BULLETIN

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PLANT SCIENCE

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Botany in Pakistan

by Anitra Thorhaug

This issue brings an end to 2008 and what an exciting year it's been for plant science and the Society. We are living our motto of "Leading Scientists and Educators since 1893" in many ways, not the least of which is PlantingScience.org. As you will read inside, six other plant-science societies have now formally joined us in this effort as we lead the grass roots effort to engage school-age students in learning about, appreciating, and researching plants. The efforts of the Society, however, are not restricted to the United States. Our lead article, Botany in Pakistan, is the second in a series from the Society's International Affairs Committee focusing on Botany and Plant Science in developing countries. Our goal is to strengthen ties between individuals and institutions in the U.S. and around the world.

Our second article focuses on Tom Croat, plant collector extraordinaire, who recently was celebrated by the Missouri Botanical Garden. Tom provided PSB with a slightly expanded transcript of the address he presented at the celebration recognizing the 6 millionth mounted specimen added to the Missouri Botanical Garden Herbarium. What an interesting story! But the thing that really caught my attention is at the beginning of his second paragraph. What got Tom interested in Botany? His college botany professor, Jack Carter. Jack, now retired in Silver City, NM, is a long time BSA member who was active in the BSA teaching section when I first joined the society. Jack could not only inspire his students, he inspired young professionals to continue the tradition of teaching about the wonder of plants. As you read Tom's story, I hope you are inspired to renew your dedication to proselytize for botany whenever an occasion arises.

-the editor

The Islamic Republic of Pakistan has a spatial extent of 796 100 km^2 (latitudes 24 and 27° N and longitudes 61 and 75° E). The boundaries include The Arabian Sea on the south, India to the east, Afghanistan on the north-west, Iran on the west; Russia and China on the north. The land mass is divided into three main geographical regions: 1.) Mountains occupying northern and western parts of the country. The northern mountains are the termination of the Himalayan range (with a number of peaks above 6 000 m permanently clad with snow). The sub-mountainous areas are extensive, forming a number of plateaus and valleys. The western mountains are not very high with plateaus, semi-arid valleys and plains, much of which land is unproductive; 2.)The Indus plain is the western part of the Indo-Gangetic plain that forms one of the most prominent and extensive physiographic features of the subcontinent. The plain is believed to be more than one thousand meters deep and is formed by large quantities of alluvial material deposited since time immemorial by the Indus and several of its tributaries. The land is fertile and heavily populated. The original agricultural civilization of this region was thought to begin here more than 5000 years ago; 3.)The coastal zone is a narrow fringe bordering the Arabian Sea. It includes also the Indus delta and saline marshes. The climate of the country, which lies in the subtropical region, is varied due to the wide range of altitude and distance to sea. In the mountain regions of the north and west, temperatures fall below freezing during winter; in the Indus Valley area, temperatures range between about 32° and 49° C in summer and the average about 13° C in winter.

The geology is recent dating from the event of the Indian subcontinent bumping into the Asian land

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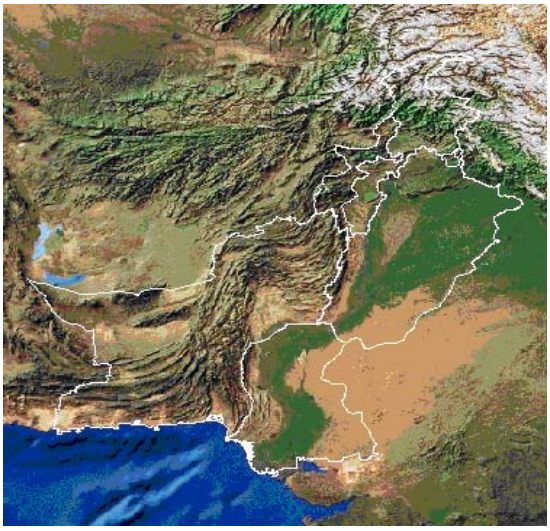
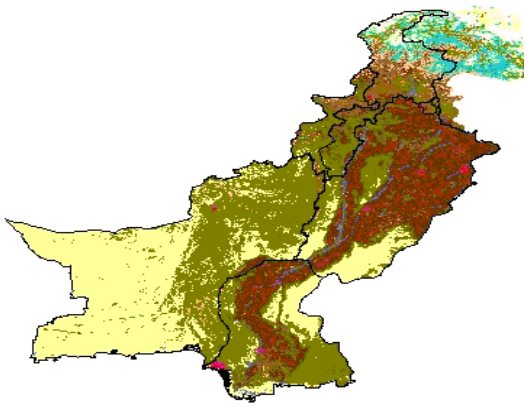


NOAA satellite image of Pakistan outlining various provincial borders in white (courtesy of FAO Forestry)



Land cover of Pakistan's vegetation. Olive green (dk gray) is shrubland, brown (darkest) is dry and irrigated cropland, turquoise is mixed and barren tundra, yellow (lightest) is barren (Courtesy of FAO)

mass. The mountains in the western and northern areas uplifted during the late Tertiary and early Quaternary. During that time the present-day plains were still under sea. The plains came into existence as a result of gradual accumulation of silt brought down by rivers during the upper Tertiary period.

Climatically the country can be divided into arid (largest part), sub arid (secondary) and humid area (smallest) (5"-10"- over 50" rainfall in the north). The mean monthly temperature in summer in plains is 37.7°C (100°F). The extreme maximum temperature rises above 47.2° C. In northern and north western mountains the temperature remains low and the areas are snow bound until April. Part of the precipitation in the high hills is received in the form of snow. Lower down, the annual rainfall averages between 750 and 900 mm, decreasing progressively to the west and south to as low as 125 mm in certain areas.

The climate is considerably influenced by monsoon winds that come from the south-east in summer and by cyclonic disturbances that originate in the Mediterranean Sea during winter. About 70 percent of the average precipitation is received from June to September. The difference in temperature between the seasons is relatively high. Most of the hilly area is denuded and has little soil left. Sub-mountainous plateaus and the adjoining plains have well drained alluvial soils and part of the corresponding agriculture land is very fertile. The Indus plain is composed of silt, sand, clay and, rarely, gravel. Much of the land in this basin was desert and has been developed by irrigation. Due to arid conditions, evaporation exceeds precipitation and this may result in the accumulation of salt in the soils, rendering them less productive (FAO, 2008).

The General Organizational Structure of Botany in Pakistan.

There is a Pakistan Botanical Society which has 600 members and there is additionally a Society of Biology and Pharmacology, Pakistan Society of Physiology, and a Wheat Society of Pakistan. Botany is taught in a series of Universities: Karachi University (where high quality research is being carried out in different fields of plant sciences such as phycology, mycology, ecology, taxonomy, physiology, biochemistry, plant tissue culture, molecular biology , genetics and natural products); Punjab University (special emphasis on molecular genetics, pathology, physiology and biotechnology) ; Agha Khan University Karachi ;Quaid I Azam University Islamabad ; Balochistan University ;Peshawar University; NIAB ;NIBGE ;PARC .

• There is PAKISTAN-US SCIENCE AND TECHNOLOGY COOPERATIVE PROGRAM in the United States Department of State. In 2003, the Ministry of Science and Technology of the Government of Pakistan and the United States Department of State signed a comprehensive Science and Technology Cooperation Agreement that established a framework to increase cooperation in science, technology, engineering and education for mutual benefit and peaceful purposes between the science and education communities in both countries. In 2005, the United States Agency for International Development joined with the Ministry of Science and Technology and the Higher Education Commission of Pakistan to support the joint Pakistan-US Science and Technology Cooperative Program. This program, which is being implemented by the US National Academy of Sciences on the US side, is intended to increase the strength and breadth of cooperation and linkages between Pakistan scientists and institutions with counterparts in the United States.

Scientific Journals

The leading journals are: *Pakistan Journal of Botanical Society, Pakistan Journal of Marine Sciences, Pakistan Journal of Biological Sciences, Pakistan Journal of Biology and Biotechnology, Biologia,* and *the Pakistan Journal of Forestry*.

The Ecological Zones of Pakistan

Uniregional elements
Irano-Turania,Sino-Japanese,Saharo-Sindian, Indian, Euro-Siberian, Mediterranean 45.6%,10.6%, 9.1%, 4.5%, 1.3%, 0.5% respectively.

Bi- or Pluriregional elements
Irano-Turanian—MediterraneanSino-Japanese—

The ecological regions of Pakistan and adjacent nations showing eco-regions in the area

Irano-TuranianTropico-SubtropicalEuro-Siberian—Irano-TuranianBoreal-SubborealIndo-MalayanSaharo-Sindian—IndianSaharo-Sindian—Irano-TuranianSaharo-Sindian—Mediterranean. All others: Euro-Siberian—Sino-Japanese, Euro-Siberian—Mediterranean, Subcosmopolitan,Boreal-Tropical—Boreal-Subtropical 5.2%, 5.07%, 4.5%, 3.5%, 2.6%, 2.03%, 1.5%, 0.9%, 0.9%, 2.1%

Phytogeographical Analysis of The Percent of Phanerograms in Pakistan and Kasmir.(Zaida, 2008)

1.) The Saharo-Sindian Region.
This region extends from the Atlantic coast of N. Africa through entire Sahara, Sinai peninsula most of Arabia, part of Syria, S. Iraq, S. Iran, most parts of Pakistan, S. Baluchistan, Sind & Punjab–Rajasthan–India .The area is very dry, has an average rain/fall between 15-30 cm. Greater part of the country belongs to this region but the flora is represented by 10.6% Saharo-Sindian element. Some plants which represent this region are the following: Representing the Arab-African north— *Anastatica hierochuntica Asteriscus pygmaeus Astragalus hauarensis Astragalus schimperi Citrullus colocynthis Eremobium aegyptiacum Fagonia glutinosa Gymnarrhena micrantha Gymnocarpos decander Helianthemum lippii, Launaea nudicaulis Lycium shawii Moricandia sinaica Neurada procumbens Panicum turgidum Psoralea plicata,Rumex vesicarius,,Salvia aegyptiaca Savignya parviflora Trigonella anguina East- West Blepharis ciliaris,Calotropis procera,Capparis cartilaginea,Capparis deciduas,Caralluma edulis ,Cassia italica,Cocculus pendulus,Cornulaca monacantha,Cymbopogon olivieri,Fagonia bruguieri,Fagonia indica,Grewia tenax.*
2.) The Irano-turanian region .
This region is characterized by extreme range of

temperature both diurnal and annual ,low precipitation, hot and dry summers, cold and harsh winters.The region is dominated by Chaemophytes and Hemicryptophytes. It has the highest percentage (45.6%) of species of phaerograms. Some species found in this regions are the following: *Haloxylon persicum,Salsola richteri, S. tomentosa, Convolvulus erinarius,Astragalus chivensis, Leptorhabdos parviflora,Haploplyllum bungei, Perovskia abratanoides,Nepeta glomerulosa,N. praetervisa, Gagea dshungarica,G. capusi,G. olgae,G. stipitata,G. gageoides,Canlligonum leucocladum,Suaeda arcuata, Cousinia schugnanica,C.multiloba,,Eremurus persicus.*

3.) The Indian Region
This area is not continuous. Its characteristics are the following:1.)The eastern part of Punjab and extreme southern part of Sindh are included in this region; 2.) The area is characterized by real monsoon; 3.)It is represented by 4.5% of the total number of species; 4.) Many of these elements extend to Saharo-Sindian region.

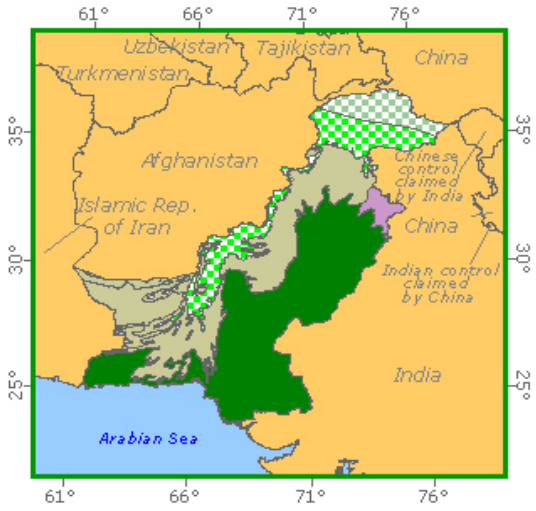
4.) Sino-Japanese Region
Characteristics are the following: 1.) This region is characterized by high rainfall (180cm); 2.)Part of Kashmir, Swat and Kaghan are included in this region;3.)The flora is one of the richest particularly in tree species 4.)10.6% of flora belongs to this region.

Conservation and Sustainability

No red data list is yet available. Only 14 species have been recorded as threatened which includes 2 species as endangered, 2 vulnerable, 5 rare and 5 of uncertain status (IUCN, 1998).Only 0.3% of the total flowering species are considered as threatened as compared to 12.5% flora of the world which is considered threatened. Two species have become extinct: *Scaveola frutescens* (Mill.) *Krause* and *S. plumieri* (L.) Vahl . Obviously, more work and research is necessary in this area. There is one biosphere reserve in Pakistan. There are 714 nature reserves and protected areas up from 205 in 2003.

The Flora of Pakistan

Due to its great diversity in habitat, a great many species are found in Pakistan. This plus the excellent level of botanical knowledge and research has allowed a great deal of botanical information to be obtained. The Flora of the Pakistan project was started by Professor E. Nasir (RAW) & Prof. S.I. Ali (KUH) in late 1960 through separate projects submitted to USDA. The best available herbarium was at Gordon College Rawalpindi with a rich collection of Stewart. Monumental work of Stewart *An Annotated Catalogue of Vascular Plants of*



Ecological zones of Pakistan: tropical desert in green, cross-hatched green for temperate mountains, tan for subtropical steppe, pink for tropical shrubland, yellow for barren, light green cross hatched for temperate mountains. (Courtesy of FAO. Data sets from U. Maryland and USGS EROS data center.)

Pakistan and Kashmir (published in 1972) provided the basis for Flora of Pakistan. Prof. Nasir & Prof. Ali continued to edit Flora of Pakistan jointly from 1970 to 1989, until the former editor migrated to Canada. From 1995 till to date Prof. Ali & Qaiser have continued working on this. This was difficult best with problems from the beginning of Independence. Not a single comprehensive book was available at the time of creation of Pakistan which could identify the plants of the whole country. The only Flora available was that of J.D. Hooker's *Flora of British India* (1872-97). It also did not include Baluchistan and major part of the NW Frontier Province. Some regional Floras and check lists were also available. At this time the information about Pakistan's plant

Typical Irano-turanian region vegetation. (Courtesy Mudassir Isman)

wealth was scattered, incomplete and out dated. The basic aim in producing the Flora was to provide a base line information which could be used for proper identification of all the plants of Pakistan. Correct identification of every plant is of utmost importance. Plant names were the key to the literature (Vansteenis, 1957). At the time of independence the following resources for the Pakistan flora were available. 1. Hooker, J. D. 1872-1894 *Flora of British India*; 2. Boissier E.1867-1884 *Flora Orientalis*; 3. Parker, R. N. 1928,*Flora of the Punjab and Delhi*; 4. Cooke, T.1904-1908 *The Flora of Bombay Presidency* ;5. Kashyap, S. R. 1936 *Lahore District Flora, Punjab*. 6. Talbot, W. A. 1909-1911 *Forest Flora of Bombay Presidency* 7. Blatter, C., E. McCann, and Sabnis, T.S. 1927-1929 *Flora of Indus Delta*. Plant collection was started as early as 1820. The conditions for complining a Flora of Pakistan were far from Ideal. 1.) Most of the collection was done by the British with a few other Europeans ;2.) The historical collections were in British Herbaria like Kew, British Museum and Edinburgh or Indian Herbaria like Calcutta (Kolkata) and Dehra Dun ; and 3.) Only few odd duplicates were present in RAW. Thus the writing of the Flora of Pakistan by a Pakistani team was difficult. Punjab University Herbarium. Three or 4 mini Herbaria were present in Pakistan at the time of its creation except R.R. Stewart Herbarium at Gordon College Rawalpindi (RAW) which had about 55000 specimen - who had collected all over Pakistan for 50 years. TheStewart collection (1910-1960) formed the basis for writing the Flora of Pakistan. Some new herbaria were also established afterward.

(Courtesy Mudassir Isman)

The herbaria in Pakistan.

Location(abbreviation), Number of specimens, Date

1. Herbarium, Biological Sciences Dept.,Quaid-i-Azam University, Islamabad, (ISL) 175000 1974
2. Herbarium, Botanical Sciences Division,Pakistan Museum of Natural History,Islamabad (PMNH) 60500 1981
3. National Herbarium, PARC,Islamabad (RAW) Formerly StewartHerbarium, Gordon College,Rawalpindi. 75000 1912
4. Herbarium, Botany Department ,Karachi University, Karachi (KUH) 150000 1953
5. Herbarium, University of the Punjab,Lahore (LAH) 50000 1918
6. Herbarium, Botany Department,Islamia College, Peshawar (ICP) 12000 1920
7. Herbarium, PCSIR, Peshawar (PES). 13000 1958
8. Herbarium, Pakistan Forest Institute,Peshawar (PPFI). 20000 1947
9. Herbarium, Botany Department,Peshawar University, Peshawar (PUP).40000 1952

The Publication of The Flora of Pakistan

Group and Date

1	Flacourtiaceae	1970
210	Asteraceae – Part II (Inuleae, Plucheeae and Gnaphaleae)	2003
211	Asphodelaceae	2005
212	Hemerocallidaceae	2005
213	Convallariaceae	2005
214	Hyacinthaceae	2005
215	Liliaceae	2007
216	Asteraceae - Part III (Mutisae and Senecioneae)	in press

Editors of the Flora of Pakistan and numbers of families produced during their editorship.

Years	Families	Editors
1970-1989	190	E. Nasir & S. I. Ali
1989-1991	3	S. I. Ali & Y. J. Nasir
1995- to date	22	S. I. Ali & M. Qaiser

Families	215+1(parts I&II)
Genera	1388
Species	4758
Plates	1286
Illustrated Taxa	2874
Printed Pages	6813

7.6% species are endemic with 405 species belonging to 43 families and 169 genera, Most of these are in the central area in the mountains.

Forests and Forest Plantations in Pakistan

Pakistan is deficient in forest resources. The natural forest cover area in 1990 was 1 855 000 ha constituting 2.4 percent of the land area. Most of the forest cover belongs to Hill and Montane forest

formations (FAO, 1993). In terms of plantations, the Forestry Sector Master Plan (FSMP 1992) estimates the total forest area of the country, including plantations and scrub forests, at 4 220 000 ha. Plantations, with the exception of nearly 100 000 ha do not legally constitute forests (Siddiqui, 1997). Plantations in Pakistan were initially established in 1866 in the plains of Punjab and Sindh provinces to produce fuel wood for the railways. Due to the arid and semi-arid climate of the region, these plantations had to be irrigated through a network of canals and are referred to as "irrigated plantations". Their size varies between 2 000 ha to 10 000 ha (FAO, 1981 and MFA, 1981). These plantations are now managed to produce wood for industrial purposes.

During the five year plan from 1977 to 1982, 39 872 ha of regular plantations and 16 200 km of linear (row) plantations were established, mainly in Punjab. During the same period 50 825 ha of plantations were established in watershed areas, mainly in North West Frontier Province (MFA, 1984). The total annual planting was on the order of 20 000 ha during that period. Many trees have also been planted in farmlands and this constitutes a major portion of the wood supply. *Dalberergia sissoo* has been the main species in the irrigated plantations. It produces high quality timber as well fuelwood. Other species subsequently introduced were Morus alba for sporting goods and Acacia nilotica for the mining industry (MFA, 1981). In farm forestry plantations, *Dalbergia sissoo, Acacia nilotica, Eucalyptus spp., Populus spp., Bombax cieba* and *Melia azedarach* are popular species. *Pinus roxburghii* is planted in subtropical regions.

What is the Future of Botany in Pakistan?

• Obviously, the flora of Pakistan needs to be completed. Relatively less explored areas should be botanized such as: North and South Waziristan ;Kurram Agency ;Sulaiman range ; Khirthar range ;Deosai plateu. More material and information is now available. First fascicle of Flora of Pakistan appeared 34 years before. Flora now has to be revised in light of recent advances in Botany.

• Conservation strategies have to be developed. At minimal red data lists must be prepared. Over exploitation of our plant wealth has to be discouraged

Criterion for the classification of threatened plants has to be developed because every county has different conditions and the criteria differ for endangered and threatened plants. Narrow endemics have to be given first preference followed by such endemics which are found in more than one locality.

The Forestry Sector Master Plan (FSMP, 1992) proposed to increase the forest area of the country from the existing 4.8 percent to 9.8 percent in 25&nmbsp;years (1993-2017), mainly through plantations. The plan envisages establishing 3 900 000 ha of plantations on new areas of which 3 600 000 ha will be on private lands - 2 070 000 ha on farmlands and 1 530 000 ha in watershed areas. The irrigated plantations will be expanded by only 50 000 ha. (FAO, 2008)

Tom Croat, Plant Collector at the Missouri Botanical Garden

Two milestones were reached simultaneously at the Missouri Botanical Garden in October 2008—the MO herbarium mounted its 6 millionth specimen, and this specimen was veteran plant collector and Curator Tom Croat's 100 thousandth plant collection. To know Tom is to admire him for his passion for botany and his adventurous spirit. This is his story, in his own words….

I was raised on a small farm in Iowa and came to know plants by their common names and mostly as weeds in our corn and bean fields. My father had died when I was 11, leaving my mother and my six siblings on a heavily mortgaged farm.

Tom with field collection of *Anthurium centimillesimum* (courtesy Missouri Botanical Garden)

We began a dairy business because nothing else seemed to bring in a steady or reliable income but it was an endless spiral of milking, hauling manure and making hay. After high school I joined the 10th Mountain Division in Germany because in my county if you weren't crippled, they eventually drafted you anyway. I trained as a radar repairman and was stationed in Bavaria. The Russians had invaded Hungary and shortly after I arrived they launched the satellite Sputnik which alarmed our government into making funds available for science education. So after returning home to operate the family farm, I also went to nearby Simpson College in Indianola, Iowa. During the summers I ran the farm and worked full time with construction jobs, including working on the roadbed of Interstate 35 and later on the paving crew that added the concrete.

One of my professors at Simpson, Jack Carter, had been a student of Bob Thorne then at the University of Iowa. Carter was a systematist and impressed me with what he knew about naming plants and I enjoyed learning the Latin names for plants. I became hooked on botany but my first official collections were made while I later taught high school in the Virgin Islands near Puerto Rico. I was impressed with the colorful tropical trees that were so prevalent there. I dried the specimens in my apartment oven.

The next summer after school was out, I loaded up an army duffle bag with a change of clothes, a sleeping bag and 75 rolls of film, then traveled 23,000 miles by boat, plane, bus and truck throughout the West Indies and South America often sleeping in parks and even in jails. The entire trip cost me only $525! While I took a lot of pictures of plants and visited botanical gardens all along my route, I was not equipped to collect or dry herbarium specimens. I returned home, worked on the Rock Island Motor Freight dock at night unloading and unloading 18 wheelers then taught a semester of high school biology in Knoxville, Iowa before entering into the University of Kansas in Lawrence to get my Ph.D. in botany.

At Kansas I took one of the first Organizational for Tropical Studies courses in Costa Rica in 1965 where I collected plants as well. On returning to Kansas I married, Pat Swope, who was teaching calculus at the university. She helped me get through my course in Biological Statistics taught by Sokal and Rolf, using their as yet unpublished textbook. Pat and I lived in a large mansion on Massachusetts Avenue where we acted as curators of the property. It was one of these plantation style homes with four huge pillars in front and large, mostly furnished rooms used by the Lawrence Women's Club. The ballroom had two fireplaces and was devoid of furniture so it served us well when I was asked to host my graduating class's Ph.D. party.

Most of my first 4000 plant collections were made in the Great Plains of North America from Saskatchewan and Montana south to Oklahoma when I worked with *Solidago* for my Ph.D. thesis. I dried these plants with the heat from my 1962 VW bug engine by propping the press on the bumper and under the hood cover.

In 1967 I came to the Missouri Botanical Garden to work on the Flora of Barro Colorado Island in the Canal Zone of Panama. The next 12,000 numbers were collected on Barro Colorado Island and other areas in Panama up until 1972. Then work began in Central America, later in 1975 in Madagascar and Kenya.

It was in Madagascar, the third largest island in the world off the eastern coast of Africa, that I first decided to dry plants in my vehicle so that I would be free to continue collecting without the long return trips to Tananarive. I collected all over the southern half of the island. Most of the terrain was eroded and dry with only isolated human populations. The massive vistas allowed me to see where I would be at the end of a day's drive. I was driving a long-bed Land Rover which belonged to John Buetner-Janish, an anthropologist who lived in New York City but who was expelled from the Malagasy Republic because anthropologists generally were mistrusted there. I built a large wooden dryer in the rear of the truck and slept aside the dryer, often on top of piles of dried specimens.

As the bundles began filling up the back of the Land Rover, I slept on top of them. The only serious problem was that the dryer occasionally caught fire and I had to put it out by reaching into the box to throw the smoldering materials outside where I could snuff out the fire with sand. I did not have enough water to waste putting out fires since drinking water was scarce.

My meals were cooked over the same drying stove. I had the same meal each night, macaroni mixed with Magi soup. It was quite tasty. Breakfast was French bread and jelly. Lunch consisted of sardines and bread.

Three weeks later I reached Tulear. Due to the terrible roads, I had ruined one tire and had no spare. Two other tires were in bad condition, so I flew back to the capitol with all my plants, leaving the plants at the botanical institute where I was headquartered. I bought two tires and secured a car to take me back to Tulear.

The car allowed me to complete this trip but no further public transportation was possible for the

next 3 weeks. I could continue to drive the Land Rover but since I was supposed to be in a hotel by dark, I had to be very secretive, camping far away from cities. One night I camped along the Indian Ocean near Finaransoa and my camp light was seen by the authorities. They sent soldiers to escort me to a military base.

On another occasion I was stopped at a military checkpoint. After the soldier said he would take me in for interrogation, I raced off and hoped that he would not take a shot at me.

My arms were covered with scratches from the spiny plants. They had become infected, perhaps owing to malnutrition. I visited an American Lutheran mission hospital and the doctor thought it might be an endemic disease requiring amputation of each area of infection but fortunately an antibiotic cured the condition.

Since no scheduled flights were leaving the country, it was difficult to leave. I received help from the Charge des Affairs at the American Embassy, a St. Louis native. He got me on an unscheduled flight to Paris. I sorted out and boxed up my plants only to discover that the Land Rover would not start. We rounded up a group of young men to push it far enough to start it.

I delivered my huge crate of dried plants to the Marine guard at the door of the American Embassy and sped to the airport, barely making the flight. Four months later, my crate containing 4000 valuable collections arrived by sea under an Embassy Customs permit, never having been opened by the authorities. This is one time the U.S. government came through for me!

In Central America I used a specialized camper that I constructed with a built-in dryer which allowed me to collect 5000 numbers in 9 weeks time. Learning from my fires in Madagascar, I added baffles to prevent any flame from reaching any part of the press and an automatic fire extinguishing system.

It was not until 1980 that I made my first official collecting trip to South America beginning in Ecuador, then Peru and Colombia but it was back in Panama where I collected my 50,000th number. In 1981 I took an extensive collecting trip to Australia, New Guinea, Philippines, Malaysia and Nigeria. In 1982 I collected in Brazil, French Guiana, Suriname, Trinidad and Venezuela. In 1983 and 1984 I collected again in Colombia, Ecuador and Peru; in 1985 in Panama, Costa Rica, Venezuela and Puerto Rico. I made repeated trips to all of these areas and more over the course of the next 15 years having collected in all parts of South America. If you took me blindfolded into nearly any forested part of South America, I would recognize the area or be able to tell you where I was based on the species composition of the forest.

As you might imagine, I enjoy collecting plants despite all the trials and tribulation as well as the many injuries I have received. During one week in Madagascar I collected 1246 numbers and during a single day in Panama on Cerro Pirre I collected 225 numbers.

Tom preparing to press his personal 100,000th specimen, *Anthurium centimillesimum* (Courtesy Missouri Botanical Garden)

My 100,000th collection was made in October of last year in Ecuador near Volcán Pichincha, in an area that had been well collected by the Jesuit botanist Luis Sodiro, at the end of the 19th Century. He had collected and described over 250 species of *Anthurium*, most of them in the region of Volcán Pichincha, so I was not expecting anything new to science. I was collecting with my student, Monica Carlsen and Dan Levin, a former President of the International Aroid Society. On the day that I approached the magic number of 100,000, I decided that I must be in an area where there were at least some interesting Araceae (the group of plants in the *Philodendron* family that I work on). The day before I had been in a rather weedy area near Esmeraldas so we drove to Puerto Quito to begin collecting the next morning. October 16th was to be our last day in the field so I knew that we had to push over the top. We had only 66 collections to make it but during the course of the day we really did not have a way of knowing exactly how many total collections we found so we just kept collecting. The first stop was near the Endesa Reserve but I did not have a permit to collect there so we collected in an

interesting area along the entrance road. Then we drove to Mindo, taking the old road that leads down to Tandayapa then on to Nono and finally Quito. This old road was once the major route to the coast for Quito. I had collected this road before and did not expect to find anything new but on our second stop along a steep road bank covered with aroids, I spotted a huge *Anthurium* leaf near the top of an almost vertical road bank 25 feet high. I climbed through the fence into a pasture above the bank then jumped down the bank to get to the plant. It had a stem 8 cm in diameter and stood well over 2 meters high. Because it was much lower on the bank than the edge of the pasture and yet so far down to the road, I had to heave it back into the pasture then with considerable difficulty haul myself out of the hole. I managed to haul the beast back to the road without even ripping a leaf and on closer inspection found that it was a new species. Since it was my 100,000th collection I named it that, which in Latin is *Anthurium centimillesimum*! The plant was so large that it required 7 sheets of herbarium paper to mount it and one of these seven sheets bears the MO-6,000,000 number.

I am glad that I was able to play a role in this significant achievement of acquiring, processing and mounting the six millionth herbarium specimen for the Missouri Botanical Garden. Many people here at the Garden are involved in this process in one way or another by collecting plants, typing labels, filing specimens or determining plant material. We are all proud to be a part of this great occasion. Now let's set our sights on the next million!

News from the Society

Meet the new staff in the BSA office

Heather Cacanindin, Director of Membership & Subscriptions

Heather joined the BSA team in August 2007 after 8 years as Program Director at the United Soybean Board. With a background in association management and governance, she enjoys the ongoing work in strategic planning and board/committee development. Joining with the efforts of Wanda Lovan and Bill Dahl, she has helped to increase BSA membership to a record high of over 3050 members. Heather also launched an effort to survey and track members' opinions and trends in order to better meet your needs. She is keenly aware of the special "community" aspect of the BSA and is working to foster more ways for members to interact. Heather also works with the American Journal of Botany editorial staff to find more avenues to market our top-notch journal. Reaching out to current and past AJB subscribers, Heather's goal is to stop the slow but steady decrease in institutional subscriptions to the AJB. From her office at the BSA World Headquarters in St. Louis, Heather is eager to talk to all of our members.

- hcacanindin@botany.org

Richard Hund, Production Editor, American Journal of Botany.

Richard joined the BSA in January 2008 as the Production Editor of the *American Journal of Botany*. He spent 5 years as a production editor of medical textbooks for Elsevier and 4 years as a project manager for SPi (a full-service compositor) before coming to the AJB. Rich has been working closely with Managing Editor Amy McPherson and Editor-in-Chief Judy Jernstedt to increase the AJB's impact factor and visibility in both the scientific and general community, and the team recently launched *AJB* Advance Access, which allows for the publication of articles ahead of print

- rhund@botany.org.

Jennifer L. Potratz, Education and Outreach Coordinator

Since May 2008 Jennifer has been helping PlantingScience maintain its present position and move into the next phase of complex program delivery, including; improved educational/ instructional materials and expanded automation to reach more students, more efficiently. Jennifer has an interdisciplinary Masters in Conservation Biology and Political Science with a strong background in Environmental and Outdoor Education having worked as a naturalist, guide, ranger, and wilderness emergency trainer in Alaska, Montana, Idaho, Wyoming, and Missouri.
- jpotratz@botany.org

News from the Annual Meeting

Awards

Michael Cichan Award
Dr. Maria A. Gandolfo, Cornell University
For her paper: "Fossil Nelumbonaceae from the La Colonia Formation (Campanian-Maastrichtian, Upper Cretaceous), Chubut, Patagonia, Argentina." Co-author on the paper is N. R. Cuneo

The Isabel Cookson Award
Cyrille Prestianni, Universite de Liege, Géologie
For the paper entitled ""Xenotheca" and Pseudosporogonites: two Belgian acupulate seeds?." Co-authors were Jason Hilton and Philippe Gerrienne.

The Darbaker Prize
The two Darbaker prize winners for 2008 are **Debashish Bhattacharya** and **Virginia (Ginger) Armbrust**
Dr. D. Bhattacharya was nominated on the basis of his contributions to an international tree of life project and phylogeny papers published on a wide range of algal groups during the years of 2006 and 2007, particularly Li, S., T. Nosenko, J.D. Hackett, and D. Bhattacharya. 2006. Phylogenomic analysis provides evidence for the endosymbiotic transfer of red algal genes in chromalveolates. *Mol. Biol. Evol*. 23:663-674.

Dr. V. Armbrust was cited for several notable research contributions on the biology of diatoms in 2006 and 2007, including the following: Oudot-Le Secq, M.-P., J. Grimwood, H. Shapiro, C. Bowler, E. V. Armbrust and B R. Green. 2007. Chloroplast genomes of the diatoms Phaeodactylum tricornutum and Thalassiosira pseudonana: comparison with other plastid genomes of the red lineage. *Molecular Genetics and Genomics* 277:427-429.

The Katherine Esau Award
Alana Oldham, Humboldt State University
For her paper "Height-Associated Variation in Sequoia sempervirens (Coast Redwood) Leaf Anatomy: Potential Impacts on Whole-Tree Carbon Balance." Her co-authors were Stephen Sillett and George Koch.

The George H.M. Lawrence Memorial Award
Mr. Dylan O. Burge, a student of Professor Paul Manos at Duke University. The proceeds of the award will help support his travel for field and collections-based work in an integrative research study of the genus *Ceanothus.*

The Margaret Menzel Award
Michael Barker, University of British Columbia
For the paper "*Evolutionary genomics of hybridization: Detecting ancient hybridization and introgression by the inference of intrologs in plant genomes*." Co-author was Loren H. Rieseberg.

The Maynard Moseley Award
Eric Madrid, University of Colorado
For his paper "Female Gametophyte Developmental Evolution in Piperales. " His co-author was Ned Friedman.

Ecological Section Best Student Presentation & Poster Awards
Iman Sylvain, of Howard University, for her poster, "Comparison of Seedling Fitness in the Hyperaccumulator, Alyssum murale Waldst and Kit. (Brassicaceae) in Soils With and Without Nickel."

Genetics Section Graduate Student Research Awards
Renate Wuersig, Purdue University (PhD student)

Historical Section Emanuel D. Rudolph Award

Sarah Kelsey, Rutgers University
for her poster: "The Establishment and Persistence of Plants Introduced to New Jersey by Solid Ballast on Ships." Co-authors were Sasha Eisenman and Lena Struwe.

Physiological Section Li-COR Prize

Uromi Manage Goodale, Yale University, for her talk "Physiological acclimation of pioneer species to changing light environments." Her co-authors were Graeme P. Berlyn, Mark S. Ashton, and Kushan U. Tennakoon.

Physiological Section Best Student Presentations

Nicole Hughes of Wake Forest University, for her poster entitled, "Coordination of anthocyanin decline and photosynthetic maturation in juvenile leaves of three deciduous tree species." Her co-authors are Christianna Morely and William Smith.

Women in Botany luncheon

The first of many Women in Botany luncheons took place during Botany 2008 in Vancouver. The event was well attended with well over 90 participants. Karen Renzaglia, Pam Soltis and Muriel Poston moderated a discussion about the strategies for women to succeed in science. We began with a brain-storming session that focused on the positive attributes women bring to science. We then turned to ideas on how to make our professional environment supportive and responsive to the needs of women. The interactions were lively and insightful.....creativity abounded.

The event provided an excellent means for women at all stages of their career to network and share experiences. We will host a second luncheon in Snowbird during Botany 2009. It is hoped that more than one man will attend the luncheon. The input and collaboration of men in botany are essential to the success of their female counterparts.

note: The Botanical Society of America's "Women in Botany" networking Listserv is now operational. To join the list, please go to http://lists.botany.org/mailman/listinfo/womeninbotany_lists.botany.org and/or contact Amy (amcpherson@botany.org) or Heather (hcacanindin@botany.org) at the BSA office for details.

BSA Science Education News and Notes

BSA Science Education News and Notes is a quarterly update about the BSA's education efforts and the broader education scene. We invite you to submit news items or ideas for future features. Contact: Claire Hemingway, BSA Education Director, at chemingway@botany.org or Marshall Sundberg, PSB Editor, at psb@botany.org.

PlantingScience — BSA-led student research and science mentoring program

Planting Science continues to grow by leaps and bounds! The fall 2008 session again broke our previous record of number of students, teachers, and scientists partnering in the online mentored inquiry projects. We are delighted to welcome scientists from the new societies as mentors. Seven Scientific Societies are now partnering in the program: **American Society of Agronomy**, **American Bryological & Lichenological Society**, **American Fern Society**, **American Society of Plant Biologists**, **American Society of Plant Taxonomists**, **Society for Economic Botany** and, of course, the **Botanical Society of America**.

Plant IT — BSA-led Plant IT Careers, Cases, and Collaboration project collaborates with Dr. Biology. Last July Charles Kazelik, aka Dr. Biology, modeled science interview techniques and podcast technology for students and teachers participating in the Plant IT Summer Institute for Teachers and Student Career Camp held at Texas A&M University. Charles's podcast with Forensic Palynologist Dr. Vaughn Bryant is online at the Ask a Biologist website of the Life Sciences Department of Arizona State University.

Pollen Podcast Interview
http://askabiologist.asu.edu/podcasts/content_logs/vol42_log_aab_podcast.html

Web article
http://askabiologist.asu.edu/research/pollen/index.html

Pollen gallery
http://askabiologist.asu.edu/research/pollen/gallery.html

Check out also the Investigative Case resources Ethel Stanley and Margaret Waterman prepared for Summer Institute teachers to explore pollen and remote sensing, and some of the pollen images and case materials developed by teachers.
http://www.bioquest.org/myplantit-2008/

Spotlight on BSA Member Contributions to Science Education

In this segment I highlight the communal effort of BSA members to take botanical education to the national science education meetings. BSA members were well represented at the 2008 National Association of Biology Teachers meeting

(Oct. 15-18) in Memphis: Beverly Brown, Kim Sadler, Steven Saupe, Ethel Stanley, Kumkum Prabhakar, Phil Gibson, Gordon Uno, James Wandersee, Linda

KumKum Prahbakar and Steven Saupe at the BSA Booth staffed by Jen Potratz and Claire Hemingway

Weinland. Look for your colleagues' contributions in the program guide. http://www.nabt2008.org/sites/S6/index.php?p=573

And consider building the botanical presence at the 2009 NABT meeting in Denver or the 2009 NSTA meeting in New Orleans. The BSA will again host a booth exhibit and distribute information about the BSA-led PlantingScience and Plant IT projects. We welcome your engaging booth ideas and interest in contributing.

Science Education in the News

High School Graduates Score Lowest in Science—The 2008 ACT College Readiness Report of 1.42 million high school graduates indicate stable scores across years in math, reading, and science. The disturbing news is that only 28% of the high school graduates taking the test met or surpassed the ACT College Readiness Benchmarks for science. Math was the next lowest content area, yet 43% of the high school graduates me or exceeded the ACT benchmarks.
http://www.act.org/news/releases/2008/crr.html

Cultural Constrictions on the Math Pipeline —How does US culture derail youth with high math aptitude? In a comprehensive analysis of decades of data on students identified with high math aptitude, the authors document that the majority of top mathematicians in the U.S. were born elsewhere and identify influences that have deterred U.S. youth from career trajectories in the mathematical sciences. They also use the rich database to tackle the controversial idea that girls lack the intrinsic aptitude to excel in math.

Andreescu, T., Gailian, J.A., Kane, J.M., Mertz, J.E. 2008. Cross-Cultural Analysis of Students with Exceptional Talent in Mathematical Problem Solving. Notices of the American Mathematical Society. 55. (10). 1248-1260
http://www.ams.org/notices/200810/fea-gallian.pdf

The Science Education Interactive Timeline Project —The University of Arkansas's Program to Advance Science Education has launched a website designedas a snapshot of the evolution of science education in the U.S. Links to events and documents noted in the timeline provide further information about the events.
http://coehp.uark.edu/pase/itseusa/Widget/Widget.htm

Editor's Choice

Franklin, Wilfred. Investigating Effects of Invasive Species on Plant Community Structure. 2008. American Biology Teacher 70(8): 479– 482.
"Can't see the trees for the forest?" Franklin describes a series of activities she uses to introduce basic plant ecological sampling and use it to answer some questions about invasive species. She is lucky to have a small forest on campus nearby but the exercises could easily be adapted to an urban landscape. The effectiveness of the activities in combating "plant blindness" (see Schussler below) is indicated by students' frequent spontaneous use of their cell phones to document their plant identifications.

Jensen, Philip A and Randy Moore. Students' Behaviors, Grades & Perceptions in an Introductory Biology Course. American Biology Teacher 70(8): 483-487.
For the last several years Randy and his colleagues have been quantitatively examining many of the "truisms" about introductory science students most of us who teach have come to accept. There are not a lot of surprises for experienced teachers, however, as Jensen and Moore suggest, it may be more effective in promoting change in student behaviors if we can present actual data supporting our contentions, such as, "It's important to attend every class" than for us to simply say it! In this paper they present data on attendance, homework, extra credit, help sessions, and student expectations.

Schussler, Elisabeth E. and Lynn A Olzak. It's Not Easy Being Green: Student Recall of Plant and Animal Images. 2008. *Journal of Biology Education* 42(3) summer: 112-118.
Remember plant blindness? (PSB 47[1]:2-9) In

this paper Schussler and her colleague provide additional substantiation that the phenomenon is real and, in fact, has a gender component – women are less "plant-blind" than men. The most discouraging finding, however, is that students enrolled in a botany course did NOT differ significantly from control students taking psychology! Clearly we have some work to do.

Flannery, Maura. 2008. Biology Books for Young People: Plants and Invaders. *BioScience* 58: 880-881. Text and illustrations of nine books introducing plant content to audiences aged 4 to 12 are reviewed.

Jordan, Nicholas R., Bawden, Richard J., and Bergmann, Luke. 2008. Pedagogy for Addressing the Worldview Challenge in Sustainable Development of Agriculture. *Journal of Natural Resources and Life Sciences Education* 92-99. Critical civic debates and classroom conversations about the rapid shifts in agriculture and increasing emphasis on production of ecological services in farmed landscapes are the focus of this article.

Dyer, William E. 2008. Inhibitors of Fatty Acid Synthesis and Elongation. Herbicide Discovery and Screening. *Journal of Natural Resources and Life Sciences Education.* The first of these Web Lessons/Learning Activities provides an overview of fatty acid synthesis and elongation and explains how herbicides inhibit the pathway. The second web lesson describes historical and current approaches to identify herbicides.

Stark, L. 2008. Plant movements revealed. *CBE Life Sciences Education* 7(3): 284-287. A review of websites, including the familiar Roger Hangarter's Plants in Motion and the new YouTube Quick Time movies, for teaching and learning about biology with a focus on plant movement and carnivorous plants. http://www.lifescied.org/cgi/content/full/7/3/284?etoc

Dolan, E.L., Lally, D.J., Brooks, E., and Tax, F.E. 2008. PREPing students for authentic science. *The Science Teacher* 75(7): 38-43. An overview of the Partnership for Research and Education in Plants program, a partnership among high school students and teachers and plant scientists, which provides students with authentic science opportunities to identify noteworthy phenotypes of *Arabidopsis thaliana* mutants.

News from the Sections

BSA Historical Section:

We are writing to encourage those of you that are interested in the history of plant biology to consider becoming part of the Historical Section of Botanical Society of America. To those of you that have already indicated affiliation through your BSA registrations and emails we say - Thank You.

Botany meetings are always a time to catch up with old friends, to meet new people, and to discover what is happening in the various fields of plant biology. The meeting in Vancouver, Canada was a great success and as always the talks and posters were excellent. Those who ventured away from the UBC campus, either on field trips or on your own, surely found that the sub-alpine and timberline plant communities, the botanical gardens, and the beautiful beaches were worth the trip. This year, the Historical Section had three outstanding posters. As you passed by the registration desk we hoped that you had time to meet and talk with some of these young students.

Next year, the annual Botanical Society of America meeting will be back at Snowbird, Utah. We look forward to seeing you and invite and encourage you and/or your students to consider presenting a paper or poster in the Historical section.

You may recall that The Emanuel Rudolph Award was established in 2006, at the Historical Section annual meeting in Chico, CA for the best student paper on a historical subject in botany. The qualifications were revised in 2007 to reflect and highlight excellence in the area of historical presentations at the Botanical Society of America meetings. Students presenting historical papers in any section or symposium are eligible for this award. The first award was given in 2007 to students organizing "A Symposium in Honor of Sherwin Carlquist." This year's award was given to a student, who co-authored a poster on "The Establishment and Persistence of Plants Introduced to New Jersey by Solid Ballast on Ships." The award recipients are announced in the Plant Science Bulletin and on the BSA website.

We encourage your comments and thoughts about the types of lectures or symposia you would like our section to sponsor and we look forward to a great session at Snowbird, Utah – Botany 2009. Our email addresses are listed below and our contact information is on the BSA Website:
http://www.botany.org/governance/sections.php#Historical\
We hope to hear from you.

Sincerely,

Carol Kelloff, Secretary/Treasurer
KELLOFFC@si.edu
Lee B. Kass, Section and Program Chair
lbk7@cornell.edu
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Announcements

In Memoriam:

Lazarus Walter (Walt) Macior (1926-2007)

Lazarus Walter (Walt) Macior passed away on October 5, 2007 after a long illness with Parkinson's disease. Walt (Walter Aloysius Macior, Jr.) was born on August 26, 1926 in Yonkers, New York. He received his first degree from Columbia University before enlisting in 1945 to serve in the United States Army as a Japanese linguist during the final months of World War II. After his war service, he received a Master of Arts degree from Columbia University. Walt then entered a Catholic seminary, becoming a priest in 1956 as a member of the Franciscan Friars of the Assumption BVM Province (taking the religious name Lazarus). He completed a Ph.D. in 1959 from the University of Wisconsin. In 1960, the results of his dissertation were published in the Bulletin of the Torrey Botanical Club 87(2): 99–138, title: "The tetrakaidecahedron and related cell forms in undifferentiated plant tissues." His first college teaching position (1960 to 1962) was Instructor of Biology at St. Francis College in Burlington, Wisconsin and it is here that he began his life-long investigation of pollination mechanisms. In the summers of 1960 and 1961 and from 1962 to 1964, he was a lecturer at Marquette University. Between 1965 and 1967, he was Assistant Professor of Biology at Loras College in Dubuque, Iowa. In 1967, he came to the University of Akron where he continued his research of *Pedicularis* and remained as Professor Emeritus beyond his retirement in 2000. He also held visiting and adjunct positions at various times during his career. From 1966 to 1968, he was a Visiting Research Assistant at the Institute of Arctic and Alpine Research (University of Colorado); between 1971 and 1973, he was an Adjunct Faculty Research Associate at Ohio State University Institute of Polar Studies; and during a sabbatical leave in 1984, he was a Faculty Research Associate in the Department of Entomology at the University of California in Davis. During his career, he published over fifty research articles. Although his research interests were in the field of pollination biology, he was by training and avocation a botanist and taught Plant Morphology, Plant Anatomy, and Plant Development while at the University of Akron in addition to Evolution and Bioethics. During his tenure at the University of Akron, he was named a Distinguished Professor of Biology and was given the honor of Outstanding Teacher by the Alumni Association in 1990. He also established two scholarships for graduate study in botany: the Lazarus Walter Macior Graduate scholarship in Botany and Plant Sciences, and the Alice and Walter Macior Award in Plant Sciences for students, which is named in honor of his parents.

Walt's earliest papers concentrated on the pollination dynamics of herbs of deciduous forests, alpine zones, and tundra. He showed an early interest in buzz-pollinated flowers with vibratile anthers (*Dodecatheon* and *Solanum*), which provided him insight into his later, major work on *Pedicularis*. With his training as a plant morphologist, he understood the significance of adaptive modifications to floral structures. His fieldwork took him throughout the Northern Hemisphere to the Yukon Territory, Japan, India, Kashmir, and China. I once asked him why *Pedicularis* and he related to me that he came upon it quite by accident. One day while he was studying the pollination of *Aquilegia*, he discovered that all the bumblebees ignored it in preference for *P. canadensis*, "Having nothing to study that day, I turned my attention to the curious little lousewort plant that was stealing the pollinators from my subject plant and I've been hooked ever since." Thus began his research focus and he often relayed this story to his students to remind them of the importance of serendipity in science. Walt was a stickler for making carefully conducted field studies and had little patience for those who assumed a mechanism merely based upon extrapolation of a pollination syndrome. He took pride in proving them wrong with actual data. A case in point is his study of *Pedicularis groenlandica*. An earlier investigator had assumed that its flowers had nectar because its bumblebee pollinators entered the flower in an upright position, but when Walt presented his data at a symposium, revealing that the flowers are nectarless and the bees collect pollen by buzzing, this investigator took great umbrage refusing to speak to Walt for several years! In fact Peter Bernhardt, a close friend and colleague of Walt, portrayed his approach as forensic, "Walt didn't believe that the mere, repeated presence of an animal on a flower made it a true pollinator or even a prospective pollinator. He wanted and got hard evidence to back it up each time. When he captured an insect he noted where pollen was deposited on its body, removed it and identified grains under the

microscope by matching it to the grains produced by the host flower. Walter called this protocol "pollen load analysis." In this way, he presented some of the earliest hard data on the fidelity (faithfulness) of foraging insects to a particular plant species. He also understood that if anthers repeatedly deposited pollen on a bee's head, then the head of a true pollinator must repeatedly contact the receptive stigma of another flower of the same species, so important in his studies of the bizarre, elephant-nose *Pedicularis groenlandica* and *P. attollens*. Walter's papers typically contain a Table analyzing the pollen load contents carried by dozens of flower visitors. Even today, very few field workers recognize the value of cross-referencing a pollinator specimen with its pollen load." With his attention to detailed field analysis, he also revealed that some *Pedicularis* of China with extremely long corolla tubes do not contain nectar as had been assumed. Rather than being a vessel for nectar, Walt suggested that the long, nectarless tube elevates the distal petals above surrounding vegetation to enhance their display. Walt was also the first botanist to study the federally endangered Furbish's lousewort (*Pedicularis furbishiae*) in the 1970's. His reports and publications about its life-cycle, habitat, and distribution helped save the plant from extinction because he showed that the major population would not survive flooding if a proposed dam was built on the site. To conduct his studies in remote areas in North America, Walt owned a medium sized Airstream travel trailer. He stocked it with all the necessary field and laboratory equipment, and it served as his mobile field station, mess hall, and sleeping quarters. One of his favorite pieces of equipment was a still camera modified to take close-up stereo photographs that he used to discern the precise fit of pollinator to flower. To reveal floral patterns only visible under ultraviolet illumination, he had another camera outfitted with a quartz lens. He was also an accomplished cinema photographer and accumulated many hours of film documenting pollinator behavior on *Pedicularis* flowers. In later years even as his health started to decline, he made several field study trips to China, and Walt would be pleased to see that many of his Chinese colleagues have since taken up the study of *Pedicularis* pollination.

Walt's teaching influenced many students. He was a keen observer of nature and used many examples in the classroom and on field trips. His style of teaching was to pose a problem or question and then let the class attempt to answer before giving a detailed explanation. Exams were often done the same way; he expected you to synthesize knowledge learned in lecture and lab by posing novel questions for the student to answer. On field trips, he often presented open ended questions that sometimes inspired laboratory investigations. I once asked if he knew the answer and he replied, "Nope, just wanted to see if anyone would take the initiative." He always had time to talk to his students about any topic. One student recollects of a time when, after failing a test, he went to Dr. Macior's office. "I well recall Dr. Macior's posted office hours being followed by the words 'or gladly by appointment.' Would he really be glad to see me? To my surprise, he was! As I found out in subsequent years, Dr. Macior was glad to see all such poor fish that washed up at his door." His door was also open to others as well. As he also taught evolution class, sometimes creationists would take up their cause with him. Not suspecting that he was also a Franciscan priest whose views of science and faith were perfectly compatible, they would quote scripture to him to prove their point. Walt soon had them squirming by posing theological, philosophical, and scientific questions to which they had no answer. His approach, however, was never mean-spirited and his final reply to them would be, "Sometimes doubt is good for the soul." Among his graduate students, Walt expected investigative thoroughness. I remember one student who spent many hours sectioning and staining *Pedicularis* haustoria and then taking great lengths to explain its detailed anatomy only to have Walt exclaim, "Well, you forgot one very important aspect. How is the anatomical structure of the host affected? Report back to me when you figure that out." Walt also took time to answer all letters from inquiring graduate students and young scientists and indeed a colleague described him as an old fashioned 'Man of Letters'. He recalls exchanging many correspondences with Walt while working on his Masters, "Walter was willing to read and critique my Masters thesis even though he was not on my graduate committee and his early intervention saved me valuable revision time. In later years, I soon learned to recognize his style when a refereed manuscript came back from a journal. Walter's critiques were always invaluable because he knew how to itemize problems in a paper in a clear and progressive manner. He never made the author feel stupid because his critiques were like road maps. He pointed you in the right direction starting at A and ending at Z."

Not only was Dr. Macior an extraordinary teacher, scientist, and mentor, he was a good friend as well. Over the years that I knew him, we had many great discussions about science, philosophy, religion, and life in general. His greatest legacy to his students, colleagues, and friends is that he made you think! We have lost a great pollination ecologist, botanist, teacher, mentor, and humanitarian. He influenced many students' careers and will be missed by all.

Bruce W. Robart, Ph.D.
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Personalia

Eshbaugh Honored for Outreach Efforts

W. Hardy Eshbaugh, Miami University professor emeritus of botany, received the Peter H. Raven Award for his outreach in the areas of public education and conservation. Presented by the American Society of Plant Taxonomists during its conference this summer, the award recognizes a plant systematist for exceptional outreach efforts to nonscientists.

Eshbaugh's public education outreach includes giving public lectures, leading field trips and ecotourism trips throughout the world and writing papers on natural history for various publications. His conservation outreach at the international and national level has encompassed serving on the boards of the Nature Conservancy (Ohio), National Audubon Society, Atlantic Salmon Federation, St. Mary's River Association (Nova Scotia) and Hawk Mountain. Locally, he has served on the boards of Audubon Miami Valley, the Avian Research and Education Institute and Three Valley Conservation Trust.

In 2007, Eshbaugh was recognized with the Herbert Osborn Award from the Ohio Biological Survey and the Distinguished Economic Botanist Award, the highest honor given to professionals by the Society for Economic Botany. He was elected President of the Botanical Society of America in 1988 and received the Society's Merit Award in 1992 and both the Centennial and Bessey Awards in 2006. He was elected President of the American Institute of Biological Sciences in 1995.

Eshbaugh was a member of Miami's faculty from 1967-98, including positions as chair of the department and director of Miami's W.S. Turrell Herbarium.

Donation of the Graham Palynological Collection to the Smithsonian Institution

The Smithsonian Tropical Research Institute in Panama is proud to announce that it has received the donation of the best collection of neotropical pollen in the world, the Graham Palynological Collection, thanks to the generosity of **Alan Graham,** Professor Emeritus at the Kent State University and current curator at the Missouri Botanical Gardens.

Alan Graham in the field

This collection began as part of an early palynology laboratory set up in the herbarium of the University of Texas in 1954, and expanded with original preparations, and also with exchanges with numerous laboratories throughout the world. It comprises over 25,000 pollen slides of modern taxa, mostly from the neotropics, thousands of pollen slides from Dr. Graham's work on the geological history of the forests of Central America, as well as pollen residues and an impressive collection of literature (over 16,000 reprints related primarily to the biology and geology of the New World with emphasis on Latin America). The modern reference component has the added virtue that all the original preparations can be referenced to a specific herbarium collection, allowing scientists to verify the identification of fossil material and specimens used in taxonomic studies.

Part of the Graham Pollen Collection

At STRI, we are grateful and honored to be hosting this collection, which is an invaluable resource for our scientists. Soon, we hope to have all components in digital format, to share it on the web with everyone who might be interested, worldwide.

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Missouri Botanical Garden Awards Highest Honor to Renowned Ecologist

Dr. Thomas E. Lovejoy, president of the Heinz Center for Science, Economics and the Environment, has received the Henry Shaw Medal from the Missouri Botanical Garden. The award was presented by Dr. Peter Raven, president of the Missouri Botanical Garden, during the annual Henry Shaw dinner on Oct. 13. Awarded since 1893, and named for the Garden's founder, the medal honors those who have made a significant contribution to the Missouri Botanical Garden, botanical research, horticulture, conservation or the museum community.

A renowned ecologist, Dr. Lovejoy has worked in the Brazilian Amazon since 1965 studying the interface of science and environmental policy. Beginning in the 1970's, Dr. Lovejoy helped bring attention to the issue of tropical deforestation, and in 1981, published the first estimate of global extinction rates in the Global 2000 Report to the President. Dr. Lovejoy also conceived the idea to conduct the Critical Size of Ecosystems project, a long term study on forest fragmentation in the Amazon.

Dr. Raven praised Dr. Lovejoy for coining the term "biological diversity," later shortened to "biodiversity," and for originating the concept of debt-for-nature swaps. A debt for nature swap is an agreement between a developing nation in debt and its creditors to forgive the debts in return for the promise of environmental protection. Dr. Lovejoy established the concept in 1981, largely to minimize the negative effect debt has on developing nations and to minimize the environmental destruction that such nations frequently cause.

Dr. Lovejoy is the founder of the public television series "Nature." He has served as the Senior Advisor to the President of the United Nations Foundations, Chief Biodiversity Advisor and Lead Specialist for the Environment for the Latin American region for the World Bank, Assistant Secretary for Environmental and External Affairs for the Smithsonian Institutions, and Executive Vice President of World Wildlife Fund-US. He has also served on advisory councils in the Reagan, George H.W. Bush, and Clinton administrations.

Dr. Lovejoy received his B.S. and PhD in biology from Yale University.

2008 ESRI User Conference Features Keynote Address by Dr. Peter H. Raven

Renowned Botanist and Environmentalist Speaks at World's Largest GIS Gathering

The 2008 ESRI International User <http://www.esri.com/events/uc/index.html> Conference (ESRI UC) featured renowned botanist, environmentalist, biodiversity expert, and president of the Missouri Botanical Garden, Dr. Peter H. Raven. Raven discussed the significance of biodiversity and the environment for sustaining our world.

"Dr. Raven has played a vital role in teaching others about the importance of biodiversity and in researching our planet's ecosystems," says Jack Dangermond, president, ESRI. "He's making a difference in securing our environmental resources. We're honored to have him as our guest and we're excited about the opportunity our users will have to hear from such a distinguished individual."

The ESRI UC, the largest conference in the world devoted to geographic <http://www.gis.com/whatisgis/index.html> information system (GIS) technology, was held August 4-8 at the San Diego Convention Center in California. The conference drew approximately 13,000 users from more than 120 countries who came together to learn, collaborate, and discover the latest developments in GIS technology. The conference theme this year was GIS: Geography in Action.

Raven talked about the importance of biodiversity and how it influences our daily lives. He discussed the threats-including loss of habitat, overconsumption, and climate change-that impact biodiversity and the solutions available for us to preserve and improve our planet's sustainability. As part of the presentation, GIS was used to analyze ecosystems and the myriad of plant and animal life that inhabit them. In addition, GIS was used to model future impacts to these bionetworks.

Professor Dedicated To Study Of Plant Use By Native Americans Will Receive William L. Brown Award

The William L. Brown Center (WLBC) of the Missouri Botanical Garden in St. Louis will award its highest honor, the William L. Brown Award for Excellence in Genetic Resource Conservation, to ethnobotanist **Dr. Nancy Turner** of the University of Victoria in British Columbia, Canada. The biennial award recognizes the outstanding contributions of an individual in the field of genetic resource conservation and use. It is made possible through the generous support of the Sehgal Family Foundation, in cooperation with the family of Dr. William L. Brown. Dr. Turner will receive the award prior to delivering the keynote address at the 2008 WLBC Symposium, Ethnobotany: Integrating Biology and Traditional Knowledge. The event will take place Friday, Nov. 7 at 7:30 p.m. at the Garden. It is free and open to the public.

Dr. Turner has devoted her career to the study and preservation of indigenous plants used by native peoples of northwestern North America. Her major research contributions include demonstrating the pivotal role of plants in past and contemporary aboriginal cultures, language and knowledge. She has documented how traditional management of plant resources has shaped the landscapes and habitats of western Canada. She has spent much of her professional career fostering lasting relationships with Native Americans to further understanding of indigenous plant management, and in turn preserve plant genetic resources for future use. Her efforts on behalf of traditional land management, sustainable use of non-timber forest products, and the relationship of human and environmental health has globally impacted the field of ethnobotany.

Immediately following the award presentation, Dr. Turner will present on "Western Redcedar: An Endangered Cultural Icon of Northwestern North America." Western redcedar (*Thuja plicata*) is an iconic tree in the culture of the indigenous population of the northwestern coast of North America. It is a critically important part of the coastal temperate rainforest ecosystem and a valuable economic species in the forest industry. Although young cedars are common, old-growth cedars have become rare due to industrial logging and global climate change. Turner will use the tree species to illustrate the clash of values and approaches that have characterized land and resource use since colonial times, and to show how ethnobotany and conservation biology, embracing ideas and concepts from indigenous peoples, can help to reinstate the species for the future.

The award presentation and keynote address will take place Friday, Nov. 7 from 7:30 to 9 p.m. at the Shoenberg Theater of the Missouri Botanical Garden, 4344 Shaw Blvd. in St. Louis. The audience is also invited to attend a multi-author ethnobotany book signing in the Garden Gate Shop from 5 to 6:30 p.m. Participants include conservation scientist Dr. Gary Nabhan, who will sign copies of his new release, Where Our Food Comes From, and Missouri Botanical Garden President Dr. Peter Raven, who will sign the new book, Missouri Botanical Garden: Green for 150 Years. Both events are free and open to the general public.

The events are being held in conjunction with the two-day symposium, Ethnobotany: Integrating Biology and Traditional Knowledge, presented by the WLBC and the International Union of Biological Sciences. The WLBC is one of the largest and most active programs in economic botany in the world. It operates under the auspices of the Science and Conservation Division of the Missouri Botanical Garden.

Courses/Workshops

Experience in Tropical Botany

Harvard University Summer School, in collaboration with The National Tropical Botanical Garden announces the following course in 2009.

Dates: June 15 to July 11 2009

Location: The Kampong Garden of the National Tropical Botanical Garden, 4013 Douglas Road, Coconut Grove, Miami FL 33133

The Class will use the newly-constructed Kenan Teaching Laboratory at The Kampong (wet bench and microscope facilities) and be accommodated in comfortable dormitory style housing in the same location (Scarborough House).

Course title: "**Biodiversity of Tropical Plants**"

Instructor: Professor P. Barry Tomlinson , Professor of Biology *Emeritus*, Harvard University & Crum Professor of Tropical Botany, National Tropical Botanical Garden.

"Biodiversity" is commonly interpreted as a catalogue of species richness in a given environment and how it might be preserved, but it can mean much more if an investigation considers the functioning, not just the systematics, of the organisms in a given area, i.e., their biology. Clearly biodiversity in this broad context can be studied best in the tropics, where diversity is richest.

South Florida offers a sampling of this richness, conveniently located in the continental United States. And the course offers an opportunity at many levels to become more familiar with tropical plants and their biological mechanisms.

The course is intensive and intended to present an overview of the rich plant diversity in natural environments (e.g. The Everglades National Park, Biscayne Bay National Park) and especially the rich collections of introduced tropical plants at collaborating Institutions, notably Fairchild Tropical Botanic Garden and Montgomery Botanical Center, Coral Gables. Here we have an estimated 10,000 species representing most major biological groups of plants. For example, there are well over 500 species of palms (tropical icons) available, and over 100 plant families not represented in natural environments in the United States.

Emphasis is on morphology and anatomy in both a systematic but and functional context and involves both field and laboratory study. The course structure is extensively enquiry-based and is intended to develop skills in investigative techniques and philosophical approaches which can be applied subsequently in Graduate Study. Students are introduced to many tropical plant families (especially the iconic Arecaceae) and such topics as, e.g., tree architecture, pollination biology, the morphology of vines and epiphytes as well as distinctive tropical ecosystems like seagrass meadows and mangroves. Laboratory work emphasizes anatomy and dissection of fresh material, using implements ranging from chain saws to scalpels.

Admission to the course depends on some demonstrated previous familiarity with at least elementary Botany and is intended to cater for students who are already enrolled in a graduate program in Botany or Biology or plan to do so in the near future.

Students will be required to register with The Harvard Summer School and will receive 4 credits.
Estimated Cost.: Harvard Summer School tuition; travel to and from Miami; Kampong accommodation at $25 per day. Tuition and Travel scholarships may be available for qualifying students.

For further information:-
P.B. Tomlinson at the above Miami address, or
Harvard Forest, Harvard University, 324 N.Main St. Petersham MA 01366
e-mail: pbtomlin@fas.harvard.edu
And Harvard Summer School on-line in 2009

Chicago Botanic Garden and Northwestern University Create Doctorate Program in Plant Biology and Conservation

Local response to global plant conservation issues

The Chicago Botanic Garden and Northwestern University announced a one-of-a-kind doctorate program in plant biology and conservation, in response to the urgent need to train scientists who will embark on a far-reaching course to address pressing conservation issues.

"We are in a global extinction crisis. Biodiversity is facing more threats than it ever has," said Dr. Kayri Havens, director of plant science and conservation at the Chicago Botanic Garden. "There is great need for a graduate program that will bring more scientists into the field of studying plant diversity, since this is the foundation of all ecosystems," she said.

According to the World Conservation Union, 30 percent of the world¹s plants are threatened with extinction by 2050. Students will have the opportunity to gain experience, skills, and knowledge to become scholars, leaders and practitioners, in the effort to stem the loss of plant life worldwide.

“This is an effort to find global solutions. With the creation of the doctorate program, the Garden will be a national home to far-reaching education and research programs, able to train professionals in a variety of plant science disciplines, which are critical to the Garden¹s mission to save the plants and save the planet,” said Sophia Siskel, president and CEO of the Chicago Botanic Garden.

The program begins in fall 2009 and will be housed in the Daniel F. and Ada L. Rice Plant Conservation Science Center at the Chicago Botanic Garden. Ground was broken on the Rice Science Center in June of 2008.

When completed in the fall of 2009, the 38,000 square-foot Rice Science Center will serve as an international center for plant conservation research providing a world-class teaching and state-of-the-art laboratory facility designed specifically to meet the needs of students and teachers.

In 2005, the Garden partnered with Northwestern University to create a Master¹s degree program in plant biology and conservation. Since the program¹s inception, twenty-one students have enrolled; five have graduated and are currently pursuing careers in the fields of plant conservation or are attending doctorate programs.

“The resources of Northwestern University and the Chicago Botanic Garden complement one another to create a learning environment that could not be duplicated by either one alone,” said Northwestern University Provost Daniel Linzer.

The doctorate program will provide a foundation in plant ecology, evolution and biology and in applied plant conservation theory and methods. The program offers advanced courses taught by distinguished faculty members and scientists from the Chicago Botanic Garden and Northwestern University. The program includes over 15 teaching and research faculty from Chicago Botanic Garden and Northwestern in fields such as ecology, population genetics, restoration ecology, invasive plant biology, pollination biology, plant evolution, taxonomy, paleontology and climate change. The doctorate program will offer a comprehensive scholastic program that contributes to the field of plant biology. Students typically should complete the degree in five years.

Positions Available

M.S. Student Position: Analysis of patterns of gene flow in Maryland populations of Harperella (*Ptilimnium nodosum*)

Funding is available for a graduate teaching assistantship in the Department of Biological Sciences at Towson University. The successful candidate will assist in a research study regarding patterns of gene flow in Maryland populations of Harperella (*Ptilimnium nodosum*), a federally-endangered stream macrophyte. The study will focus on examining patterns and relationships between gene flow via seed and pollen using molecular markers. Understanding historical and contemporary patterns of gene flow and their effects on genetic diversity and genetic structure is necessary to manage and restore populations of Harperella. Identification of more genetically diverse plants may be key to restoring viable populations as these carry more adaptive genetic variance. Additionally, if we understand historical patterns of gene flow we can formulate more educated hypotheses about the manner of restoration efforts, in particular, we can identify the most genetically diverse subpopulations for protection and use in restoration activities. Students would be expected to use data generated from their studies for a Master’s thesis at Towson University. The stipend is currently $12,000/year, plus a full tuition waiver and travel costs. The assistantship will begin in August 2009. Deadline for applications is 15 March 2009, but early applications are encouraged.

The ideal student for this position is self-motivated, works well independently, and has a strong interest in conservation biology, plant molecular ecology and evolution. The position will require long hours in both the field and laboratory. Prior experience with field research and molecular ecology is preferred but not required.

Towson University is located just a mile north of the vibrant city of Baltimore, Maryland. TU’s Department of Biology offers outstanding opportunities for graduate students in several areas including ecology, conservation biology and molecular ecology. Previous graduate students have gone on to Ph.D. programs at a number of major institutions or have found employment with state or federal management agencies.

A complete list of departmental facilities, our current Graduate Faculty, and their teaching and research interests is available on our web site at: http://

wwwnew.towson.edu/biologicalsciences/graduate_program.html

For additional information, contact:
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410-704-3034
rroberts@towson.edu

Other News

Brooklyn Botanic Garden and NYC Department of Parks & Recreation Sign Breakthrough Conservation Initiative

BROOKLYN, NY–SEPTEMBER 22, 2008–Today, in the shade of the Native Flora Garden at Brooklyn Botanic Garden (BBG), New York City Department of Parks & Recreation (Parks) commissioner Adrian Benepe and Brooklyn Botanic Garden president Scot Medbury signed a historic memorandum of understanding (MOU), committing the resources of the Garden and Parks to the conservation of plants native to New York City. This is the first-ever comprehensive conservation initiative targeting New York City's native plants. The conservation effort will be conducted primarily through ecological and molecular assessments of remaining plant populations in the city's 23 ecosystems, leading to management protocols to improve the long-term sustainability of these plants.

The MOU acknowledges that of the over 1,450 species that once occurred in the city, over 600 are gone and 500 are vulnerable. "Little attention has been given to the management of rare species in the urban context and virtually no attempt has been made to assess and manage the more common, yet declining species found in urban, fragmented habitats," the memorandum reads. The conservation agreement will work toward increased conservation of the area's flora. BBG will utilize the resources of its New York Metropolitan Flora project (NYMF) and other related BBG science programs. Parks brings to the initiative its expertise from the Greenbelt Native Plant Center and Natural Resources Group. Through the MOU, Parks and BBG will collect plants and seeds for research and seed banking purposes, analyze the genetic diversity of plants, and raise awareness about the conservation of New York City's native plants.

Brooklyn Botanic Garden has long been committed to researching and promoting the native flora of the region. The Native Flora Garden was the first "garden within the Garden" opened to the public at BBG, in 1911. In 1990 the Garden embarked on the New York Metropolitan Flora project, a multiyear effort to document the flora in all counties within a 50-mile radius of New York City.

New York City may be known to many for its towering skyscrapers and pulsing urban lifestyle, but few are aware of the incredible biodiversity and plant life found within the city. "We are proud to collaborate with Parks and work toward the common goal of conserving the area's native plants," said Scot Medbury, BBG's president. "Through the work of BBG's respected Science department, we will be able to engage in detailed analysis—down to the molecular level—to help us understand the condition of New York City's native plants. This in turn will help us formulate ways to both conserve current populations and preserve them for the future," Medbury explained. "In addition, I have asked BBG's interpretive staff to develop signage to better explain the initiative to the Garden's visitors, so that more people will learn of the work being done to protect the plants that will populate our great city for generations to come," Medbury added.

"The conservation initiative is an important step to not only preserve New York City's flora but also to provide information on the state of plant life throughout the five boroughs," said Commissioner Benepe. "Plants provide numerous benefits, from helping to clean the city's air to cooling the environment to beautifying our streets and parks. We are pleased to partner with Brooklyn Botanic Garden for this vital study to make the city a greener, greater New York."

Rare Book Exhibition Focuses on Children's Books about Plants Lenhardt Library, November 28, 2008 through February 1, 2009

Plants and gardens have long been places of wonder for children and excellent opportunities to teach them about science. A new exhibition from the Rare Book Collection of the Lenhardt Library provides a glimpse into rare children's books about

plants and the natural world. The exhibition will be on display in the Lenhardt Library from November 28, 2008 through February 1, 2009.

One of the earliest books written specifically for a young reader was published in Paris in 1545. Entitled De re Hortensi Libellus, it was written by Charles Estienne for his eight-year-old nephew, Henri Estienne. In the late eighteenth and early nineteenth centuries, an explosion of books for children were published, many of which were quite small. Les Plaisirs de la Campagne, published in 1825, is about the size of a postage stamp. Later in the nineteenth century, children's books took on a slightly fantastic nature to make the scientific aspects of the text a little more digestible and they usually included many colorful illustrations. An interesting example is The Little Flower Seekers: Being Adventures of Trot and Daisy in a Wonderful Garden, by Moonlight, published in London in 1873 and written by Rosa Mulholland Gilbert. By the end of the nineteenth century, fictional stories used gardens and botany as a background, as in The Secret Garden by Frances Hodgson Burnett. The Lenhardt Library's copy is the first American edition published in New York in 1911. Approximately fifteen books will be on display in the exhibition.

A free library talk, "Early Editions of Well-Loved Stories," will be given by Susan Boothe, curator of exhibitions at the Chicago Botanic Garden at 2 p.m. on Saturday, January 10, 2009.

The Lenhardt Library is the primary research tool for students of the Joseph Regenstein, Jr. School of the Chicago Botanic Garden. Visitors are encouraged to research their latest gardening project, thumb through inspiring garden journals and magazines, or see the display of selections from the Garden¹s rare book collection.

The Lenhardt Library is located in the Regenstein Center. Hours are from 9 a.m. to 4 p.m. Monday through Saturday and from noon to 4 p.m. on Sunday. On Tuesdays, the Lenhardt Library is open until 7 p.m. Closed on holidays. Members have borrowing privileges. visit www.chicagobotanic.org/library

Missouri Botanical Garden Mounts Milestone Six Millionth Herbarium Specimen

Collection is Among the World's Largest

The Missouri Botanical Garden in St. Louis operates one of the largest and fastest growing herbaria in the world, and the second largest in the western hemisphere. With the addition of a specimen of Anthurium centimillesimum, a gigantic new aroid species from Ecuador, the Garden's permanent collection of pressed and dried plant specimens has reached a milestone of six million specimens.

A herbarium is essentially a "library" of plant specimens. The Garden's herbarium includes about five-and-a-half-million vascular plants (flowering plants, ferns and conifers) and 500,000 bryophytes (mosses, liverworts and hornworts). The bryophyte collection is also one of the largest of its kind in the world.

"The importance of these 'libraries' of plants cannot be overstated," said Vice President, Science and Conservation, Dr. Robert Magill. "There are an estimated 300,000 recognized, named species of plants, with perhaps an additional 100,000 species still to be discovered. Herbaria are vital resources that allow botanists to organize information about this enormous diversity of plant life. Without a system of documentation that includes actual samples of the plants, it would be nearly impossible to make conclusions about the roles and relationships of plants, or to even verify the discovery of a species new to science."

Plant specimens are collected in the wild, pressed in newspaper folds, and dried in a wooden-framed plant press before being sent to the Garden's herbarium for study and identification. At the Garden, newly received specimens are counted, recorded, and treated by freezing to kill insects that might eat them. Permanent labels are prepared from the collector's field catalog for each specimen. The label contains information on where and when the specimen was gathered, by whom, and any features about the plant that are not readily apparent from the

From Left: Dr. Robert Magill, v.p. Science and Conservation, Dr. Thomas Croat,discoverer, Dr. James Soloman, Curator of the Herbarium. (Courtesy Missouri Botanical Garden)

pressed specimen. The specimens are then studied by plant taxonomists with specialized knowledge of the group to which the plant in question belongs. Taxonomists will either identify the specimens, or recognize them as new to science. One specimen from each collection is mounted and added to the Garden's herbarium. Any duplicates are distributed to other herbaria in exchange for specimens from their areas of activity; the Garden exchanges specimens with about 400 other herbaria worldwide.

The Missouri Botanical Garden's six millionth herbarium specimen was collected in late 2007 by Dr. Thomas Croat, P. A. Schulz Curator of Botany. Croat discovered Anthurium centimillesimum while on a collecting trip in Ecuador's Pichincha province, in an area of tropical premontane rain forest. The giant plant was found growing on a steep bank next to a pasture.

"At first I considered it impossible that this species was new, simply because the area was previously well collected," said Croat. "Still, after returning to the Garden, I went through all the existing species and none came close to this Anthurium."

Croat has been collecting plant specimens in the wild for over 41 years as part of the Garden's science and conservation team. Anthurium centimillesimum is the 100,000th collection made by Croat, making him the fourth most prolific plant collector in the history of botany. Of his vast collections, all but 4,500 have been deposited at the Garden.

The new Anthurium is a member of the aroid or Araceae family, also known as the Philodendron family. Aroids make up the largest group of ornamental pot plants, and more aroid species are counted among the top dozen plants in North American sales than any other plant family. The Missouri Botanical Garden is a major center of aroid research, with one of the largest living collections in the world. In some cases, it is unknown whether the species are still found in nature, or whether the Garden's plants are the only survivors.

Garden scientists conduct field research in 36 countries and six continents around the globe in an effort to collect, identify, and preserve plant specimens. Staff focus their efforts on areas of high biological diversity, with the goal of characterizing and grouping the plant life they discover.

The expansiveness of the Garden's science and conservation programs allows the institution to coordinate in-house editorial activity through MBG Press, the Garden's publishing arm. Plants collected in the wild and accessioned to the herbarium form the basis of scholarly publications, including floras, which document the known information about the plant species found in a particular geographic region. These taxonomic tools allow the Garden's wealth of plant information to be readily accessed by a wide variety of users throughout the worldwide scientific community.

"A fundamental part of our mission is to characterize, describe, and name the patterns of diversity found in the plant world," said Dr. James Solomon, herbarium curator. "We then build the tools that allow people to learn about, understand, and communicate about that diversity. In order to find medicines or sustainably manage lands, you have to be able to recognize and know the species involved. Our work is helping to synthesize knowledge from around the globe to make this possible."

For more information on the Missouri Botanical Garden's science and conservation work, visit www.mobot.org/plantscience.

Rancho Santa Ana Botanic Garden on Display in Olympic Venues

A global audience gained knowledge of the all-important, sustaining work of botanic gardens throughout the world this summer in Beijing. Together with other botanical gardens and arboreta, Rancho Santa Ana Botanic Garden (RSABG) in Claremont was featured in the World Botanic Gardens Exhibition, "Homes for Plants - Gardens for Humans," - located in the active Olympic venues of Beijing.

RSABG botanical field studies coordinator, Naomi Fraga submitted exhibit materials on the local 86-acre California native plant garden to the Botanic Garden Council International (BGCI). The RSABG exhibit includes historical information, the Garden's mission and programmatic work.

Inclusion in this important Olympic exhibit underscores the importance of maintaining public and private gardens for scientific research, conservation, restoration, education and public enjoyment. RSABG is pleased to be acknowledged for its mission in support of these critically essential world-wide endeavors.

Ann Joslin
Director of Visitor Services & Community Relations
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California's Native Garden
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The Elastic Stability of Palms

Peter Sterken

Abstract

A mathematical model and hypothesis are presented, which goal is to enhance visual palm diagnosis. Firstly, the safety factor of the palm trunk regarding elastic stability is calculated. This factor has to be higher than 100%, in order not to buckle under its own weight. If this factor is satisfied, the palm can withstand a certain amount of additional loads, like the weight of a climber or wind loads. Secondly, the additional wind loads are estimated which enables to optimize artificial supports of the palm. The wind load in the palm, and the resulting loading of the supporting structure, has to be assessed undeniably. The input of the expected wind speed for the area, temperature and altitude, enable to optimise this wind load analysis. Thirdly, a hypothesis has been formulated (Sterken, 2005c) which could heighten the efficiency of visual assessment. It is suggested that the critical wind speed for failure of the palm stem depends significantly on the relationship between the modulus of elasticity, the form of the cross-section (not only diameter), the slenderness of the palm (ratio of height vs. the thin stem), dynamic wind loading and mechanical behaviours. Deductions from the Leonardo Da Vinci – Euler - Bernoulli theory and the theory of elastic stability are introduced. The guidelines that are given is to combine the visual assessment of mechanical catastrophic behaviours with the safety factor regarding elastic stability and the wind load analysis for cabling the palm tree.

Earlier components of this model have recently been published in the scientific peer-reviewed *Arboricultural Journal* , Vol. 29, pp 243-265. The content of this publication has been published earlier as a part of the Spanish paper on the modelling of forest trees and palms in *Foresta* (Sterken**,** 2008).

Key-words: Palms · Safety · Critical wind speed
Data of the complete publication:
Sterken, P. 2008. *The Elastic Stability of Palms.* 15p.
Royal Belgian Library
Keizerslaan**,** 4
B-1000 Brussel

www.sterken.be

Wind load analysis for trees

Peter Sterken

In accordance with Eurocode 1, part 2-4.

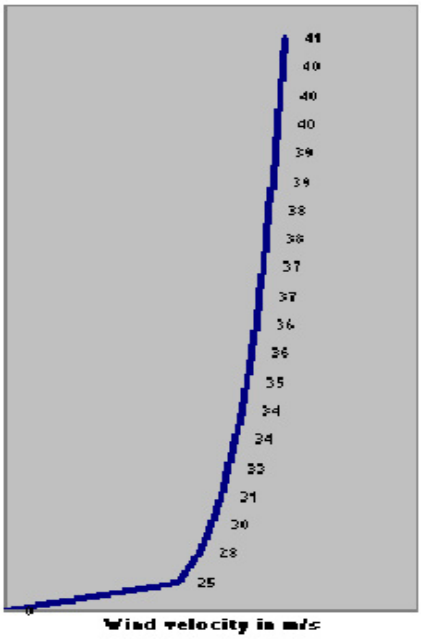
Data input=

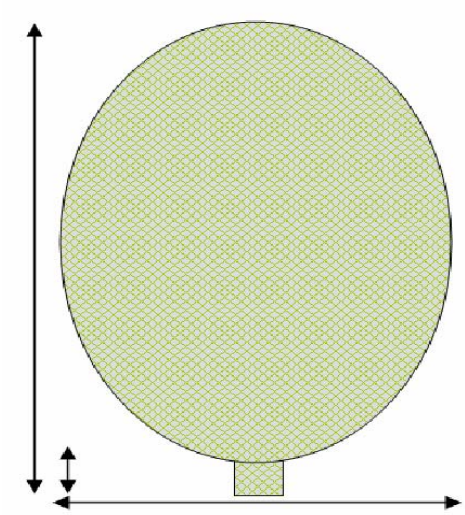
Tree characteristics

Species (see list of species)=	*Quercus robur*	
Height tree=	21.00	m
Crown diameter=	12.00	m
Height trunk=	1.50	m
Circumference=	245.00	cm
Bark thickness=	4.00	cm
Residual wall thickness,t=	9.50	cm
Cw-value (see list of species)=	0.25	
Compression strength= (see list of species)	2.8kN/cm*cm	

Environment

Altitude=	10.00	m
Minimum temperature=	-15.00	°C
Expected wind speed for the area=	130.00	km/h





Results=

Wind load analysis for trees

Crown area=	183.78	m*m
Air density=	1.37	kg/m*m*m
Wind speed=	37.29	m/s
at height=	12.23	m
Wind load=	42.96	kN
	4380.55	kg

Wind induced bending moment=
525.17 kNm

Bending fracture of the sound stem=

Critical wind speed=	49.95	m/s
Safety=	179.43	%

Required residual wall thickness=
8.32cm

Torsion safety of the closed and concentric residual wall=

Critical wind speed=	60.43	m/s
Safety=	262.61	%

Bending fracture of the residual wall=

t/R measured=	0.27	
Critical wind speed=	39.12	m/s
Safety=	110.05	%

Dynamics=

Natural frequency=	7.82	
Vcrit_resonance=	27.35	m/s
Equivalent wind load=	23.11	kN

Please consult the following publications, in order to interpret correctly wind load analysis for trees:

Sterken P (2006) Prognosis of the development of decay and the fracture-safety of hollow trees. *Arboricultural Journal.* Vol 29: 245-267

Sterken P (2005) A Guide for Tree-stability Analysis. Second and expanded edition. University and Research-centre of Wageningen: http://library.wur.nl/gkn/

Sterken P (2008) Modelización de la estabilidad del arbolado y palmeras. *FORESTA. Asociación y Colegio Oficial de Ingenieros Técnicos Forestales*. Nº 38: 59-67.

Sterken P (2006) Prognose van de breukvastheid van holle bomen. *KPB Nieuwsbrief. Kring Praktiserende Boomverzorgers*. Dutch ISA chapter. Vol. 27: 1-10. Nederland.

www.sterken.be

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Teaching Plant Anatomy Through Creative Laboratory Exercises. R. Larry Peterson, Carol A. Peterson, Lewis Melville 2008. ISBN 978-0-660-19798-2 National Research Council Press, Ottawa, Ontario, Canada. ix +154 pp +CD. ($US 59.95 Spiral).

Plant Anatomy is fun! This "hands-on" book has the objective of providing "students, teachers and researchers with simple methods to investigate the structure of plant cells, tissues, and organs using fresh material and a minimum of supplies". It achieves this objective and may well go beyond that. It is a practical guide to the study of plant anatomy and can help to reintroduce this important subject into biology curricula in schools and universities, from which it has virtually disappeared, by making the subject visually attractive and enjoyable.

The standard texts in plant anatomy, as listed in this books Appendix, do not do this. They vary from the encyclopedic to the sophomoric with, in some instances, an attempt to relate the subject to its applied aspects (e.g. industry, agriculture, forensics, pharmacology), but do little to teach plant anatomy as a practical discipline and largely fail to connect internal structure to the whole plant (which is rarely illustrated). The present book achieves this objective because it moves from fresh material of whole plants to what can be revealed under the microscope entirely at the hands of the student. This is done through the medium of sections cut with double-edge razor blades, stained in various ways and mounted as temporary wet preparations to be viewed directly under the microscope, all within minutes. The book is profusely illustrated with color photographs taken directly from sections prepared in this way. They show the kind of result that students themselves can produce. In fact, the numerous photo credits to the plates suggest that many of them were actually made in class by undergraduates. Hey, guys let's write our own text-book!

Students do like hands on activity in the lab and plant anatomy is NOT fun if it is presented via prepared slides in which xylem is always red and phloem green, or as PowerPoint images remote from the original plant. My experience is that motivated students, with a little practice and a sympathetic instructor, can become very proficient in section preparation and staining so as to produce results which when seen under the microscope are easily of the quality of the many illustrations in this book. In addition an ace preparation shared among classmates scores points without competition and inflates egos nicely. The lab soon fills with "Wows!" and "Cool"! As an aside here I recommend 50% glycerine/water as a mounting medium rather than water alone as it is more permanent.

The book begins with the use of the compound microscope and has a useful scale chart that connects microscopic dimensions to the real world (but misses out the hand-lens, the cheapest microscope of all). There is then a short chapter on the simple methods advocated for section cutting, based on double-edged razor blades, but complemented throughout the book by boxes which describe other methods like maceration and clearing together with some experiments and even guides to growing the fresh material. Recipes for stains and reagents are in the Appendix. The obligatory beginning is an introduction to cells and organelles but largely dealing with their visible products. Cell types and simple tissues introduces the metachromatic stain toluidine blue (TBO - good old Tol Blue) which turns up extensively in the illustrations. Complex tissues refer largely to xylem and phloem, but dealt with inadequately. Secondary xylem is scarcely illustrated because of the limitations of flexible double-edge blades; single edge blades would have been better here because they are firmer (and cheaper). Phloem is difficult to study with freehand sections – the usual conclusion is that if it does not stain and you can identify everything else, it must be phloem. There are separate chapters on roots, stems and leaves, the root chapter especially well illustrated because this is the Peterson's area of research expertise. The flower is briefly dealt with, (with pictures of flowers!) but nothing on the fruit. The best tool here would probably be a machete. The Appendix has further useful information, especially on the recognition of microscopic artifacts, often a problem for the beginning microscopist.

Those remaining practitioners of this disappearing art (e.g., my students!) will have their own special take on methods and approaches which are in no way detrimental to the objectives of the book. I missed a description of Kohler illumination even though there is almost a whole page of space available for it. The temperate bias is obvious and herbaceous. The dissecting microscope can be used extensively for bulky organs, especially with transmitted light capability. As a simplistic and minimalist approach fluorescent techniques with ultraviolet light and Nomarski optics seem a little out of place but, as demonstrated, can produce spectacular results. Polarized light is similar, here made accessible by the ingenious recommendation to disassemble polarizing sun-glasses.

One last comment is that the motivated student (all of them at the end of the first class?) will enthuse over being able to see images from their own preparations as good, if not better than the images in this text. Therefore they should be assisted in recording them. I find students are very enterprising with the use of their own digital cameras and will

take pictures through the eyepiece, but it is important to make sure they produce annotated drawings in quantity so that the instructor can check that accurate information has been retained. . Students thus build up a portfolio that becomes invaluable for presentations and revision. A class camera with an appropriate eyepiece will complement the book – so throw away the book's accompanying CD of all the plates, it is an unnecessary distraction.

The book is highly recommended for its originality and diversity of color so that it cannot fail to be attractive to students at all levels, especially as they will find they can work the magic themselves. Advanced researchers should also take in its message and use it to learn about the microscopic structure of organisms they may work on, since this is the basis for all the internal mechanisms of the plant. After all one would have little faith in an auto mechanic who had never looked under the hood!

-P. Barry Tomlinson. Harvard Forest, Harvard University, 324 N. Main St., Petersham MA 01366.and The Kampong of the National Tropical Botanic Garden, 4013 Douglas Rd., Miami FL 33133

Ecology of Weeds and Invasive Plants, 3rd ed. Steven R. Radosevich, Jodie S. Holt and Claudio M. Ghersa. 2007. ISBN 978-0-471-76779-4 (cloth, US$75.00) xvii + 454 pp. Wiley-Interscience, Hoboken, New Jersey. The third edition of this well known textbook on weed ecology now has a longer title (and Invasive Plants) and shorter text (454 instead of 589 pages). More importantly, this edition is more affordable for students ($75.00 instead of $175.00). While three excellent textbooks of weed ecology have appeared since the second (1997) edition (Liebman et al. 2001; Booth et al. 2003; Myers & Bazely 2003), this third edition is still very useful as a textbook and reference.

The text is divided into nine chapters: (1) Weeds and invasive plants, (2) Principles, (3) Invasibility of agricultural and natural ecosystems, (4) Evolution of weeds and invasive plants, (5) Weed demography and population dynamics, (6) Plant-plant associations, (7) Weed and invasive plant management approaches, (8)Herbicides, (9) Systems approaches for weed and invasive plant management. Over 1400 references (an over 60% increase since the last edition) will serve as important sources of primary contributions and review publications.

Inevitably, like in many ecology textbooks, there are some mistakes in the text. Logistic equation was not developed by Lotka (1925) and Volterra (1926) (p. 54), but by Verhulst (1838). B_i terms in population transition matrices are not age-specific fecundities (p. 137 & 138), but age-specific fertilities (numbers of viable offspring produced per unit of time). This misconception can lead to incorrect construction of population models (e.g., Figure 2.9). Rejmánek (2000) discussed in detail this frequent mistake. In the first chapter (p. 3-11), the authors struggled quite a bit with terminology. However, the result is not completely satisfactory. After reading this chapter, my students remained unsure whether invasive plants are a subset of weeds or vice versa. When we read the first six lines on p. 4, we should not be surprised. Also, it looks like the authors believe that non-native agricultural weeds are not invasive plants. Terminological clarification in this area is highly desirable (Pyšek et al. 2004). Just a detail: the word anthropomorphic should be replaced by anthropocentric (p. 5-7). Surprisingly, rather limited space in the book on invasive plants is dedicated to plant dispersal (p. 142-149, 178-179). Now, however, this can be compensated for with supplementary reading from Cousens et al. (2008). Some important topics are clearly underrepresented (apomixis, vegetative propagation, aquatic plants, invasive vines, invasive Cactaceae). Some are not mentioned at all (Allee effects, residence time, species range modeling, climate change).

Despite these weaknesses, the strengths of this book are many. Growth analysis, design of competition experiments, and management implications are three of them. Over the last 22 years, I have been using progressively all three editions of this textbook in my classes on weed biology. Very likely, I will continue to do so. This is the best textbook of weed ecology currently available.

– Marcel Rejmánek, Department of Evolution and Ecology, University of California, Davis, CA 95616.

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Trees, Truffles, and Beasts: How Forests Function. Maser, Chris, Andrew W. Claridge, and James M. Trappe. 2008. ISBN 978-0-8135-4226-3 (Paper US$26.95) 288 pp. Rutgers University Press, 100 Joyce Kilmer Avenue, Piscataway, NJ 08854-8099.

Maser, Claridge, and Trappe try to write three books in one: a guidebook to the natural history of forests in the North America's Pacific Northwest and Australia's southeast, an analysis of disturbance and succession in these forests, and a philosophical discussion of ecology and evolution. The guidebook is interesting, the treatment of disturbance and response to disturbance is superb, but the philosophical musing alternately disappointed and annoyed me. When I started reading Trees, Truffles, and Beasts: How Forests Function, I saw it as part of my eternal search for books to use with undergraduate biology seminars. At first the philosophy of ecology the authors present made me hesitate to use their book, but I am slowly getting over it. It might make for even better discussions.

Mycorrhizal interactions between fungi and plants, animals eating fungi and thereby dispersing fungal spores, and coevolution among the three groups of creatures provide a thread unifying the three books. The creatures involved are presented in the first chapter, "The Forest We See" and the last large chapter, "Of Lifestyles and Shared Habitats". The descriptions of predominant species in both regions are done in a way comparing animals, plants, and fungi in terms of niches, which allows direct comparison of the two communities. Re-reading these sections before the next International Botanical Congress in Melbourne will definitely be worthwhile!

Three chapters about mycophagy, including one on coevolution and one about the importance of fungi in the diets of animals that eat them along with a short summary of ecosystem services provided by mycophagy, begin the book's midsection. Having spent a fair amount of time foraging for chanterelles in Oregon I was aware of generalities of these topics, but the detailed natural history in these chapters added a great deal to my understanding of this interaction. However, the two chapters coming next, about landscape patterns, fire, succession, and habitat dynamics, are the gems that make the book worthwhile. After broad description of fire in forests, the authors summarize the fire histories of the two regions, examine several cases in detail, and then talk about the fungal and specifically mycorrhizal responses to disturbance. I have never encountered such a nicely written and engaging discussion of succession from a fungal point of view and organized around the role of fungi in the community's response to disturbance. These two chapters are strong, informative, and enlightening. They tend to make me forgive the book's less pleasant aspects.

On a technical note, one of those less pleasant aspects is the bibliography. Too many of the citations are wrong, even those of the authors' own publications. Many of the papers I tried to look up either had incorrect page numbers or the volume numbers given did not match the years. Several times this was obvious without going to the library because the beginning page number was higher than the ending page number.

The aspect of the book that bothered me the most, though, is a philosophy of ecology (and evolution) sprinkled throughout every topic. I could not decide whether I was reading a later-day revival of Clementsian ideas about communities and ecosystems or a subtle advocacy of Gaia. Repeated suggestions that evolution works for the greater good, and possibly intentionally and directionally, pop up in almost every chapter. I do not know whether the authors share this inclination, but many of my students would find this aspect of the book supportive of sentimental and even spiritual ideas about nature. Maybe I am over-reacting to a very strong emphasis upon coevolution, but I would hesitate to offer such ideas within a scientific treatise. Still, the section on fire ecology is very good, and my mid-western students could always use exposure to the ecology of other climates and continents. Perhaps they are ready for discussions about the philosophy of ecology that could grow out of this book along with the particular content that the authors present so well.

-Chester Wilson, Department of Biology, University of St. Thomas, St. Paul, MN.

The Curious World of Carnivorous Plants: A comprehensive guide to their biology and cultivation by Wilhelm Barthlott, Stefan Porembski, Rüdiger Seine, Inge Thiesen [Translated by Michael Ashdown]. Timber Press: Portland. 224 pages, 158 illustrations, 2 maps. ISBN-13: 9780881927924, ISBN-10: 0881927929. US$39.95.

This is an exquisite book, truly covering both biology and cultivation of carnivorous plants. It provides an up-to-date review of scientific work on these plants, much of it done by the authors. It also contains a lot of obscure older references. The photos are remarkable. While not particularly artistic - there are no gorgeous panoramas with these plants, as can be found in other recent volumes, such as Stewart McPherson's *Pitcher Plants of the Americas* - Barthlott et al. provide photos with such lush detail that you can really begin to understand the intricacies of these plants.

This book begins with curious and far-ranging history, that covers everything from the first suspicions of carnivory, to the not-so-subtle sexual innuendo in the binomial of the Venus flytrap, to Charles Darwin, and molecular systematics. After a short digression into distributions and diversity, the authors move on to six lovely chapters on how carnivorous plants make a living: attracting, trapping, and digesting their meals, sometimes with the help of other organisms. After another short digression into conservation and cultivation, the book launches into chapters on each family of carnivorous plant, although the terms "carnivorous"and "plant" are used liberally.

The book is filled with fascinating details. Although Darwin titled his seminal monograph *"Insectivorous Plants,"* many carnivorous plants have diets composed of things other than insects or even other arthropods. Although it will hardly surprise anyone that bladderworts (*Utricularia)* eat rotifers (which curiously do not appear in the index), they also eat mollusks and protists, including algae. Many carnivorous plants eat a fair amount of pollen, with some butterworts (*Pinguicula*) making up 70% or more of their catch in pollen. Barthlott, who has done much work with epiphytic cacti, also highlights epiphytic carnivorous plants. *Utricularia reniformis* can grow epiphytically on tussocks of grass. *Utricularia nelumbifolia* and *U. humboldtii* grow epiphytically in the water-filled rosettes of bromeliads, where they can spread vegetatively from bromeliad to bromeliad, including the carnivorous bromeliad genus *Brocchinia*. Some *Nepenthes* and *Pinguicula* species are also epiphytes, including *P. lignicola*, which only grows on pines. The authors also report some amazing observations about longevity of single flowers. *Utricularia meziesii* in cultivation had a single flower that was open for over two months! If unpollinated, some female flowers of *Nepenthes* can remain viable for several weeks.

This book is, however, not without problems. The authors use archaic terminology. Describing taxa as primitive or advanced, instead of ancestral and derived, carries too much pejorative baggage. Contrary to standard usage for at least a quarter century, the authors consider lichens and fungi to be plants. The authors use the term "precarnivorous" for plants that do not meet all their criteria for carnivory, such as bromeliads that catch and kill insects in cisterns (pitchers) but do not have digestive enzymes, instead relying on bacteria for digestion. This is like saying that termites do not eat wood or cows do not eat grass because they rely on microbes for their digestion. Furthermore, the term precarnivorous is a teleological nightmare in that it needlessly implies that descendants of these plants will evolve what the authors call true carnivory.

The authors assert correctly that carnivorous leaves and (non-carnivorous) flowers use the same mechanisms to attract insects. They then claim that carnivorous plants have tall inflorescences to keep pollinators from being eaten. This is a too adaptationist—and untested. Moreover, the cosmopolitan *Drosera rotundifolia* has relatively short inflorescences.

Disturbingly, this book does not contain information on ISBN, year of publication, place of publication, or information on who did the translation from the 2004 German text. I had to go to the publisher[1]s website for most of this information, although I still could not easily locate the year of publication. Lack of information on the translator is particularly disturbing because of errors in botanical nomenclature (e.g., *Discocactus horstii* absorbs water via spines, not thorns) and failure to detect silly errors, such as in the etymology of *Heliamphora*, and confusion between figures 26 and 27. There is also the odd production maneuver of filling up blank space with uncaptioned repeats of photos that have been used elsewhere in the book. I am not sure if lack of care with production is attributable to Timber Press, the last great independent North American botanical publisher, having been recently acquired by Storey and Workman Publishing. However, such essential information, especially full credit to the translator, needs to be given.

Regardless of these shortfalls, this is a superb book, at a reasonable price, that beautifully covers both biology and horticulture of a group of plants that have fascinated people for centuries.

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Duke's Handbook of Medicinal Plants of the Bible. Duke, James A. with Peggy-Ann K. Duke and Judith L. duCellier. 2008. ISBN 978-0-8493-8202-4 (Cloth US$89.95) 528 pp. CRC Press/Taylor & Francis Group, LLC. 6000 Broken Sound Parkway, NW, Suite 300, Boca Raton, FL 33487

Duke's Handbook of Medicinal Plants of the Bible attempts to present a range of Biblical plants and their pharmaceutical uses. In doing so, the author is only partly successful.

The book opens with extensive introductory material, including charts of the many, many abbreviations used throughout the text. This introduction also includes a less-than-professional multi-page diatribe against large pharmaceutical companies and current medical practice. The author should be free to state his objections, but they should come in a more professional voice. He also uses the term "Farmaceuticals" which the reviewer found rather offputting.

The main section of Duke's Handbook of Medicinal Plants of the Bible then proceeds from one plant to the next, providing ample discussion of what exaxt species might match the terms used in Scripture. Common names, ethnopharmacological uses in (sometimes many cultures), etc. are listed, with heavy reliance on the abbreviations tables from the front of the book for references and other explanatory information.Toxicity, dosing, and natural history of the particular species follows in each entry.

One particularly odd aspect of these entries is the translations of the Bible which the author uses—each entry has a relevant verse or verses from up to three translations: the King James Version, the Revised Standard Version, and the New World Translation. These are given to help in identifying the Biblical term with a modern Latin name. Why use three derivative English translations? True, the author does discuss words from the original, but why not give at least something as old as the Vulgate or Septuagint? Failing that, the most immediate translation into English from those sources, the Douay-Rheims. Using original texts or translations only one step removed from them would certainly give a more accurate identification.

While there is a true wealth of information here which might be of use to ethnopharmacologists and bioprospectors, the very long lists of uses and the heavy reliance on many, many abbreviations are sure to make this book cumbersome to use. It deserves a place in university and some professional libraries, but may not find as wide as use as it might.

-Douglas Darnowski, Department of Biology, Indiana University Southeast

Edible Medicines: An Ethnopharmacology of Food. Etkin, Nina L. 2008. ISBN 978-0-8165-2748-9 (Paper US$24.95) 320 pp. The University of Arizona Press. 355 S. Euclid Avenue, Suite 103, Tucson, AZ 85719.

Nina Etkin's *Edible Medicines,* reprinted from its original (2006) hardcover edition, reflects its broad appeal, and its value as a textbook in University courses e.g., anthropology, economic botany or ethnobotany. *Edible Medicines* surveys the medicinal properties of foods across continents and cultures. Etkin's status as medical anthropologist and her original work on the pharmacologic implications of plant use are well-established with an earlier book: *Eating on the Wild Side* (1994), which she edited.

In this wide-ranging book, Etkin reveals the medicinal properties of foods in the specific cultural contexts in which they are used. She addresses some of the physiological effects of foods through history, taking into account the complex dynamics of food choice. Showing that food choice is more closely linked to health than is commonly thought, she helps us to understand the health implications of people's food-centered actions documented with examples. Foods are set in a global perspective e.g., we learn that most of the world population is lactose intolerant. The social history of coffee, tea, cocoa and alcohol shows that the invention of those beverages imparted prestige and their appeal inspired rapid dispersal. Drawing on her research among Nigeria's Hausa people and studies of other indigenous cultures, Etkin addresses the medicinal properties of social foods and masticatories, e.g., kava, khat, kola.

Focal chapters with appeal to botanists are: Food in the History of Biomedicine; Spices: the Pharmacology of the Exotic; little-discussed, Fermented Foods and Beverages; Lives of Social Plants, foods consumed in company; Health in the Marketplace: Complementary and Alternative Medicine, Functional Foods, and More. The book closes with a 7 page Appendix titled Some Common Spices; 7 pages of Notes; 36 pages of References, including both scholarly and popular sources; a 13 page General Index; and a 5 page Scientific Index. There are 11 black and white photos, most taken during the author's fieldwork in Nigeria.

In her succinct analytical Conclusions, Etkin's writing shines, as she describes her objectives and theoretical foundations: that cultural construction and social transaction of all aspects of food-production, transformation, circulation, consumption-are both undergirded by, and have impact on, food culture and human physiology. She observes the "extranutritive meaning of foods that embody sociability or star in origin myths," not just

their phytochemical profiles, and admires "people-food relationships that are apparent in the structure of cuisines" and their roles in "creating and sustaining community and identity." Here too, Etkin points out the "rapid globalization of some foods beyond their source areas (e.g., chocolate, chile) compared to the sluggish radiation of others from points of origin (e.g., tomato) and the narrow range of consumption of still others (e.g., kola and betel nuts)." "The history of the spice trade is a series of encounters with political and economic asymmetries: mercantile capitalism, Euromonopolies, colonialism, wars."

Given a subject this broad, an author cannot be an expert on all foods, and Etkins relies heavily upon Simmoons' *Food in China* (1991). Finding the plant I know best, corrections are wanted on p. 23, Table 1.3, Origins of Some Domesticated Plant and Animal Foods. Sesame did not originate in Africa although numerous authors continue to state that as fact, but on the Indian subcontinent (Bedigian 1988, 1998, 2000, 2003a, 2003b, 2004, Bedigian et al. 1985, 1986) bringing to attention the perils of overreliance upon secondary sources, in this case Davidson's *Oxford Companion to Food* (1999), rather than searching the originals. This reliance reappears on p. 89 in the section A Cultural History of Spices, where inexplicably, Etkin wrote, "United States, Canada and Europe are significant sources of sesame seed" when in fact, China (825,531 MT) and India (620,000 MT) are the world's principal producers (IPGRI 2004). Myanmar, Sudan, Uganda, Nigeria, Pakistan, Ethiopia (exceeding Bangladesh, and displacing Thailand from the top 10 in 2005), and Central African Republic, are other major sesame growing countries (FAO Economic and Social Department 2005; IPGRI 2004). Here and there one can find a typo, e.g., Ha**m**id Dirar (p 252).

-Dorothea Bedigian, Research Associate, Missouri Botanical Garden, St. Louis, MO

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Gardens, City Life and Culture. Conan, Michel and Chen Whangheng (eds.) 2008. ISBN 978-0-88402-328-9 (Paper US$40.00) 274 pp, 33b/w illustrations, 80 color photographs. Harvard University Press, 79 Garden Street, Cambridge, MA 02138.

Gardens, City Life and Culture is a critical exploration of public garden spaces through history. It shows that gardens have profoundly influenced the cultural development and social life in many world capitols. Gardens have provided an opportunity to break social barriers, and to enact in public, behavior once unseemly. Gardens permit the presentation of self in everyday life, and play a role in transformation of culture, mores and lifestyles. The collection surveys gardens from ancient Roman Pompeii through the

20th century, in China, India, Constantinople, Genoa, Paris, Vienna and the United States. Pertinent to all those involved in urban planning, it examines the dire lack of a municipal garden policy in modern Beijing and Marrakech. Exhaustive reviews of park and garden planning reveal the successes and failings of different policies in Stockholm, Tokyo, Kerala India, historic Suzhou China, and three US "New Towns" of the 1960s.

Arranged more or less chronologically, the contents appear in two sections: Historical Contributions of Gardens to City Life, and Gardens in Modern Cities. A significant contribution of this tome is that it draws together and makes accessible in English, new literatures from many different languages: Arabic, Chinese, French, German, Italian, Japanese, Spanish, and Swedish; the Ottoman bibliography includes four works translated from Armenian into Turkish and in one case, Italian. The contents are many and varied; limited space allows comment on only a few.

Gardens and Garden life in Pompeii in the First Century AD reviews the varieties of social roles gardens played in Pompeii, in temples, public baths, food, gardens for dead, religious worship, and mystery cults, involving perfume, incense, libations or blood sacrifice.

Royal Gardens and City Life in Paris (1643—1789) by Editor Michael Conan argues for the promotion by gardens of new mores and breaches in previously accepted social norms, blurring social differences: Abbeys flirt with women, new permissive gender relations, encouraged development of fashion and conspicuous consumption, illicit sexual activities, fostered social movements, existing norms of civility were challenged by the social forces they repressed.

Garden Sociability in Eighteenth-Century Ottoman Istanbul points out that women were "seldom visible in mostly male recreational universe of taverns and coffeehouses." Garden visits allowed "complete collapse of gender boundaries triggered by a frivolous gaze, or by the location of a swing." Its spotlight on public fountains - a focal point, around which all activities converged, reminds this reader of resemblances to similar settings around wells in other cultures, in Sudan and Yemen, where women are secluded. There girls, usually sheltered, were able to converse with unknown men. The sources provided here include writings of the famous 17th c Ottoman traveler Evliya Çelebi and his Armenian counterpart, Eremya Çelebi. Readers gain insight into the evolution of mosque gardens and refurbishment of old imperial gardens- the passage from courtly to urban.

The Shanghai Gardens in Transition from the Concessions to the Present Times points out "As leisure entertainment moved from an essentially agricultural focus on seasonal festivals to weekly or daily recuperative activities, the for-profit garden also hastened the transformation of its space from a localized phenomenon marked by class hierarchy and centered on family to open public space…dominated by market consumption." The section Medium for Importation of Western Culture indicates Shanghai was at the vanguard of Westernization. After 1860, all Chinese and foreign commodities were assembled there. For-profit gardens utilized every kind of entertainment to entice consumers with an eye on profit, and to parade the new. Besides flower and moon viewing, they offered billiards, dancing, magic and circuses. Display of foreign rarities, e.g., an exhibition of electric lights spurred the spread of electric lights in that city. In 1896, before the arrival of a cinema house, films were screened at Xu Garden. Zhang Garden used scenic sites for souvenir outdoor photography, as well as for banquets, meetings with friends, birthday parties and weddings, "for the powerful and for prostitutes." Exceptional illustrations are included, e.g., a scenic railway built by the foreign circus, and Lamp Boats. An anti-Russian Congress was held there – outside the control of the Qing court, it was the site of special public gatherings and public speeches. Urban gardens, born from the pollution, congestion and turbulence that accompanied the Industrial Revolution in the latter 19th c functioned to improve the quality of the urban environment. Urban forests were the "green lungs of Shanghai."

Part I closes with the review Parks, Parkways, and Suburban Communities: Frederick Law Olmsted and the Modern Metropolis, and the view that the grid was an unfortunate choice for a city plan. Part II opens with Swedish Mid-Century Utopia: Park Design as a Tool for Society Improvements. It points out that in agricultural societies, men and women shared work responsibilities and made mutual economic contributions. Industrialization ruined the gender balance; now men have greater responsibilities to contribute financial support. Women were tied at home, and this created economic dependency.

Cities in the Garden: American New Towns and Landscape Planning, features Reston VA, Columbia MD and Irvine CA. The findings disclose that despite the planners' intent, designed cities such as Reston VA and Columbia MD did not lead to decreased auto use. With no viable transit alternative, an internal bus system that barely functions, planning has failed to diminish the American love affair with automobiles. Irvine CA has traffic problems as serious, perhaps worse than other new towns. "Convenient schools, shopping and community centers are primarily patronized by

people arriving in cars. As in the other new towns, the environmental ethic has not transformed daily lives of individuals in any appreciable manner."

I was deeply moved reading Marrakech: An Ecological Miracle and its Wanton Destruction (1071-2000 AD), Mohammed el Faïz' powerful petition for its preservation and exposé of its annihilation. It reminded me of another, the totally ruined historic 10th century Armenian capitol, Ani http://www.virtualani.org/history/part1.htm. Marrakech is the only city in Morocco to be classified by UNESCO as a World Heritage site for both its physical environment [akin to Ani], and its cultural riches. Urbanizing tendencies of the last two decades are dooming Marrakech's ecological heritage. They have sapped the basis of its ecosystem and threaten to destroy it in short order. There were powerful causes such as sharp rise in population and urban development. Now, the Medina has lost all the traditional park space of its historic legacy: gardens paved over; paving of streets and plazas smothered the root systems, causing many trees to die. I observed these changes myself, during three visits: 1995, 1996 and 2000. Human negligence, i.e. through uncontrolled urbanization, appears in two photographs: Fig. 8, The Triumphant Desert, and Fig. 9, The Time of Vandalism. Invoking the Hanging Gardens of Babylon, "Countless gardened enclosures have been destroyed through human negligence." "To stop this degradation, each individual needs to view the whole planet as a garden and to act in harmony with nature and not against it. Loss of cultural inheritance is irreversible." Appropriate to so many world regimes, el Faïz concludes: No remedy in the world can cure a ravaged national conscience or restore to a nation its lost garden art."

The Promenades and Public Parks of Tokyo: A Tradition Permanently Reinvented shows "beyond the rupture of the ancient balance and the apparent disorder of its megalopolitan development, Tokyo demonstrates a capacity to regenerate itself from principles of engagement with space and nature issuing from a deep-rooted cultural matrix."

Horticulturalists may be especially interested in Ecological and Socioeconomic Dimensions of Home Gardens of Kerala, India. Kerala, compared with other states of India, is distinctive in its village system. Gardens feature the agrosilvopastoral approach, combining herbaceous crops, woody perennials and animals. Using the authors' phrase, 'Homegardens' play a negligible role in conservation of wild species outside protected areas. However, they serve as informal experiment stations for transfer, trial and adaptation of domesticated species and a "genetic backstop" for preserving species not economic in field production and planted in small scale for taste preference, tradition or available planting materials. World over, of approximately 300 major vegetables, 200 are produced in homegardens, while only 20 in field cultivation. Addressing the role of women in homegarden management, the drastic transition from subsistence to cash crop monocultures will increasingly marginalize women. The authors conclude that traditional homegardens in Kerala help conserve crop diversity and reduce pressure on local national forests as sources of fuel, fodder and medicinal plants. They observe a shift in multiple crop patterns toward monocropping. There is a growing disinterest among farmers toward long gestation tree crops. There is a lack of solid research data of the ecological properties of plant components of homegardens, particularly trees, the economics of homestead farming, resource management and utilization. The authors argue this will be possible only when the same priority is given to resources of homegardens, as is given to control pests and diseases of cash crops and to breeding new varieties of rice.

This substantial volume has a nine page index, and illustrated generously with color and black and white photographs, aerial photographs, drawings, engravings, miniature paintings, other paintings, and garden site plans. It will appeal to city planners, environmentalists, historians, landscape architects and preservationists. Resembling other publications in this series printed on high quality paper stock, it is well-bound, as warranted by its weight.

-Dorothea Bedigian, Research Associate, Missouri Botanical Garden, St. Louis, MO

Timber Press Pocket Guide to Palms. Riffle, Robert Lee. 2008. ISBN 978-0-88192-776-4 (Flex US$19.95) 244 pp. Timber Press, Inc. 133 S.W. Second Avenue, Suite 450. Portland, OR 97204-3527.

The Timber Press Pocket Guide to Palms by Robert Lee Riffle presents itself as a guide for gardeners who want to identify palms, either those commonly cultivated or some few deserving, in the author's opinion, wider cultivation. The now-deceased author was an authority in horticulture, particularly on palms in cultivation.

Certainly the book is very complete, both in terms of the large number of species, even those rarely

cultivated, and in terms of the information provided for each species. This list includes wild distribution, habit, number of trunks, crown shaft presence/absence, leaf details, flower structure, fruit edibility and description, growth rate, climatic requirements, sun exposure requirements/tolerances, soil preference, water needs, salt tolerance, possibility of indoor cultivation, seed germination parameters, and a descriptive paragraph. All of these listings follow an introductory chapter on the botany and horticulture of palms. The images are uniformly pleasant and useful, though not masterful, with many needing more contrast to highlight important details (for example, see p. 72 and the photo there of *Caryota gigas*).

There are some deficiencies. This is supposed to be a "pocket" guide, but it would take an enormous pocket to hold it, so taking this book and a notebook through a garden might be more awkward than needed. Given the nature of the photographs, a smaller, truly pocket-sized edition might have been a better option. In addition, the great majority of the photographs of plants in cultivation are taken in the US, while more photographs from outside the US would probably give the book more of an international appeal. Finally, and this may just be the reviewer's own personal reaction, the book is full of annoying, personal reactions to particular plants, methods of pruning dead leaves, etc. Not so surprising in a horticultural book, but still not always needed.

This would be a useful work for horticulturists, university libraries, and gardeners in warmer zones where many palms are within reach, climatically.

-Douglas Darnowski, Department of Biology, Indiana University Southeast

Gods and Goddesses in the Garden - *Greco-Roman Mythology and the Scientific Names of Plants*. Peter Bernhardt. Rutgers University Press. 239 pp. ISBN 0-8135-4266-9.

The title of this short, but pleasant addition to one's collection of reference books certainly makes it clear what is covered. What is not immediately known from the title is exactly how the author will approach the subject. In fact, there could be a question about whether this book is intended for serious, well-versed botanists or for non-scientists, non-botanists who just like plants, just like mythology, or just like the etymology of plant names. Bernhardt has done a good job of balancing his approach and a non-scientist might find the volume a bit more detailed than he or she wants, and a hard core botanist might find the treatment a bit simplistic (especially the introductory Chapter 1 ("In the Cyclop's Orchard: The Why and How of Scientific Names"), so presumably the balance is just right. The book could easily "teach" a lay person some basic features of plant taxonomy (and taxonomy in general) rather painlessly as the reader moves through the first two chapters to get to the core chapters (3 through 7). Certainly the seven-page glossary could be very helpful to the lay reader.

The organization and titles of the chapters are part of the charm of the book and one instantly wonders what information will be found under the chapter titles (e.g., "Mortal Monarchs and Monsters," and, "Troy and Its Aftermath") and the numerous chapter subtitles (e.g., "Chaste or Constant Nymphs," "Meleager and the Fates," and "The Interrupted Voyage of Odysseus"). The small book is filled with interesting (fascinating, perhaps) tidbits about the gods, goddesses, demigods, and humans associated with some of the botanical names. Just one example of historical trivia that some potential readers might appreciate (as I certainly did) was the fact that "Greek and Roman herbalist would not gather peony roots or seeds by day. They believed that if Hades saw them, the underworld god would send a woodpecker to pick out their eyes!" Now, if perchance you were not already aware of the quarrel between Hades and Asclepius and did not know the role of Paeonius in the story you would not fully appreciate the quoted historical factoid. I was certainly aware of none of this and thoroughly enjoyed gaining some erudition rather painlessly as I read through this delightful volume. For those more interested in sex and incest, Berhardt provides some of that as, for example, in the tale of Myrrha and King Cinyras (sex, drugs, attempted murder, and a strange birth of handsome Adonis – wow!). In terms of the humans mentioned there are also interesting, sometimes humorous comments on the botanists who did the science and chose the names. The author's approach has created an interesting reference work that does not read with page-turning excitement of a murder mystery, but is a very enjoyable romp through a lot of mythology, a lot of botanical history, and a lot of science including the chemistry of interesting plant compounds.

The rather narrow (esoteric?) focus of this book presumably would not lead to massive sales and if that is indeed the case, it is too bad. Because it would be wonderful to see the book succeed well and appear in a new, heavily illustrated version. I've underscored the word "heavily" because ideally it would be fantastic to have many photos of the plants mentioned and many illustrations of works of art portraying the mythology stories recounted in the book. This would be a much larger and much more expensive book but what a gem it would be. Perhaps

an online version would be the cost effective way to bring some visual richness to the trove of information that Bernhardt has compiled. The rather minimal illustrations that are provided were for the most part the only thing I did not like about this otherwise simply delightful addition to my library. On the other hand, the jacket illustration of Hyacinth from "Flora's Feast" (1892) by Walter Crane is an absolutely charming and appropriate piece of art to adorn the cover of this delightful reference work.

-Russell L. Chapman, Center for Marine Biodiversity and Conservation, Scripps Institution of Oceanography, UCSD, La Jolla, California.

The Origins of Genome Architecture. Lynch, Michael. 2007. ISBN 978-0-87893-484-3 (cloth US$59.95) 494 pp. Sinauer Associates, Inc. P.O. Box 407, Sunderland MA 01375-0407.

This is a truly remarkable book, which will forever change your view of evolutionary biology. Anyone with even tangential interest in evolution needs to read the preface, epilogue, and especially the fourth chapter on population size. Lynch takes a detailed knowledge of molecular genetics and genomics, combined with a refined fluency in population genetics, to create sound sweeping descriptions and predictions about evolution.

Lynch shows how modern genomic data imply that large eukaryotes - e.g. plants and animals - are largely immune from selection. Drift and mutation are much more salient drivers of their evolution, virtually mocking adaptationist explanations. Empirically, he shows how small effective population size also results in reduced recombination, increased linkage disequilibrium, greater genetic hitchhiking, and increased mutation rates. By contrast, with small eukaryotes with few cell types, selection reigns supreme. This does create tension. Rich Lenski pioneered experimental evolution in prokaryotes, a field that others have expanded to protists and fungi, showing that selection drives evolution of large populations. For better or worse, Lynch shows that such results cannot be extrapolated to larger, more complex eukaryotes. He thereby resurrects Sewall Wright¹s early vision that drift matters. Botanists need to heed his words and stop always looking for adaptationist explanations. For example, why are angiosperm radiations invariably thought to be adaptive? Evolutionary botanists need to look elsewhere for answers, especially to the roles of gene duplications, where polyploidy is the most dramatic case, in driving drift, mutation, linkage, epistasis and pleiotropy.

This book is not aimed at botanists. In fact, Lynch knowledgeably covers all life and even life¹s progenitors. The chapter on gene duplications, which are prevalent in plants, will probably be most useful to plant scientists, especially his discussions of neo- and sub-functionalization, which is greatly strengthened by Keith Adams¹ beautiful work on reciprocal epigenetic silencing of homeologous genes in cotton.

Alex Haley¹s Autobiography of Malcolm X was ironically not an autobiography. Charles Darwin¹s Origin of Species was ironically not about the origin of species. Lynch follows in this grand tradition. His book is not is much about the origins of genome architecture, but rather about ramifications of that architecture to evolutionary trajectories.

The only faults that I could find with this book are extremely minor. More extensive coverage of epigenetic effects would have been nice. His discussion of centromeres omitted mention of karyotypic fission and perpetuated the inaccurate suggestion that only one of four products of meiosis survives in most female organs (cf Ed Klekowski¹s wonderful diagrams of angiosperm megagametophytes, which show more than just the textbook Polygonum type). While Lynch¹s index is moderately good, a more comprehensive index would be a great addition to any revision.

This is not a book for the meek. The genetic and population genetic details, while accessible, are still extraordinarily rich in detail. Many of the arguments are cumulative throughout the volume. But it is worth the effort wading through these details, which, while important in their own right, add up to an expected synthesis that selection is not the primary driver of plant (or animal) evolution. Casting the hand-waving aside, Lynch shows that it is only by looking at the details of genome architecture and associated population genetics that we can really see how important non-adaptive evolutionary explanations can be. While most botanists abhor mathematics, it is worth trying to understand the nicely presented and simplified mathematics herein. Read Lynch¹s book, have your students read it, and let¹s revise our views of evolution.

-Root Gorelick, Department of Biology, Carleton University, Ottawa, Ontario K1S 5B6 Canada.

Fruits and Plains: The Horticultural Transformation of America. Philip J. Pauly. 2007. ISBN-13: 978-0-674-02663-6. 337 pages. Harvard University Press; Cambridge Massachusetts.

"Fruits and Plains" is a deceptively simple title for a book that covers a wide range of horticultural subjects and geographic areas from the time of the arrival of Europeans in North America to the present. It seems that the urgent challenges of today such as invasive species have been with us from the beginning. Pauly reviews the wide variety of approaches that have been taken to the culture of plants through introduction, breeding and control. His goal was to show how difficult it is to understand contemporary environments without knowledge of the past. He makes many important connections through time and space that would never have occurred to me and I feel that he has succeeded in achieving his goal in this extremely readable book.

In the early days of the United States, little value was placed on native plants for food or aesthetics. As European settlers began to colonize, every effort was made to maintain the familiar diet, gardens and culture of their native lands and there began their often unsuccessful attempts to contend with the perceived imperfections of climate and growing conditions they found.

One of the most interesting threads woven throughout the whole book is that apparently unrelated events can cause unexpected and lasting changes in the landscape. For example, George Washington fought and kept the British contained in a small area north of Delaware for several years therefore the British and Hessian soldiers had no access to the food needed to keep their horses and cattle alive. Large quantities of grass were shipped from all over Europe and the first invasive species called the Hessian fly arrived from the Mediterranean where it was so uncommon as to be unnoticed. Once introduced in New York it proved to have a devastating affect on the growth of wheat, a most basic food of life. Responding to such a crisis in a new country where horticulture was mainly the passion of amateurs and naturalists greatly increased the importance of the plant scientist throughout the many of investigation of this pest that followed. Ultimately an unexpectedly large part of the federal and state government has therefore come to be dedicated to the culture and control of food and forage crops.

Fruit establishment in America proved to be unexpectedly challenging. Early horticulturists, mostly in Massachusetts, felt sure that just as humans had adapted to the change in continent, the fruits they had become so accustomed to in Europe should do so as well. They failed to account for the very long time frame that had ultimately led to the success of fruit culture in Europe. For example, strawberries presented a challenge to early North American breeders but by the 1850s an apparently mediocre, but marketable product was available. Early attempts at grape (and therefore wine) culture continually failed as fungi and climate played their part.

In addition to providing historical perspective on botanical and horticultural issues, Pauly provides many interesting details about the individuals who have been passionately involved with plants. He demonstrates the importance of beliefs, attitudes and even the social standing in plant culture. He traces the beginnings of federal programs to Patent Office involvement with the spreading of new introductions. He captures the frustration of forest pathologists in the early 1900s who found themselves completely unable to stop chestnut blight and the subsequent challenges of the federal Plant Quarantine program. The value and methods of restricting entry of new organisms into the country became the controversial subject it remains today.

Pauly traces the shift of the split of the horticultural field into two groups. Those who continued to focus on breeding and growing conditions worked mostly in the academic world and in federal and state agricultural offices where their decision profoundly impact the fields of agriculture, forestry and ornamental plant development. Those interested in gardens shifted toward the field now called landscape architecture where aesthetics became the central concern, a trend that he feels ultimately marginalized many of the botanical gardens which had originally had a central role in international plant commerce.

Toward the end the book does address the subject of the plains with a fascinating discussion of the efforts to "restore" prairie in the west. It proves to be a tale involving people and organizations from the citizens living near Chicago parks targeted for restoration, to ecologists from various midwestern Universities, the National Park Service and the Nature Conservancy. Ultimately through federal funding the Konza Prairie Long-term Ecological Research site was established and currently investigates competing views of what a natural prairie actually is.

In this review I've only presented a sample of the many interrelated topics covered in this well-written book. The material is well-researched and 56 pages of notes document references from a variety of sources. There is an index, which can be very helpful in finding specifics within chapters with such intriguing titles as "Fixing the accidents of American natural history". Anyone who is interested

in plants will find an engaging historical perspective on their culture and management in this book.

-Joanne Sharpe, Coastal Maine Botanical Gardens, Boothbay Maine

Middle East Garden Traditions: Unity and Diversity. Conan, Michel (ed.) ISBN 978-0-88402-329-6 (Paper US$40.00) 363 pp. Dumbarton Oaks Research Library and Collection, distributed by Harvard University Press, 79.Garden Street, Cambridge, Massachusetts 02138.

It is difficult to write about *Middle East Garden Traditions* without gushing superlatives. I have been waiting for a scholarly compilation on this subject for decades. Editor Michael Conan, former Director of Garden and Landscape Studies, Dumbarton Oaks admirably assembled colleagues to execute this undertaking, which links gardens and people of different cultures and creeds. These chapters originated as conference proceedings from the Dumbarton Oaks Colloquium on the History of Landscape Architecture, XXXI, held at the Freer and Sackler Galleries April 2007. The resulting commentary represents decades of research by experts who have diligently compiled centuries of study by others: area specialists who brought into English a vast literature about garden history that was previously unavailable. It presents a critical selection, not intentionally comprehensive, of sources on studies of gardens issued from Middle East garden traditions. It displays erudition at the highest order.

This account sorts out cultural connections, variations and distinctions between gardens in the Middle East since Roman times, and in the broader Islamic world. Scholars supply new sources for studies of gardens in India, Pakistan, Afghanistan, Iran, the Ottoman world, Judea, Morocco and Moorish Spain. They explore the interaction of conflicting influences, the cultural reception of gardens in religious and mystical societies, and the political uses of gardens, presenting an astonishing range of garden forms among diverse social groups. It includes 56 black and white photographs, 173 color photographs, site maps and digital reconstructions of vanished gardens. It has an extensive, 27 page Index covering garden terminology and botanical, geographical and person names.

In addition, there is associated with this work, a feature both highly unusual, in my experience, and rich: a searchable website of expanded contents: http://www.middleeastgarden.com. Authors of this study have participated in it, and it currently consists of five features: a catalog of gardens of interest for future research referencing major scholarship or more often, the absence of scholarly discussion of their traces; a multicultural glossary giving a short definition of many garden terms used in Arabic, Hebrew, Farsi, Ottoman and Urdu; a historical garden dictionary for Ottoman prepared by one of the authors in the Istanbul study group for the History of Ottoman Gardens, which brings together all the original entries about garden and horticultural terms found in more than 200 historical dictionaries and technical treatises written in Ottoman or translated from Ottoman to English; a joint bibliography of sources and scholarly research on gardens in the different languages used by the authors; and an exemplary study of the historical flora of al-Andalus with a methodological commentary by E.García Sánchez and J.E. Hernández Bermejo in their study of agricultural treatises of al-Andalus. They suggest that other scholars could engage in similar endeavors but they will have to devise a method adapted to the sources they are using, and it is not certain that such rich historical sources as were found in al Andalus will be readily available for other parts of the world.

Having searched a series of my favorite subjects: geographical (Armenia, Diyarbakir, Van) botanical (jasmine, rose, eaglewood, sandalwood,) and thematic (agriculture, irrigation, poetry), it seems undeniably comprehensive, and pointless to identify any single principal audience for this book. Fully interdisciplinary, it contains broad and thorough treatments that will enlighten many specialists in Middle East and related regional studies, and in a number of subject areas, including architecture, art, geography, history, as well as botany and horticulture.

The arrangement offers five main sections: first, the Editor's Introduction showing how new developments and new questions in garden archaeology transform our understanding of ancient evidence and broaden the field of garden history, 3rd-14th c. New Perspectives for Garden Archaeology contains the following articles: The Rose and the Balsam: The Garden as a Source of Perfume and Medicine; Soil Improvement and Agricultural Pesticides in Antiquity; An Approach to the Visual Analysis of the Gardens of Al-Andalus; and Ornamental Plants in Agricultural and Botanical Treatises from Al-Andalus.

The Political Uses of Gardens has five contributions: Garden Strategy of the Almohad Sultans and Their Successors (1157-1900); Princely Safavid Gardens: Stage for Rituals of Imperial Display and Political Legitimacy; Royal Gardens of Farahâbâd

and the Fall of Shah Sultan Husayn Revisited; My Garden is Hindustan: The Mughal Padshah's Realization of a Political Metaphor; Questions about the Political Significance of Mughal Garden Waterworks.

The next sections each hold two essays. Cultural Receptions of Gardens includes Matrakçý Nasuh and Evliya Çelebi: Perspectives on Ottoman Gardens (1534-1682); and Unity and Diversity of Mughal Garden Experiences. Critical Discussion of Cultural Influences presents: Gardens at the Kaðithane Commons during the Tulip Period (1718-1730); and Rajput Gardens and Landscapes. Exploring the Limits of Garden Traditions extends From the Andalusí Garden to the Andalusian Garden: Remnants and Re-Creation; to Gardens of Afghanistan.

Testing the capability of the Advanced Search Multilingual Vocabulary and Glossary, searching *Sesamum indicum* L. under the widespread Turkish name '*susam*' I obtained various citations under 19 synonyms. There were no entries under other languages. It is sensible, considering the vast amount of material remaining to be examined along these lines that these authorities decided to open the web site to the public, and to encourage other scholars to participate in its development.

One can now only wish that the regions that Editor Conan admits were skipped involuntarily in this volume: Mesopotamia, Egypt, ancient Persia, Iraq and Syria will find their place in another tome of this elegant series. Considering the value of its contents and the giant efforts to assemble these scarce materials, the published work, stitched solid to strengthen the binding to support its hefty weight, is worth every penny of its price, and belongs in libraries of botanical gardens, horticulture institutes, museums, universities and public libraries worldwide.

-Dorothea Bedigian, Research Associate, Missouri Botanical Garden, St. Louis, MO

Musa Cliffortiana: Clifford's Banana plant. Linnaeus, Carl **(**Reprint and translation of the original edition [Leiden 1736]). Translated into English by Stephen Freer. With an introduction by Staffan Müller-Wille. 2007. ISBN 978-3-906166-63-6 (Cloth US$ 124.00) 264 pp. A. R. G. Gantner Verlag K. G. Distributed by Koeltz Scientific Books, P.O. Box 1360, D-61453 Koenigstein, Germany.

Musa Cliffortiana is a very nice book which provides much more than the title may suggest. The main body is a facsimile of Linnaeus's detailed description of a banana plant ("Musa Cliffortiana") which flowered in 1736 in the garden of Georg Clifford (1685–1760). Clifford was Linnaeus's patron for whom the 28 year old Swede officially worked as a private physician. However, one of the main duties of Linnaeus was to curate Clifford's vast plant collection at the Hartenkamp. The facsimile is accompanied by Stephen Freer's translation into English. The binding is in such a way that the Latin text of each page is on the left and its translation on the right side of the book. This particular binding makes the reading of both the original Latin version and Freer's translation rather interesting and good fun. Two illustrations on large folded sheets – one showing the whole plant and the other the inflorescence with young fruits and flowers – are reproduced to a smaller scale at the end of the text.

Facsimile and translation are preceded by a comprehensive and thoughtful introduction by Staffan Müller-Wille. He carefully analyzed Musa Cliffortiana and puts it into the broader context of Linnaeus's work and achievements. The introduction is accompanied by 10 figures of which four are in color and six in b/w.

Next, a "Musa-centric" chronology gives an overview of Linnaeus's work on the banana plant. The chronology starts with Linnaeus's arrival in Holland (13 June 1735) and it ends in 1762 with the thesis "Fundamentum fructificationis" in which Linnaeus speculates that *Musa paradisiaca* (this is the name that Linnaeus recognized in 1753 for the plant in his Species plantarum) is a hybrid.

The chronology is followed by a brief preface of the translator, Stephen Freer. He discusses the history of Linnaeus's two private copies of Musa Cliffortiana (one of which is the basis of Freer's translation) which were bought by James Edward Smith in 1784. Smith was a founding member of the Linnaean Society of London which now holds the two copies of the book. However, for "technical and financial" reasons the present facsimile is produced from a copy held by the University of Vienna Library (but this does not reduce the value of the actual book). Freer also highlights that Linnaeus's publications are largely derived from lecture-notes, and that this

affects his style which is sometimes highly rhetorical. As a result Freer notes that "... I almost felt that I could see Linnaeus pointing to each part ... and hear him discoursing about the details..." It is noteworthy that this excitement and liveliness of Linnaeus description is successfully transformed into modern English by Freer.

The core text is not a mere translation, but Freer also provides more than 120 notes with highly informative background information referring to both the text, wording, and translation and to many other aspects such as biographical notes, other studies on *Musa* and he even reports on a *Musa basjoo* which produced fruit out-of-doors at Clare College, Cambridge (UK) during a heat-wave in 2006 (this is a note in response to Linnaeus' note that *Musa* has never grown out-of-doors in Europe).

After all of this, the reader will still find additional and valuable bonuses: First, Linnaeus's handwritten notes (52 in total) are reproduced from one of his personal copies of Musa Cliffortiana. The position of the notes is marked in the facsimile by encircled numbers and the handwriting is translated by Freer. The reproduction of Linnaeus's handwriting is not always to scale and sometimes it is not easy to read. Nevertheless, it is rather interesting and fascinating to actually see how he worked. Some of the notes are written on blank pages which were bound opposite each printed page in Linnaeus's private copies. This gives an interesting glimpse on how Linnaeus continued his work on *Musa*. It seems possible that he even planned a second edition of the book, which never appeared. However, parts of these notes were published as corrigenda in the Hortus Cliffortianus (1737).

This is still not the end of the book. What follows is a bibliography of Linnaeus's sources compiled by Müller-Wille which again adds up to the value of the book. And finally we find two appendices at the end of the book. Appendix I is a reprint and translation of Linnaeus's Methodus which was published separately in 1736 and which is inserted as a folded letterpress in Linnaeus's own copies of Musa Cliffortiana. The Methodus perfectly accomplishes Musa Cliffortiana, because it contains detailed instructions on how to describe species, which Linnaeus followed meticulously in writing Musa Cliffortiana. Finally Appendix II – the definitive end of the book – is the reproduction of a laudatory poem by Johann Heinrich Jungius which is enclosed on a loose sheet in Linnaeus's annotated copy of Musa Cliffortiana. The poem which consists of eighteen elegiac couplets is handwritten (interestingly it is Linnaeus's own handwriting) and translated again by Freer.

Summing up, the translation of Musa Cliffortiana is an excellent and highly welcome attempt to rediscover this early piece of Carl Linnaeus's work. Because of the successful introduction by Müller-Wille and the fact that the translation goes far beyond a mere English version of the Latin text, and because of the other extras such as the reprint of Linnaeus's handwritten annotations, Musa Cliffortiana is highly recommendable to a broader audience. Everyone who is interested in Carl Linnaeus, the history of botany and/or in the fruit, which "is so excellently sweat that hardly any other can be compared with it" (Musa Cliffortiana, p. 177) will be pleased with this book. According to Müller-Wille (p. 24) "Musa Cliffortiana was not in the first instance produced for sale. Its purpose was rather to serve as a present for botanical amateurs and botanists with whom Clifford either had established or wanted to establish exchange relations." Here again we can find a link to the present, because this edition of Musa Cliffortiana certainly makes a nice (but not cheap) present for esteemed friends and colleagues.

– Gerhard Prenner, Royal Botanic Gardens, Kew, Richmond, Surrey, TW9 3DS, UK.

Physiology and Behaviour of Plants. Scott, Peter. 2008. ISBN 0-470-85024-4 (Cloth US$170.00) 305 pp. John Wiley & Sons, Ltd., The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, England.

The concept of plant behavior may not be readily apparent to most observers. While a few plants exhibit dramatic movements such as the famous Venus fly trap, most other plant behaviors or movements occur at a much slower scale. One of the overarching concepts in this book is that plants exhibit a range of fascinating behaviors which are based on an intriguing underlying physiology.

Author Peter Scott's approach is to present basic concepts of plant physiology and development in an enthusiastic and engaging manner. While Scott considers biochemistry, he does not use molecular biology throughout the book in an attempt to make it more accessible to a broad audience.

The author also believes that while plant biology is relevant to solving global problems such as feeding a large population, interest in the topic appears at a historic low, and plant biology gets too little coverage in most undergraduate biology programs.

Hence, he tries to use his passion for his subject to be an effective teacher, and his enthusiasm is evident throughout the book.

As an example of his exuberance, I cite chapter 2 entitled: *Photosynthesis: the ultimate in autotrophy*. He describes RUBISCO as the "marvel enzyme of the universe" that supports almost all life on Earth! The author also discusses the biochemical elegance of photosystem II with its ability to split water and extract the oxygen we need to breathe.

Another fascinating chapter discusses carnivorous plants, a topic which seems to attract a great deal of interest among introductory students. The overall approach is to consider these organisms as highly adapted plants that have elaborate mechanisms that have evolved from alterations in leaf structure that are common to all plants. In many ways, including basic mechanisms of nutrient uptake, the author views the carnivorous plants as similar to non-carnivorous plants.

Given my personal interests, I particularly enjoyed chapter 13, *Plant senses and perceiving the world*. His description of shade avoidance and the role of phytochromes in this process is very enlightening. The subheadings in this chapter are informative and provide a new perspective for many students on plant biology: sensing light (sight), sensing time, sensing touch (feeling), sensing chemicals (taste), and sensing sounds (hearing). The last issue seems to be a perennial topic in science fairs: do plants respond better to Mozart or Meatloaf?

One of the clear strengths of this book are the high-quality color diagrams. The figures are simply stunning and are a fabulous tool for learning. They have an elegant simplicity while covering the basic points–without being overly "busy." For instance, the diagram on vesicular-arbuscular mycorrhiza in the chapter on mycorrhizal associations and saprophytic nutrition provides a good explanation of the importance of this group of fungi. Other fine examples include the diagram on the capture of light energy by an antenna complex and the figure illustrating the difference between shade and sun plants.

I enjoyed reading *Physiology and Behaviour of Plants* and came away with good ideas for new approaches to teaching topics in plant biology. The book could be useful in a number of courses in botany and plant biology at the freshman and sophomore level.

-John Z. Kiss, Department of Botany, Miami University, Oxford OH 45056

Field guide to Wisconsin sedges, An introduction to the genus *Carex* (Cyperaceae), by Andrew L. Hipp, illustrations by Rachel D. Davis. 2008. 265 pp. ISBN 978-029922594. $27.95 (pbk). The University of Wisconsin Press, Madison, WI.

Carex provides many unique challenges to the serious field botanist. The extreme specialization of their floral structures means that experience with other taxa is not applicable to this genus; *Carex* must be learned (Catling et al. 1990). The primary resources available up to now have been rather imposing technical floras. Andrew Hipp's new field guide thus fills an important gap: it provides an introduction to *Carex* that is both complete enough to be of lasting value to professional botanists, and accessible enough to provide an entry point for keen amateurs.

The book begins with a ten-page overview of *Carex* morphology, "What is a sedge?". This section is organized around the Flora of North America (FNA, Ball and Reznicek 2002) description. Hipp quotes key lines from the FNA, each accompanied by a paragraph of further explanation. This provides the reader with a clear outline of the key features of *Carex*. Perhaps more importantly, the formal language used in the FNA is rendered somewhat less intimidating to budding caricologists. Indeed, Hipp refers to the FNA repeatedly throughout the book, and the two volumes complement each other nicely. The introduction briefly discusses differentiating *Carex* from other sedges, as well as grasses and rushes. Beginners would have benefited from an illustration of the differences among these groups, but that is perhaps beyond the scope of this field guide.

The introduction is concluded by a brief overview of *Carex* taxonomy. Not a great deal of depth is provided, just enough to place the genus in its evolutionary context, and introduce some of the main concepts in its Linnaean classification. This is followed by some general tips for studying sedges in the field.

Hipp proceeds with the taxonomic key and species descriptions. He emphasizes the utility of the existing classification, noting the advantages of learning to recognize the subgenera *Vignea* and *Carex*, and the many sections within each subgenus. In my experience this aspect of *Carex* taxonomy is too often overlooked by field botanists. With 150 species in the flora, having a logical way to partition the diversity into manageable chunks is critical in coming to terms with the genus. However, while Hipp acknowledges the value of the sectional classifications, this could be better reflected in the keys themselves. He begins with a key to the subgenera, and then provides separate keys for

different combinations of species within each subgenus. Sections are indicated within the species-level keys, but I prefer keys that provide separate intra-sectional keys, as in FNA, Gleason and Cronquist (1991) or Voss (1972). This further reinforces the sectional relationships among species, at the cost of somewhat longer keys. Hipp's decision not to include intra-sectional keys may have been influenced by the fact that the species-level classification of *Carex* is likely to undergo some substantial rearrangement in the next decade, however.

Keys notwithstanding, the species descriptions are arranged in sections. Hipp provides interesting notes to accompany each key, section, and species, emphasizing key characters for the group, ecological relationships, or Wisconsin distribution, as appropriate. This provides considerable value, making this more than simply a scaled-back version of the FNA. I expect even experienced caricologists will find much of interest here. The notes on section *Ovales*, one of Dr. Hipp's specialities within the genus, provide a very welcome introduction to this most challenging group.

The second half of the book is devoted to the field guide. Here, four-fifths of the Wisconsin *Carex* flora is fully illustrated with excellent watercolour paintings. The artist, Rachel Davis, clearly has spent some time in the study of sedges herself, as she has done a wonderful job in capturing the fine details of perigynia and scales. Each of the species illustrated is accompanied by a full page description, including habitat preferences, similar species, and Wisconsin distribution. The extent of the coverage, and the quality of the illustrations, will allow for ready identification, at least to section, of many specimens simply by thumbing through the book.

The book concludes with two appendices. The first is a guide to the principal carices of different habitat types in Wisconsin, compiled by Theodore Cochrane. The second is a county level atlas for the *Carex* flora of Wisconsin. Although these are obviously of greatest interest to botanists in that area, the book as a whole is a fantastic resource for anyone working with *Carex* anywhere in the midwest or northeast. Indeed, I included this book in a recent *Carex* workshop here in Nova Scotia, and it was very popular. The students enjoyed the book well enough that I can forgive Dr. Hipp for not including the species in our local salt marshes in his treatment.

At $27.95, this book is a bargain. Any serious student of *Carex* will want a copy on their shelf. The species coverage make it a useful guide for carices from Minnesota to Nova Scotia, although it will be comprehensive only for Wisconsin.

-Tyler Smith

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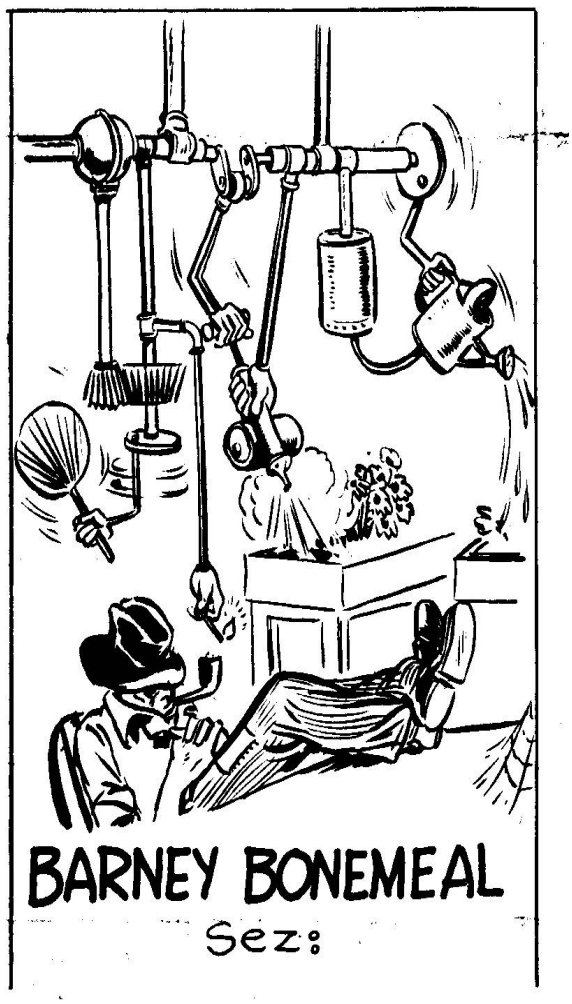

Early greenhouse automation
from *Greenhouse Gossip* 4(4), April, 1945.
Flight Floral Co., New York, NY

Flora of the Northeast: A Manual of the Vascular Flora of New England and Adjacent New York. Dennis W. Magee and Harry E. Ahles. 2007. 2nd edition. ISBN 10: 1–55849–577–0; ISBN 13: 978–1–55849–577–7 (Cloth US$95) 1264 pp. University of Massachusetts Press, Amherst.

New England has been blessed with a bouquet of good floras. Without even including single-state volumes or those limited to particular groups like the ferns, botanists in the region have been able to reach for Fernald's excellent Gray's Manual of Botany, Gleason and Cronquist's Manual of Vascular Plants, Gleason's New Britton and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada or Seymour's Flora of New England. Still, Gleason & Cronquist (G&C) is the only one of these that is less than 25 years old. Given the rapidity with which plant systematics has been changing in recent years, a new flora of the region is more than welcome.

Flora of the Northeast: A Manual of the Vascular Flora of New England and Adjacent New York by Dennis W. Magee and the late Harry E. Ahles has been issued in a 2nd edition (University of Massachusetts Press, Amherst, 2007). The keys and distributional information in this volume are primarily the work of Ahles, curator of the University of Massachusetts herbarium who died in 1981, but they have been assembled and revised by Magee, vice president of an environmental consulting company, who added the descriptive text.

For New England botanists, there is much to like about this volume. For one thing, it focuses more closely on the six-state region (it actually covers an area extending west to the Hudson River and south to Long Island, outside the political bounds of the New England states) than does G&C, which is the best of the other floras. In trying to identify a plant in the Apiaceae, a botanist using Magee and Ahles (M&A) would have to work through 34 genera instead of the 49 in G&C, including those like *Lomatium* and *Polytaenia* that don't occur east of the Great Plains. Of course, the close geographical focus makes M&A less useful for botanists in Minnesota, Missouri or Virginia.

The volume also includes county-level dot maps showing the range of most species (the range of very infrequent species is described in the text) as well as line drawings by Abigail Rorer of 995 species – at least one per genus. G&C lacks both. Furthermore, M&A provides information on the etymology of genus and species names, as Fernald does, and includes accents on Latin names as an aid to pronunciation.

Family and genus descriptions are adequate. The only descriptive information for most species is provided in the keys, but the flora does include information on species' wetland indicator value, food value for people and wildlife, medicinal uses and poisonous properties, as well as more traditional information such as habitat and synonyms. Moreover, the volume includes a 56-page matrix to help in identifying dicots to genus and a separate 10-page matrix to help identify woody plants in winter. A welcome addition to the 2nd edition is a CD that makes using the dicot matrix much easier and adds images of all 624 genera. Using the text matrix, I was unable to identify a vegetative specimen of *Diervilla lonicera,* but I recognized it immediately from among the photographs provided on the CD after narrowing my search to the genera to which my specimen could belong, based on its having opposite, simple, dentate leaves.

For field botanists, keys to identify specimens represent the heart of any flora, and the keys in this one are many and excellent. Separate artificial keys are provided for aquatic plants, parasites and saprophytes, vines, pteridophytes, gymnosperms, scapose herbs, herbs with opposite or whorled leaves, herbs with alternate leaves, woody plants without leaves, woody plants with opposite or whorled leaves, woody plants with alternative leaves and woody plants in winter condition. The keys led to the correct identification of herbarium and freshly collected material, including a sedge, a composite, a legume, a fern, a lycopod and a specimen of *Anemone quinquefolia*. The only problem occurred with identifying a vegetative specimen of *Myriophyllum humile*; keys led to the correct genus but could not identify the species without flowers or fruits.

County-level distributional maps give M&A a great advantage over G&C. However, these were not revised in the 2nd edition; Magee says in a preface that he "lacked opportunity" to update the maps. That is unfortunate. Magee acknowledges that "county level distributional data are changing constantly," and maps for many taxa were out of date even in the first edition. For example, *Myriophyllum spicatum* is not listed as a resident species in Connecticut even though it is the most frequently found of all milfoil species in southern New England (it is described as "reported for CT, MA, NH, VT"). Probably it is unfair to use a non-native species as a test case, since these can spread so quickly, but the maps are out of date for native species as well. The maps can be used only as a general guide to where species occur: *Zannichellia palustris* does, in fact, occur primarily along the coast and in areas with calcareous rock in the extreme western part of the region; ignore the fact that the map shows the species absent from Connecticut's Fairfield County

(although specimens date at least from 1982) and Middlesex County (specimens from 1980). Magee says in the preface that this edition's range maps "provide reasonable indication of the distribution of approximately two-thirds of the flora." That seems like settling for too little.

The most serious problem with the region's other floras is that they are too old to reflect the current understanding of the relationships among plants. This, therefore, is where M&A could make the greatest contribution. To some degree it succeeds. When G&C was published, there was a single genus for lycopods; M&A divides the species among *Huperzia*, *Lycopodiella*, *Pseudolycopodiella*, *Diphasiastrum* and *Lycopodium*, in line with the arrangement accepted by the Flora of North America. *Thelypteris* is placed in its own family, in accord with FNA, the Integrated Taxonomic Information System and the Plants database, not in the Aspleniaceae, as it was in G&C; *Onoclea* and *Matteuccia* are in the Dryopteridaceae, as they are in FNA and ITIS, not in the Onocleaceae, as they were in G&C. Much taxonomy is corrected – *Wolffiella floridana* becomes *W. gladiata*.

However, this flora fails to fully embrace modern systematics. Magee says in a preface that production of the second edition was motivated primarily by systematic revisions adopted since publication of the first edition in 1999. He relies heavily on John Kartesz of the Flora of North American project to guide his decisions on taxonomy, and Magee writes that, in most cases, he accepted Kartesz's recommendations. But not in all. Magee clearly believes older classifications in some cases are more convenient. Families in the flora are arranged using the Englerian system instead of what he acknowledges would be a "more modern" approach like that taken in G&C because "it seemed more practical to use the familiar system that is most generally used by taxonomists and field botanists," which seems an odd approach even if the assumption is correct, which is unlikely. This flora is for field botanists, Magee stresses, and until characters recognizable in the field are identified for groups, it is more convenient to stick with the old classification, regardless of what molecular analyses tell us. Perhaps this is why *Stuckenia pectinata* is still listed as *Potamogeton pectinatus*, although both FNA and ITIS place it in *Stuckenia*. Species traditionally assigned to the genus *Scirpus* are retained in that genus by Magee "to promote comprehension and convenience of use" although he does list alternative names in the genera *Trichophorum* and *Schoenoplectus* for some species; he doesn't acknowledge *Bolboschoenus* even though FNA recognizes it.

The primary goal for Magee was to provide "a functional manual for the serious field botanist." He avoided splitting taxa into groups "lacking conspicuous distinguishing field characteristics," and he declined to combine taxa that can be distinguished from each other based only on molecular analyses. That would be "counterproductive for consistent and accurate plant identification in the field," Magee writes. "For comprehension and convenience of use, I have frequently retained concepts and names of taxonomic entities that have become well established through usage over the years."

Convenience is a worthy goal, but this is a flora, not a field guide, and it presents itself as a serious reference work for serious botanists. Serious botany, first and foremost, is not about convenience (I would much prefer to simply stick with G&C, frankly). A modern flora can best serve regional botanists by embracing the new systematics, helping botanists keep up with all the changes, reminding us of the new names and phylogenetic relationships. This flora represents an improvement over other available floras for the region, yet it seems to want to keep one foot in the past, and that is unfortunate. In spite of its imperfections, this flora will be a valuable addition to the shelf of any New England botanist – for use both in the field and as a reference work. I can hope only that it will continue to improve with future editions.

-Robert S. Capers, George Safford Torrey Herbarium, Department of Ecology and Evolutionary Biology, University of Connecticut, Storrs CT 06269-3043

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Weeds in South Texas and Northern Texas: A Guide to identification. James H. Everitt, Robert I. Lonard, and Christopher R. Little. 222 pages, (paperback) ISBN-13: 978-0-89672-614-7, ISBN-10: 0-89672-614-2

This book is the third guide on the vegetation of the temperate-tropic of Southern Texas and Northern Mexico. The reference provides easy access to information on common weedy species of plants found in both rural and urban areas, and is intended for people working the field of agriculture. Field guides for this region of the world are scarce and while other available publications contain more taxa, species selected by the authors include those that dominate in disturbed areas, i.e. because they are weeds.

Given the predominance of agriculture throughout this region, there is a need to be able to recognize invasive species and access information on their management. This guide is of obvious value for those purposes. The appendices on important plant pathogens, their host plants, and available treatment options make this publication an especially useful resource. Descriptions or pictures of the pathogens would have been helpful given that not all readers may be familiar with plant diseases.

The book begins with a discussion on the definition, significance, and ecology of weeds. The main text is broken into three sections: Polypodiopsida, Magnoliopsida, Liliiopsida, and contains 261 colored photographs of the 189 included species arranged by families. Poaceae has the lion's share of entries, and the detailed pictures are particularly useful for determining species. Each entry includes a description as well as notes on the ecology, pathology, and significance for selected species. There are also seven appendices, a glossary, and an index. Between the color photos and clearly executed plant descriptions the guide is very easy to use without needing to employ the glossary. Unfortunately by leaving out plant measurements in the descriptions, and not providing scale for the photos, the reader has a poor idea of the size of the plants and their critical features.

The book itself is a durable paperback (9" x 6") able to withstand the wear and tear that comes with field work. While a little too wide for a pants pocket, the guide fits comfortably into a backpack without adding too much weight. Every page has a large blank space that could have been cut out to make the book smaller. Alternately the photographs could have been made larger. A key would be useful for beginning botanists and amateurs who are not familiar with plant family characteristics. Nevertheless, *Weeds of South Texas and North Mexico* would be a positive addition to the library of anyone interested in plants of this region, and doubly so for those with interests in agricultural and urban floras.

-Nathan LeClear, Department of Biological Sciences, University of Texas-Pan American.

Woody Plants of the Southeastern U.S.: A Field Botany Course on CD. Kirchoff, Bruce. 2008. ISBN 13:978-1-930723-62-7. (CD US$27.00) Missouri Botanical Garden Press, P.O. Box 299, St. Louis, Missouri 63166-0299

Woody Plants of the Southeastern United States: A Field Botany Course on CD provides a wonderful tool for teaching and learning taxonomy in general as well as the specific flora mentioned in the title.

Formatted for Windows machines, the program is quite simple. After registering, the user selects one of four options: building a list from the available families, genera, or species; studying the items on the list; taking a quiz; and taking a test. Study can be with or without prompts and can be either advanced slide-by-slide by the user or automatically advanced by the program. The quizzes are shorter than the tests and have the display of text prompts as an option, while tests do not.

While the CD is aimed at the Southeastern US, the families represented include many of broader distribution which might make this CD-ROM of interest to a wider audience in the US, Canada, and possibly elsewhere in the Northern Hemisphere. There are 55 families represented, many with multiple genera, and each species shown has at least four high quality photographs available, most species with more. Some even have over a dozen photographs of various taxonomically-useful features.

It would be nice if this CD-ROM also came in Mac and Linux formats, but given the capacities of the newer Intel-based Macs and of various Linux tricks, that may not be an insurmountable impediment to users of those operating systems. Buy a copy today for your introductory class to use in practicing taxonomic features and the quick identification of common woody plants.

-Douglas Darnowski, Department of Biology, Indiana University Southeast

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