

Orchid Research Newsletter No. 55

It is hardly a sunburst that orchid science experienced a quantum leap in the last ten years. In fact, it can safely be said that advances in the last decade eclipsed those of any single decade to date, primarily driven by the technological improvement and widespread application of molecular techniques. Several well-known researchers were polled for their short lists of the principal developments – good or bad -- from 2000-2009 inclusive. We thank those who responded.

Anonymous: 1) *Genera Orchidacearum*; 2) changes to nomenclature as a result of molecular work; 3) digitization of type specimens and other herbarium specimens and making many of them available online; 4) digitization of botanical literature and making much of it available online; 5) an increased effort worldwide to conserve orchids and their habitats; 5) publication of several major floristic treatments of Orchidaceae, such as the orchid volumes of the *Flora of Bhutan* and *Flora of China*.

Richard Bateman (Royal Botanic Gardens, Kew): 1) Integration of molecular systematics and classical morphology, leading to credible supraspecific delimitation (e.g., *Genera Orchidacearum*); 2) integration of population genetics and morphometrics, leading to credible species delimitation; 3) co-evolutionary studies with mycorrhizae, co-evolutionary studies with pollinators; 4) evo-devo studies of model orchids elucidating the origin of the family; 5) early stages of the realization that 'citizen scientists' and ecologists can become the field 'shock troops' for orchid studies

Ken Cameron (University of Wisconsin): 1) Refined phylogenetic reconstructions at both high and lower taxonomic levels; 2) whole-genome sequencing, with several plastid genomes complete and nuclear on the way; 3) *Genera Orchidacearum* series; 4) increase in detailed studies of orchid mycorrhizal partnerships; 5) increased paranoia over scientific field collecting and CITES regulations

Phillip Cribb (Royal Botanic Gardens, Kew): 1) *Genera Orchidacearum*; 2) barcoding of species; 3) revolutionary nomenclatural changes as the result of molecular phylogenetic studies; 4) online publication of the *World Checklist of Orchids* by Govaerts *et al.*

Michael Fay (Royal Botanic Gardens, Kew): 1) *World Checklist of Monocotyledons* and/or IPNI; 2) development of genetic fingerprinting techniques for conservation studies/low level taxonomic studies; 3) great strides in understanding mycorrhizal associations due to advent of molecular techniques allowing the fungi to be identified; 4) improved understanding of how orchid flowers are produced through evo-devo studies; 5) *Genera Orchidacearum*; 6) nomenclatural changes resulting from molecular phylogenetics; 7) barcoding of species

Barbara Gravendeel (Nationaal Herbarium Nederland): 1) Molecular clock age estimates of the family calibrated with orchid fossils; 2) the discovery of

developmental genes enabling innovative homology assessments of orchid morphology; 3) the sequencing of the first complete orchid genome

Finn Rasmussen (University of Copenhagen): 1) *Genera Orchidacearum*, the most massive contribution to general orchidology of the decade; 2) sweeping nomenclatural changes as the result of molecular phylogenetic studies; 3) discovery of the first unambiguous orchid fossil: the 15-20 myr old *Meliorchis caribea*

Philip Seaton (Royal Botanic Gardens, Kew): 1) Orchid seed-banking; 2) development of techniques for germination of temperate terrestrial orchids; 3) the upsurge in interest in pollination biology, especially related to reintroduction of orchid species successfully in the long-term; 4) molecular techniques, not only for their transformation of taxonomy but also enabling identification of orchid mycorrhizae.

Raymond Tremblay (University of Puerto Rico): I think that the special issue on *Caladenia* of the *Australian Journal of Botany* is worth mentioning. This is the first time that a series of papers with a range of topics on the same genus has appeared, all oriented toward conservation/evolution issues. It shows how a group of scientists working together can come up with some interesting results.

Jeffrey Wood (Royal Botanic Gardens, Kew): 1) New classification and a stabilizing of nomenclature resulting from the revolution in molecular systematics; 2) publication of *Genera Orchidacearum*, which will serve as a benchmark for a new generation of researchers; 3) species barcoding; 4) publication of an increasing number of authoritative monographs, particularly of horticulturally important groups. On the negative side, 1) continuing and increasing lack of funding for taxonomic science; 2) alarming trend toward unnecessary splitting of larger (and sometimes even smaller) genera by some.

What might we expect in the next 10 years? Here are a few possibilities, I daresay probabilities: 1) Orchids genetically engineered for colour, warmth-tolerance, shape, etc. will become more common; 2) genes from other groups of plants will be inserted into orchid genomes (and vice versa) to the extent that what it means to be an orchid will become blurred by bioengineering; 3) the natural range of thousands of orchid species will shrink even more -- and dramatically so; hundreds if not thousands will exist only in natural preserves and/or cultivation; 4) at least 500 new epithets in *Ophrys*.

Alec Pridgeon

News from Correspondents

Please submit any news about newly completed research, future research plans and needs, change of address, upcoming or recent fieldwork, etc. to Alec Pridgeon (a.pridgeon@kew.org). Graduate students are especially encouraged to share the

subjects of their thesis or dissertation with the international community. We will print submissions in the format below. Many thanks to those who have contributed.

Hubert Kurzweil (National Parks Board, 1 Cluny Road, Singapore 259569; e-mail: Hubert_KURZWEIL@nparks.gov.sg) has written to report that Joseph Arditti has donated his vast reprint collection to the Singapore Botanic Gardens.

Upcoming Conferences

We welcome any news about future conferences for promotion here. Please send details to Alec Pridgeon (a.pridgeon@kew.org) 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.

In Memoriam: Miguel Ángel Soto Arenas (12 July 1963 – 27 August 2009)

Miguel Angel Soto was born in the city of Torreón, Coahuila, on 12 July 1963. His parents loved plants, and he inherited a great part of this culture. Living in a semi-arid region allowed him to get to know closely one of his favorite groups of plants, about which he acquired ample knowledge: the Crassulaceae and other succulents. In spite of living in the desert, Miguel Angel already knew and cultivated his favorite plants -- orchids. Numerous visitors and even journalists from the local communication media came to see his orchid house.

Later on, Miguel Angel moved to Mexico City to follow university studies. He majored in biology at the Faculty of Sciences/UNAM) from 1982-1987. When he finished the credits, he began to write his undergraduate thesis on the orchids of Bonampak, Chiapas. It is suitable to point out that in those times Bonampak was a remote place, with great extensions of the well-known Lacandon Jungle. From there, Miguel Angel and Jorge Meave had to flee in view of the apocalyptic scenes generated by the eruption of the “El Chichón” (or Chichonal) volcano. Miguel Angel was a perfectionist, and maybe because of this he did not finish his thesis, although he did publish an article on that journey in the heart of the Lacandon Jungle (Soto Arenas, M. A. (1986), Orquídeas de Bonampak, Chiapas. *Orquídea* (Mexico City) 10: 113-132). Miguel graduated sometime later with a new thesis topic, this time on the genus *Lepanthes*. He wrote the thesis with Gerardo Salazar, and their work served as the basis for the publication of the book, *The Genus Lepanthes Sw. in Mexico*, in which they published 32 new species, doubling the number of known species for Mexico.

Between finishing his undergraduate studies and thesis, Miguel Angel developed numerous projects and publications on orchids. During this period, Miguel spent his days among the Ecology Laboratory of the Faculty of Sciences, UNAM, the AMO Herbarium, and his innumerable field trips. He also traveled to the main herbaria of the United States and Europe, studying all the Mexican material on orchids.

He directed or co-directed around 10 students, both undergraduates and graduates. Some of them received recognition for the quality of their thesis, such as Rodolfo Solano Gómez, whose thesis “The Genus *Stelis* Sw. (Orchidaceae: Pleurothallidinae) in México” earned an Honors Mention in the Undergraduate Thesis Contest of the Botanical Society of Mexico. Similarly, Mariana Hernández Apolinar received First Place in the Undergraduate Thesis Contest of the Botanical Society of Mexico with the thesis “Population Dynamics of *Laelia speciosa* (HBK) Schltr. (Orchidaceae)”. In October of 1993 he successfully organized the 5th Latin American Meeting of Orchidology in Xalapa, Veracruz, with the participation of the best-known specialists and scholars of orchids of tropical America. In this event an important international exhibition of orchids was also held, of which he was President of the Organizing Committee (Exporquídea Xalapa '93). Miguel Angel was Vice President of the Latin American Orchidology Commission (C.L.O., 1991-1993) and President of the same in 1993.

Miguel Angel was admitted into the Post-Graduate Program in Ecology of the Ecology Institute in 1994. He received all the credits and passed the doctoral candidacy examination. However, due to his perfectionism, he postponed sitting for his graduation examination until he had the publications he considered were necessary. The thesis he developed was titled “Evolution in *Vanilla* (Orchidaceae): Phylogeny, Biogeography and Evolution of Characters”, prepared under the direction of Dr. Elena Álvarez-Buylla (Laboratory of Molecular Genetics and Evolution, Ecology Institute, UNAM). Miguel Angel's studies on *Vanilla* were not limited to the aspects mentioned in the title of his thesis, because he also included a study of the diversity, genetic variation, and historic uses of *Vanilla*. From this work there were interesting results, such as the routes and dates of the spread of the cultivation of *Vanilla planifolia* around the world. Unfortunately, he did not live to see the publication of the formal description of several new species and varieties of this genus, such as *Vanilla costarricensis*, *V. cribbiana* (ined.), *V. dressleri* (ined.), *V. martinezii* (ined.), *V. sarapiquíensis* (ined.), *V. pompona* subsp. *grandiflora* (Lindl.) Soto Arenas (ined.), and *V. espondae* (ined.), soon to be published in *Lankesteriana*, and his corresponding contribution to Flora Mesoamericana, which had already been delivered to the editors at Missouri Botanical Garden.

From his studies on vanillas the following were published or were left to be published:

- Soto Arenas, M. A. (2006). La vainilla: retos y perspectivas de su cultivo. (Vanilla: challenges and perspectives of its cultivation). *Biodiversitas* 66: 1-9.
- Soto Arenas, M. A. (In press). A new species of *Vanilla* from South America. *Lankesteriana*.
- Soto Arenas, M. A. and Dressler, R. L. (In press). A revision of the Mexican and Central American species of *Vanilla* Plum. ex Mill: conspectus of morphological and molecular data. *Lankesteriana*.
- Soto Arenas, M. A., Cameron, K. M., and Álvarez-Buylla, E. R. (In preparation) Phylogenetic analysis of *Vanilla* Plum. ex Mill. (Orchidaceae: Vanilleae) from congruent morphological and molecular data.

Soto Arenas, M. A. and Cribb, P. (In preparation). Annotated checklist, identification guide, and a proposal for a new infrageneric classification of the genus *Vanilla* Plum. ex Miller (Orchidaceae, Vanillinae).

Soto Arenas, M. A. and Alvarez-Buylla, E. R. (In preparation). Notes on the floral biology of Mexican *Vanilla* (Orchidaceae) and the evolution of pollination systems in the genus.

Soto Arenas, M. A. and Alvarez-Buylla E. R. (In preparation). Biogeographic history of the pantropical genus *Vanilla* and the history on the Gondwanic tropical biota.

Soto Arenas, M. A., Cibrián A. J., Alvarez-Buylla, E. R., Delgado, P., and Piñero, D. (In preparation). Intraspecific variation of *Vanilla planifolia*: what morphology, isozymes, RAPDs, and nuclear DNA sequences indicate.

Miguel Angel was one of the most knowledgeable people on the orchid flora of Mexico and, in general, of all of tropical America. He described, alone or as co-author, many new orchids including *Phragmipedium xerophyticum*, *Barkeria fritz-halbingerii*, *Rossioglossum hagsaterianum*, *Sobralia macdougallii*, *Stanhopea dodsoniana*, *S. whittenii*, *Stelis greenwoodii*, *Elleanthus teotepecensis*, *Encyclia calderoniae*, *E. rzedowskiana*, and *Oncidium leleui*. Also, he formalized the intraspecific systematics of *Laelia anceps* and reclassified (alone or as co-author) numerous species of different genera, among them *Barkeria*, *Elleanthus*, *Rhynchostele*, *Prosthechea*, and *Dichromanthus*. He had ample knowledge on the Pleurothallidiinae (*Stelis*, *Acianthera*, *Pleurothallis*, etc.). According to the Missouri Botanical Garden database (W3TROPICOS), there are more than 160 species and subspecies described by him, including new descriptions and reclassifications of some previously published.

Miguel collected more than 11,000 different samples (collection numbers) of plants in Mexico, Guatemala, Costa Rica, Panama, and Brazil, which include almost 150 type collections. The main set of his collections as well as his collecting notebooks and personal notes are deposited in the AMO Herbarium (Chinoín Institute, Mexico City). Miguel was a tireless traveler, and few people knew the natural habitats of orchids like he did. This is one of the reasons why he wrote most of the book, *The Orchids of Mexico*, and personally supervised its design and production. The work describes a journey through the ecosystems of Mexico and its orchids, including cultural and conservation chapters. Together with the digital Catalogue (CD) of *The Orchids of Mexico* it is the most complete popular work there is about Mexican orchids.

One of his already classic works was the basis of the most recent lists of the orchids of Mexico: "Updated Listing of the Orchids of Mexico", published in 1989 in *Orquídea (Mexico City)* 11: 231-275. Together with Federico Halbinger he co-authored the book *Laelias of Mexico*, which is one of the most widely cultivated genera. Miguel Angel was executive editor of the journal *Orquídea (Mexico City)* from 1985 until his death. He was also executive editor of some volumes of the *Icones Orchidacearum (Mexico)*, which is probably the best technical reference of the Mexican orchids. He

had two other volumes in preparation. Other issues deal with the genus *Epidendrum* throughout the Neotropics.

Miguel was a conservationist from an early age. He was one of the most active students in the creation of the Reserve of the Pedregal of San Angel in Mexico City. More recently, he published one of the most complete works on the current situation of orchid conservation in Mexico and participated in many forums related to the conservation of orchids. He was a prominent member of the Orchid Specialist Group, Species Survival Commission, IUCN (1993-1997; 1998-2009) and a member of the Conservation ex-situ Committee of the same commission (2000-2003). He also participated as counselor of various government agencies such as SARH (Ministry of Agriculture and Water Resources), SEDESOL (Ministry of Social Development), SEMARNAT (Ministry of Natural Resources), and CONABIO (National Commission of Biodiversity), establishing the most important criteria for the national orchid conservation strategies of Mexico. He was able to form the most important collection of live plants of Mexican orchid species, much of which is now located in the living collection at AMO Herbarium. From the cultivated plants and the field samples he helped form a DNA bank for research in molecular biology of almost 500 orchid species and 500 *Vanilla* samples.

In collaboration with Eric Hágsater and Cássio van den Berg, he was preparing a phylogeny of the genus *Epidendrum* based on molecular and morphological data including vegetative architecture. For that he sequenced more than 300 species from throughout the Neotropics, mostly collected by Hágsater and cultivated at AMO, and was always careful to have voucher specimens prepared.

Those of us who had the good fortune of having access to his field notebooks could observe the encyclopedic knowledge he had about the flora and vegetation of Mexico. His acute vision allowed him to find orchids even when driving the car at high speeds or in the darkness of the closed forest canopy. He was a "human altimeter," since he could calculate exactly the elevation where we found ourselves by only looking at the vegetation around us.

Nora Esponda, the associate secretary of Instituto Chinoín, worked with Miguel for 25 years and developed a close friendship/professional relationship with him. She described him as passionate in his work and everything he did. She said he described himself as "neurotic and ill-tempered," but she never saw him lose control. His character was strong but affable, very demanding of himself, but he was also very sensitive.

His sister Miriam described him as a great chef. He enjoyed cooking a chicken in *mole* or a leg of venison with herbs in white wine for his friends. His specialty, vanilla ice cream, was delicious. He moved back to Torreón a couple of years ago in search of tranquility to continue writing about orchids of Mexico and spend much more time with his parents and two sisters. He had recently traveled with his sisters on a month-long trip through the Huasteca of San Luis Potosí, Veracruz, and into Chiapas; they

were amazed how well he knew the country. A couple of weeks before his death he had discovered what appeared to be a new species of *Pinus* on an excursion with his sister Miriam and other friends.

His tragic murder occurred on 27 August, at his home in Torreón, Coahuila. Miguel Angel Soto was a controversial character, but without a doubt he was an extraordinary human being who leaves behind a great void that will be very difficult to fill. We all miss him.

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Translation by Carlos Ossenbach

New *Icones Orchidacearum*

On 15 December 2009, the latest issue of *Icones Orchidacearum -- The Genus Epidendrum: Species New and Old, Part 8* -- was published. It is now available at no charge in pdf format at the new site, www.herbarioamo.org, which is still under construction. Back issues will be made available progressively for free. -- **Eric Hágsater, Herbario AMO**

Recent Orchid Nomenclature

New orchid names may now be accessed on the IPNI website:

(www.ipni.org/ipni/plantsearch?request_type=search&output_format=query&ret_defaults=on)

Click on "Show additional search items" on the right-hand side of the screen. After the search page appears, type in **Orchidaceae** under family name and (for example) **2005-11-30** under "Record date" and "Added since." This will pull up a list of all names added to the IPNI database since 30 November 2005.

Recent Literature

Important notice: The Kew Record of Taxonomic Literature is a database of over 200,000 bibliographic references to books, journal articles, and grey literature released since 1971 and relating to plant taxonomy in its broadest sense. It is available online as part of the Kew Bibliographic Databases (KBD) and via ePIC and is published in print on a quarterly basis by TSO.

For 18 months there was an assessment of the value of keeping the Kew Record up to date. This included a user survey for online and print versions. The emergence of web crawlers and powerful search engines and the increasing availability of taxonomic literature in electronic formats mean that the current literature is much more easily accessible than it has been in the past.

Approximately 4,000 new records were compiled each year at considerable expense to Kew. Reluctantly it was decided that the cost of keeping the database up to date outweighed its value in relation to newly published literature. Following consultation with Kew staff and users, it was decided that from the end of 2008 no new references will be added to the database. Print publication ceased with the release of KR 2007(4). The dataset of references from 1971-2007 will still be a valuable resource for those searching past literature, so Kew Record will continue to be available as part of the KBD.

Anna Lynch will continue to provide micromorphological references, and for this we are grateful. We will consult a variety of other sources for recent literature, and you will find a more extensive range of journals from more disciplines than ever before. If you are aware of any recent citations not listed here and henceforth, please send them – **in the exact style below** – to Alec Pridgeon (a.pridgeon@kew.org) for publication in the following issue (January or July). Write "ORN references" in the subject line of the e-mail. Book citations should include author(s), date of publication, title, publisher, and place of publication (in that order).

Anatomy and morphology

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Conservation biology

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Book Reviews

Szlachetko, D. L. and Mytnik-Ejsmont, J. 2009. *Gynostemia Orchidaleum IV*. Acta Botanica Fennica 180. ISBN 978-951-9469-74-4. Pp. 313, 406 figs. Finnish Zoological and Botanical Publishing Board, Helsinki. Price for 4-volume series: €150.

The fourth and final volume of a new classification of the orchid family by Dariusz Szlachetko and his co-authors has finally appeared; the first volume by Szlachetko and Rutkowski appeared in 2000 (Acta Botanica Fennica 169), the second by Szlachetko and Margonska in 2002 (Acta Botanica Fennica 173), and the third by Szlachetko alone in 2003 (Acta Botanica Fennica 176).

This volume includes accounts of several tribes in subfamily Vandoideae, namely Maxillarieae, Zygopetaleae, Dichaeae, Telipogoneae, Ornithocephaleae, and Oncidieae. A total of 26 subtribes and 228 genera are covered in this volume. Nomenclature, basionym references, and descriptions are provided for each subtribe and genus. Each genus is illustrated by a line drawing of the features of the column, stigma, and stamen (gynoecium and androecium). Some micrographs of anatomical dissections are also provided to illustrate particular points of interest. The illustrations, all made from preserved or living material, are clear and well-drawn. Taxonomic descriptions concentrate on the structural features of the column. Other features, either vegetative or floral, are usually ignored.

This classification is based on a limited suite of characters, mostly features of the gynostemium and androecium. It ignores recently published classifications based on a combination of morphological, anatomical, chemical, and DNA data (e.g. Pridgeon *et al.*, *Genera Orchidacearum* 1999, 2001, 2003, 2005, 2009. Oxford University Press). The result has been a proliferation of new infrafamilial taxa: one tribe and seven subtribes are ascribed to Szlachetko in this volume alone.

Readers interested in the classification of the orchids will want to have this series in their library, but its approach is somewhat old-fashioned and is unlikely to be followed by orchid specialists elsewhere. Its value lies in its comprehensive and detailed illustrations of orchid column structure, the like of which cannot be found elsewhere. The book is well produced in an attractive hardback cover, and the series is available at a reasonable price from the publisher (email: tiedekirja@tsv.fi).

Phillip Cribb