

Orchid Research Newsletter No. 53 (January 2009)

On 12 February 1809, one of the giants of modern science was born -- Charles Robert Darwin. His bombshell, *On the Origin of Species*, was published on 24 November 1859, 502 pages long. The first printing of 1250 copies sold out that same day. Within six months it was a sensation, the *Da Vinci Code* of its day. Reverberations are still felt today, and although scientists debate the mechanisms of evolution, it is still the best explanation for the diversity of life forms present and past.

As I write this from the States, it is perhaps worth mentioning the famous trial in 1925 that put teacher John Scopes -- and Darwin -- on the witness stand in Dayton, Tennessee. Much of it you may already know, but I am saving something that you probably didn't know until the end.

By way of background, in the 1920s intellectual experimentation with jazz, Freudian theory, evolutionary theory, etc. led to new social patterns that threatened the status quo. A wave of revivalism, especially strong in the American South, was generated to defeat it. By 1925, perennial Presidential candidate William Jennings Bryan and his followers had introduced legislation in 15 states to ban the teaching of evolution. One of those states was Tennessee, where the Butler Act made it unlawful "to teach any theory that denies the story of divine creation as taught by the Bible and to teach instead that man was descended from a lower order of animals."

Dayton, Tennessee, was a sleepy town of 1,800 people in the Cumberland Mountains. Its population had fallen dramatically in the last 30 years. One of its leading citizens, George Rappalyea, was a transplanted New Yorker and local coal company manager. Under the auspices of the American Civil Liberties Union (ACLU), he wanted to challenge the new law that was so abhorrent to him and at the same time put Dayton in the media spotlight. Others joined Rappalyea in thinking that a controversial trial might help their town financially, and so they invited a 24-year-old general science teacher and part-time football coach, John Scopes, to meet them at Robinson's drug store. As Scopes later described the meeting, Rappalyea said, "John, we've been arguing and I said nobody could teach biology without teaching evolution." Scopes agreed. Rappalyea pulled a copy of *Hunter's Civic Biology* off the shelf. "You been teachin' 'em this book?" Rappalyea asked. Scopes replied that while he had been a substitute for the regular biology teacher during an illness, he had assigned readings on evolution from the book for review purposes. "Then

you've been violating the law," Rappalyea concluded. "Would you be willing to stand for a test case?" he asked. Scopes agreed.

Not long afterwards, the players in this drama that would be broadcast on radio across the country began to arrive. Columnist for the *Baltimore Evening Sun* and curmudgeon, H. L. Mencken, arrived in Dayton to find it "suffocatingly moral." He complained that the town had no bootleggers, no gambling, no place to dance, and that "no fancy women" had been seen in Dayton "since the McKinley Administration." The "relatively wicked," according to Mencken, "when they would indulge themselves, go to Robinson's drug store and debate theology." William Jennings Bryan loved the soapbox and agreed to assist the prosecution. Clarence Darrow, an agnostic and champion of liberty, joined the ACLU defense team without pay.

Leading scientists were called to testify on behalf of Scopes. Bryan began and ended a speech talking about expert witnesses but in between disparaged evolution. He was particularly miffed that Scopes and others were teaching that man is a mammal along with 3499 other mammals and descended from monkeys ("not even from American monkeys but Old World monkeys"). Judge Raulston refused to admit the testimony of scientists under pressure from state leaders that such testimony would embarrass the state of Tennessee and its law even more. However, the witnesses were allowed to prepare affidavits that could be read in court but without the jury present. At that point the trial seemed to be moribund. Mencken went back to Baltimore declaring a victory for the prosecution. Then Darrow pulled one of the most famous legal maneuvers in history. He called an expert on the Bible to the stand -- William Jennings Bryan. The move was a complete surprise to the prosecution and Raulston, but Bryan insisted on taking the stand.

Darrow began his interrogation of Bryan with a quiet question: "You have given considerable study to the Bible, haven't you, Mr. Bryan?" Bryan replied, "Yes, I have. I have studied the Bible for about 50 years." Thus began a series of questions designed to undermine a literalist interpretation of the Bible. Bryan was asked about a whale swallowing Jonah, Joshua making the sun stand still, Noah and the great flood, the temptation of Adam in the garden of Eden, and the creation according to Genesis. After initially contending that "everything in the Bible should be accepted as it is given there," Bryan finally conceded that the words of the Bible should not always be taken literally. In response to Darrow's relentless questions as to whether the six days of creation, as described in Genesis, were 24-hour days, Bryan said "My impression is that they were periods." Bryan, who had begun his testimony calmly, soon became exasperated

and at one point responded "I do not think about things I don't think about." Darrow asked, "Do you think about the things you do think about?" Bryan responded, to laughter from the 3000 spectators, "Well, sometimes." Bryan accused Darrow of attempting to "slur the Bible." He said that he would continue to answer Darrow's impertinent questions because "I want the world to know that this man, who does not believe in God, is trying to use a court in Tennessee...." Darrow interrupted. "I object to your statement and to your fool ideas that no intelligent Christian on earth believes." After that outburst, Raulston ordered the court adjourned. The next day, Raulston ruled that Bryan could not return to the stand and that his testimony the previous day should be stricken from the record.

Darrow asked the jury to return a verdict of guilty in order that the case might be appealed to the Tennessee Supreme Court. The jury complied with Darrow's request, and Judge Raulston fined Scopes \$100. Both the ACLU and Bryan offered to pay the fine.

A year later, the Tennessee Supreme Court reversed the decision of the Dayton court on a technicality, not the constitutional grounds as Darrow had hoped. According to the court, the fine should have been set by the jury, not Raulston. Rather than send the case back for further action, however, the Tennessee Supreme Court dismissed the case. So the issue was never settled in court and the Butler Act remained in effect until 1968.

This is where we pick up our story in modern times. With the success of Sputnik in 1957, there was suddenly a drive to compete in science with the USSR, and one result was passage of the Biological Sciences Curriculum Study in 1963. This produced a substantially improved high school biology textbook, which included evolution. At about the same time, in the early 1960s, there was again a resurgence of concern among fundamentalists about the loss of traditional values and a fear of growing secularism in society, just as 40 years before. Several states including Arkansas tried to ban the teaching of evolution, presumably using the Butler Act as precedent. The Arkansas law made it unlawful for a teacher in any state-supported school or university "to teach the theory or doctrine that mankind ascended or descended from a lower order of animals," or "to adopt or use in any such institution a textbook that teaches' this theory." Violation was a misdemeanor and subjected the violator to dismissal from his or her position. For the academic year 1965-1966, the school administration, on recommendation of the teachers of biology in the school system, adopted and prescribed a textbook that contained a chapter setting forth "the theory about the origin of man from a lower form of animal."

My friend Susan Epperson, who graduated from Arkansas' school system and then obtained her master's degree in zoology at the University of Illinois, was employed by the Little Rock school system in the fall of 1964 to teach 10th grade biology at Central High School. At the start of the academic year 1965, she was confronted with the new textbook. She was required to teach the statutorily condemned chapter. But to do so would have been a criminal offense and subjected her to dismissal. She and the Arkansas Education Association (AEA) filed suit against the state of Arkansas (*Epperson v. Arkansas*). The case was ultimately heard by the U.S. Supreme Court. Justice Abe Fortas delivered the opinion of the court on November 12, 1968, and in it said, "There is and can be no doubt that the First Amendment does not permit the State to require that teaching and learning must be tailored to the principles or prohibitions of any religious sect or dogma." The Supreme Court overturned those bans in 1968. So what Darrow and Scopes could not accomplish was finally and successfully concluded by Susan Epperson and the AEA. After this, fundamentalists turned to the equal-time strategy and promoted creation science (later to be renamed intelligent design) as an alternative to evolution. More court cases have developed since then as local school boards have tried (and failed) to introduce intelligent design into the curriculum or paste disclaimers about evolution in textbooks.

After the trial, Scopes worked as a geologist for United Gas in Shreveport, Louisiana. In 1969, a Presbyterian minister in Shreveport arranged for Epperson and Scopes to meet for lunch at the local Holiday Inn, the two figures around whom the battles between evolution and creationism had spun for so long. Scopes told Susan that he supported her effort but intentionally stayed away from her trial in Little Rock because he knew he would draw unwelcome publicity. Susan spoke of him as a kind and gentle, unassuming man. Scopes died the following year. Susan is now a biology teacher in Colorado but returned to Arkansas (in her words, "to the scene of the crime") in 2007 to speak at a meeting of the Arkansas Science Teachers Association.

Next month we celebrate the birth of the individual who, with Alfred Russel Wallace, redefined biology. We should also celebrate the efforts of those who fought so hard to teach our children true science instead of the 5000-year-old mythology in Genesis being passed off as such.

Alec Pridgeon

Further Reading

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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 David Roberts (d.roberts@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 from

the last issue. Many thanks to those who have contributed.

Acharya, Kamal Prasad (Department of Biology, Faculty of Mathematics and Natural Sciences, University of Bergen, Norway; e-mail: acharya.kamal@gmail.com) has recently completed his research on orchid species richness along a Himalayan elevation gradient. His study was based on orchids from Nepal, Tibet, Bhutan, and surrounding areas.

Upcoming Conferences

We welcome any news about future conferences for promotion here. Please send details to David Roberts (d.roberts@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.

4-8 February 2009

The Third Scientific Conference on Andean Orchids will be held 4-8 February 2009 in Quito, Ecuador. Three days of world-class talks on orchid systematics, ecology, and conservation science will be complemented by poster sessions, roundtable programs on a variety of subjects, a spectacular orchid show in the Itchimbia Cultural Center, and special evening dinner events. As for prior, highly successful Conferences in this series, there will be local tours and orchid tours operated by Ecuagenera, but what makes this event special is also the link for tours to the Galapagos. The impressive, bilingual Conference website (www.quitoorchidexpo2009.org) is now online to supply more information.

Genera Orchidacearum, Volume 5

The long-awaited fifth volume of *Genera Orchidacearum* will finally be published this spring by Oxford University Press. We could have published long ago if we had chosen to treat *Maxillaria sensu lato* and leave *Oncidium*, *Odontoglossum*, and other *Oncidiinae* as they were. Yet doing so would have been intellectually dishonest and wasted time and money. Why? Because DNA sequencing was producing strongly supported and congruent trees that clearly showed the polyphyly of all those genera as well as some relationships never even imagined. Waiting until workers were content with sample sizes and number of molecular markers and then publishing the new combinations means that this volume will provide the most up-to-date, most complete, and most accurate phylogenies in those subtribes of *Cymbidiinae* treated: *Catasetinae*, *Coeliopsidinae*, *Cymbidiinae*, *Cyrtopodiinae*, *Eriopsidinae*, *Eulophiinae*,

Maxillariinae, Oncidiinae, Stanhopeinae (including the magnificent genus *Coryanthes*, illustrated on the "front cover" of this issue), Vargasiellinae, and Zygopetalinae.

The manuscript, submitted to Oxford Press on 7 May 2008, is the second longest to date, topped only by volume 4. Collectively, 29 contributors treat 186 genera in tribe Cymbidieae, including some of the showiest orchids often used in hybridizing. Comprehensive treatments are provided for each genus, which include complete nomenclature, description, distribution (with map), anatomy, palynology, cytogenetics, phytochemistry, phylogenetics, pollination, ecology, and economic uses. Cultivation notes are included for those genera known to be in hobbyist collections. Genera are beautifully illustrated with line drawings and colour photographs.

After publication of volume 5, only one volume remains. Volume 6 will cover *Dendrobium* and relatives, *Bulbophyllum* and relatives, and all Vandaeae, along with changes made since publication of volume 1 as part of the "final" classification. The editors have no illusions that there will be more changes to come after the end of the series, for that is the nature of science. Yet we and all the contributors, numbering close to 100 by the time the series is complete, will have compiled a summary of what is currently known about the 800 or so orchid genera and provided a testable framework for future research.

Digitization of Herbarium Specimens

In our last issue we listed several institutions around the world that are now scanning their herbaria to make specimens more accessible to scientists and the general public for systematics and conservation uses. Mario Blanco (Herbarium, Florida Museum of Natural History, University of Florida, Gainesville, Florida 32611-7800, USA) has added names of other herbaria to the list. The Florida Museum of Natural History herbarium (FLAS) website has images of 31 of its 61 type accessions (including paratypes and "clonotypes"). The FLAS type search page can be accessed at <http://www.flmnh.ufl.edu/herbarium/types/>. More importantly, the University of Vienna Herbarium (WU) is also digitizing its collections, and it is also incorporating images from Graz (GZU), Jena (JE), and the Naturhistorisches Museum in Vienna (W), which includes the Reichenbach herbarium. The list of digitized Orchidaceae specimens is random, but several large genera have many specimens scanned (e.g., *Maxillaria*), although few of them are types. Probably few orchidologists know about this, but it can be useful because the Reichenbach specimens are not sent on loan.

On the website for virtual herbaria (<http://herbarium.univie.ac.at/database/search.php>), many institutions with digitized collections (including those already mentioned in ORN 52) are listed as follows:

Europe

AAU / Aarhus University - Aarhus, Denmark
E / Royal Botanic Garden Edinburgh - Edinburgh, Scotland
K / Royal Botanic Garden Kew - Richmond, England
L, U, WAG / Nationaal Herbarium Nederland - Universities Leiden, Utrecht, Wageningen, The Netherlands
MPU, NCY, P / MNHN - Paris, France
Z, ZT / Zürcher Herbarien - Zurich, Switzerland

North America

A, ECON, GH / Harvard University Herbaria - Cambridge, MA
F / FMNH Botany Collections - Field Museum, Chicago, IL
MO / Tropicos Specimens Database - Missouri Botanical Garden, St. Louis, MO
NY / Virtual Herbarium NY Botanical Garden - New York, NY

South America

COL / Herbario Nacional - Bogota, Colombia
Species link - CRIA, Brasil

Asia

Chinese Virtual Herbarium / Chinese Academy of Sciences Inst. Botany - Beijing, China
PE / Chinese Academy of Sciences Inst. Botany - Beijing, China

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

We are grateful to Ann McNeil and Margaret Ramsay for providing citations for the following publications received between 28 June and 31 December 2008.

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Book Review

Miller, K. R. 2008. *Only a Theory: Evolution and the Battle for America's Soul*. Viking, New York. 244 pp. + line drawings and halftones. ISBN 978-0-670-01883-3. £17.00.

As part of this "evolution issue" to commemorate the 200th anniversary of Darwin's birth, it is perhaps appropriate to review a new book by Kenneth Miller, Professor of Biology at Brown University and one of the prominent advocates of evolutionary theory vis-à-vis creationism and intelligent design, both of which have predominantly American support. Miller has debated the late William F. Buckley on the issue and

testified in several trials where a board of education sought to allow intelligent design to be taught or claim that evolution was "a theory, not a fact" (in the sense of a hypothesis that had not been tested sufficiently).

In the opening pages he asks why a nation that spawns so many Nobel laureates can still foster viable creationist and intelligent design movements. The answer, he says, lies in the willingness of Americans to reject established authority and apply that attitude to education at the local and even state levels.

Miller traces the roots of design theory from Aristotle and Thomas Aquinas through Rev. William Paley's watch and watchmaker analogy, to Michael Behe's mousetrap analogy and studies of the bacterial flagellum and blood-clotting cascade, and finally to William Dembski's "complex specified information", which, Dembski claims, cannot be generated by "blind, undirected natural processes." Throughout the book Miller brilliantly dissects and rejects the arguments from the proponents of intelligent design and then illustrates quite a few of his own to support evolutionary explanations, such as that human chromosome 2 was formed from the fusion of chimpanzee chromosomes 12 and 23. As if in vindication, scientists working on the chimp genome have renumbered chimp chromosomes 12 and 13 as 2A and 2B, respectively. Much of this grist for Miller's mill was covered in his earlier, better-illustrated book, *Finding Darwin's God* (1999), which should be read before this one to help understand the biological pathways and paleontology being discussed.

Only a Theory is an interesting follow-up to his earlier book and cites new studies. One of them is a survey in 2005 that showed the United States is near the bottom among 32 industrialized countries in public acceptance of evolution. Only 40% of Americans in the survey thought that this statement was true: "Human beings, as we know them, developed from earlier species of animals." In the United Kingdom, 70% thought it was true. In fact, the only country with a lower percentage of public acceptance than the United States was Turkey with about 25%. That study is a frightening and sobering commentary on the state of public attitude toward science in the United States, which Miller explains so well in this book.
