

Orchid Research Newsletter No. 58

Evolution versus Creationism. Part One: Public Opinion

No one doubts that molecular phylogenetic studies at all levels of classification have exponentially increased our knowledge of orchids in the last 20 years or so. Well-supported studies have enabled us to date the origin of orchids to the Late Cretaceous using a definitive fossil and molecular clocks (Ramírez *et al.*, 2007), suggest character-state trends from the family level on down, reveal monophyletic groups previously obscured by homoplasy and the sediment of taxonomic authoritarianism deposited over the centuries, and answer fundamental questions about orchid biogeography and pollination biology. In light of all that, many Europeans will be surprised (perhaps even shocked) to learn the results of a Pew Research Center telephone survey taken 7-17 July 2005 in the United States under the direction of Princeton Survey Research Associates International. The sample included 2,000 white adults, 18 years of age or older, with the error attributable to sampling estimated as ± 2.5 percentage points.

A plurality of Americans (48%) said that humans and other living things have evolved over time, but nearly as many (42%) said that humans and other living things have existed in their present form since the beginning of time. The latter group is often called "creationist" because this view is seen as consistent with a literal reading of the Bible's account of creation.

There is further division among those who agreed that life has evolved over time. Of those who said that living things have evolved over time, roughly half (26% of the public overall) accept the Darwinian account of evolution, believing that evolution has occurred through natural processes such as natural selection. But of those who accept evolution, 18% said that evolution was guided by a supreme being, a view that is consistent with some aspects of what has been called "intelligent design".

Among religious groups, white evangelicals were most distinctive in their support for the creationist position. The majority of them (70%) said that living things have always existed in their present form. In contrast, most white mainline Protestants (60%) and white Catholics (61%) believed that living things have evolved over time, whereas only 32% and 31% of mainline Protestants and Catholics, respectively, accepted the creationist account.

But both mainline Protestants and Catholics were divided over the nature of the evolutionary process. Almost a third of mainline Protestants (31%) said that evolution occurred through natural selection, but 24% thought evolution was guided by a supreme being. Among white Catholics, equal numbers subscribed to natural selection and a higher power as the cause.

In contrast, a whopping 71% of secular respondents felt that life has evolved over time, and 56% of those accepted the idea of evolution through processes such as natural selection.

In the January 28th issue of *Science* magazine this year, the results of the National Survey of High School Biology Teachers were published, based on a sample of 926 public school biology instructors in America (Berkman and Plutzer, 2011). Twenty-eight percent of all teachers consistently implement the recommendations of the National Research Council and craft lesson plans so that evolution is a theme that unifies different aspects of biology. Thirteen percent explicitly advocate creationism or intelligent design by spending at least one hour presenting it in a positive light. The remaining 60% want to avoid controversy or don't feel knowledgeable about evolution, and only 37% of them have completed a course on evolution. In the 60% group, one Pennsylvania teacher said that students should make up their own minds based on their own beliefs and research. The authors of this study pointedly asked, though, "Does a 15-year-old student really have enough information to reject thousands of peer-reviewed scientific papers?"

In a poll taken among citizens of European nations, Japan, and the U.S., Americans were next to last in accepting evolution, above only the people of Turkey (Miller *et al.*, 2006).

Over the next few issues of the *Orchid Research Newsletter*, I will trace the origins of American antipathy toward evolutionary explanations, which began at the turn of the 20th century, lay dormant from the 1930s until the 1960s, and then experienced a resurgence and moved to the forefront as an ongoing national debate more than 150 years after the first edition of *On the Origin of Species* appeared.

Literature cited

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Next in the series: Evolution versus Creationism. Part Two: The Birth of Fundamentalism and Anti-evolution Attitudes in the U.S.

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.

Juan F. Silva Armas (Instituto de Ciencias Ambientales y Ecológicas ICAE,

Facultad de Ciencias, ULA, Mérida, Venezuela; e-mail: : jsilva@ula.ve) and his colleagues have published a book entitled *Botánica y Ecología de las Monocotiledóneas de los Páramos en Venezuela* in two volumes and edited by Professors Gilberto Morillo, Benito Briceño, and Juan F. Silva. The book is written in Spanish. A total of 22 families, 141 genera, and 597 species (including 226 orchids) are described and illustrated with drawings and photographs. Each species includes a botanical description, world and national distribution (including paramo sites), elevational limits, ecology, phenology, anatomy, and ethnobotany. The price of the two volumes is USD 90.00 plus shipping. For further information, you may contact Juan F. Silva and/or see their website at <http://www.ciencias.ula.ve/icae/>.

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.

20th World Orchid Conference, 13-20 November 2011, Singapore

It's not too late to register for what promises to be a magnificent Conference and to book hotel rooms and post-Conference tours to Thailand, Peninsular Malaysia, East Java and Bali, and Sabah. For information, consult the last issue of the *ORN* (number 57) or go to <http://www.20woc.com.sg/site/>.

19th AOC Conference & Show, 11-16 September 2012, Perth, Western Australia

Eighteen speakers from several countries will fill out the large lecture programme in Perth, surely one of the most beautiful cities in Australia and home to Kings Park and Botanic Garden. You should not miss the five-day post-Conference tour to the South West with its rich terrestrial orchid flora that have been the subjects of many nature specials on television. For more information, go to http://www.waorchids.iinet.net.au/19th_AOC_Conference.htm/.

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 terms" on the right-hand side of the screen. After the search page appears, type in **Orchidaceae** under family name and (for example) **2010-11-30** under "Record date" and "Added since." This will pull up a list of all names added to the IPNI database since 30 November 2010.

Orchids of Greenland

Few people visit Greenland, but many of us have flown over it in route between North America and Europe. Fred Campbell contributed an excellent article, "Greenland - Its history, geography, and nature ... and, of course, its native orchids," in the McAllen International Orchid Society Journal in 2010, available at <http://miosjournal.org/journal/2010/12/Greenland.html/>.

Recent Literature

We 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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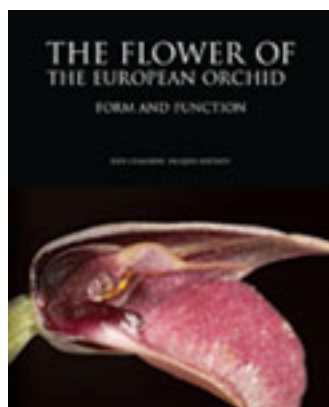
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Book Review

Claessens, J. and Kleynen, J. 2011. *The Flower of the European Orchid. Form and Function*. Published by Jean Claessens and Jacques Kleynen. 439 pp. + 829 colour photos + 106 microscopic sections + 125 SEM photos. ISBN/EAN 978-90-9025556-9. EUR 72.50 (to order this book, visit www.europeanorchids.com).



When introducing his legendary work -- *On the Various Contrivances by which British and Foreign Orchids are Fertilised by Insects, and on the Good Effects of Intercrossing* -- Charles Darwin, in 1862, made the following statement: "I have been led to publish this little treatise separately, as it has become inconveniently large to be incorporated with the rest of the discussion on the same subject. And I have thought, that, as Orchids are universally acknowledged to rank amongst the most singular and most modified forms in the vegetable kingdom, the facts to be presently given might lead some observers to look more curiously into the habits of our several native species. An examination of their many beautiful contrivances will exalt the whole vegetable kingdom in most persons' estimation. I fear, however, that the necessary details will be too minute and complex for any one who has not a strong taste for Natural History". I am convinced that, if Darwin had been given the chance to see *The Flower of the European Orchid. Form and Function*, he would have been exalted by Claessens and Kleynen's curious scrutiny of the floral adaptations of native European orchids -- and especially by how conspicuously the authors have managed to expose the minute and complex details by means of macrophotography.

The Flower of the European Orchid is a hard-covered volume in large format and jacket, and with high-quality print. Following a foreword by Richard Bateman, a

preface and acknowledgements, the book continues with a "General account" (c. 25 pages) and a "Systematic account" (c. 330 pages). The "General account" includes a section on "Orchid biology", outlining the form and function of both vegetative and floral organs, and a section on "Pollination biology" that introduces the main concepts relating to both allogamic and autogamic modes of reproduction. The entire "General account" is thoroughly illustrated by macrophotos where lettering often usefully indicates specific details. Apart from brief introductory sections on systematics, histology/microscopy, and palynology (presenting adopted standards and methods), the "Systematic account" consists of 30 sections dealing with individual genera -- all delimited according to *Genera Orchidacearum*. Each genus account starts with a thorough morphological description that also includes information on chromosome numbers and geographic distribution. This is followed by subsections on "Morphological adaptations", "Pollination" and "Observations", to be completed by a few literature references under the heading "Further reading". All generic accounts are illustrated by macrophotos, microscopic sections, and SEM photos.

The scientific core of this volume is the thorough descriptions and photographic documentation of the morphological adaptations of European orchid flowers to their individual insect pollinators or to their specific mechanisms of self-pollination. A multitude of such adaptations are explained and demonstrated in the generic accounts. In most cases, they have already been described by earlier authors. But for the first time the very diverse and scattered literature is thoroughly reviewed (a few, significantly less exhaustive reviews by other authors do exist). Furthermore, in several cases the macrophotos provided by Claessens and Kleynen represent the first photographic documentation of observations previously reported by others. On top of this, the observations and superb macrophotos of the present authors give testimony to previously unrecognized (or widely questioned) orchid/pollinator interactions. In this context, I particularly wish to emphasize Claessens and Kleynen's original observations documenting the existence of both consistently autogamous and partially allogamous populations of *Limodorum abortivum*, bumblebee pollination in *Epipogium aphyllum*, and twilight pollination by fungus gnats in *Malaxis monophyllos*. Anyone who has ever studied pollination biology in orchids will acknowledge that a vast number of observation hours, combined with the patience of a saint, must underlie the numerous original observations and pollinator photos included.

The main text is followed by a glossary and five useful appendices, mainly based on observations previously reported in the literature. The first two appendices list the pollinators and natural fruit set of individual species, respectively. Appendix 3 is a list of autogamous orchid taxa, with the pollination mechanism specified for each. Appendix 4 gives the seed number per capsule for all hitherto examined species, and Appendix 5 gives the caudicle bending times. The book ends with a comprehensive list of references and an index.

This is a cleverly thought-out book that provides an unprecedented overview of the floral biology and pollination adaptations of the orchids of Europe, based not only on information from the literature but also on original observations that are in some cases quite remarkable. A high degree of stylistic consistency across the generic accounts, both with regard to text and illustrations, adds to the overall impression of an unusually well-edited volume. Last, but not least, the comprehensive selection of macrophotos that are both of impressive technical and aesthetic quality elevates this book to the level of excellence. *The Flower of the European Orchid* simply sets a new

standard for photographic illustration of orchid books. No book is perfect, and even in this volume you will encounter errors and mistakes - but they are very few and of very little significance. In conclusion, I wholeheartedly recommend this magnificent book to anyone who has just the slightest interest in the orchids of Europe, or in the pollination biology of orchids in general.

Henrik Æ. Pedersen