City.

Lwin, S. 2021. Income generated and conservation oriented orchid growing of Pansit village, Myanmar. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 125–126. Taiwan Orchid Growers Association, Tainan City.

Mirenda, T. and Flanagan, N. 2021. The Orchid Garden Conservation Network (OGCN): Building bridges between in situ and ex situ conservation. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 110–113. Taiwan Orchid Growers Association, Tainan City.

Mo, M., Wilson, A., McGowan, A., Demers, M. C. A., and Steenbeeke, G. L. 2023. Orchids with scarce occurrence records: The case of the endangered Botany Bay Bearded Greenhood. *Ecological Management and Restoration* 24(1): 56–61 (<https://doi.org/10.1111/emr.12575>) [*Pterostylis*].

Munawaroh, E., Isnaini, Y., and Purwanto, Y. 2023. Diversity of orchid species in Liwa Botanic Gardens and their utilization by the community. *AIP Conference Proceedings* 2606: art. 050004 (<https://doi.org/10.1063/5.0119074>) [Sumatra].

Mutum, R. D., Chanu, N. M., Khangnaba, T. N., and Thongam, B. 2022. Propagation and conservation of selected orchids of Manipur. *Journal of the Orchid Society of India* 36: 95–101.

Panday, S., Agrawala, D. K., Aazhivaendhan, G., and Roy, R. 2022. Threat status assessment of *Chiloschista usneoides* (D. Don) Lindl. (Orchidaceae) as per IUCN criteria. *Nelumbo* 64(2): 285–289 (<https://doi.org/10.20324/nelumbo/v64/2022/172596>).

Pant, B., Paudel, M. R., Shah, S., Joshi, P. R., Chand, K., Thapa, B. B., Rajbahak, S., and Thakuri, L. S. 2021. Conservation and utilization of medicinal orchids through research and outreach program. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 78–83. Taiwan Orchid Growers Association, Tainan City.

Rahayu, E. M. D. 2021. Review of the conservation efforts of orchid species in Bogor Botanic Gardens. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 168–173. Taiwan Orchid Growers Association, Tainan City.

Rahma, M. 2021. Enhancement of the seriously depleted populations of some Critically Endangered and Endangered wild orchid species in their natural habitats in Bangladesh. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 448–453. Taiwan Orchid Growers Association, Tainan City.

Reiter, N. 2021. Ecology informing orchid conservation translocations. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 114–119. Taiwan Orchid Growers Association, Tainan City. [*Caladenia*].

Rolland, R. 2022. Pour une (meilleure) prise en compte des enjeux “Biodiversité” dans les travaux liés aux incendies en zone méditerranéenne. *l’Orchidophile* 53(235): 299–309.

Rose-Smyth, M. C. 2021. Out of flask, outcrossed, and out of danger: ensuring the survival of *Dendrophylax fawcettii*, Grand Cayman’s endemic ghost orchid. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 470–474. Taiwan Orchid Growers Association, Tainan City.

Seaton, P. T. 2021. Orchid conservation: Responding to the challenge. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 90–94. Taiwan Orchid Growers Association, Tainan City. [*Oncidium alexandrae*].

Sprunger, S. and De Jong, C. 2023. The reintroduction project of *Cypripedium calceolus* in Switzerland. *Curtis's Botanical Magazine* 40(1): 129–145 (<https://doi.org/10.1111/curt.12498>).

Suyundukov, I. V. and Kildiyarova, G. N. 2023. Distribution of orchids in the upper basin of the Ural River and questions of nature conservation. *South of Russia: Ecology, Development* 18(1): 54–61 (<https://doi.org/10.18470/1992-1098-2023-1-54-61>).

Thammasiri, K. 2022. Conservation of some endangered Thai orchid species using cryopreservation methods. *Journal of the Orchid Society of India* 36: 51–58.

Torres, G. T., Ospina-Calderón, N. H., Hernández-Delgadillo, G. A., Mosquera-Espinosa, A. T., and Flanagan, N. S. 2021. An integrated conservation strategy for the *Cattleya quadricolor* Lindl., an endemic species in Colombia. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 460–465. Taiwan Orchid Growers Association, Tainan City.

Vitt, P., Taylor, A., Rakosy, D., Kreft, H., Meyer, A., Weigelt, P., and Knight, T. M. 2023. Global conservation prioritization for the Orchidaceae. *Scientific Reports* 13(1): art. 6718 (<https://doi.org/10.1038/s41598-023-30177-y>).

Wang, K. P. and Wang, I. 2021. *Hispaniella henekenii*: A bee lost its way to prosper. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 478–479. Taiwan Orchid Growers Association, Tainan City.

Wang, K. P. and Wang, I. 2021. *Dendrophylax sallei*: A ghost orchid or leaping frog? In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 480–481. Taiwan Orchid Growers Association, Tainan City.

Yam, T. W., Ang, P., and Tay, F. 2021. Conservation of a critically endangered native orchid species of Singapore: *Acriopsis ridleyi*. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 421–425. Taiwan Orchid Growers Association, Tainan City.

Yam, T. W., Ang, P., and Tay, F. 2021. Conservation of a critically endangered native orchid species of Singapore: *Polystachya concreta*. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 426–430. Taiwan Orchid Growers Association, Tainan City.

Yamashita, Y., Satoh, N., Kurosawa, T., Kaneko, S., and Yukawa, T. 2021. Clonal structure of the largest wild and ex situ conserved populations of *Cypripedium japonicum* Thunb. (Orchidaceae) in Japan. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 136–137. Taiwan Orchid Growers Association, Tainan City.

Yang, X., Gu, W., Zhang, S., Xing, M., Qu, X., and Luo, J. 2023. Study on endangered degree and priority conservation sequence of orchids in the lower reaches of Yarlung Zangbo River. *Bulletin of Botanical Research* 43(2): 169–178 (<https://doi.org/10.7525/j.issn.1673-5102.2023.02.002>) [Tibet].

Zettler, L. W., Herdman, A. R., Mújica, E. B., González, E. H., Kane, M. E., Vergara, A. C., and Danaher, M. W. 2021. Conserving the Ghost Orchid (*Dendrophylax lindenii*) of Florida and Cuba: How close are we? In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 256–261. Taiwan Orchid Growers Association, Tainan City.

Zhang, Q., Wang, H. C., Cheng, Z., Wang, M. N., Li, L. Q., and Long, C. L. 2022. Current status of wild orchid resources in China, focusing on their conservation and utilization. *China Biotechnology* 42(11): 59–72 (<https://doi.org/10.13523/j.cb.2209047>).

Cytogenetics/Horticultural genetics

Hartati, S., Samanhudi, Cahyono, O., Wibowo, A., and Herviana, A. 2023. The chromosome of *Phalaenopsis* spp. and *Doritaenopsis* sp. hybrid induced by colchicine. *IOP Conference Series: Earth and Environmental Science* 1133: art. 012064 (<https://doi.org/10.1088/1755-1315/1133/1/012064>).

Hartati, S., Samanhudi, Cahyono, O., Wibowo, A., Muliawati, E. S., and Andarrini, A. A. 2023. Morphology of hybrid orchid induced by polyploidy using colchicine. *IOP Conference Series: Earth and Environmental Science* 1133: art. 012065 (<https://doi.org/10.1088/1755-1315/1133/1/012065>).

Liu, Y., Duan, S. D., Jia, Y., Hao, L. H., Xiang, D. Y., Chen, D. F., and Niu, S. C. 2023. Polyploid induction and karyotype analysis of *Dendrobium officinale*. *Horticulturae* 9(3): art. 329 (<https://doi.org/10.3390/horticulturae9030329>).

Muliawati, E. S., Hartati, S., Parjanto, P., Sukaya, S., Nandariyah, N., Yuniastuti, E., Manurung, I. R., and Purmiyoto, C. W. W. 2023. Karyotype of *Phaius tankervilleae* and *Phaius amboinensis* orchid. *E3S Web of Conferences* 373: art. 03029 (<https://doi.org/10.1051/e3sconf/202337303029>).

Taratima, W., Rohmah, K. N., Plaikhuntod, K., Maneerattananarungroj, P., and Trunjaruen, A. 2023. Optimal protocol for in vitro polyploid induction of *Cymbidium aloifolium* (L.) Sw. *BMC Plant Biology* 23(1): art. 295 (<https://doi.org/10.1186/s12870-023-04314-8>).

Vilcherrez-Atoche, J. A., Silva, J. C., Clarindo, W. R., Mondin, M., and Cardoso, J. C. 2023. In vitro polyploidization of *Brassolaeliocattleya* hybrid orchid. *Plants* 12(2): art. 281 (<https://doi.org/10.3390/plants12020281>).

Ecology

Ackerman, J. D. 2021. Orchids on the move: Go forth & proliferate! In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 262–266. Taiwan Orchid Growers Association, Tainan City. [invasive orchid species].

- Ai, Y. Y., Liu, Q., Hu, H. X., Shen, T., Mo, Y. X., Wu, X. F., Li, J. L., Dossa, G. G. O., and Song, L. 2023. Terrestrial and epiphytic orchids exhibit different diversity and distribution patterns along an elevation gradient of Mt. Victoria, Myanmar. *Global Ecology and Conservation* 42: art. e02408 (<https://doi.org/10.1016/j.gecco.2023.e02408>).
- Besi, E. E., Mustafa, M., Yong, C. S. Y., and Go, R. 2023. Habitat ecology, structure influence diversity, and host-species associations of wild orchids in undisturbed and disturbed forests in Peninsular Malaysia. *Forests* 14(3): art. 544 (<https://doi.org/10.3390/f14030544>).
- Borrero, H., Oviedo-Prieto, R., Alvarez, J. C., Ticktin, T., Cisneros, M., and Liu, H. 2023. Populations of a tropical epiphytic orchid are destabilized in its peripheral range by hurricane and an exotic herbivore. *Ecosphere* 14(1): (<https://doi.org/10.1002/ecs2.4355>) [*Trichocentrum undulatum*].
- Chandra, N., Singh, G., Rai, I. D., Mishra, A. P., Kazmi, M. Y., Pandey, A., Jalal, J. S., Costache, R., Almohamad, H., Al-Mutiry, M., and Abdo, H. G. 2023. Predicting distribution and range dynamics of three threatened *Cypripedium* species under climate change scenario in Western Himalaya. *Forests* 14(3): art. 633 (<https://doi.org/10.3390/f14030633>).
- Crain, B. J., Sánchez-Cuervo, A. M., and Deren, V. 2023. Mixed evidence of a commensal relationship between a rare epiphytic orchid and cohabiting bryophytes. *Botanical Journal of the Linnean Society* 201(4): 498–509 (<https://doi.org/10.1093/botlinnean/boac049>) [*Lepanthes caritensis*].
- de Mattos, J. S., Pinheiro, F., Luize, B. G., Chaves, C. J. N., de Lima, T. M., Palma da Silva, C., and Leal, B. S. S. 2023. The relative role of climate and biotic interactions in shaping the range limits of a neotropical orchid. *Journal of Biogeography* 50(7): 1315–1328 (<https://doi.org/10.1111/jbi.14629>) [*Epidendrum fulgens*].
- Decruse, S. W. 2023. Ecological niche modeling to find potential habitats of *Vanda thwaitesii*, a notified endangered orchid of Western Ghats, India. *Journal of Threatened Taxa* 15(3): 22874–22882 (<https://doi.org/10.11609/jott.7814.15.3.22874-22882>).
- Fibeck, W. and Phiri, V. 2022. Ökologische Betrachtungen zur simbabwischen Orchideenflora. Teil 11: Dambos und ihre Orchideenflora. *Die Orchidee* 73(6): 454–461.
- Jacquemyn, H., Pankhurst, T., Jones, P. S., Brys, R., and Hutchings, M. J. 2023. Biological Flora of Britain and Ireland: *Liparis loeselii*: No. 304. *Journal of Ecology* 111(4): 943–966 (<https://doi.org/10.1111/1365-2745.14086>).
- Jakovljević, K., Mišljenović, T., Djordjević, V., van der Ent, A., Ćosić, M., Andrejić, G., and Šinžar-Sekulić, J. 2023. Elemental and ecophysiological profiles of orchid *Dactylorhiza sambucina* show distinct responses to contrasting geological substrates. *Flora: Morphology, Distribution, Functional Ecology of Plants* 303: art. 152276 (<https://doi.org/10.1016/j.flora.2023.152276>).
- Khapugin, A. A. and Chugunov, G. G. 2022. Habitat preferences of orchids in the Republic of Mordovia (European Russia): insights from (un)published floristic data. *Wulfenia* 29: 94–102.

Kirillova, I. A., Dubrovskiy, Y. A., Degteva, S. V., and Novakovskiy, A. B. 2023. Ecological and habitat ranges of orchids in the northernmost regions of their distribution areas: A case study from Ural Mountains, Russia. *Plant Diversity* 45(2): 211–218 (<https://doi.org/10.1016/j.pld.2022.08.005>).

Kolanowska, M. 2023. Loss of fungal symbionts and changes in pollinator availability caused by climate change will affect the distribution and survival chances of myco-heterotrophic orchid species. *Scientific Reports* 13(1): art. 6848 (<https://doi.org/10.1038/s41598-023-33856-y>).

Kolanowska, M. and Michalska, E. 2023. The effect of global warming on the Australian endemic orchid *Cryptostylis leptochila* and its pollinator. *PLoS ONE* 18(1 January): art. e0280922 (<https://doi.org/10.1371/journal.pone.0280922>).

Kolanowska, M., Nowak, S., and Rewicz, A. 2022. Will Greenland be the last refuge for the continental European small-white orchid? Niche modeling of future distribution of *Pseudorchis albida*. *Frontiers in Environmental Science* 10: art. 912428 (<https://doi.org/10.3389/fenvs.2022.912428>).

Křenová, Z., Lustyk, P., Kindlmann, P., and Vosmíková, A. 2023. Forest disturbances threatening *Cypripedium calceolus* populations can improve its habitat conditions. *Diversity* 15(3): art. 319 (<https://doi.org/10.3390/d15030319>).

Ospina-Calderón, N. H., Tremblay, R. L., Torres, A. M., and Flanagan, N. S. 2023. The effect of habitat transformation on a twig epiphytic orchid: Evidence from population dynamics. *Frontiers in Ecology and Evolution* 11: art. 1135316 (<https://doi.org/10.3389/fevo.2023.1135316>).

Pieterse, C., Thomas, B., Everham III, E. M., Bovard, B., and Owen, M. 2023. Potential drivers of spatial distribution of the ghost orchid, *Dendrophylax lindenii*, in a South Florida cypress strand: a preliminary study. *Lankesteriana* 23(1): 81–90 (<https://doi.org/10.15517/lank.v23i1.54576>).

Potapohn, N., Vasupen, E., and Pintajam, P. 2021. Growth cycle of some *Eulophia* in Thailand. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 142–145. Taiwan Orchid Growers Association, Tainan City.

Rongier, A. 2022. *Goodyera repens*, staphylins et biodiversité en forêt du Haut-Giffre (Haute-Savoie, France). *l'Orchidophile* 53(234): 263–270.

Sharma, M. K., Ram, B., and Chawla, A. 2023. Ensemble modelling under multiple climate change scenarios predicts reduction in highly suitable range of habitats of *Dactylorhiza hatagirea* (D. Don) Soo in Himachal Pradesh, western Himalaya. *South African Journal of Botany* 154: 203–218 (<https://doi.org/10.1016/j.sajb.2022.12.026>).

Sourabh, P. and Uniya, P. L. 2022. Predicting potential habitat distribution of *Habenaria longicorniculata* J. Graham in Western Ghats, India. *Journal of the Orchid Society of India* 36: 107–112.

Tsiftsis, S. and Kindlmann, P. 2023. Advances in orchid research in East Macedonia (NE Greece) and the importance of current data in furthering our understanding of the orchids' altitudinal requirements. *Journal for Nature Conservation* 72: art. 126346 (<https://doi.org/10.1016/j.jnc.2023.126346>).

Yam, T. W., Arditti, J., and Anghelescu, N. 2022. Predators in orchids. *Orchids, the Bulletin of the American Orchid Society* 91(12): 920–933.

Zheleznaia, E. and Pushay, E. 2021. The art of orchid adaptations in a changing environment. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 95–99. Taiwan Orchid Growers Association, Tainan City. [Russia].

Ethnobotany/(Ethno)pharmacology

Arslan, A., Sagdic, O., Karasu, S., and Tekin-Cakmak, Z. H. 2023. The effect of the use of salep powder obtained from different wild orchid species in Turkey on the rheological, thermal, and sensory properties of ice cream. *Food Science and Technology (Brazil)* 43: art. e103822 (<https://doi.org/10.1590/fst.103822>).

Bazzicalupo, M., Calevo, J., Smeriglio, A., and Cornara, L. 2023. Traditional, therapeutic uses and phytochemistry of terrestrial European orchids and implications for conservation. *Plants* 12(2): art. 257 (<https://doi.org/10.3390/plants12020257>).

Bhattacharyya, P., Kumar, S., Lalthafamkimi, L., Sharma, R., Kumar, D., Singh, D., and Kumar, S. 2023. Molecular and phytomedicinal stability of long term micropropagated *Malaxis acuminata*: An endangered terrestrial orchid of biopharmaceutical importance. *South African Journal of Botany* 155: 372–382 (<https://doi.org/10.1016/j.sajb.2023.01.051>).

Buacheen, P., Chaipuang, A., Karinchai, J., Nuchuchua, O., Imsumran, A., Wongnoppavich, A., Pimpha, N., and Pitchakarn, P. 2023. Stabilization of antioxidant and anti-inflammatory activities of nano-selenium using *Anoectochilus burmannicus* extract as a potential novel functional ingredient. *Nutrients* 15(4): art. 1018 (<https://doi.org/10.3390/nu15041018>).

Buacheen, P., Karinchai, J., Kammasit, N., Temviriyankul, P., Butkinaree, C., Watthana, S., Wongnoppavich, A., Imsumran, A., and Pitchakarn, P. 2023. Protective effect of *Anoectochilus burmannicus* extracts and its active compound, kinsenoside on adipocyte differentiation induced by benzyl butyl phthalate and bisphenol A. *Scientific Reports* 13(1): art. 2939 (<https://doi.org/10.1038/s41598-023-30227-5>).

Cazar, M. E., Abad, D. H., Idrovo, A. M., and Barrera, D. A. 2023. Assessment of antioxidant activities of *Epidendrum secundum* Jacq, a terrestrial orchid from southern Ecuadorian highlands. *South African Journal of Botany* 154: 380–386 (<https://doi.org/10.1016/j.sajb.2023.01.050>).

Cheun-Aro, T. and Sritularak, B. 2023. In vitro antidiabetic and advanced glycation end products inhibitory activity of methanol extracts of various *Dendrobium* species. *Journal of Applied Pharmaceutical Science* 13(6): 100–107 (<https://doi.org/10.7324/JAPS.2023.75102>).

Ertürk, O., Ayvaz, M. C., Cil, E., and Bagdatlı, E. 2023. Gas chromatography-mass spectrometry analysis and antimicrobial and antioxidant activities of some orchid (Orchidaceae) species growing in Turkey. *Brazilian Archives of Biology and Technology* 66: art. e23210265 (<https://doi.org/10.1590/1678-4324-2023210265>).

Han, X., Song, Z., Liu, J., Zhang, Y., Wu, M., and Liu, H. 2023. Effects of different drying methods on the quality of *Bletilla striata* scented tea. *Molecules* 28(6): art. 2438 (<https://doi.org/10.3390/molecules28062438>).

Joshi, P. R., Paudel, M. R., Chand, M. B., Pradhan, S., Pant, K. K., Joshi, G. P., Bohara, M., Wagner, S. H., Pant, B., and Pant, B. 2021. Screening of the in vitro cytotoxic effect of selected wild orchids of Nepal. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 444–447. Taiwan Orchid Growers Association, Tainan City.

Lipińska, M. M., Haliński, Ł. P., Gołębiowski, M., and Kowalkowska, A. K. 2023. Active compounds with medicinal potential found in Maxillariinae Benth. (Orchidaceae Juss.) representatives—A review. *International Journal of Molecular Sciences* 24(1): art. 739 (<https://doi.org/10.3390/ijms24010739>).

Luo, Z., Liu, L., Nie, Q., Huang, M., Luo, C., Sun, Y., Ma, Y., Yu, J., and Du, F. 2023. HPLC-based metabolomics of *Dendrobium officinale* revealing its antioxidant ability. *Frontiers in Plant Science* 14: art. 1060242 (<https://doi.org/10.3389/fpls.2023.1060242>).

Misra, A., Chaudhary, M. K., Tripathi, D., Srivastava, P. K., Gupta, V., Acharya, R., and Srivastava, S. 2023. Nutritional potential of an edible terrestrial orchid *Eulophia nuda* LINDL[sic] and validation of its traditional claim in arthritis. *Journal of Ethnopharmacology* 306: art. 116123 (<https://doi.org/10.1016/j.jep.2022.116123>).

Panuthai, P., Phumsuay, R., Muangnoi, C., Maitreesophon, P., Kongkatitham, V., Mekboonsonglarp, W., Rojsitthisak, P., Likhitwitayawuid, K., and Sritularak, B. 2023. Isolation and identification of dihydrophenanthrene derivatives from *Dendrobium virgineum* with protective effects against hydrogen-peroxide-induced oxidative stress of human retinal pigment epithelium ARPE-19 cells. *Antioxidants* 12(3): art. 624 (<https://doi.org/10.3390/antiox12030624>).

Paraste, V. K., Sarsaiya, S., Mishra, U. C., and Sourabh, P. 2023. A comprehensive review on global research trends on *Aerides* genus with reference to *Aerides odorata* species. *Journal of Applied Biology and Biotechnology* 11(2): 55–62 (<https://doi.org/10.7324/JABB.2023.110205>).

Paul, T., Chowdhury, B., Bhowmik, T. K., and Rahman, M. M. 2022. Antioxidant and anti-inflammatory activities of in vivo grown plants and in vitro raised plantlets in *Dendrobium crepidatum* Lindl. & Paxt. of Bangladesh. *Journal of the Orchid Society of India* 36: 29–33.

Peña-Barrientos, A., Perea-Flores, M. D. J., Martínez-Gutiérrez, H., Patrón-Soberano, O. A., González-Jiménez, F. E., Vega-Cuellar, M. Á., and Dávila-Ortiz, G. 2023. Physicochemical, microbiological, and structural relationship of vanilla beans (*Vanilla planifolia*, Andrews) during traditional curing process and use of its waste. *Journal of Applied Research on Medicinal and Aromatic Plants* 32: art. 100445 (<https://doi.org/10.1016/j.jarmap.2022.100445>).

Rivai, B., Hasriadi, N., Dasuni Wasana, P. W., Chansriniyom, C., Towiwat, P., Punpreuk, Y., Likhitwitayawuid, K., Rojsitthisak, P., and Sritularak, B. 2023. Potential role of a novel biphenanthrene derivative isolated from *Aerides falcata* in central nervous system diseases. *RSC Advances* 13(16): 10757–10767 (<https://doi.org/10.1039/d3ra01402a>).

Tedsree, N., Likhitwitayawuid, K., Sritularak, B., and Tanasupawat, S. 2022. Genome analysis and plant growth promoting activity of *Pseudonocardia* strain DR1-2 from the root of *Dendrobium christyanum* Rchb.f. *Malaysian Journal of Microbiology* 18(6): 629–639 (<https://doi.org/10.21161/mjm.221520>).

Tripura, A., Sumi, M. A., Bhowmik, T. K., and Rahman, M. 2022. In vitro seed germination and phytochemical screening of an epiphytic medicinal orchid, *Pholidota imbricata* W. J. Hook. of *Bangladesh Journal of the Orchid Society of India* 36: 137–145.

Üreyen Esertaş, Ü. Z., Uzunalioglu, E., Bozdeveci, A., and Alpay Karaoglu, Ş. 2023. Identification of bacteria obtained from *Dactylorhiza urvilleana* rhizoid region, metal tolerances, bioremediant characteristics and effects on maize germination in copper presence. *Tarim Bilimleri Dergisi* 29(1): 26–37 (<https://doi.org/10.15832/ankutbd.887688>).

Wang, R. T., Yen, J. H., Liao, Y. C., Li, Y. Z., and Wang, W. P. 2023. Extract of *Bletilla formosana* callus elevates cellular antioxidative activity via Nrf2/HO-1 signaling pathway and inhibits melanogenesis in zebrafish. *Journal of Genetic Engineering and Biotechnology* 21(1): art. 26 (<https://doi.org/10.1186/s43141-023-00482-0>).

Wati, R. K., Astuti, I. P., and Cahyaningsih, R. 2023. Inventorying medicinal orchid in Indonesia from global database. *E3S Web of Conferences* 373: art. 05009 (<https://doi.org/10.1051/e3sconf/202337305009>).

Wen, C.-L., Lin, D. P. C., Wu, C. C., Kuo, Y. H., Chang, J. H. H., Lu, T. H., Lin, C. C., Chang, J. C., Chien, Y. W., Hsu, T. L., Chang, S.-L., and Kuo, C. L. 2021. Medicinal *Dendrobium*—Breeding, Good Agricultural Practice (GAP), functional assay and chemical composition. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 352–355. Taiwan Orchid Growers Association, Tainan City.

Wu, Y. N., Wen, S. H., Zhang, W., Yu, S. S., Yang, K., Liu, D., Zhao, C. B., and Sun, J. 2023. *Gastrodia elata* BI.[sic]: A comprehensive review of its traditional use, botany, phytochemistry, pharmacology, and pharmacokinetics. *Evidence-based Complementary and Alternative Medicine* 2023: art. 5606021 (<https://doi.org/10.1155/2023/5606021>).

Yingchutrakul, Y. and Krobthong, S. 2023. Proteomics dataset for the analysis of the effects of *Grammatophyllum speciosum* extracts on RAW 264.7 cells. *Data in Brief* 47: art. 108937 (<https://doi.org/10.1016/j.dib.2023.108937>).

Zhu, X., Wang, J., Fu, Y., Zhou, A., Ye, M., Riaz, M. W., Xing, B., and Shao, Q. 2023. Evaluation of whitening and antimicrobial activity of two strains of *Bletilla striata* WT and HL20. *Journal of Ethnopharmacology* 306: art. 116151 (<https://doi.org/10.1016/j.jep.2023.116151>).

Zorzi, G., Gambini, S., Negri, S., Guzzo, F., and Commisso, M. 2023. Untargeted metabolomics analysis of the orchid species *Oncidium sotoanum* reveals the presence of rare bioactive c-diglycosylated chrysin derivatives. *Plants* 12(3): art. 655 (<https://doi.org/10.3390/plants12030655>).

History

De Angelli, N. 2022. Noël Bernard: ‘The greatest hope of French botany’. *Orchid Review* 130(1339): 24–31.

De Angelli, N. 2022. A brief history of orchids: discovery, lust and wealth. *Orchid Review* 130(1338): 14–21.

Fibeck, W. 2023. Zum Gedenken an Rudolf Schlechter (1872–1925). Teil 2: “Die Orchidaceen von Deutsch-Neu-Guinea”. *Die Orchidee* 74(1): 6–13.

Hermans, C. and Hermans, J. 2022. Émilie Vouga (1839–1909). A forgotten painter of orchids. *Orchids, the Bulletin of the American Orchid Society* 91(11): 840–844.

Hervouet, J.-M. 2022. Les botanistes sont-ils tous excentriques? Le cas extrême du Français Constantin Rafinesque. *l’Orchidophile* 53(234): 271–286.

Ossenbach, C. 2023. Orchids of the southern cone (1830–2000)—Part II. The Philippi dynasty: *Plantarum Novarum Chilensium* and *Catalogus Plantarum Chilensium*. *Lankesteriana* 23(1): 11–33 (<https://doi.org/10.15517/lank.v23i1.54405>).

Ossenbach, C. and Jenny, R. 2021. Rudolf Schlechter’s South-American orchids IV. Schlechter’s “network”: Venezuela and Colombia. *Lankesteriana* 21(2): 157–233 (<https://doi.org/10.15517/lank.v21i2.47581>).

Ossenbach, C. and Jenny, R. 2021. Rudolf Schlechter’s South-American orchids V. Schlechter’s “network”: Ecuador and Peru. *Lankesteriana* 21(2): 235–268 (<https://doi.org/10.15517/lank.v21i2.47977>).

Sander, P. 2022. Marianne North and her orchids. *Orchid Review* 130(1339): 42–45.

Horticultural science

Chang, Y.-C. A. 2021. It is not a good practice to reduce nitrogen fertilization during the reproductive period of *Phalaenopsis*. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 213–217. Taiwan Orchid Growers Association, Tainan City.

Chen, H., Li, Z., Ma, N., Xiao, W., Chen, H., Lü, F., Li, Z., and Zhu, G. 2022. Research advances on fresh-keeping technologies of orchid cut flowers and potted Plants. *Acta Horticulturae Sinica* 49(12): 2743–2760 (<https://doi.org/10.16420/j.issn.0513-353x.2022-0488>).

Chen, J. and Chen, C. 2023. Study on the shape characteristics and the allometry of *Phalaenopsis* leaves for greenhouse management. *Plants* 12(10): art. 2031 (<https://doi.org/10.3390/plants12102031>).

Chen, W.-H., Chang, Y.-L., and Chen, H.-H. 2021. Contribution to variety improvement of *Phalaenopsis* from two native species: *Phal. aphrodite* and *Phal. equestris*. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 47–52. Taiwan Orchid Growers Association, Tainan City.

Chin, S.-W., Lee, C.-Y., Huang, J. Z., and Chen, F.-C. 2021. The strategy of Nobile *Dendrobium* breeding at NPUST in Taiwan. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 294–296. Taiwan Orchid Growers Association, Tainan City.

de Castro, A. C. R., Correia, D., Souza, F. V. D., de Souza, E. H., Franco, J., Cavalcanti, T. B., and da Silva, D. A. 2022. Brazilian ornamental phylogenetic resources in Embrapa germplasm banks: obstacles and opportunities. *Ornamental Horticulture* 28(4): 396–406 (<https://doi.org/10.1590/2447-536X.V28I4.2549>).

Hartatie Hardjo, P., Bagus Made Artadana, I., Emantoko Dwi Putra, S., and Jan, A. 2023. Keiki induction by cytokinin on *Phalaenopsis* spp. *E3S Web of Conferences* 374: art. 00026 (<https://doi.org/10.1051/e3sconf/202337400026>).

Kuo, L.-T., Chen, S.-C., and Liu, M.-C. 2021. Development of flower induction technology of the nobile-type *Dendrobium*. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 222–226. Taiwan Orchid Growers Association, Tainan City.

Li, Y. T. and Chang, Y. C. A. 2023. Relationship between the growth of current shoot and the development of inflorescence and vegetative buds in *Oncidesa* Gower Ramsey ‘Honey Angel’ leaf axils. *HortScience* 58(3): 268–273 (<https://doi.org/10.21273/HORTSCI16960-22>).

Reddy, R. V. S. K., Omprasad, J., and Janakiram, T. 2022. Importance and scope of orchids in Andhra Pradesh. *Journal of the Orchid Society of India* 36: 59–64.

Rodríguez-Deméneghi, M. V., Aguilar-Rivera, N., Gheno-Heredia, Y. A., and Armas-Silva, A. A. 2023. *Vanilla* cultivation in Mexico: Typology, characteristics, production, agroindustrial prospective and biotechnological innovations as a sustainability strategy. *Scientia Agropecuaria* 14(1): 93–109 (<https://doi.org/10.17268/sci.agropecu.2023.009>).

Runkle, E. S. 2021. Regulating the flowering process of *Phalaenopsis* orchids. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 199–203. Taiwan Orchid Growers Association, Tainan City.

Silveira, K. C., Oliveira de Melo, R., Altoé Baldotto, M., and Borges Baldotto, E. L. 2023. Acclimatisation of orchids using plant growth-promoting bacteria and humic acids. *Journal of Horticultural Science and Biotechnology*: (<https://doi.org/10.1080/14620316.2023.2209569>).

Sivakumar, V., Reddy, R. V. S. K., Ranganna, G., and Omprasad, J. 2022. Orchid farming—A prospective enterprise in Andhra Pradesh. *Journal of the Orchid Society of India* 36: 41–43.

Teerarak, M., Saetiew, K., and Laosinwattana, C. 2023. Peppermint essential oil extends the vase life of the cut *Dendrobium* orchid ‘White Sanan’. *Acta Horticulturae* 1358: 259–266 (<https://doi.org/10.17660/ActaHortic.2023.1358.34>).

Thammasiri, K. 2021. Orchid cultivation in Thailand for international markets. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 208–212. Taiwan Orchid Growers Association, Tainan City.

Wang, H. X., Cai, X. L., Wen, J. F., Guo, L., Huang, J. W., and Xu, Y. H. 2023. Key technology of HX-NGS adsorption for treating organic matter in orchid carbon wastewater. *Water science and technology : a journal of the International Association on Water Pollution Research* 87(7): 1713–1731 (<https://doi.org/10.2166/wst.2023.093>).

Wang, Y. T. 2021. Plant growth regulators on greenhouse orchids. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 174–182. Taiwan Orchid Growers Association, Tainan City.

Yam, T. W. 2021. Orchid breeding at the Singapore Botanic Gardens—A 90-year journey. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 30–37. Taiwan Orchid Growers Association, Tainan City.

Yeh, Y.-C., Hung, C.-Y., Chang, C.-J., Du, L.-H., and Chang, Y.-C. A. 2021. Breeding of fragrant *Phalaenopsis*. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 301–304. Taiwan Orchid Growers Association, Tainan City.

(Micro)propagation/Seed germination/Cryopreservation

Anit, J. A. and Distor, J. O. P. 2021. In vitro seed culture of selected native orchids from Mt. Daraitan, Tanay Rizal and Infanta Quezon Provinces, Philippines. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 127–130. Taiwan Orchid Growers Association, Tainan City.

Arzate-Fernández, A. M., Rosas-Chávez, R., Norman-Mondragón, T. H., Corona-Rodríguez, M. C., and Piña-Escutia, J. L. 2023. Multiplication in vitro of *Phalaenopsis* sp. using plant growth regulators, honey water and fermented sap (organic complexes). *Tropical and Subtropical Agroecosystems* 26(1): art. 019 (<https://doi.org/10.56369/tsaes.3981>).

Bhowmik, T. K. and Rahman, M. M. 2022. Seed germination, protocorm multiplication, and seedling development in *Dendrobium formosum* Roxb. ex Lindl. of Bangladesh—a study in vitro. *Journal of the Orchid Society of India* 36: 1–7.

David, D., Faik, A. A. M., Bakar, A. M. S. A., and Gansau, J. A. 2021. Plantlets regeneration from shoot tip and nodal explants of the Sabah jewel orchid, *Macodes limii* J.J. Wood & A.L. Lamb. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 454–459. Taiwan Orchid Growers Association, Tainan City.

de Souza Ribeiro, I., Ribeiro, L. M., Soares, J. S., Ramos, J. C. M., and Sorgato, J. C. 2022. Light condition, flask sealing, and cultivation time on the germination and initial in vitro development of *Dendrobium nobile* Lindl. *Ornamental Horticulture* 28(4): 407–413 (<https://doi.org/10.1590/2447-536X.V28I4.2515>).

Diengdoh, R. V., Das, M. C., Nongsiang, A., and Kumaria, S. 2023. Efficient utilization of phytohormones for the in vitro proliferation of *Paphiopedilum villosum* Lindl. Stein—a Lady's Slipper orchid. *South African Journal of Botany* 154: 387–393 (<https://doi.org/10.1016/j.sajb.2023.01.022>).

Gao, X., Wang, Y., Deng, D., Luo, Y., Shao, S., and Luo, Y. 2023. Morphogenesis changes in protocorm development during symbiotic seed germination of *Dendrobium chrysotoxum* (Orchidaceae) with its mycobiont, *Tulasnella* sp. *Horticulturae* 9(5): art. 531 (<https://doi.org/10.3390/horticulturae9050531>).

Gil, A. I. C., Ariza, C. A. C., Castillo, L. M. T., Salgado, L. E. D., Sánchez, L. B., and Vanegas, L. E. M. 2019. Induction of organogenesis in vitro with 6-benzylaminopurine in *Cattleya trianae* Linden & Rchb.f. *Revista UDCA Actualidad and Divulgacion Cientifica* 22(2): art. 1275 (<https://doi.org/10.31910/rudca.v22.n2.2019.1275>).

Guillén-Rodríguez, S., Cruz-López, C., Martínez-Ávalos, J. G., and Martínez-Palacios, A. 2022. Effect of N6-benzyladenine and photoperiod on the flowering of in vitro protocorms of *Bletia urbana* (Orchidaceae). *Revista Fitotecnia Mexicana* 45(4): 475–482 (<https://doi.org/10.35196/RFM.2022.4.475>).

Hosain, H. B., Jurcy, N. J. A., Douglas, A., Iskandar, N. H. M., and Auvaroz, T. 2021. A study on in vitro micropropagation of *Dendrobium anosmum* (an endangered species orchid). In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 151–156. Taiwan Orchid Growers Association, Tainan City.

Hussien, M., Kryuchkova, V., Raeva-Bogoslovskaya, E., and Molkanova, O. 2023. Clonal micropropagation of *Cymbidium erythrostylum* Rolfe. *International Journal of Plant Biology* 14(1): 28–38 (<https://doi.org/10.3390/ijpb14010003>).

Jawan, R., David, D., Marbawi, H., and Gansau, J. A. 2021. Effect of plant growth regulators and basal media strengths on protocorm proliferation and development of Borneo threatened orchid, *Vanda dearei*. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 67–72. Taiwan Orchid Growers Association, Tainan City.

Joshi, P. R., Thakuri, L. S., Chand, K., Thapa, B. B., Karki, S., and Pant, B. 2021. In vitro seed germination of *Gastrochilus calceolaris* (Buch. -Ham ex J.E.Sm.) D.Don., a critically endangered orchid of Nepal. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 146–150. Taiwan Orchid Growers Association, Tainan City.

Lan, V. T., Yen, H. T. T., Phat, D. T., and Phuong, N. V. 2023. Factors affecting high frequency germination and regeneration in vitro from seeds of *Paphiopedilum concolor* (Bateman) Pfitzer. *Propagation of Ornamental Plants* 23(1): 13–21.

Montri, N., Charoensrimuang, S., Deewatthanawong, R., Montri, W., and Bunya-Atichart, K. (2023). Effect of plant growth regulators on in vitro seedling growth of *Papilionanthe hookeriana* (Rchb.f.) Schltr. In: Editor, editor^editors. *Acta Horticulturae*. 57–64.

Mora-Cruz, Y., López-Peralta, M. C. G., Hernández-Meneses, E., and Cruz-Huerta, N. 2023. In vitro regeneration of *Prosthechea vitellina* (Lindley) W. W. Higgins plants by direct organogenesis. *Revista Fitotecnica Mexicana* 46(1): 33–40 (<https://doi.org/10.35196/rfm.2023.1.33>).

Moraes, M. C., Bertão, M. R., Custódio, C. C., and Machado-Neto, N. B. 2023. The influence of pre-treatment on germination of three species of *Catasetum* (Orchidaceae). *Journal of Seed Science* 45: art. e202345010 (<https://doi.org/10.1590/2317-1545v45266264>).

Nguyen, K. V. and Tran, M. V. 2021. In vitro propagation of *Oncidium* sp. by protocorm-like-body culture techniques. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 227–231. Taiwan Orchid Growers Association, Tainan City.

Nongdam, P., Beleski, D. G., Tikendra, L., Dey, A., Varte, V., El Merzougui, S., Pereira, V. M., Barros, P. R., and Vendrame, W. A. 2023. Orchid micropropagation using conventional semi-solid and temporary immersion systems: a review. *Plants* 12(5): art. 1136 (<https://doi.org/10.3390/plants12051136>).

Pinedo-Pandur, M., Alves-Chaga, E., Luz, F. F., Panduro-Tenazoa, N. M., Chagas, P. C., Bardales-Lozan, R., Abanto-Rodríguez, C., Paredes-Dávila, E., and Saldaña, H. C. 2022. Effect of the salts of the Murashige & Skoog and Knudson culture media on the in vitro culture establishment of *Epidendrum schomburgkii* Lindl. *Ciencia Tecnologia Agropecuaria* 23(3): art. e2526 (https://doi.org/10.21930/rcta.vol23_num3_art:2526).

Purwanto, E., Arniputri, R. B., Handoyo, G. C., Yunus, A., Purnomo, D., Sakya, A. T., Rahayu, M., Setyawati, A., and Brimantara, F. 2023. In vitro growth of *Dendrobium stratiotes* on various medium and growth regulator. *IOP Conference Series: Earth and Environmental Science* 1165: art. 012019 (<https://doi.org/10.1088/1755-1315/1165/1/012019>).

Quijia-Lamiña, P. H., Baquero, L. E., Kane, M. E., and Zettler, L. W. 2023. Symbiotic seed germination and seedling development of *Epidendrum geminiflorum* Knuth[sic: Kunth] from Ecuador. *Diversity* 15(2): (<https://doi.org/10.3390/d15020236>).

Rahamtulla, M. and Khasim, S. M. 2022. In vitro regeneration of an epiphytic orchid, *Dendrobium aphyllum* using leaf explants. *Journal of the Orchid Society of India* 36: 121–129.

Rineksane, I. A., Nu’Imah, M. N. K., and Astuti, A. 2023. Effect of different types of medium and fertilizer on acclimatization of *Vanda tricolor*. *IOP Conference Series: Earth and Environmental Science* 1172: art. 012026 (<https://doi.org/10.1088/1755-1315/1172/1/012026>).

Romeida, A., Ganefianti, D. W., Marlin, M., Sudjatmiko, S., Hairani, P. M., Herawati, R., Rustikawati, R., and Supanjani, S. 2023. Protocorm Like Bodies (PLBs) *Dendrobium* orchid “Gatton Sunraya”. *E3S Web of Conferences* 373: art. 03002 (<https://doi.org/10.1051/e3sconf/202337303002>).

Samala, S. and Thipwong, J. 2023. Influences of organic additives on asymbiotic seed germination of *Dendrobium cruentum* Rchb. f. for in vitro micropropagation. *Trends in Sciences* 20(3): art. 4181 (<https://doi.org/10.48048/tis.2023.4181>).

Sánchez-Gutiérrez, A. E., Soto-Zarazúa, G. M., España-Sánchez, B. L., Rodríguez-González, S., and Zamora-Castro, S. 2023. Development of agar substitute formulated with mucilage and pectin from *Opuntia* local waste matter for *Cattleya* sp. orchids in vitro culture media. *Processes* 11(3): art. 717 (<https://doi.org/10.3390/pr11030717>).

Šoch, J., Šonka, J., and Ponert, J. 2023. Acid scarification as a potent treatment for an in vitro germination of mature endozoochorous *Vanilla planifolia* seeds. *Botanical Studies* 64(1): art. 9 (<https://doi.org/10.1186/s40529-023-00374-z>).

Werbrouck, S. P. O. 2018. A new wind is blowing through *Phalaenopsis* micropropagation. In: Bettaieb, T. (ed.), *Micropropagation of Ornamental Plants: Research and Practice*. Nova Science Publishers, Inc., Hauppauge, pp. 47–58.

Wijaya, A. N., Artadana, I. B. M., Putra, S. E. D., and Hardjo, P. H. 2023. Effect of organic additives on regeneration of orchid hybrid (*Dendrobium* ‘Bertachong’ × *Dendrobium* ‘Blackspider × *sutiknoi*’[sic]). *AIP Conference Proceedings* 2606: art. 040003 (<https://doi.org/10.1063/5.0118811>).

Yang, H., Li, N. Q., and Gao, J. Y. 2023. A novel method to produce massive seedlings via symbiotic seed germination in orchids. *Frontiers in Plant Science* 14: art. 1114105 (<https://doi.org/10.3389/fpls.2023.1114105>).

Yeh, C.-H., Lin, H.-J., Chou, C.-Y., and Lee, Y.-I. 2021. Capsule development and in vitro germination of *Vanilla planifolia* in Taiwan. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 297–300. Taiwan Orchid Growers Association, Tainan City.

Molecular biology

Ahmad, S., Lu, C., Gao, J., Wei, Y., Xie, Q., Jin, J., Zhu, G., and Yang, F. 2023. The integrated mRNA and miRNA approach reveals potential regulators of flowering time in *Arundina graminifolia*. *International Journal of Molecular Sciences* 24(2): art. 1699 (<https://doi.org/10.3390/ijms24021699>).

Bai, Y., Ma, Y., Chang, Y., Zhang, W., Deng, Y., Zhang, N., Zhang, X., Fan, K., Hu, X., Wang, S., Jiang, Z., and Hu, T. 2023. Identification and transcriptome data analysis of ARF family genes in five Orchidaceae species. *Plant Molecular Biology* 112(1–2): 85–98 (<https://doi.org/10.1007/s11103-023-01354-4>).

Cai, J., Muhammad, I., Chen, B., Xu, P., Li, Y., Xu, H., and Li, K. 2023. Whole genome sequencing and analysis of *Armillaria gallica* Jzi34 symbiotic with *Gastrodia elata*. *BMC Genomics* 24(1): art. 275 (<https://doi.org/10.1186/s12864-023-09384-4>).

Chuang, Y.-C. and Chen, H.-H. 2021. Regulation of orchid floral scent. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 273–276. Taiwan Orchid Growers Association, Tainan City.

Deng, X., Hu, C., Xie, C., Lu, A., Luo, Y., Peng, T., and Huang, W. 2023. Metabolomic and transcriptomic analysis reveal the role of metabolites and genes in modulating flower color of *Paphiopedilum micranthum*. *Plants* 12(10): art. 2058 (<https://doi.org/10.3390/plants12102058>).

Doucette, A., Medina, H., Portilla, J., and Cameron, K. M. 2022. The phylogenetic placement of *Andreettaea ocellus* has significant implications for generic circumscription of Pleurothallidinae (Orchidaceae). *Orchids, the Bulletin of the American Orchid Society* 91(10): 768–779.

Fiorini, C. F., Borba, E. L., Resende-Moreira, L. C., de Camargo Smidt, E., and Knowles, L. L. 2023. Geographic isolation alone does not explain divergence of a group of orchid species across Brazil's campos rupestres sky-islands | Isolamento geográfico por si só não explica a divergência de um grupo de espécies de orquídeas nos campos rupestres do Brasil. *Evolution; international journal of organic evolution* 77(4): 946–958 (<https://doi.org/10.1093/evolut/qpad010>) [*Bulbophyllum*].

Gargiulo, R. A., Fay, M. F., and Kull, T. 2021. *Cypripedium calceolus* L. as a model system for molecular ecology and conservation genomics. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 316–320. Taiwan Orchid Growers Association, Tainan City.

Ha, D. C., Cao, P. B., Nguyen, V. D., and Le, C. T. 2022. Molecular phylogeny and deep origins of the hybrid *Mokara Dear Heart* (Orchidaceae). *Jordan Journal of Biological Sciences* 15(5): 805–811 (<https://doi.org/10.54319/jjbs/150509>).

Hai, Y. N. T., Xuan, Q. N., Dinh, T. N., Tien, P. D., and Hoang, M. C. 2023. Morphology and DNA marker for distinguishing *Paphiopedilum hangianum* and *Paphiopedilum emersonii* from Vietnam. *Journal of Experimental Biology and Agricultural Sciences* 11(2): 423–435 ([https://doi.org/10.18006/2023.11\(2\).423.435](https://doi.org/10.18006/2023.11(2).423.435)).

Hsiao, Y.-Y. and Tsai, W.-C. 2021. Orchid genomes and orchid morphological evolution. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 288–293. Taiwan Orchid Growers Association, Tainan City.

Hu, A.-Q., Huang, Y.-L., Chang, C.-C., Chen, C.-M., and Chung, K.-F. 2021. Bringing moth orchids home—Identifying genuine native *Phalaenopsis* of Taiwan from nursery collections using ddRADseq. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 120–124. Taiwan Orchid Growers Association, Tainan City.

Jiang, Y., Tu, X., and He, J. 2023. Analysis of differential expression genes in leaves of leaf color mutant of Chinese orchid. *Acta Horticulturae Sinica* 50(2): 371–381 (<https://doi.org/10.16420/j.issn.0513-353x.2021-0950>) [*Cymbidium*].

Kambara, K., Fujino, K., and Shimura, H. 2023. Construction of a de novo assembly pipeline using multiple transcriptome data sets from *Cypripedium macranthos* (Orchidaceae). *PloS one* 18(6): art. e0286804 (<https://doi.org/10.1371/journal.pone.0286804>).

Ke, S. J., Liu, D. K., Tu, X. D., He, X., Zhang, M. M., Zhu, M. J., Zhang, D. Y., Zhang, C. L., Lan, S. R., and Liu, Z. J. 2023. *Apostasia* mitochondrial genome analysis and monocot mitochondria phylogenomics. *International Journal of Molecular Sciences* 24(9): art. 7837 (<https://doi.org/10.3390/ijms24097837>).

Kim, Y. K., Cheon, S. H., Hong, J. R., and Kim, K. J. 2023. Evolutionary patterns of the chloroplast genome in vanilloid orchids (Vanilloideae, Orchidaceae). *International Journal of Molecular Sciences* 24(4): art. 3808 (<https://doi.org/10.3390/ijms24043808>).

Lal, A., Pant, M., Pant, G., Palni, L. M. S., Kumar, A., and Kumar, G. 2023. ISSR marker assisted genetic diversity assessment in natural populations of two endemic orchids *Aerides multiflora* and *Rhynchostylis retusa* from Uttarakhand, India. *South African Journal of Botany* 157: 151–158 (<https://doi.org/10.1016/j.sajb.2023.03.031>).

Li, L., Wang, W., Zhang, G., Wu, K., Fang, L., Li, M., Liu, Z., and Zeng, S. 2023. Comparative analyses and phylogenetic relationships of thirteen *Pholidota* species (Orchidaceae) inferred from complete chloroplast genomes. *BMC Plant Biology* 23(1): art. 269 (<https://doi.org/10.1186/s12870-023-04233-8>).

Li, X., Zhe, M., Huang, Y., Fan, W., Yang, J., and Zhu, A. 2023. The evolution of mitochondrial genomes between two *Cymbidium* sister species: dozens of circular chromosomes and the maintenance and deterioration of genome synteny. *Genes* 14(4): art. 864 (<https://doi.org/10.3390/genes14040864>).

Mohapatra, P., Ray, A., and Jena, S. 2022. Evaluation of genetic stability of in vitro raised orchids using molecular-based markers. In: Gupta, S. and Chaturvedi, P. (eds.), *Commercial Scale Tissue Culture for Horticulture and Plantation Crops*. Springer, Singapore, pp. 293–316. (https://doi.org/10.1007/978-981-19-0055-6_13).

Ovcharenko, O. O. and Rudas, V. A. 2023. Modern approaches to genetic engineering in the Orchidaceae family. *Cytology and Genetics* 57(2): 142–156 (<https://doi.org/10.3103/S0095452723020093>).

Pan, T., Deng, N. M., Guo, W. X., Wan, M. Z., Zheng, Y. T., Chen, S. Y., Liu, C. L., Li, H. B., and Liang, S. 2023. DnFCA isoforms cooperatively regulate temperature-related flowering in *Dendrobium nobile*. *Biology* 12(2): art. 331 (<https://doi.org/10.3390/biology12020331>).

Pradhan, S., Paudel, Y. P., Qin, W., and Pant, B. 2023. Genetic fidelity assessment of wild and tissue cultured regenerants of a threatened orchid, *Cymbidium aloifolium* using molecular markers. *Plant Gene* 34: art. 100418 (<https://doi.org/10.1016/j.plgene.2023.100418>).

Prat, D. and Briolay, J. 2021. Differentiation and dynamics of some *Epipactis* species. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 321–326. Taiwan Orchid Growers Association, Tainan City.

Pratama, A. N., Grandmottet, F., Kongbangkerd, A., Sujipuli, K., and Ratanasut, K. 2023. Low-light intensity reprogramed flower pigmentation in *Dendrobium Sonia* via downregulation of dihydroflavonol 4-reductase and anthocyanidin synthase genes. *Scientia Horticulturae* 312: art. 111853 (<https://doi.org/10.1016/j.scienta.2023.111853>).

Ramudu, J. and Khasim, S. M. 2022. Genetic diversity of an endemic orchid, *Coelogyne nervosa* A. Rich from southern India using morphological and molecular markers. *Journal of the Orchid Society of India* 36: 113–119.

Shao, B. Y., Wang, M. Z., Chen, S. S., Ya, J. D., and Jin, X. H. 2023. Habitat-related plastome evolution in the mycoheterotrophic *Neottia listeroides* complex (Orchidaceae, Neottieae). *BMC Plant Biology* 23(1): art. 282 (<https://doi.org/10.1186/s12870-023-04302-y>).

Si, C., Zeng, D., da Silva, J. A. T., Qiu, S., Duan, J., Bai, S., and He, C. 2023. Genome-wide identification of Aux/IAA and ARF gene families reveal their potential roles in flower opening of *Dendrobium officinale*. *BMC Genomics* 24(1): art. 199 (<https://doi.org/10.1186/s12864-023-09263-y>).

Sumaythachotphong, N., Potapohn, N., and Bundithya, W. 2021. Anthocyanin synthetic genes in *Rhynchostylis gigantea* (Lindl.) Ridl. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 283–287. Taiwan Orchid Growers Association, Tainan City.

Sung, P.-H. 2021. Development of spring orchid SSR markers and their utility in genetic diversity. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 418–420. Taiwan Orchid Growers Association, Tainan City. [*Cymbidium goeringii*].

Suputri, N. P. A. E. O., Prasajo, I. S., Prabowo, L. A. T., Purwestri, Y. A., and Semiarti, E. 2023. Identification of early flowering mutant gene in *Phalaenopsis amabilis* (L.) Blume for sgRNA construction in CRISPR/Cas9 genome editing system. *Brazilian Journal of Biology* 84: art. e268133 (<https://doi.org/10.1590/1519-6984.268133>).

Tao, L., Duan, H., Tao, K., Luo, Y., Li, Q., and Li, L. 2023. Complete chloroplast genome structural characterization of two *Phalaenopsis* (Orchidaceae) species and comparative analysis with their alliance. *BMC Genomics* 24: art. 359 (<https://doi.org/10.1186/s12864-023-09448-5>).

Timilsena, P. R., Barrett, C. F., Piñeyro-Nelson, A., Wafula, E. K., Ayyampalayam, S., McNeal, J. R., Yukawa, T., Givnish, T. J., Graham, S. W., Pires, J. C., Davis, J. I., Ané, C., Stevenson, D. W., Leebens-Mack, J., Martínez-Salas, E., Álvarez-Buylla, E. R., and de Pamphilis, C. W. 2023. Phylotranscriptomic analyses of mycoheterotrophic monocots show a continuum of convergent evolutionary changes in expressed nuclear genes from three independent nonphotosynthetic lineages. *Genome biology and evolution* 15(1): art. evac183 (<https://doi.org/10.1093/gbe/evac183>).

Wang, M. J., Ou, Y., Li, Z., Zheng, Q. D., Ke, Y. J., Lai, H. P., Lan, S. R., Peng, D. H., Liu, Z. J., and Ai, Y. 2023. Genome-wide identification and analysis of bHLH transcription factors related to anthocyanin biosynthesis in *Cymbidium ensifolium*. *International Journal of Molecular Sciences* 24(4): art. 3825 (<https://doi.org/10.3390/ijms24043825>).

Wang, Y.-J., Lin, Y.-F., and Tsai, W.-C. 2021. Functional characterization of EPIDERMAL PATTERNING FACTOR-like (PeEPFLs) genes from *Phalaenopsis equestris*. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 305–310. Taiwan Orchid Growers Association, Tainan City.

Wati, R. K., de Graaf, E., Smets, E., van Vugt, R. R., Wibowo, A. R. U., Atmaja, M. B., and Gravendeel, B. 2021. Identification of sterile orchids in living collections by DNA barcoding of types. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 412–417. Taiwan Orchid Growers Association, Tainan City. [*Glomera*].

Wu, S. S., Jiang, M. T., Miao, J. L., Li, M. H., Wang, J. Y., Shen, L. M., Peng, D. H., Lan, S. R., Zhai, J. W., and Liu, Z. J. 2023. Origin and diversification of a Himalayan orchid genus *Pleione*. *Molecular Phylogenetics and Evolution* 184: art. 107797 (<https://doi.org/10.1016/j.ympev.2023.107797>).

Xue, Q., Yang, J., Yu, W., Wang, H., Hou, Z., Li, C., Xue, Q., Liu, W., Ding, X., and Niu, Z. 2023. The climate changes promoted the chloroplast genomic evolution of *Dendrobium* orchids among multiple photosynthetic pathways. *BMC Plant Biology* 23(1): art. 189 (<https://doi.org/10.1186/s12870-023-04186-y>).

Yang, J., Li, P., Li, Y., and Xiao, Q. 2023. GelFAP v2.0: an improved platform for Gene functional analysis in *Gastrodia elata*. *BMC Genomics* 24(1): art. 164 (<https://doi.org/10.1186/s12864-023-09260-1>).

Yang, J. X., Dierckxsens, N., Bai, M. Z., and Guo, Y. Y. 2023. Multichromosomal mitochondrial genome of *Paphiopedilum micranthum*: compact and fragmented genome, and rampant intracellular gene transfer. *International Journal of Molecular Sciences* 24(4): art. 3976 (<https://doi.org/10.3390/ijms24043976>).

Yang, K., Hou, Y., Wu, M., Pan, Q., Xie, Y., Zhang, Y., Sun, F., Zhang, Z., and Wu, J. 2023. DoMYB5 and DobHLH24, transcription factors involved in regulating anthocyanin accumulation in *Dendrobium officinale*. *International Journal of Molecular Sciences* 24(8): art. 7552 (<https://doi.org/10.3390/ijms24087552>).

Yang, T. W., Gao, M. R., Huang, S. Y., Zhang, S. W., Zhang, X. J., Li, T., Yu, W. H., Meng, P., and Shi, Q. 2023. Genetic diversity and DNA fingerprinting of *Dendrobium officinale* based on ISSR and SCOT markers. *Applied Ecology and Environmental Research* 21(1): 421–438 (https://doi.org/10.15666/aeer/2101_421438).

Yang, W., Wu, K., Fang, L., Zeng, S., and Li, L. 2023. The complete chloroplast genomes of *Blepharoglossum elegans* and *B. grossum* and comparative analysis with related species (Orchidaceae, Malaxideae). *Genes* 14(5): art. 1069 (<https://doi.org/10.3390/genes14051069>).

Zeng, D., Si, C., Teixeira da Silva, J. A., Shi, H., Chen, J., Huang, L., Duan, J., and He, C. 2023. Uncovering the involvement of DoDELLA1-interacting proteins in development by characterizing the DoDELLA gene family in *Dendrobium officinale*. *BMC Plant Biology* 23(1): art. 93 (<https://doi.org/10.1186/s12870-023-04099-w>).

Zeng, D., Si, C., da Silva, J. A. T., Shi, H., Chen, J., Huang, L., Duan, J., and He, C. 2023. Correction: Uncovering the involvement of DoDELLA1-interacting proteins in development by characterizing the DoDELLA gene family in *Dendrobium officinale* (BMC Plant Biology, (2023), 23, 1, (93), 10.1186/s12870-023-04099-w). *BMC Plant Biology* 23(1): art. 173 (<https://doi.org/10.1186/s12870-023-04184-0>).

Zhou, L., Chen, T., Qiu, X., Liu, J., and Guo, S. 2023. Evolutionary differences in gene loss and pseudogenization among mycoheterotrophic orchids in the tribe Vanilleae (subfamily Vanilloideae). *Frontiers in Plant Science* 14: art. 1160446 (<https://doi.org/10.3389/fpls.2023.1160446>).

Zhu, M., Wang, Q., Tu, S., Ke, S., Bi, Y., Ahmad, S., Zhang, D., Liu, D., and Lan, S. 2023. Genome-wide identification analysis of the R2R3-MYB transcription factor family in *Cymbidium sinense* for insights into drought stress responses. *International Journal of Molecular Sciences* 24(4): art. 3235 (<https://doi.org/10.3390/ijms24043235>).

Mycorrhiza and endophytes

Fang, L. A. N., Zheng, X., Sun, Z., Li, Y., Deng, J., and Zhou, Y. I. 2023. Characterization of a plant growth-promoting endohyphal *Bacillus subtilis* in *Fusarium acuminatum* from *Spiranthes sinensis*. *Polish Journal of Microbiology* 72(1): 29–37 (<https://doi.org/10.33073/pjm-2023-007>).

Fernández, M., Kaur, J., and Sharma, J. 2023. Co-occurring epiphytic orchids have specialized mycorrhizal fungal niches that are also linked to ontogeny. *Mycorrhiza* 33(1–2): 87–105 (<https://doi.org/10.1007/s00572-022-01099-w>).

Gebauer, G. and Schweiger, J. M. I. 2021. The use of multi-element stable isotope natural abundance (^{13}C , ^{15}N , ^2H) to elucidate orchid mycorrhizal nutrition. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 250–255. Taiwan Orchid Growers Association, Tainan City.

Graziosi, S., Leonardi, P., and Zambonelli, A. 2022. Symbiotic interactions between orchids and *Tuber borchii*. *Italian Journal of Mycology* 51(1): 58–65 (<https://doi.org/10.6092/issn.2531-7342/15348>).

Herdman, A. R., Mújica, E. B., Danaher, M. W., Zettler, L. W., Schulz, K., and Esselman, E. 2023. Initial population analysis and mycorrhizal fungi of the leafless epiphytic orchid, *Campylocentrum pachyrrhizum*, in Florida. *Diversity* 15(4): art. 576 (<https://doi.org/10.3390/d15040576>).

Johnson, L. J. A. N., Kane, M. E., Zettler, L. W., and Mueller, G. M. 2023. Diversity and specificity of orchid mycorrhizal fungi in a leafless epiphytic orchid, *Dendrophylax lindenii* and the potential role of fungi in shaping its fine-scale distribution. *Frontiers in Ecology and Evolution* 11: art. 1057940 (<https://doi.org/10.3389/fevo.2023.1057940>).

Kaur, J., Harder, C. B., and Sharma, J. 2023. Congeneric temperate orchids recruit similar—yet differentially abundant—endophytic bacterial communities that are uncoupled from soil, but linked to host phenology and population size. *American Journal of Botany* 110(5): art. e16168 (<https://doi.org/10.1002/ajb2.16168>).

Liu, N., Zhao, Z., Shi, L., Yang, L., and Xing, X. 2023. The role of mycorrhizal fungi in improving drought tolerance of epiphytic orchid: a case study on *Coelogyne viscosa*. *Mycosystema* 42(1): 217–230 (<https://doi.org/10.13346/j.mycosystema.220471>).

Novotná, A., Mennicken, S., de Paula, C. C. P., Vogt-Schilb, H., Kotlínek, M., Těšitelová, T., Šmilauer, P., and Jersáková, J. 2023. Variability in nutrient use by orchid mycorrhizal fungi in two medium types. *Journal of Fungi* 9(1): art. 88 (<https://doi.org/10.3390/jof9010088>).

Sukarno, N., Mursidawati, S., Listiyowati, S., Nugraha, N. H., Fadillah, W. N., and Waite, M. 2023. Root associated *Fusarium solani* Species Complex (FSSC) in epiphytic and terrestrial orchids. *Biodiversitas* 24(5): 2577–2586 (<https://doi.org/10.13057/biodiv/d240509>).

Yadav, A., Boruah, J. L. H., Geed, S. R., Sharma, R. K., and Saikia, R. 2023. Occurrence, identification and characterization of diazotrophic bacteria from aerial roots of *Rhynchostylis retusa* (L.) Blume for plant growth-promoting activity. *Archives of Microbiology* 205(4): art. 131 (<https://doi.org/10.1007/s00203-023-03458-3>).

Yukawa, T., Ogura-Tsujita, Y., Kinoshita, A., Tsutsumi, C., Yamashita, Y., Abe, A., Akai, K., Sato, H., Chung, S. W., Hsu, T. C., and Lee, Y. I. 2021. *Gastrodia*, an enigmatic orchid group with specialized fungal symbioses. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 398–401. Taiwan Orchid Growers Association, Tainan City.

Zhang, W., Gao, J., Shao, S., and Li, T. 2023. Low specificity but dissimilar mycorrhizal communities associating with roots may contribute to the spatial pattern of four co-occurring *Habenaria* (Orchidaceae) species. *International Journal of Molecular Sciences* 24(1): art. 665 (<https://doi.org/10.3390/ijms24010665>).

Zhao, R., Zheng, S., Hu, Y., Li, H., Chen, Y., and Chun, Z. 2023. Endophytic bacterial diversity of medicinal orchid *Dendrobium nobile*. *South African Journal of Botany* 158: 90–97 (<https://doi.org/10.1016/j.sajb.2023.04.050>).

Pathology

Alam, S. H., Chakraborty, S., Hooi, A., Samanta, M., and Mahapatra, S. 2023. Morpho-molecular identification of *Lasiodiplodia theobromae* causing leaf blight of orchid in India. *National Academy Science Letters*: (<https://doi.org/10.1007/s40009-023-01278-z>).

Chang, C.-A. 2021. An overview of three decades' effort to combat orchid virus diseases in Taiwan. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 204–207. Taiwan Orchid Growers Association, Tainan City.

Chen, Y.-C., Chen, H.-R., Lee, C.-H., Jan, F.-J., Huang, H.-C., Liao, S., and Li, C.-W. 2021. Easy-to-use label-free immuno-biosensor for directly detecting *Phalaenopsis* viruses from fresh leaves. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 368–371. Taiwan Orchid Growers Association, Tainan City.

Das, M. C., Nongsiang, A., and Sanglyne, M. W. 2023. Detection methods and in vitro elimination techniques for orchid viruses: A review. *South African Journal of Botany* 153: 227–235 (<https://doi.org/10.1016/j.sajb.2022.12.003>).

Hidayat, M. M. and Arifannisa, S. J. 2023. Study of orchid resistance induction using *Rhizoctonia* against ORSV infection based on anatomical characters of roots and leaves. *Asian Journal of Plant Sciences* 22(2): 239–249 (<https://doi.org/10.3923/ajps.2023.239.249>).

Ho, T. T., Park, S.-Y., Murthy, H. N., and Paek, K. Y. 2021. Bioreactor system for the stable production of plantlets and bioactive molecules in orchid species. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 372–375. Taiwan Orchid Growers Association, Tainan City.

Kalaivanan, N. S., De, L. C., Biswas, S. S., and Pal, R. 2022. Pathogenic constraints of Indian orchid growers: a review. *Journal of the Orchid Society of India* 36: 21–27.

Kwon, T. H., Kim, D. B., Lee, B. H., Cha, D. H., and Park, M. G. 2023. Comparison of methyl bromide and ethyl formate for fumigation of snail and fly pests of imported orchids. *Insects* 14(1): art. 66 (<https://doi.org/10.3390/insects14010066>).

Liang, P. Y., Xu, M. Y., Jiang, J. W., Tan, L. T., Li, Q., Zhou, Y., and Sun, Z. X. 2023. First report of stem rot in *Cymbidium sinense* caused by *Fusarium oxysporum* in China. *Plant Disease* 107(2): 557 (<https://doi.org/10.1094/PDIS-02-22-0416-PDN>).

Meena, N. K. and Mani, M. 2022. Pests and their management in orchids. In: Mani, M. (eds.), *Trends in Horticultural Entomology*. Springer, Singapore, pp. 1239–1254. (https://doi.org/10.1007/978-981-19-0343-4_53).

Randriambololona, M., Rakotonirina, T. J., Rieux, A., and Grisoni, M. 2023. First report of odontoglossum ringspot virus in *Vanilla* (Orchidaceae) in Madagascar. *Plant Disease* 107(4): 1250 (<https://doi.org/10.1094/PDIS-06-22-1399-PDN>).

Sanjaya, I. P. W., Sukma, D., Sudarsono, S., and Chan, M.-T. 2021. Analysis of resistance mechanism to soft-rot disease on *Phalaenopsis*: Preliminary test of *Phalaenopsis* species in response to soft-rot pathogen (*Dickeya dadantii*). In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 311–315. Taiwan Orchid Growers Association, Tainan City.

Sun, A., Wang, L., Zhang, Y., Yang, X., Wei, Y., Yang, D., Li, W., and Wu, X. 2023. Establishment of a triplex TaqMan quantitative real-time PCR assay for simultaneous detection of Cymbidium mosaic virus, Odontoglossum ringspot virus and Cymbidium ringspot virus. *Frontiers in Microbiology* 14: art. 1129259 (<https://doi.org/10.3389/fmicb.2023.1129259>).

Physiology/Phytochemistry

Barreda-Castillo, J. M., Monribot-Villanueva, J. L., Velázquez-Rosas, N., Bayman, P., Guerrero-Analco, J. A., and Menchaca-García, R. A. 2023. Morphological and physiochemical responses to peg-induced water stress in *Vanilla planifolia* and *V. pompona* hybrids. *International Journal of Molecular Sciences* 24(5): art. 4690 (<https://doi.org/10.3390/ijms24054690>).

Chagi, K., Komoda, H., and Murakami, M. 2023. Effect of light conditions on trophic level and gene expression of partially mycoheterotrophic orchid, *Cymbidium goeringii*. *Plant signaling & behavior* 18(1): art. 2180159 (<https://doi.org/10.1080/15592324.2023.2180159>).

Chandler, B. D., Ruiz, A. E., Danaher, M. W., and Zettler, L. W. 2022. Chemical composition of floral nectar collected from the ghost orchid, *Dendrophylax lindenii* (Lindl.) Benth. ex Rolfe (Orchidaceae: Angraecinae), in Florida. *Journal of the Orchid Society of India* 36: 9–14.

Cheng, L. and Wang, J. 2022. Analysis of flavonoid metabolic pathways of different varieties of *Phalaenopsis* and their molecular mechanism. *China Surfactant Detergent and Cosmetics* 52(12): 1293–1299 (<https://doi.org/10.3969/j.issn.1001-1803.2022.12.005>).

de Vasconcelos, F. M., Andrade, E. H. A., Teixeira, L. O. A., Figueiredo, P. L. B., and Maia, J. G. S. 2023. Volatile constituents from *Catasetum* (Orchidaceae) species with occurrence in the Brazilian Amazon. *Plants* 12(4): art. 703 (<https://doi.org/10.3390/plants12040703>).

Diaz-Bautista, M., Barrientos, F. M., Francisco, M. Á S., Espinoza-Pérez, J., Reyes-Reyes, C., Soto-Hernández, M., Herrera-Cabrera, B. E., López-Valdez, L. G., Montiel-Montoya, J., and Barrales-Cureño, H. J. 2023. Quantification of vanillin in fruits of *Vanilla planifolia* by high-resolution liquid chromatography. *Letters in Applied NanoBioScience* 12(1): art. 15 (<https://doi.org/10.33263/LIANBS121.015>).

Idris, N. A., Ismail, N., Manimaran, K. S., and Salim, N. S. M. 2022. A review of green technologies for the extraction of vanillin from *Vanilla planifolia* leaves: advantages and limitations. *Malaysian Journal of Chemistry* 24(3): 29–43.

Lin, H. and Chang, Y.-C. A. 2021. Carbohydrate partitioning between pseudobulb and inflorescence during reproductive growth of *Oncidesa* Gower Ramsey ‘Honey Angel’. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 185–187. Taiwan Orchid Growers Association, Tainan City.

Pinheiro, C. L., Zampirolo, J. B., Mendes, M. M., dos Santos, V. F., Martins, J. P. R., Silva, D. M., Tognella, M. M. P., Cassol, D., and Falqueto, A. R. 2023. Exposition of three *Cattleya* species (Orchidaceae) to full sunlight: effect on their physiological plasticity and response to changes in light conditions. *Ornamental Horticulture* 29(1): 57–67 (<https://doi.org/10.1590/2447-536X.v29i1.2527>).

Sun, W. T., Cheng, S. C., Chao, Y. T., Lin, S. Y., Yang, T. T., Ho, Y. P., Shih, M. C., and Ko, S. S. 2023. Sugars and sucrose transporters in pollinia of *Phalaenopsis aphrodite* (Orchidaceae). *Journal of Experimental Botany* 74(8): 2556–2571 (<https://doi.org/10.1093/jxb/erad028>).

Widiarsih, S. and Dwimahyani, I. 2023. Induced mutation on Indonesian black orchid (*Coelogyne pandurata* Lindley) in-vitro culture by gamma irradiation. *IOP Conference Series: Earth and Environmental Science* 1160: art. 012001 (<https://doi.org/10.1088/1755-1315/1160/1/012001>).

Wu, C.-H., Lai, S.-L., Chi, H.-J., Hsieh, T.-F., and Dai, T.-E. 2021. The physiological parameters of some commercial orchid cultivars, examined by response surface methodology. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 193–198. Taiwan Orchid Growers Association, Tainan City.

Yacob, S. N. and Kee, A. 2021. Effects of cooling duration on flower bud formation in *Dendrobium aphyllum*. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 232–237. Taiwan Orchid Growers Association, Tainan City.

Zhang, W., Dong, X. M., Zhang, Y. W., Fan, Z. X., and Zhang, S. B. 2023. Age-related differences in physiological and metabolic responses of *Pleione aurita* (Orchidaceae) pseudobulbs to drought stress and recovery. *Plant Physiology and Biochemistry* 197: art. 107655 (<https://doi.org/10.1016/j.plaphy.2023.107655>).

Zheng, B. Q., Li, X. Q., and Wang, Y. 2023. New insights into the mechanism of spatiotemporal scent accumulation in orchid flowers. *Plants* 12(2): art. 304 (<https://doi.org/10.3390/plants12020304>).

Pollination/Population genetics/Seed dispersal

Barlow, P. A., Dunaway, B. S., and Hill, J. G. 2023. Insect interactions of *Spiranthes magnicamporum* (Orchidaceae) in the Black Belt prairie of Mississippi. *Southeastern Naturalist* 22(1): 28–35 (<https://doi.org/10.1656/058.022.0103>).

Brzosko, E., Bajguz, A., Burzyńska, J., and Chmur, M. 2023. Does reproductive success in natural and anthropogenic populations of generalist *Epipactis helleborine* depend on flower morphology and nectar composition? *International Journal of Molecular Sciences* 24(5): art. 4276 (<https://doi.org/10.3390/ijms24054276>).

Brzosko, E., Bajguz, A., Burzyńska, J., and Chmur, M. 2023. In which way do the flower properties of the specialist orchid *Goodyera repens* meet the requirements of its generalist pollinators? *International Journal of Molecular Sciences* 24(10): art. 8602 (<https://doi.org/10.3390/ijms24108602>).

Cameron, K. M. 2023. Plant ecology: *Vanilla* lures both insects and mammals to disperse its seeds and fruits. *Current Biology* 33(2): R63–R65 (<https://doi.org/10.1016/j.cub.2022.12.012>).

Cardoso, J. C. F., Johnson, S. D., Rezende, U. C., and Oliveira, P. E. 2023. The lady's 'slippery' orchid: functions of the floral trap and aphid mimicry in a hoverfly-pollinated *Phragmipedium* species in Brazil. *Annals of botany* 131(2): 275–286 (<https://doi.org/10.1093/aob/mcac140>).

Cardoso, J. C. F., Rezende, U. C., Caetano, A. P. S., and Oliveira, P. E. 2023. Pollinators and plants as ecosystem engineers: post-dispersal fruits provide new habitats for other organisms. *Oikos*: art. e09819 (<https://doi.org/10.1111/oik.09819>) [*Cyrtopodium eugenii*].

De Angelli, N. 2023. Scorpion fly *Panorpa communis* — a fierce predator of orchid visitors. *Orchid Society of Great Britain Journal* 72(1): 31–39.

De Angelli, N. 2023. Narcotic nectar. Der berauschende Nektar von *Epipactis*. *Die Orchidee* 74(1): 14–18.

Decruse, S. W., Pillai, P. P., and Manikantan, K. 2022. Analysis of genetic diversity amongst populations of *Vanda thwaitesii* Hook.f. and *Vanda wightii* Rchb.f., two notified endangered orchids of Western Ghats, India. *Journal of the Orchid Society of India* 36: 65–73.

Duffy, K. J. 2023. Increasing density enhances pollination and fecundity in the rewarding orchid *Gymnadenia conopsea*. *Flora: Morphology, Distribution, Functional Ecology of Plants* 299: art. 152219 (<https://doi.org/10.1016/j.flora.2023.152219>).

Fardeeva, M. B. and Chizhikova, N. A. 2023. Dynamics of spatial and ontogenetic structure of *Cephalanthera rubra* (Orchidaceae) populations in the east of European Russia (Middle Volga region). *Nature Conservation Research* 8(2): 52–71 (<https://doi.org/10.24189/ncr.2023.015>).

Joffard, N., Arnal, V., Buatois, B., Schatz, B., and Montgelard, C. 2020. Floral scent evolution in the section *Pseudophrys*: Pollinator-mediated selection or phylogenetic constraints? *Plant Biology* 20(5): 881–889 (<https://doi.org/10.1111/plb.13104>).

Khapugin, A. A. and Senchugova, M. A. 2023. The age structure of a *Cypripedium guttatum* (Orchidaceae) population in the Tyumen Region, Western Siberia. *Journal of Wildlife and Biodiversity* 7(2): 35–44 (<https://doi.org/10.5281/zenodo.7178289>).

Kirillova, I. A. and Kirillov, D. V. 2022. Population structure and seed productivity of *Dactylorhiza incarnata* (L.) Soó (Orchidaceae, Liliopsida) at the northern border of its habitat. *Biology Bulletin* 49(10): 1781–1791 (<https://doi.org/10.1134/S1062359022100119>).

Kirillova, I. A. and Kirillov, D. V. 2023. *Calypso bulbosa* (Orchidaceae) on the northern border of its distribution range (Komi Republic, Russia): Population structure, fruit and seed set. *Nature Conservation Research* 8(2): 81–97 (<https://doi.org/10.24189/ncr.2023.017>).

Kirillova, I. A. and Kirillov, D. V. 2023. Reproductive success of *Dactylorhiza fuchsii* (Druce) Soó at the northern border of its distribution range. *Biology Bulletin* 50(1): 61–71 (<https://doi.org/10.1134/S1062359023010077>).

Martín-Fores, I., Bywaters, S. L., Sparrow, B., and Guerin, G. R. 2023. Orchid fruiting success is unrelated to surrounding floral resources in South Australian plant communities. *Journal of Plant Ecology* 16(2): art. rtac074 (<https://doi.org/10.1093/jpe/rtac074>).

Milet-Pinheiro, P., Pinto, C. E., Navarro, D. M. A. F., Silva, J. B. F., Brandt, K., and Ayasse, M. 2023. Floral scent chemistry and pollinators of a sexually dimorphic neotropical orchid. *Plants* 12(1): art. 17 (<https://doi.org/10.3390/plants12010017>) [*Catasetum maranhense*].

Pathak, P. and Prakash, A. 2021. Pollination biology of orchids: A case study in an endangered and medicinally important Northwestern Himalayan Indian orchid, *Cephalanthera longifolia*. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 62–66. Taiwan Orchid Growers Association, Tainan City.

Prakash, A. and Pathak, P. 2022. Bee pollination in *Calanthe tricarinata* Lindl. (Orchidaceae)—an endangered orchid from northwestern Himalayas. *Journal of the Orchid Society of India* 36: 15–20.

Ray, H. A. and Gillett-Kaufman, J. L. 2022. By land and by tree: pollinator taxa diversity of terrestrial and epiphytic orchids. *Journal of Pollination Ecology* 32: 174–185 ([https://doi.org/10.26786/1920-7603\(2022\)671](https://doi.org/10.26786/1920-7603(2022)671)).

Ren, Z. X., Grimm, W., Towle, B., Qiao, Q., Bickel, D. J., Outim, S. K. M., and Bernhardt, P. 2023. Comparative pollination ecology, fruit and seed set in *Corunastylis* species (Orchidaceae). *Plant Systematics and Evolution* 309(2): art. 7 (<https://doi.org/10.1007/s00606-023-01845-3>).

Rodrigues, J. G. and Borba, E. L. 2023. Variation in self-incompatibility and interspecific compatibility in a lineage of the mostly self-compatible genus *Bulbophyllum* (B. sect. *Micranthae*—Orchidaceae). *Plant Systematics and Evolution* 309(2): art. 9 (<https://doi.org/10.1007/s00606-023-01846-2>).

Scaccabarozzi, D., Lunau, K., Guzzetti, L., Cozzolino, S., Dyer, A. G., Tommasi, N., Biella, P., Galimberti, A., Labra, M., Bruni, I., Pattarini, G., Brundrett, M., and Gagliano, M. 2023. Mimicking orchids lure bees from afar with exaggerated ultraviolet signals. *Ecology and Evolution* 13(1): art. e9759 (<https://doi.org/10.1002/ece3.9759>) [*Diuris brumalis*].

Schatz, B., Genoud, D., Esudié, P., Geniez, P., Wüsch, K. G., and Joffard, N. 2021. Is *Ophrys* pollination more opportunistic than previously thought? Insights from different field methods of pollinator observation. *Botany Letters* 168(3): 333–347 (<https://doi.org/10.1080/23818107.2021.1959394>).

Silveira, R. S., Singer, R. B., and Ferro, V. G. 2023. Pollination in *Epidendrum densiflorum* Hook. (Orchidaceae: Laeliinae): Fraudulent trap-flowers, self-incompatibility, and a possible new type of mimicry. *Plants* 12(3): art. 679 (<https://doi.org/10.3390/plants12030679>).

Tan, K. H., Ong, P. T., and Tan, L. T. 2023. Morphology and movement of *Bulbophyllum hortorum* (Orchidaceae) flowers enable selection of optimal-sized Dacini fruit fly males as pollinators. *Arthropod-Plant Interactions*: (<https://doi.org/10.1007/s11829-023-09987-4>).

Tan, S. L., Chen, X. H., Liao, H. H., Huang, L., Xiao, H. W., Luo, H. L., Xiong, D. J., Yang, B. Y., and Ren, Z. X. 2023. Swallowtail butterflies and hawkmoths contribute equally to the pollination of *Habenaria dentata* (Orchidaceae). *Flora: Morphology, Distribution, Functional Ecology of Plants* 300: art. 152230 (<https://doi.org/10.1016/j.flora.2023.152230>).

Wallace, L. E. and Bowles, M. L. 2023. Floral and genetic divergence across environmental gradients is moderated by inter-population gene flow in *Platanthera dilatata* (Orchidaceae). *Frontiers in Ecology and Evolution* 11: art. 1085938 (<https://doi.org/10.3389/fevo.2023.1085938>).

Watteyn, C., Scaccabarozzi, D., Muys, B., Reubens, B., Ackerman, J. D., Otárola, M. F., Amador, M. F. G., and Karremans, A. P. 2023. Sweet as *Vanilla hartii*: Evidence for a nectar-rewarding pollination mechanism in *Vanilla* (Orchidaceae) flowers. *Flora: Morphology, Distribution, Functional Ecology of Plants* 303: art. 152294 (<https://doi.org/10.1016/j.flora.2023.152294>).

Wilcox, Y. 2022. Nos *Spiranthes*: leurs pollinisations et leurs hybrides. *l'Orchidophile* 53(234): 251–261.

Wu, Q., Dong, S., Zhao, Y., Yang, L., Qi, X., Ren, Z., Dong, S., and Cheng, J. 2023. Genetic diversity, population genetic structure and gene flow in the rare and endangered wild plant *Cypripedium macranthos* revealed by genotyping-by-sequencing. *BMC Plant Biology* 23(1): art. 254 (<https://doi.org/10.1186/s12870-023-04212-z>).

Zhang, Z., Li, J., Suddee, S., Bouamanivong, S., Averyanov, L. V., and Gale, S. W. 2023. Exploring island syndromes: Variable matrix permeability in *Phalaenopsis pulcherrima* (Orchidaceae), a specialist lithophyte of tropical Asian inselbergs. *Frontiers in Plant Science* 14: art. 1097113 (<https://doi.org/10.3389/fpls.2023.1097113>).

Systematics and distribution

AFRICA (excluding NORTH AFRICA, including the southern part of the ARABIAN PENINSULA)

Andriamihaja, C. F., Grisoni, M., Ramarosandratana, A. V., Vololoniaina, J., and Besse, P. 2021. Morphological and molecular differentiation in a recent monophyletic group of aphyllous *Vanilla* species from the South West Indian Ocean region: Implications for species delimitation in Madagascar. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 387–392. Taiwan Orchid Growers Association, Tainan City.

Hermans, J. and Cribb, P. J. 2021. New combinations and other taxonomic changes for the forthcoming “Flore des Mascareignes” Orchidaceae accounts. *Lankesteriana* 21(2): 61–137 (<https://doi.org/10.155517/lank.v21i2.47156>).

Pailler, T. and Baider, C. 2020. *Bulbophyllum mascarenense* Pailler and Baider sp[sic] nov.: a new endemic orchid species from the Mascarenes. *Botany Letters* 167(4): 417–423 (<https://doi.org/10.1080/23818107.2020.1817145>).

AMERICA

Archila Morales, F. L., Lipińska, M. M., Dudek, M., and Szlachetko, D. L. 2023. *Schiedeella bajaverapacensis* (Orchidaceae, Spiranthinae), a new orchid species from Guatemala. *International Journal of Molecular Sciences* 24(6): art. 5362 (<https://doi.org/10.3390/ijms24065362>).

Arista, J. P., Hágater, E., Santiago, E., Edquén, J. D., Pariente, E., Oliva, M., and Salazar, G. A. 2023. New and noteworthy species of the genus *Epidendrum* (Orchidaceae, Laeliinae) from the Área de Conservación Privada La Pampa del Burro, Amazonas, Peru. *PhytoKeys* 227: 43–87 (<https://doi.org/10.3897/phytokeys.227.101907>).

Baquero, L. E. and Mogrovejo, A. L. 2021. A new and previously misidentified species of *Trisetella* (Pleurothallidinae: Orchidaceae) from southeast Ecuador. *Lankesteriana* 21(2): 269–276 (<https://doi.org/10.155517/lank.v21i2.48007>).

Baranow, P., Szlachetko, D., and Kindlmann, P. 2023. Taxonomic revision of *Sobralia* section *Racemosae* Brieger (Sobralieae, Orchidaceae). *Frontiers in Ecology and Evolution* 10: art. 1058334 (<https://doi.org/10.3389/fevo.2022.1058334>).

Batista, J. A. N. and Valebella, G. M. 2023. A new overlooked species of *Cyrtopodium* (Cymbidiaceae, Orchidaceae) from the southern Andean Yungas and Chaco Serrano Ecoregions of northern Argentina and southwestern Bolivia. *Phytotaxa* 587(3): 283–293 (<https://doi.org/10.11646/phytotaxa.587.3.6>).

Bogarín, D., Pérez-Escobar, O. A., Pupulin, F., Smets, E., and Gravendeel, B. 2021. Evolutionary diversification of *Lepanthes* (Pleurothallidinae): A hyperdiverse neotropical orchid lineage. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 382–386. Taiwan Orchid Growers Association, Tainan City.

Chase, M. and Hermans, J. 2022. *Odontoglossum* or *Oncidium*? *Orchid Review* 130(1339): 58–63.

Da Luz Fernandes Menezes, E. 2022. *Cattleya porphyroscens*, a new species (Laeliinae) of the genus *Cattleya* is described for Minas Gerais State, Brazil. *Phytotaxa* 579(1): 61–66 (<https://doi.org/10.11646/phytotaxa.579.1.7>).

Dalström, S., Deburghgraeve, G., and Pérez, S. R. 2023. A new *Masdevallia* (Pleurothallidinae) from the Huanuco region in Peru. *Lankesteriana* 23(1): 91–95 (<https://doi.org/10.15517/lank.v23i1.54708>).

Edquén, J. D., Arista, J. P., Damián, A., and Salazar, G. A. 2023. A new species of *Liparis* (Orchidaceae, Epidendroideae, Malaxidinae) from the Bosque de Protección Alto Mayo, San Martín, Peru. *Phytokeys* 224: 89–99 (<https://doi.org/10.3897/phytokeys.224.98654>).

Feng, Z. 2023. *Aletheia*, a new replacement name for *Aenigma* (Luer) Szlach. & Kolan. (Orchidaceae, Pleurothallidinae) with new combinations. *Phytotaxa* 579(3): 228–230 (<https://doi.org/10.11646/phytotaxa.579.3.9>).

Figueroa, D. S., Zabalgoitia, A., Velázquez-Ríos, P., Muñiz-Castro, M. Á., Jiménez-Machorro, R., Guerrero-Hernández, R., and Huerta-Galván, O. 2023. A new species of *Triphora* (Orchidaceae: Triphoreae, Triphorinae) from Mexico. *Phytotaxa* 599(2): 89–99 (<https://doi.org/10.11646/phytotaxa.599.2.1>).

Filho, R. L. F. and Barberena, F. F. V. A. 2022. Orchidaceae of the municipality of Igarapé-Miri, Pará, Brazilian Amazon. *Rodriguesia* 73: art. e01432021 (<https://doi.org/10.1590/2175-7860202273103>).

Florian, C. 2022. *Brassia revoluta*, a new species *Brassia* found in culture. *OrchideenJournal* 29(3): 104–107.

Fonseca-Cortés, A., Rincón-González, M., León-Linares, J., and Salazar, G. A. 2023. *Pachygenium muyscarum* (Spiranthinae), a new overlooked species from the subxerophytic enclaves from the Eastern Range of Colombia. *Lankesteriana* 23(1): 97–108 (<https://doi.org/10.15517/lank.v23i1.53886>).

Gerlach, G. 2022. “Guter Ritt im Türkensattel”. Die Geschichte von *Acineta sella-turcica*. *OrchideenJournal* 29(3): 92–95.

Hágsater, E., Salinas, J. D., Machorro, R. J., Pío-León, J. F., and Otero, M. G. M. 2023. *Epidendrum petacaense*, a new species of Orchidaceae from Sinaloa, Mexico. *Phytotaxa* 592(2): 81–87 (<https://doi.org/10.11646/phytotaxa.592.2.1>).

Jiménez-Vázquez, A., Vega, H., Alvarado, A., and Mó, E. 2023. First record of a natural hybrid of the genus *Gongora* (Stanhopeinae) and comments on the parent species. *Lankesteriana* 23(1): 1–9 (<https://doi.org/10.15517/lank.v23i1.54261>).

Karremans, A. P. 2023. *Karma*, a new genus in the Pleurothallidinae (Orchidaceae). *Harvard Papers in Botany* 28(1): 61–69 (<https://doi.org/10.3100/hpib.v28iss1.2023.n7>).

Karremans, A. P. and Jiménez, J. E. 2023. *Pleurothallis pugio* (Orchidaceae), a new Pleurothallidinae from Costa Rica. *Phytotaxa* 599(3): 150–154 (<https://doi.org/10.11646/phytotaxa.599.3.2>).

Medina, H., Portilla, J., and Portilla, I. 2022. *Platystele* (Orchidaceae: Pleurothallidinae). Two new species from the Ecuadorian Amazon and a new record of *Platystele pyriformis* in Ecuador. *Orchids, the Bulletin of the American Orchid Society* 91(11): 854–859.

Morales, N. G., Moreno, J. S., Karremans, A. P., and Gil-Amaya, K. 2023. *Restrepia santanderensis* (Orchidaceae: Pleurothallidinae), a new species from the western slope of the eastern Andes in Colombia. *Phytotaxa* 598(4): 293–300 (<https://doi.org/10.11646/phytotaxa.598.4.3>).

Moreno, J. S., Galindo-Tarazona, R., and Tróchez, A. Z. 2023. *Lepanthes carrizosana*, a new species of *Lepanthes* (Orchidaceae: Pleurothallidinae) from the Southwestern Andes in Colombia. *Harvard Papers in Botany* 28(1): 89–92 (<https://doi.org/10.3100/hpib.v28iss1.2023.n11>).

Pace, M. C. 2023. Independent origins of *Spiranthes* × *kapnosperia* (Orchidaceae) and their nomenclatural implications. *PhytoKeys* 226: 89–100 (<https://doi.org/10.3897/phytokeys.226.100062>).

Parra-Sanchez, E. and Baquero, L. 2023. Circumscription, first confirmed locality, and conservation status of *Dracula anthracina* (Orchidaceae). *Systematic Botany* 48(2): 200–207 (<https://doi.org/10.1600/036364423X16847773873080>).

Passos Krah, D. R., Schmal, P., Chiron, G., Da Silva, J. B. F., Krah, A. H., and De Castro Cantuária, P. 2023. *Catasetum* × *grasineideae* (Orchidaceae: Catasetinae), a new nothospecies from Brazilian Amazon and taxonomic notes for the genus. *Phytotaxa* 594(2): 89–104 (<https://doi.org/10.11646/phytotaxa.594.2.1>).

Ponert, J., Trávníček, P., and Chumová, Z. 2023. Phylogenetic placement of *Specklinia ordinata* in *Madisonia* (Pleurothallidinae, Orchidaceae). *Phytotaxa* 585(2): 161–166 (<https://doi.org/10.11646/phytotaxa.585.2.7>).

Pupulin, F., Álvarez-Alcázar, L., and Bogarín, D. 2022. A just overtime discovery: another new species of *Echinosepala* (Orchidaceae) from Costa Rica. *Blumea* 67(2): 109–112 (<https://doi.org/10.3767/blumea.2022.67.02.03>).

Reina-Rodríguez, G. A., Bogarín, D., Hernandez, Y., Nicholls-Giraldo, I., and Pérez-Escobar, O. A. 2023. A new *Ophidion* (Orchidaceae, Pleurothallidinae) from the Pacific lowlands of Colombia and the unresolved phylogenetic position of *Phloeophila* s.l. *Systematics and Biodiversity* 21(1): art. 2160504 (<https://doi.org/10.1080/14772000.2022.2160504>).

Sambin, A. and Aucourd, M. 2023. *Anathallis* & *Lankesteriana* (Orchidaceae, Pleurothallidinae) de Guyane. Révision taxinomique avec quatre nouvelles espèces et une nouvelle occurrence. *Richardiana*, nouv. sér. 7: 1–77 (<https://richardiana.jardinbotaniquedeguyane.com/wp-content/uploads/2023/02/Anathallis-Lankesteriana-SambinAucourd-2023.pdf>).

Sambin, A. and Aucourd, M. 2023. Extension géographique de *Lepanthes ravetii* & *Lepanthes cremersii* (Orchidaceae-Pleurothallidinae) au Brésil et preuves additionnelles de la présence potentielle de *Lepanthes cercion* en Guyane. *Richardiana*, nouv. sér. 7: 103–131 (<https://richardiana.jardinbotaniquedeguyane.com/wp-content/uploads/2023/03/Lepanthes-de-Guyane.pdf>).

Sambin, A. and Aucourd, M. 2023. *Kegeliella houtteana* (Orchidaceae, Stanhopeinae) et espèces apparentées. Analyse critique des confusions spécifiques dans le genre. *Richardiana*, nouv. sér. 7: 144–179 (<https://richardiana.jardinbotaniquedeguyane.com/wp-content/uploads/2023/06/Kegeliella-houtteana-et-especes-apparentees.pdf>).

Senger, I. and Senger, G. 2022. *Sigmatostalix* oder *Oncidium*? Geschichte, Systematik, Sortiment und Kultur einer Gattung aus der Subtribus Oncidiinae. *OrchideenJournal* 29(3): 124–131.

Senger, I. and Senger, G. 2022. *Sigmatostalix* oder *Oncidium*? Geschichte, Systematik, Sortiment und Kultur einer Gattung aus der Subtribus Oncidiinae. Teil 2. *OrchideenJournal* 29(4): 141–150.

Senger, I. and Senger, G. 2022. *Sigmatostalix* oder *Oncidium*? Geschichte, Systematik, Sortiment und Kultur einer Gattung aus der Subtribus Oncidiinae. Teil 3. *OrchideenJournal* 30(1): 27–37.

Sierra-Ariza, M. A. 2023. Two new species of *Pleurothallis* (Pleurothallidinae) subsection *Macrophyllae-Fasciculatae* from the central Andes of Colombia. *Lankesteriana* 23(1): 35–44 (<https://doi.org/10.15517/lank.v23i1.54321>).

Sierra-Ariza, M. A., Alvarez-Diaz, J. A., and Moreno, J. S. 2023. A new species of *Bulbophyllum* (Orchidaceae) from the Andean region of Colombia. *Harvard Papers in Botany* 28(1): 129–135 (<https://doi.org/10.3100/hpib.v28iss1.2023.n16>).

Vierling, G. 2022. Beschreibung zweier neuer Arten: *Restrepia divaricata* und *Restrepia extensa*. *OrchideenJournal* 29(3): 120–124.

Vierling, G. 2022. Beschreibung dreier neuer Arten: *Restrepia fistulosa*, *Restrepia tenebricosa* und *Scaphosepalum duplex*. *OrchideenJournal* 29(4): 151–157.

Vierling, G. 2022. Fünf neue Taxa aus verschiedenen Gattungen der Subtribus Pleurothallidinae. *Die Orchidee* 73(6): 476–486 [*Dresslerella*, *Dryadella*, *Scaphosepalum*, *Trisetella*].

Vierling, G. 2023. Beschreibung zweier neuer Arten: *Scaphosepalum globiflorum* und *Trisetella clavigera*. *OrchideenJournal* 30(1): 16–20.

ASIA - PACIFIC (excluding the MIDDLE EAST, AUSTRALIA, and NEW ZEALAND)

Ahmed, M. and Dhiman, M. 2023. *Cyrtosia falconeri* (Hook.f.) Aver. (Orchidaceae): an addition to the flora of Jammu & Kashmir, India. *Journal of Threatened Taxa* 15(3): 22916–22919 (<https://doi.org/10.11609/jott.7917.15.3.22916-22919>).

Ahmed, M., Dhiman, M., and Bagri, A. S. 2022. *Nervilia mackinnonii* (Duthie) Schltr. (Orchidaceae): A new record from Jammu and Kashmir, India. *Nelumbo* 64(2): 236–238 (<https://doi.org/10.20324/nelumbo/v64/2022/168851>).

Averyanov, L. V., Nguyen, V. C., Truong, B. V., Nguyen, K. S., Nguyen, C. H., Maisak, T. V., Doan, N. T., Nguyen, T. H., Pham, V. T., Dat, P. T. Thanh, Thai, T. H., Nguyen, V. K., and Trinh, N. B. 2023. New orchids in the flora of Vietnam VI (Orchidaceae, tribes Arethuseae, Cymbidieae, Diurideae, Epidendreae, Vandaeae, and Vanilleae). *Phytotaxa* 597(2): 87–110 (<https://doi.org/10.11646/phytotaxa.597.2.1>).

Baishnab, B., Paul, S., Banik, B., Chowdhury, A. K., and Datta, B. K. 2022. Eight new additions to the Orchid flora of Tripura, NE India. *Nelumbo* 64(2): 210–219 (<https://doi.org/10.20324/nelumbo/v64/2022/166851>).

Besi, E. E., Paul, A., Punga, R. S., and Go, R. 2021. Noteworthy orchids of conservation significance from Ba'kelalan, Sarawak, Borneo. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 157–162. Taiwan Orchid Growers Association, Tainan City.

Bhattacharjee, A., Agrawala, D. K., Jalal, J. S., and Deori, C. 2022. Three new synonyms in *Gastrochilus* (Orchidaceae) with notes on typification of *Gastrochilus calceolaris* and misreport of *Gastrochilus changjiangensis* from India. *Botany Letters* 169(1): 106–118 (<https://doi.org/10.1080/23818107.2021.2000889>).

Bhattacharjee, A., Tsering, J., M.R., R. L., Banu, F., and Kumar, A. 2023. Elucidating taxonomic status of *Goodyera medogensis* (Orchidaceae) based on morpho-molecular data. *Phytotaxa* 592(2): 209–218 (<https://doi.org/10.11646/phytotaxa.595.2.7>).

Bhattacharjee, A., Tsering, J., and Rinya, K. 2022. On the first authentic report of *Goodyera alveolata* (Orchidaceae) from India. *Nelumbo* 64(2): 187–191 (<https://doi.org/10.20324/nelumbo/v64/2022/172526>).

Cahyanto, T., Rosma, T., Zulkarnaen, D., Efendi, M., Fadillah, A., and Kulsum, Y. 2023. Notes on terrestrial orchids in Mount Burangrang Nature Reserve, West Java. *AIP Conference Proceedings* 2646: art. 020010 (<https://doi.org/10.1063/5.0114489>).

Chaitra, H. P., Nataraj, S. K., and Satish, K. M. 2021. Studies on diversity and conservation of wild orchids of Western Ghats. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 84–89. Taiwan Orchid Growers Association, Tainan City.

Chantanaorrapint, S., Chantanaorrapint, A., and Suddee, S. 2023. *Taeniophyllum rudolfii* (Orchidaceae), a new species record for Thailand with a note on its typification. *Thai Forest Bulletin* 51(1): 45–48 (<https://doi.org/10.20531/tfb.2023.51.1.06>).

Chen, Z.-H., Zhang, Z.-Y., Song, X.-Q., and Zhang, Z. 2023. *Gastrodia bawanglingensis* (Orchidaceae, Epidendroideae), a new species from Hainan Island, China. *PhytoKeys* 220: 39–50 (<https://doi.org/10.3897/phytokeys.220.95137>).

Chowlu, K., Bhattacharjee, A., and Rao, A. N. 2023. Endangered plant from India, *Anoectochilus medogensis* (Orchidaceae). *The Journal of Japanese Botany* 98(2): 82–85 (<https://doi.org/10.51033/jjapbot.ID0056>).

Dang, M. Q., Averyanov, L. V., Maisak, T. V., Nguyen, Q. B., Bui, V. H., Tu, B. N., Nguyen, V. C., and Truong, B. V. 2023. *Bulbophyllum sondangii* (Orchidaceae), a new species from Da Lat Plateau, southern Vietnam. *Phytotaxa* 589(2): 203–208 (<https://doi.org/10.11646/phytotaxa.589.2.8>).

Distor, J. O., Sales, M. R. M. I., and Pagana, M. A. 2021. Preliminary inventory of native orchid species in Mt. Daraitan, Tanay, Rizal. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 138–141. Taiwan Orchid Growers Association, Tainan City.

Geiger, D. L. 2021. Studies in *Oberonia*, 9: lessons from excess names in *Oberonia* for Orchidaceae systematics, including a revision of the *Oberonia* sect. *Scytoxiphium*. *Lankesteriana* 21(2): 139–156 (<https://doi.org/10.155517/lank.v21i2.47245>).

Geiger, D. L. 2023. Studies in *Oberonia* 11: The genus *Hippeophyllum* reduced to *Oberonia*, with ten new synonyms of *Oberonia scortechinii* (Orchidaceae: Malaxideae). *Gardens' Bulletin Singapore* 75(1): 129–148 ([https://doi.org/10.26492/gbs75\(1\).2023-10](https://doi.org/10.26492/gbs75(1).2023-10)).

Gogoi, K. 2023. Rediscovery of *Calanthe nana* (Orchidaceae) and new addition to the flora of Assam. *Richardiana, nouv. sér.* 7: 133–139 (<https://richardiana.jardinbotaniquedeguyane.com/wp-content/uploads/2023/05/Calanthe-nana.pdf>).

Gogoi, K., Chowlu, K., and Jalal, J. S. 2023. The genus *Nervilia* (Orchidaceae) in Arunachal Pradesh (India) with a new addition for the flora of this state. *Richardiana, nouv. sér.* 7: 78–102 (<https://richardiana.jardinbotaniquedeguyane.com/wp-content/uploads/2023/03/Nervilia-in-Arunachal-Pradesh.pdf>).

Gogoi, K. and Gogoi, A. R. 2023. *Bulbophyllum propinquum* Kraenzlin (Orchidaceae) a new addition to the flora of Assam (India). *Pleione* 17(1): 111–116 (<https://doi.org/10.26679/Pleione.17.1.2023.111-116>).

Gogoi, K., Gogoi, A. R., and Chowlu, K. 2023. Two new additions to the orchid flora of Arunachal Pradesh, India. *Pleione* 17(1): 104–110 (<https://doi.org/10.26679/Pleione.17.1.2023.104-110>) [*Ceratostylis radiata*, *Stereochilus laxus*].

Gogoi, K. and Hondiqui, R. 2023. *Trachoma rhopalorrhachis* (Rchb.f.) Garay (Orchidaceae: Epidendroideae: Vandeae: Aeridinae), a new addition to the flora of India. *Pleione* 17(1): 95–99 (<https://doi.org/10.26679/Pleione.17.1.2023.095-099>).

Gopallawa, B., Perera, A., Madola, I., Yakandawala, D., Kumar, P., Jayawickrama, H., and Chase, M. W. 2023. *Gastrodia pushparaga* (Orchidaceae, Epidendroideae, Gastrodieae), a new species from Sri Lanka. *Phytotaxa* 587(2): 193–199 (<https://doi.org/10.11646/phytotaxa.587.2.8>).

Gruss, O., Saputra, R., and Juswara, L. 2022. A new synonym of the endangered species *Paphiopedilum papuanum* (Orchidaceae). *Telopea* 25: 319–321 (<https://doi.org/10.7751/telepea16282>).

Gruss, O., Tuan, N. H., and Canh [‘Cahn’], C. X. 2022. *Phalaenopsis hygrochila* forma *flava*. Eine neue Farbform aus Vietnam. *OrchideenJournal* 29(3): 116–120.

Gyeltshen, P., Rabgay, K., Tobgay, K., Gyeltshen, C., Sangay, K., Chenchu, Tenzin, K., Phuentsho, and Kumar, P. 2023. Two new species of *Bulbophyllum* from Bhutan. *Lankesteriana* 23(1): 109–120 (<https://doi.org/10.15517/lank.v23i1.54911>).

Hasibuan, M. W., Santoso, J., Mulyanto, B., Cahyo, Y. I. D., Kafiari, K. M., Hamidi, A., Schuiteman, A., Jennings, L., Heatubun, C. D., Wanma, J. F., Oruw, D. J., Arifin, H., and Suratman, D. 2023. The rediscovery of *Dendrobium azureum* on Waigeo Island, Indonesia. *Malesian Orchid Journal* 26: 95–105.

Jayanthi, J. and Jalal, J. S. 2023. A checklist to the orchids of Biligiri Rangaswamy Temple Tiger Reserve, Western Ghats, India. *Lankesteriana* 23(1): 45–79 (<https://doi.org/10.15517/lank.v23i1.54573>).

Jiang, H., Cheng, Y. H., Liu, G. Y., Jin, S. L., Mutie, F. M., Peng, S., Yang, J. X., Ding, S. X., Tian, J., Hu, G. W., and Wang, Q. F. 2023. *Bulbophyllum wolongense*, a new Orchidaceae species from Sichuan Province in China, and its plastome comparative analysis. *Ecosystem Health and Sustainability* 9: art. 0072 (<https://doi.org/10.34133/ehs.0072>).

Lee, C. T., Wu, J. H., Wang, Y. Q., and Hsieh, S. I. 2023. *Gastrochilus yehii* sp. nov. (Orchidaceae) from Taiwan. *Phytotaxa* 587(1): 53–58 (<https://doi.org/10.11646/phytotaxa.587.1.7>).

Lei, J.-J., Zhang, X., and Jin, X.-H. 2023. *Neottia milinensis* (Orchidaceae: Neottieae), a new species from Xizang, China. *Phytotaxa* 589(2): 112–118 (<https://doi.org/10.11646/phytotaxa.589.2.2>).

Li, M., Pang, S., Deng, J., Chen, X., Wang, W., Tang, L., Luo, Y., and Xing, Z. 2023. Additions to the orchid flora of China and taxonomic notes on orchids of Eastern Himalaya region. *Taiwania* 68(1): 106–115 (<https://doi.org/10.6165/tai.2023.68.106>).

Li, M., Tang, L., Deng, J., Tang, H., Shao, S., Xing, Z., and Luo, Y. 2023. Comparative chloroplast genomics of three species of *Bulbophyllum* section *Cirrhopetalum* (Orchidaceae), with an emphasis on the description of a new species from Eastern Himalaya. *PeerJ* 11: art. e14721 (<https://doi.org/10.7717/peerj.14721>).

Li, M.-K., Chen, X.-D., Pang, S.-S., Deng, J.-P., Wang, W., Luo, Y., and Xing, Z. 2023. *Bulbophyllum basiflorum* (Orchidaceae), a new species from southeastern Xizang, China. *Taiwania* 68(2): 143–147 (<https://doi.org/10.6165/tai.2023.68.143>).

- Li, Y., Ma, L., Liu, D. K., Zhao, X. W., Zhang, D., Ke, S., Chen, G. Z., Zheng, Q., Liu, Z. J., and Lan, S. 2023. *Apostasia fujianica* (Apostasioideae, Orchidaceae), a new Chinese species: evidence from morphological, genome size and molecular analyses. *Phytotaxa* 583(3): 277–284 (<https://doi.org/10.11646/phytotaxa.583.3.6>).
- Ling, C. Y. 2021. Conservation of wild orchids in Sarawak: A decade of study and way to go forward. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 163–167. Taiwan Orchid Growers Association, Tainan City.
- Ling, C. Y. and Leong, P. K. F. 2023. A new *Dendrobium* species (sect. *Aporum*) from Sarawak, Borneo. *Malesian Orchid Journal* 26: 21–26.
- Liu, Q., Wu, X., Xing, H., Chi, K., Wang, W., Song, L., and Xing, X. 2023. Orchid diversity and distribution pattern in karst forests in eastern Yunnan Province, China. *Forest Ecosystems* 10: art. 100117 (<https://doi.org/10.1016/j.fecs.2023.100117>).
- Liu, Q., Wu, X.-F., Zhou, S.-S., Li, J.-W., and Jin, X.-H. 2023. New species and record of *Gastrochilus* (Orchidaceae, Aeridinae) from China and Laos. *Phytotaxa* 585(3): 210–224 (<https://doi.org/10.11646/phytotaxa.585.3.3>).
- Liu, X.-J. and Sun, X.-G. 2023. *Liparis tianchiensis* (Orchidaceae), a new species from Gansu, China. *PhytoKeys* 219: 27–33 (<https://doi.org/10.3897/phytokeys.219.90351>).
- Irawati and Partomihardjo, T. 2021. The orchid migration in the Krakatau Island. In: Wang, Y.-T., Chang, Y.-C. A., Lee, Y.-I., Chen, F.-C., and Tsai, W.-C. (eds.), *Proceedings of the 2021 Virtual World Orchid Conference*, pp. 244–249. Taiwan Orchid Growers Association, Tainan City.
- Ma, C.-B., Wang, H.-C., Deng, T., Lin, P.-C., and Jin, X.-H. 2023. A new species of *Habenaria* (Orchidaceae, Orchideae) from Qinghai Province, China. *Phytotaxa* 583(3): 260–268 (<https://doi.org/10.11646/phytotaxa.583.3.4>).
- Makanur, N. S. and Kotresha, K. 2022. *Geodorum laxiflorum* Griff. (Orchidaceae): A new addition to flora of Karnataka, India. *Nelumbo* 64(2): 252–254 (<https://doi.org/10.20324/nelumbo/v64/2022/172122>).
- Malek, A.-A. A. and Ong, P. T. 2023. *Crepidium oculus-draconis* (Orchidaceae: Malaxidinae), a new species from Peninsular Malaysia and Sumatra. *Malesian Orchid Journal* 26: 27–36.
- Mathew, J., Salim Pichan, M., and Mathew, M. J. 2022. Rare and endemic orchids of Agasthyamala Biosphere Reserve, South Western Ghats, India. In: Dellasala, D. A. & Goldstein, M. I. (eds.), *Imperiled: The Encyclopedia of Conservation: Volume 1–3*: 683–723. Elsevier. (<https://doi.org/10.1016/B978-0-12-821139-7.00151-3>).
- Mittrach, U. 2022. Der *Paphiopedilum bullenianum*-Komplex. *OrchideenJournal* 29(3): 106–112.

Nayak, S., Agrawala, D. K., Jalal, J. S., Maity, D., and Choudhury, S. 2022. Exclusion of two *Bulbophyllum* species from orchid flora of India. *Nelumbo* 64(2): 192–198 (<https://doi.org/10.20324/nelumbo/v64/2022/172589>).

Nguyen, V. C., Averyanov, L. V., Maisak, T. V., Nguyen, T. L. T., Nguyen, V. K., Pham, T. T. D., Nguyen, D. D., Dang, V. S., Aromyen, W., and Truong, B. V. 2023. The review of *Bulbophyllum* section *Tripudianthes* (Orchidaceae) in the flora of Vietnam with the description of new species, *B. viridipallidum*. *Phytotaxa* 598(1): 59–68 (<https://doi.org/10.11646/phytotaxa.598.1.4>).

Niissalo, M. A., Leong, P. K. F., Tay, F. E. L., Choo, L. M., Kurzweil, H., and Khew, G. S. 2023. A new species of *Claderia* (Orchidaceae). *Gardens' Bulletin Singapore* 75(1): 21–41 ([https://doi.org/10.26492/gbs75\(1\).2023-02](https://doi.org/10.26492/gbs75(1).2023-02)).

Nordin, F. A., Raffi, A., Go, R., Seok Yien Yong, C., Saibeh, K., and Othman, A. S. 2023. Morphological systematics of *Spathoglottis* Blume (Orchidaceae: Collabieae) in Peninsular Malaysia and Borneo. *Forests* 14(5): art. 940 (<https://doi.org/10.3390/f14050940>).

Nyorak, J. 2023. Orchid flora of Arunachal Pradesh (India)—A compilation. *Pleione* 17(1): 50–81 (<https://doi.org/10.26679/Pleione.17.1.2023.050-081>).

Ong, P. T. 2023. A revision of *Vanda* in Peninsular Malaysia. *Malesian Orchid Journal* 26: 9–19.

Ong, P. T. 2023. A revision of *Thelasis* in Peninsular Malaysia. *Malesian Orchid Journal* 26: 57–78.

Ong, P. T. 2023. A revision of *Renanthera* in Peninsular Malaysia. *Malesian Orchid Journal* 26: 79–94.

Ong, P. T., Malek, A.-A. A., and Kiew, R. 2023. *Didymoplexis flexipes*, a new orchid record for Peninsular Malaysia from Fraser's Hill, Pahang. *Malesian Orchid Journal* 26: 51–56.

Ong, P. T. and Metusala, D. 2023. *Dendrobium obrienianum* Kraenzl. (section *Pedilonum*)—Reintroduction of an old taxon in cultivation. *Malesian Orchid Journal* 26: 107–115.

Ong, P. T. and Schuiteman, A. 2023. A new subspecies of *Liparis viridiflora* from the limestone hills of Peninsular Malaysia. *Malesian Orchid Journal* 26: 43–49.

Ormerod, P. and Juswara, L. 2023. Notes on some Malesian Orchidaceae V. *Harvard Papers in Botany* 28(1): 93–98 (<https://doi.org/10.3100/hpib.v28iss1.2023.n12>) [*Calanthe*, *Coelogyne*, *Dendrobium*, *Didymoplexis*, *Pinalia*].

Pal, R., Ngangom, N. M., Bhusal, A., Kalaivanan, N. S., Bharath, K. A., Biswas, S. S., and Agrawala, D. K. 2022. New locations of occurrence of *Bulbophyllum jejosephii* J.J. Verm., Schuit. & de Vogel—an endemic and endangered orchid of India. *Nelumbo* 64(2): 272–275 (<https://doi.org/10.20324/nelumbo/v64/2022/167055>).

Phonepaseuth, P., Souvannakhoummane, K., Xayyasith, S., Keovongsy, C., Soulida, K., and Souladeth, P. 2023. Two new distribution records of *Dendrobium* (Orchidaceae), with an updated checklist of *Dendrobium* for Laos. *Thai Forest Bulletin* 51(1): 24–35 (<https://doi.org/10.20531/tfb.2023.51.1.04>).

Pradhan, D. K. and Maity, D. 2023. Lectotypification of *Goodyera dongchenii* (Orchidaceae). *Richardiana*, nouv. sér. 7: 140–143 (<https://richardiana.jardinbotaniquedeguyane.com/wp-content/uploads/2023/06/Lectotypification-of-Goodyera-dongchenii.pdf>).

Prasad, K. 2023. The genus *Platanthera* (Orchidaceae) in India with two new species. *Rheedea* 33(2): 31–52 (<https://doi.org/10.22244/rheedea.2023.33.02.01>).

Rajasekar, C., Aazhivaendhan, G., Rajendran, R., Kumar, T. S., and Kottaimuthu, R. 2022. *Schoenorchis manilaliana* M.Kumar & Sequiera (Orchidaceae): A new record for Orchidaceae of Tamil Nadu, India. *Plant Science Today* 9: 19–20 (<https://doi.org/10.14719/pst.1614>).

Rao, A. N. 2022. Monopodial orchids in India—An update. *Journal of the Orchid Society of India* 36: 75–90.

Raskoti, B. B. and Ale, R. 2023. A new variety of *Habenaria* (Orchidaceae; Orchideae; Habenariinae) and new records of orchids from Nepal. *Taiwania* 68(1): 122–128 (<https://doi.org/10.6165/tai.2023.68.122>).

Roy, A. K. 2022. Intraspecific variations in floral morphology of *Luisia trichorrhiza* (W. J. Hook.) Bl. from foot-hills of eastern Himalaya, in West Bengal, India. *Journal of the Orchid Society of India* 36: 103–106.

Saadi, S. M. A. I., Sinha, S., Islam, S. R., Tripathi, S., Hossain, M. S., and Mondal, A. K. 2022. *Tropidia curculigoides* Lindl.—A rare terrestrial orchid from the Lower Gangetic Plains of West Bengal, India. *Journal of the Orchid Society of India* 36: 131–136.

Sahana, V., Sringswara, A., Manjunath, B., and Shashidhar, S. 2023. New distributional record of a narrow endemic orchid *Cleisostomopsis salimii* (J.Mathew, Hrideek, V.B. Sreek. & K.Madhus.) A.N.Rao from Western Ghats of Karnataka, India. *Species* 24: art. e27s1027.

Saputra, R., Mustaqim, W. A., Champion, J., and Schuiteman, A. 2023. *Bulbophyllum wiratnoi* (Orchidaceae), a new species of section *Epicrianthes* from Indonesian New Guinea. *Phytotaxa* 589(3): 283–288 (<https://doi.org/10.11646/phytotaxa.589.3.7>).

Saputra, R., Schuiteman, A., Metusala, D., and Heatubun, C. D. 2023. *Bulbophyllum whitteniorum* (Orchidaceae), a new species of section *Schistopetalum* from a karst region in the Bird's Head Peninsula, Indonesian New Guinea. *Malesian Orchid Journal* 26: 37–42.

Sarkar, S., Agrawala, D. K., Chakraborty, S., Maity, D., and Choudhury, S. 2022. Two new additions to the orchid flora of Mizoram, India. *Nelumbo* 64(2): 255–258 (<https://doi.org/10.20324/nelumbo/v64/2022/172594>) [*Acanthephippium striatum*, *Phreatia elegans*].

Schuiteman, A., Mustaqim, W. A., and Wanma, J. F. 2023. *Dendrobium parnatatum* (Orchidaceae), a new record from the Arfak Mountains, Papua Barat Province. *Malesian Orchid Journal* 26: 5–7.

Schuiteman, A., Vermeulen, J. J., Want, T., and Lambkin, D. 2023. *Bulbophyllum polliculosum* Seidenf[sic]: Orchidaceae. *Curtis's Botanical Magazine* 40(1): 15–23 (<https://doi.org/10.1111/curt.12491>).

Sengupta, S., Agrawala, D. K., Bhattacharjee, A., Deori, C., Maity, D., and Choudhury, S. 2022. Notes on the correct identity of *Phalaenopsis arunachalensis* (Orchidaceae). *Nelumbo* 64(2): 177–180 (<https://doi.org/10.20324/nelumbo/v64/2022/172161>).

Shi, X.-L., Kang, Y., Liu, Y.-Y., Tu, S., Peng, H.-J., Liu, Z.-J., and Peng, D.-H. 2023. *Malaxis henanensis* (Orchidaceae, Malaxideae), a new species from China. *Phytotaxa* 589(3): 293–295 (<https://doi.org/10.11646/phytotaxa.589.3.9>).

Shreyas, B. and Kotresha, K. 2022. *Luisia trichorrhiza* (Orchidaceae-Vandaeae): A new addition to Karnataka, India. *Nelumbo* 64(2): 242–244 (<https://doi.org/10.20324/nelumbo/v64/2022/169696>).

Shreyas, B. and Kotresha, K. 2023. Does *Habenaria hollandiana* Santapau (Orchidaceae) exists[sic]? *Species* 24: art. e45s1540.

Suetsugu, K., Aoki, R., and Kaneko, S. 2023. Resurrection and emended description of *Gastrodia foetida* (Orchidaceae). *Phytotaxa* 583(3): 251–259 (<https://doi.org/10.11646/phytotaxa.583.3.3>).

Suetsugu, K., Hirota, S. K., and Suyama, Y. 2023. *Spiranthes minamitaniana* (Orchidaceae), a new orchid species from Japan based on morphological and phylogenetic data. *Phytotaxa* 599(3): 139–149 (<https://doi.org/10.11646/phytotaxa.599.3.1>).

Suetsugu, K. and Hsu, T.-C. 2023. Resurrection and lectotypification of *Taeniophyllum aphyllum* (Orchidaceae). *Acta Phytotaxonomica et Geobotanica* 74(1): 39–45 (<https://doi.org/10.18942/apg.202302>).

Sulaiman, M. and Kiruthika, K. 2022. Type designation of five Lindley's names in the genus *Habenaria* (Orchidaceae). *Plant Science Today* 9(1): 46–49 (<https://doi.org/10.14719/pst.1706>).

Sulaiman, M., Murugesan, M., and Murugan, C. 2022. *Pteroceras viridiflorum* (Orchidaceae: Vandaeae): A Sri Lankan species reported from India and a review of *Proteroceras holtumii*, Western Ghats, India. *Nelumbo* 64(2): 181–186 (<https://doi.org/10.20324/nelumbo/v64/2022/172427>).

Sumbembayev, A. A., Nowak, S., Burzacka-Hinz, A., Kosiróg-Ceynowa, A., and Szlachetko, D. L. 2023. New and noteworthy taxa of the genus *Dactylorhiza* Necker ex Nevski (Orchidaceae Juss.) in Kazakhstan flora and its response to global warming. *Diversity* 15(3): art. 369 (<https://doi.org/10.3390/d15030369>).

Tandang, D. N., Docot, R. V. A., Galindon, J. M., Jr., T. R., Tadosa, E. R., Tandang, S. D. A., Moran, C. B., and Bustamante, R. A. A. 2023. *Corybas hamiguitanensis* (Orchidaceae), a new species from a UNESCO world heritage site in the Philippines. *Phytotaxa* 598(1): 80–88 (<https://doi.org/10.11646/phytotaxa.598.1.6>).

Toolmal, N., Suddee, S., Culham, A., Utteridge, T. M. A., and Schuiteman, A. 2023. Taxonomic notes on *Thrixspermum* (Orchidaceae: Aeridinae), with five new species from Thailand. *Phytotaxa* 601(3): 203–226 (<https://doi.org/10.11646/phytotaxa.601.3.3>).

Uddin, M. S., Mazumder, A.-A.-M., and Uddin, S. B. 2023. Addition of one hundred and forty-seven new vascular taxa to the flora of Bangladesh. *Species 24*: art. e13s1013 [22 Orchidaceae spp.].

Vazhov, S. V., Matsyura, A. V., Rusanov, G. G., Vazhov, V. M., and Shtekhman, A. I. 2022. New habitats of three rare orchid species in the Altai Republic (upper Biya River basin). *Acta Biologica Sibirica* 8: 821–829 (<https://doi.org/10.14258/abs.v8.e51>).

Vo, D. T., Averyanov, L. V., Maisak, T. V., Dang, M. Q., Dang, V. S., Nguyen, Q. B., Nguyen, V. C., Truong, Q. T., and Truong, B. V. 2023. A new orchid species, *Coelogyne lecongkietii* (C. sect. *Panisea*) from Da Lat Plateau, southern Vietnam. *Kew Bulletin* 78(2): 197–201 (<https://doi.org/10.1007/s12225-023-10078-Z>).

Wen, Y.-Y., Ma, C.-B., Zhang, T.-K., Wang, X.-L., Chen, W.-S., Yang, B.-Y., and Jin, X.-H. 2023. *Chiloschista densiflora* (Orchidaceae), a distinctive species newly recorded from Xizang, China. *Phytotaxa* 589(1): 68–72 (<https://doi.org/10.11646/phytotaxa.589.1.6>).

Zou, Y., Liu, Z., Deng, L., Lee, S. Y., Suetsugu, K., and Liao, W. 2022. New records of *Yoania* (Orchidaceae) from the Luoxiao Range, China, and notes on the systematics and floristic significance of *Yoania*. *Acta Phytotaxonomica et Geobotanica* 73(3): 233–238 (<https://doi.org/10.18942/apg.202212>).

AUSTRALIA & NEW ZEALAND

Barrett, R. L., Barrett, M. D., and Clements, M. A. 2022. A revision of Orchidaceae from the Kimberley region of Western Australia with new species of tropical *Calochilus* and *Dipodium*. *Telopea* 25: 203–270 (<https://doi.org/10.7751/telopea15711>).

Renner, M. A. M., Towle, B., and Weston, P. 2022. Two new species of *Genoplesium* R.Br. sensu lato (Orchidaceae: Prasophyllinae) from the Central Coast of New South Wales. *Telopea* 25: 285–299 (<https://doi.org/10.7751/telopea15648>).

EUROPE, NORTH AFRICA & THE MIDDLE EAST (excluding the southern part of the ARABIAN PENINSULA)

Anghelescu, N. E., Balogh, M., Balogh, L., Kigyossy, N., Georgescu, M. I., Petra, S. A., Toma, F., and Peticilă, A. G. 2023. *Epipactis bucegensis*—A separate autogamous species within the *E. helleborine* alliance. *Plants* 12(9): art. 1761 (<https://doi.org/10.3390/plants12091761>).

Bateman, R. M. 2021. Phenotypic versus genotypic disparity in the Eurasian orchid genus *Gymnadenia*: Exploring the limits of phylogeny reconstruction. *Systematics and Biodiversity* 19(4): 400–422 (<https://doi.org/10.1080/14772000.2021.1877845>).

Bateman, R. M., Denholm, I., Mcleod, L., Craig, W., and Ennos, R. A. 2023. Systematic reappraisal of marsh-orchids native to Scotland. *Kew Bulletin* 78(2): 107–131 (<https://doi.org/10.1007/s12225-023-10080-5>) [*Dactylorhiza*].

Bateman, R. M. and Rudall, P. J. 2023. Morphological continua make poor species: Genus-wide morphometric survey of the European bee orchids (*Ophrys* L.). *Biology* 12: art. 136 (<https://doi.org/10.3390/biology12010136>).

Bateman, R. M., Rudall, P. J., and Denholm, I. 2021. In situ morphometric survey elucidates the evolutionary systematics of the orchid genus *Gymnadenia* in the British Isles. *Systematics and Biodiversity* 19(6): 571–600 (<https://doi.org/10.1080/14772000.2021.1877848>).

Bertrand, J., Baguette, M. N., and Schatz, B. 2021. Challenges inherent in the systematics and taxonomy of genera that have recently experienced explosive radiation: The case of orchids of the genus *Ophrys*. In: Grandcolas, P. and Maurel, M.-C. (eds.), *Systematics and the Exploration of Life*, pp. 113–134. Wiley/Iste, New York.

Calevo, J., Christenhusz, M. J. M., and Fay, M. F. 2023. A taxonomic overview of *Orchis* sect. *Robustocalcare* (Orchidaceae). *Phytotaxa* 592(2): 157–162 (<https://doi.org/10.11646/phytotaxa.592.2.10>).

Calevo, J., Gargiulo, R., Bersweden, L., Viruel, J., González-Montelongo, C., Rebbas, K., Boutabia, L., and Fay, M. F. 2021. Molecular evidence of species- and subspecies-level distinctions in the rare *Orchis patens* s.l. and implications for conservation. *Biodiversity and Conservation* 30: 1293–1314 (<https://doi.org/10.1007/s10531-021-02142-6>).

De Angelli, N. 2022. Les orchidées de Roumanie. *l'Orchidophile* 53(234): 235–246.

Djordjević, V., Ačić, S., Kabaš, E., Lazarević, P., Tsiftsis, S., and Lakušić, D. 2023. The orchids of wetland vegetation in the central Balkans. *Diversity* 15(1): art. 26 (<https://doi.org/10.3390/d15010026>).

Djordjević, V., Lazarević, P., Stanković, V., and Kabaš, E. 2023. *Epipactis exilis* (Orchidaceae), a species new to the flora of Serbia. *Phyton—Annales Rei Botanicae* 62–63: 29–35 (<https://doi.org/10.12905/0380.phyton62-63-2023-0029>).

Fateryga, V. V., Svirin, S. A., and Fateryga, A. V. 2023. On the presence of *Cephalanthera caucasica* (Orchidaceae) in Russia: rediscovery of a threatened orchid in the republic of Dagestan. *Nature Conservation Research* 8(2): 44–51 (<https://doi.org/10.24189/ncr.2023.014>).

Kreutz, C. A. J., Alblas, P., and Lammers, W. 2023. IJle moerasorchis (*Paludorchis laxiflora*) terugggevonden in Nederland. *Gorteria: Tijdschrift voor Onderzoek aan de Wilde Flora* 45(1): 1–10.

Martin, R. 2022. Les orchidées des petits îles de la Méditerranée occidentale: 1. Les îles tunisiennnes. *l'Orchidophile* 53(234): 247–250.

Padilla, A. M. D. and González, M. G. 2022. Wild orchids in Chiclana de Segura (Jaén, Spain), hidden garden in Sierra Morena. *Flora Montiberica* 82: 3–14.

Sanz, J. M. C. and Aquillué, J. L. 2022. Contributions to the orchid flora from the Hoya de Huesca County (Spain). *Flora Montiberica* 83: 11–18.

Serra Laliga, L., Agueras, M., Cutillas, A., Lario, A., Espinosa, V., Fernández, B., Fidel, L., Hernández, J. C., Laguna, E., Liñana, D., Martí, E., Mir Pegueroles, C., Navarro, S., Núñez, A., Oltra, J. E., Sanchis, M. J., Tornero, J. A., and Torregrosa, R. 2022. Additions and corrections about Valencian Orchidaceae, X. *Flora Montiberica* 84: 41–49.

Tóth, G., Magos, G., Molnár, M., and Csábi, M. 2020. A new, remarkable population of *Epipactis placentina* found near Parádsasvár village (Mátra Mts, NE Hungary). *Kitaibelia* 25(2): 247–248 (<https://doi.org/10.17542/kit.25.247>).

Turco, A., Albano, A., Medagli, P., D’Emerico, S., and Wagensommer, R. P. 2023. Orchidaceae in Puglia (Italy): Consistency, Distribution, and Conservation. *Plants* 12(11): art. 2223 (<https://doi.org/10.3390/plants12112223>).

Literature categories

Anatomy and morphology	20
Bioinformatics.....	21
Books	21
Conservation	22
Cytogenetics/Horticultural genetics.....	27
Ecology	27
Ethnobotany/(Ethno)pharmacology	30
History	33
Horticultural science	33
Micropropagation/Seed germination/Cryopreservation	34
Molecular biology	38
Mycorrhiza and endophytes.....	43
Pathology.....	44
Physiology/Phytochemistry	45
Pollination/Population genetics/Seed dispersal	47
Systematics and distribution	50
AFRICA	50
AMERICA	50
ASIA - PACIFIC	54
AUSTRALIA & NEW ZEALAND	61
EUROPE	61