ORCHID CONSERVATION NEWS

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

Issue 1 May 2018

CONSERVATION ISSUES:

SPECIES, ECOTYPES, AND PERIODIC DORMANCY

Dirk Kaptyen den Boumeester (L), and Rik Schoon (R) then Executive Manager, Nature Preservation, visiting the young dune landscape near Haarlem, The Netherlands, in 1992, where *Epipactis helleborine* subsp. *neerlandica* grows. Details of studies of this orchid made by Dirk from 1985 to 2012 are now available: https://www.dwkdb.nl/orch-onderz/ Photo: M. MacConaill

Editorial

Being in the right place at the right time is often suggested as the reason why we are successful in our quest. But being in the right place at the wrong time can have consequences for those assessing population status for Red List purposes, particularly with orchids that are prone to periodic dormancy. Surveys conducted during years when many plants are non-emergent can be misleading. Repeated surveys may be needed to verify initial assessment but studies spanning insufficient years may not capture data critical to population assessment: lengthy studies are rare. A review the drivers of vegetative dormancy across a range of herbaceous perennials including orchids by Shefferson *et al.* (2018) provides us with much food for thought on this important conservation topic.

Investigators are now teasing apart the complex nature of widespread populations into their composite parts as with *Spiranthes cernua s.l.* (Pace & Cameron, 2017). It does help that we now have tools to more fully explore what before presented taxonomic dilemmas and conservation challenges. Jacquemyn *et al.*, 2017, using molecular methods and material collected in Belgium, have shown that the dune ecotype of *Epipactis helleborine* subsp. *neerlandica* is genetically distinct from the forest ecotype: the taxonomic status remains unclear. We look forward to hearing about new initiatives that together further the work of orchid conservation. Marilyn H.S. Light, Editor

Epipactis helleborine subsp. *neerlandica* at Haarlem NL

Photo: M. MacConaill

Cryptic diversity in the *Spiranthes cernua* species complex

Matthew Pace
(mpace@nybg.org)
The New York Botanical Garden
New York, U.S.A.

My first encounter with a member of the *Spiranthes cernua* species complex occurred in the Adirondack Mountains of New York. As I struggled with the available keys to determine this population to species, little did I know that I would return to this very spot three years later as part of my graduate work on *Spiranthes*, part of which focused on this complex, and that this population actually represented an unknown cryptic species.

The *S. cernua* species complex traditionally included six species spread across eastern North America. The systematics of this complex has given pause to many a botanist and naturalist due to the polymorphic nature of its component species, similarities between species, and hypothesized hybridization. Although the complex had received morphologic (Sheviak 1982) and molecular attention (Dueck *et al*. 2014), these approaches had not been applied to the complex synergistically. Indeed, viewing morphology through the lens of phylogenetics proved critical to satisfactory unraveling the diversity of this complex.

Our research included a broad revision of herbarium material, expansive fieldwork, and incorporation of herbarium samples collected within the last 20 years in our molecular research. Including a large number of herbarium and field samples in our molecular research was essential to fully contextualize morphological variation. Although DNA amplification from herbarium sources was often challenging, we found that a CTAB and chloroform approach using the IBI Plant Isolate Kit yielded consistently good quality DNA.

Phylogenetic and morphologic research at WIS and NY (Pace and Cameron 2016, Pace *et al.* 2017, Pace and Cameron 2017) indicated that the *S. cernua* species complex is an evolutionary lineage of eleven closely related species, including three new cryptic species (*S. arcisepala*, *S. igniorchis*, and *S. niklasii*), and one new

nothospecies (*S.* ×*kapnosperia* (*S. cernua* × *S. ochroleuca*). Additionally, two species needed to be brought out of synonymy and recognized as distinct (*S. incurva* and *S. triloba*). Our research also found that ancient hybridization has occurred (*S. niklasii* = *S. cernua* s.s. × *S. ovalis*; *S. incurva* = *S. cernua* s.s. × *S. magnicamporum*), however extant hybridization appears to be rare.

Spiranthes arcisepala

Photo: M. Pace

Spiranthes incurva

Photo: M. Pace

A more refined understanding of the role of hybridization and species-level is critical to implementing useful conservation strategies. For example, *S. cernua* s.s. remains common in New Jersey, however S. *arcisepala* should be state listed. Our research also sheds light on the apparently strong influencing role of physiography and historical biogeography on this complex, as many of the newly described or recognized cryptic species have strong geographic signals (e.g., *S. arcisepala* is mostly restricted to the Appalachian Mountain system).

Dueck, L. A., D. Aygoren & K. M. Cameron. 2014. A molecular framework for understanding the phylogeny of *Spiranthes* (Orchidaceae), a cosmopolitan genus with a North American center of diversity. *American Journal of Botany*, 101: 1551–1571.

Pace, M.C. & K.M. Cameron. 2017. The systematics of the *Spiranthes cernua* species complex (Orchidaceae): Untangling The Gordian Knot. *Systematic Botany*, 42: 640–669.

Pace, M.C., S.L. Orzell, E.L. Bridges, & K.M. Cameron. 2017. *Spiranthes igniorchis* (Orchidaceae), a new and rare cryptic endemic of the south-central Florida Osceola Plain subtropical grasslands. *Brittonia*, 3: 323–339.

Pace, M.C. & K.M. Cameron. 2016. Reinstatement, redescription, and emending of *Spiranthes triloba* (Orchidaceae): Solving a 117 year old cryptic puzzle. *Systematic Botany*, 41: 924–939.

Sheviak, C. J. 1982. Biosystematic study of the *Spiranthes cernua* complex. *New York State Museum Bulletin* 448: 1–73.

On the Bookshelf

Plants of the Eastern Caribbean - Online Database
http://ecflora.cavehill.uwi.edu/index.html

The Virtual Herbarium brings us to the Barbados Herbarium of the University of the West Indies where we can find, for example, specimens of the indigenous *Epidendrum ciliare* collected in Barbados WI.

Photo: M. MacConaill.

Eurorchis volumes now online
https://www.dwkdb.nl/orch-onderz/

From 1989 to 2007, articles pertaining to the study and protection of European orchids were published in annual volumes of *Eurorchis* by the Werkgroep Europese Orchideeën (KNNV). The articles are primarily in Dutch. Summaries and some articles are in English and German. *Proceedings of the International Symposium Eurorchis* 92 is included in this collection. Thanks to Dirk Kapteyn den Bouwmeester for providing us with this useful link.

Food for Thought

Brundrett, M.C. and L. Tedersoo (2018). Evolutionary history of mycorrhizal symbioses and global plant diversity. *New Phytologist* (2018). doi: 10.1111/nph.14976

Jacquemyn, H., De Kort, H., Vanden Broeck, and R. Brys (2018). Immigrant and extrinsic hybrid seed inviability contribute to reproductive isolation between forest and dune ecotypes of *Epipactis helleborine* (Orchidaceae). *Oikos* 127: 73–84. doi: 10.1111/oik.04329

Kapteyn den Bouwmeester, D.W. (1989). *Epipactis helleborine* var. *neerlandica* Vermeulen – problematiek, veldwaarnemingen, bestuivers. *Eurorchis* 1: 93–112.

Kennedy, A.H. and G.L. Walker (2007). The population genetic structure of the showy lady's-slipper orchid (*Cypripedium reginae* Walter) in its glaciated and unglaciated ranges. *Casteanea* 72: 248–261. doi: http://dx.doi.org/10.2179/06-30.1

Kuzmina, M.L., *et al.* (2017). Using herbarium-derived DNAs to assemble a large-scale DNA barcode library for the vascular plants of Canada. *Applications in Plant Sciences* 5 (12): 1700079. doi: 10.3732/apps.1700079

Pace, M.C. and K.M. Cameron (2017). The systematics of the *Spiranthes cernua* species complex (Orchidaceae): Untangling the Gordian Knot. *Systematic Botany* 42: 640–669.

Rock-Blake, R., McCormick, M.K., Brooks, H.E.A., Jones, C.S., and D.F. Whigham (2017). Symbiont abundance can affect host plant population dynamics. *American Journal of Botany* 104: 72–82.

Shefferson, R.P., Kull, T., Hutchings, M.J., *et al*. (2018). Drivers of vegetative dormancy across herbaceous perennial plant species. *Ecology Letters* (2018). doi: 10.1111/ele.12940

Ulloa Ulloa, C., Acevedo-Rodríguez.P., Beck, S., *et al*. (2017). An integrated assessment of the vascular plant species of the Americas. *Science* 358: 1614–1617.

Mark your calendar

IOCC VII – Kew Gardens, England UK

Provisional dates set for 28 May to 1 June 2019.
More information to follow when available.

Changes to contact information?

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

Please inform the OSG Chair, Mike Fay. (M.Fay@kew.org)

Call for conservation news

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

Please submit material in Microsoft Word, and illustrations, if any, as separate jpeg files. If applicable, please include suggested captions and photographic credits. Send news to Marilyn Light, Editor, (mslight@distributel.net)