

# TAXONOMY OF CALIFORNIA PLANTS - Biology 531

SAN DIEGO STATE UNIVERSITY Spring 2015

Dr. Michael G. Simpson, Instructor

Course Site: <<http://www.sci.sdsu.edu/plants/tax>> Blackboard:<<http://blackboard.sdsu.edu>>

Plants of San Diego County: <<http://www.sci.sdsu.edu/plants/sdpls>>

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(Revised 8 Nov 2014)

*To climb these coming crests  
one word to you, to you and your children:  
stay together  
learn the flowers  
go light*  
Gary Snyder, Turtle Island (1974)

*To be able to call the plants by name  
makes them a hundredfold more sweet and intimate.  
Naming things is one of the oldest and simplest  
of human pastimes.*  
Henry Van Dyke in *Little Rivers* (Dale, 1986).

## **Required Pre-Requisites**

Biology 203, 203L, 204, 204L.

## **Course Description (Catalog)**

Fundamentals of plant taxonomy with emphasis on identification of plants native and naturalized to California. Plant collecting techniques. Field trips are required.

## **Course Overview**

This course is designed for the serious student to acquire the basic skills of native plant identification and basic plant community assessment. It is suitable for advanced undergraduates, graduate students in systematics or ecology, and people with positions in private or governmental conservation/environmental organizations.

## **Student Learning Outcomes**

After completing the course, students should be able to:

1. State, define, and give examples of the components of taxonomy: description, identification, nomenclature, and classification.
2. Describe a plant in detail, using descriptive botanical terminology.
3. Identify on-sight approximately **170** (scientific names, correctly spelled) of the common, native and naturalized plants of San Diego County.
4. Identify an unknown taxon using a taxonomic key and specimen comparisons.
5. Identify, on-sight or using a hand-lens or dissecting scope, approximately 20 angiosperm families (scientific names, correctly spelled).
6. State the principles and rules of plant nomenclature, including how to publish a new taxon name, and know how to use and apply botanical names.
7. Collect, document, and process (press, dry, label, mount) a plant from the field. Toward this, each of you will prepare a collection of plants, pressed, dried, labeled, and mounted.
8. Properly use the collections of the herbarium.
9. Use an herbarium and access herbarium databases.

*Students are assessed for the above objectives with quizzes, tests, lab practicals, and assignments.*

## **Add/Drop Procedures**

Students who do not show up by the second class date will be dropped by the instructor from the class.

Otherwise, the following apply:

Feb 4: Last day to add/drop classes or change grading basis.

Students will be added to the course with priority on the number of units in their major.

## **Course Assessment**

Students will be assessed with quizzes, group research paper presentations, lecture exams, lab practicals, and an original research project.

**Format of class**

8:00 am - 8:10 am	Quiz
8:10 am - 9:15 am	Lecture, discussion, group learning
ca. 9:15 am - 9:30 am	Break
9:30 am - 11:20 am	Lab time - observing, studying plant material; learning concepts/terms
11:20 am - 11:40 am	Review of new plant species

**Always bring textbook and lab manual materials to class!**

**Disabled Students**

Please see me (in private) if you have special needs, as approved by Disabled Student Services at SDSU. I will do everything I can to accommodate these needs.

**Strategies for Doing Well in this Course**

To do well in the course, you need to keep up with the material. Answer the assigned questions for each chapter. The quizzes I give in some way entice you to learn the material as we go along (and not wait until the last minute). Also, a good study technique is the three R's: Read (the textbook or research articles in this case), Recite (every now and then, recite, orally or in writing, what you just read), and Review (don't assume you know the material after reading and reciting; review the study questions). Also, be able to answer the study questions both ways; i.e., make the answer into a question and see if you could answer that.

**Course Materials And Texts****Required supplies**

Pencils: 2H (or 3H), for drawing. Eraser if needed.  
3-ring notebook (for lab manual)

**Recommended supplies**

Hand lens ("loupe"), silver metal cover, 10X: available in bookstore. Better (more expensive) hand lens are available for order. I recommend the 10X Bausch & Lomb Hastings triplet, ca. \$36; e.g. at [www.kooters.com](http://www.kooters.com).

**Required Books and Manuals:**

Textbook: Simpson, M. G. 2010. Plant Systematics, 2nd edition. Elsevier-Academic Press. (available at Aztec Shops and KB Books) **Note:** To be used in class, daily, and for assignments.

Lab Manual: Simpson, M. G. 2014. Plant Taxonomy Laboratory Manual. (available at Aztec Shops) **Note:** To be used in class, daily.

**Optional Books** (available in bookstore)

Borror, Donald J. 1960. Dictionary of word roots and combining forms. Mayfield Publishing Company, Palo Alto, California. [Recommended as an aid for learning and retaining scientific names.]

Baldwin, B. G., D. H. Goldman, D. J. Keil, R. Patterson, T. J. Rosatti (eds). 2012. *The Jepson Manual: Vascular Plants of California. Second Edition*. Berkeley: University of California Press. [Highly recommended. Note: Keys and descriptions available on-line.]

Lightner, James. 2011. San Diego County Native Plants. San Diego Flora, San Diego. [Highly recommended; best color photo book of our plants.]

Rebman, J. P. and M. G. Simpson. 2014. Checklist of the Vascular Plants of San Diego County.

Simpson, M. G. 2013. Plant Collection and Documentation Field Notebook.

**Grading Criteria And Procedures**

Percentages of lab practicals or mid-term exams based on total class time for that unit:

Quizzes:	25%
Exam #1:	20%
Exam #2:	20%
Final exam:	25%
Herbarium collection / project:	10%

Letter grades will be assigned according to standard categories: A = 90-100%; B = 80-89.9%; C = 70-79.9%; D = 60-69.9%; F = <60%. The top and bottom 2-3% of each category might earn +/- grades depending on class distributions.

**No electronic devices (e.g., cell phones, ipads, ipods, calculators) may be used/worn during an exam.**

### ***Approximate Due Dates For Major Assignment Or Exams***

Exam 1	25 Feb	Lab Practical #3	8 May
Exam 2	12 Apr	Final Exam	13 May
Herbarium collection labels due	6 May		

### ***Goals and Expectations***

Although I teach this course with the attitude of training you as plant taxonomists, you will inevitably forget many of the details of this material. But, I hope that you will retain the big ideas: 1) appreciate the beauty and intricacy of plants and enjoy discovering aspects of nature; 2) improve your skills in memory, observation, writing, and critical thinking; 3) gain a useful, base knowledge of the structure, function, and evolutionary history of plants; 4) learn how scientific research is conducted and present the findings of research through application.

### ***Technology Utilized***

Blackboard <<http://blackboard.sdsu.edu>> will be used to post grades, research articles, and assignments. Other resources are at the ***Plant Systematics Resources*** web site <<http://www.sci.sdsu.edu/plants/plantsystematics>> and the course web site <<http://www.sci.sdsu.edu/plants/tax/index.htm>>

### ***Classroom Procedure***

Please ***bring your textbook and lab manual to every class***. Arrive to class on time, 8:00 am, and plan to stay for the full period of the class, ca. 11:40 am. If you are late, come right in and sit down while I'm talking. (But note that quizzes start at 8:00 am and are taken up at about 8:10 am.) ***Turn off all cell phones (no texting!) during lecture and lab*** (you may use them outside the classroom or during the break) and ***keep laptop computers closed*** unless we are doing a specific computer exercise. Discussion about plant taxonomy is expected and encouraged, but always interact with me and other students in a respectful and civil manner. ***Keep personal conversations to a minimum***. (Go outside if you feel so compelled.) Most people, including me, require quiet and absence of distractions in order to focus on something. Feel free to go to the restroom if needed; just try to avoid doing so during the first hour and after ca. 11:00 am. Always be neat and ***clean up your area completely at the end of class***; use the hand brush as needed. **Note:** Be aware that you are responsible for all lecture notes, supplements, and additional readings for the exams. If you miss a class, you are responsible for making up that missed lab and for getting homework assignments and supplements.

There are times when we will do exercises with computers, and I will ask you to bring your laptop (if you have one) to class. Please, ***no personal use of computers during class*** (that includes emailing and checking web sites not related to class activities). You may do this during the break; otherwise, go outside the classroom.

I'm sorry, but due to liability concerns, no friends, relatives, or pets can go on class fieldtrips. No smoking on any fieldtrips (campus or otherwise); it is both discourteous/unhealthy to others and a potential fire hazard.

**Cheating will not be tolerated in this class.** Any evidence of cheating will result in a minimum of a zero for that exam/quiz and a report to the judicial board of SDSU.

### ***Homework Assignments***

Most homework assignments are to answer select Chapter Review Questions (see Schedule for which ones) for a topic. This will be graded (each counts as 1/2 quiz) and are important to study for quizzes and exams.

### ***Quizzes***

Quizzes will be given often, in class or in the field. Their purpose is test your knowledge and to help you to keep up with the material in the course. Quizzes start at 8:00 am sharp and are taken up at ca. 8:10 am, and there are no make-ups (except under extenuating circumstances). So, it's important for you to arrive to class on time. ***The lowest quiz grade is dropped***, so you do have one reprieve for being late or ill; there will generally be no makeup for quizzes. Questions answered as an assignment may count as the equivalent of one quiz. One quiz grade (the lowest) will be dropped. Assume that you will have a quiz in the field on ***every*** field trip.

## *Exams*

These will generally consist of a lab practical followed by a lecture exam. Lab practicals consist of on-site identification of plants and plant parts and identity of major group, family, and/or species. The first portion of the lab practical consists of a number of stations, with a 1.5–2 minute time period to answer the questions at that station. General questions are: what is this? to what major group/family/genus/species does this belong? Some lab practicals may include material for dissection and identification and a more lengthy elaboration of features of that material. The lecture exam covers facts and concepts of lecture material only (although in this course, lecture and lab intergrade). The exams will mostly entail rote response of information, with many questions directly or modified from the chapter review questions. But some questions will demand a degree of synthesis. The typical format for lecture exams will be short answer, short essay, and usually one longer essay question, synthesizing information from several facets. Grading for essay questions will be based in part on organization, grammar, and prose. Thus, it is strongly suggested that you spend a minute or two jotting down an outline of what you wish to say before you begin writing.

## *Herbarium Collection / Project*

A herbarium collection of 5-10 specimens will be required of all enrolled students. Generally, students will collect with the instructor on one of a few independent trips to a specific region (to be determined). Additional specimens may be collected as part of a floristic survey of a general region, e.g., a canyon in San Diego County, in which all plants in the area are collected, with documentation (to be discussed). Alternative, extra projects, for the interested/advanced student might involve a taxonomic problem, such as evaluating the validity of a subspecies versus a species or annotating our specimens of a particular group (e.g., a family or genus).

Herbarium specimens (with final label) are due on the dates indicated unless otherwise indicated. Late specimens will result in a 10% decrease per day of that herbarium grade. Mounting is mandatory!

## *Photography*

I wish to emphasize photography, both in the lab and on field trips. Some of you may wish to photograph plants in the field or in the lab. I will ask that you download images to add to our web page. In addition, a color print makes a nice addition to an herbarium sheet. It is important to practice, in order to get good depth of field and crisp focus; a flash is often useful.

I will also encourage high magnification shots (e. g., of small flowers or flower parts) using the photo-dissecting microscope in the lab.

## *Field Trips*

This is largely a field course. Thus, scheduled field trips are mandatory and extremely important. Don't miss them! Missing a field trip will (in addition to a missed quiz) result in the following percentile reductions in your final grade: half-day class/weekend field trip: 2.5%; full-day weekend field trip (desert or mountain trips): 5%. (A make-up may be possible, but don't count on it.)

Some field trips will be during the class period. In general, you will be responsible for your own transportation to local sites. There may be a couple of optional field trips, which you may attend if you wish; these will be a good opportunity to collect for your herbarium.

**Be field hardy!** Wear appropriate clothing: light-weight boots or tennis shoes (preferably with good tread); pants and shirt you don't mind getting dirty or scratched up; hat, jacket, sunblock, sunglasses, etc. as appropriate. **If rain is even a remote possibility, bring a rain jacket; we won't let a little drizzle stop us!** Be ready to go in the field as soon as we arrive at a sight. You should plan to bring water and a snack on all field trips. Bring a lunch and drinks for the all-day weekend field trips; you may bring a small ice chest, or share with someone else.

Bring the following to the field:

Plant Collection and Documentation Field Notebook or forms (in lab manual); pencil

Checklist of the Vascular Plants of San Diego Co.

Class Species List (I suggest making copies of appropriate pages to be taken into the field.)

Hand lens (on cord around neck is handy)

Portable plant press.

In the field, don't wander off alone or far away from the bulk of the class. Be cautious and use common sense. **Watch out for snakes!** Don't reach for a plant without looking over the area. Even though we will always collect in areas where collection is allowed, be discrete about it.

Despite all of the above precautions and rules, you can still have fun. We will be visiting some beautiful areas, so enjoy the wildlife and your time in the field.

**Class Schedule (subject to change)**

<b>Date</b>			<b>Exams / Lecture Topic</b>	<b>Lab or Field Topic / Assignments</b>
Th	Jan	22	<b>Ch. 1</b> Plant Systematics and Evolution: an Overview; <b>Ch1: Q1-32; Ch. 16 (Botanical Names, pp. 620-623): Q53-67</b>	Lab 1: Pl.Syst.; Spp. 1-5
T	Jan	27	<b>Ch. 4</b> Lycophytes, Ferns; <b>Ch4: Q1, 2, 27, 32, 36-38, 39, 43-49, 54-59, 69-75, 85</b>	Lab 4: Ferns; Spp. 6-10
Th	Jan	29	<b>Ch. 9</b> Plant Morphology: Roots, stems, leaf structural types <b>Ch9: Q1-19, 134</b>	Ch. 9: Root, stem, lvs; Spp. 11-15
T	Feb	3	<b>Ch. 9</b> Plant Morphology: Leaves <b>Ch9: Q20-31; 128-132</b>	Lab 9: Leaves. Spp. 16-20
Th	Feb	5	<b>Ch. 9.</b> Plant Morphology: Leaves, general terms Ch9:Q98-117; 118-127	Lab 9: Leaves. Spp. 1-25 Review
<b>Sa</b>	<b>Feb</b>	<b>7</b>	<b>FIELD TRIP: 8:00-12:00</b> , Mission Trails Reg. Park-Cowles Mtn., fr. Barker Way, switchback trail [ <b>Rain date: Su Feb. 8</b> ]	<b>FIELD QUIZ: Spp. 1-24</b>
T	Feb	10	<b>Ch. 6</b> Flowering Plants; <b>Ch. 9</b> Plant Morphology: Flowers & inflor., gen. <b>Ch6: Q1-21; Ch9: Q32-58, 96-97, 133</b>	Lab 9: Flowers. Spp. 25-31
Th	Feb	12	<b>Ch. 9</b> Plant Morphology: Flowers & inflor., gen. <b>Ch9: Q59-80, 135, 136</b>	Lab 9: Flowers. Spp. 32-37
T	Feb	17	<b>Ch. 9</b> Plant Morphology: Fruits & seeds, gen. <b>Ch9: Q81-95</b>	Lab 9: Fruits & Seeds. Spp.38-44
Th	Feb	19	<b>Ch. 9</b> Plant Description, Review	<b>Appendix 1; Description Exercise Scavenger Hunt; Spp. 45-51</b>
<b>Sa</b>	<b>Feb</b>	<b>21</b>	<b>FIELD TRIP: 8:00-12:00</b> , Mission Trails Regional Park Old Mission Dam region [ <b>Rain date: Su Feb. 22</b> ]	<b>FIELD QUIZ: Spp. 26-51 (+1-25)</b>
T	Feb	24	<b>EXAM #1: Chs. 1, 4, 6, 9, 16 (Botanical Names); spp. 1-51</b>	<b>Assign: Ch15:Q (all)</b>
Th	Feb	26	<b>California Plant Communities</b> <b>Ch. 15</b> Identification: <b>Q1-16; Chs. 7-8</b> Angiosperms. Keying.	Handout; Lab 15: Plant Identification <b>Assign: Ch18:Q(all); Spp. 52-57</b>
T	Mar	3	<b>Ch. 18</b> Herbarium Use; <b>Chs. 7-8</b> Angiosperms. Keying.	Lab 18: Herbaria. Databases, labels. <b>Assign: Ch17:Q(all); Spp. 58-64</b>
Th	Mar	5	<b>Ch. 16</b> Nomenclature: <b>Q1-29</b> <b>Chs. 7-8</b> Angiosperms. Keying.	Lab 16: Nomenclature. Lab 7-8: Angiosperm families. <u>Spp. 65-70</u>
T	Mar	10	<b>Ch. 16</b> Nomenclature: <b>Q30-52</b> <b>Chs. 7-8</b> Angiosperms. Keying.	Lab 16: Nomenclature. Lab 7-8: Angiosperm families. <u>Spp. 71-77</u>
Th	Mar	12	<b>FIELD TRIP: 8:00-11:00 am, Torrey Pines State Park</b> [Rain date: T Mar. 17]	<b>QUIZ: Spp. 52-77</b> <b>(+ extra credit: 1 sp. 1-51)</b>
T	Mar	17	<b>Chs. 7-8</b> Angiosperms. Keying. Desert Plants	Lab 7-8: Angiosperm families. <u>Spp. 78-84</u>
Th	Mar	19	<b>Ch 17</b> Plant Collecting; <b>Chs. 7-8</b> Angiosperms. Keying. Desert Plants	Lab 7-8: Angiosperm families. <u>Spp. 85-92</u>
T	Mar	24	<b>Chs. 7-8</b> Angiosperms. Keying. Desert Plants	Lab 7-8: Angiosperm families. <u>Spp. 93-100</u>
Th	Mar	26	<b>Chs. 7-8</b> Angiosperms. Keying. Desert Plants	Lab 7-8: Angiosperm families: Fabac. <u>Spp. 101-108 (109-112 optional)</u>
<b>Fr</b>	<b>Mar</b>	<b>27</b>	<b>FIELD TRIP: 7:00am-5:00pm</b> , Anza Borrego Desert State Park	<b>QUIZ: Spp. 78-108</b>
<b>Sa</b>	<b>Mar</b>	<b>28</b>	<b>FIELD TRIP: 7:00am-5:00pm</b> , Anza Borrego Desert State Park	<b>QUIZ: Spp. 78-108</b>
<b>Mar 31 - Apr 4: Spring Recess &amp; Holiday</b>				
T	Apr	7	Specimens, labels; Estuary Plants	<u>Spp. 136-140</u>
Th	Apr	9	<b>Chs. 7-8</b> Angiosperms. Keying. Estuary Plants. Review.	<u>Spp. 141-146</u>
T	Apr	14	<b>EXAM #2: Ch. 5, 7 (families), 8 (families), 15-18, Calif Plant Communities, Desert Adaptations; Spp. 52-106</b>	
Th	Apr	16	<b>Chs. 7-8</b> Angiosperms. Keying. Estuary Plants.	<u>Spp. 147-155</u>
<b>T</b>	<b>Apr</b>	<b>21</b>	<b>FIELD TRIP: Tijuana Estuary: 8:00 am - 11:00 am</b> <b>QUIZ: Spp. 132-152; [Rain date Th Apr. 23]</b>	
Th	Apr	23	<b>Ch. 5</b> Gymnosperms-Conifers & Ephedraceae; Mountain Plants; <b>Chs. 7-8</b> Angiosperms. Keying	<u>Spp. 156-166</u>
T	Apr	28	<b>Chs. 7-8</b> Angiosperms. Keying. Mountain Plants	<u>Spp. 167-178</u>
Th	Apr	29	<b>Chs. 7-8</b> Angiosperms. Keying. Mountain Plants	<u>Spp. 179-192; Herbarium Labels Final Printing, Final collection due!</u>
<b>Sa</b>	<b>May</b>	<b>2</b>	<b>FIELD TRIP: 8:00am - 5:00pm, Cuyamaca, Laguna Mtns.</b> (Rain or shine, unless a torrent, then rain date Su 3 May)	<b>QUIZ: Spp. 156-192</b>

T	May	5	<b>Review; final labels due</b>	
Th	May	7	<b>Lab Practical #3: Plant Family Identification (Tentative)</b>	
T	May	12	<b>FINAL EXAM:</b> (8-10 am): Spp. 110-192 (1-109)	<b>All Chapters of book that we covered. Families covered.</b>
Th	May	14	<b>Mounting party! (10 am-12 noon): Optional (will only take 5-10 minutes per student; two stations set up)</b>	<b>Herbarium specimen mounting</b>

### ***Other Books on Plants of California and Adjacent Regions:***

- Beauchamp, R. Mitchel. 1986. A flora of San Diego County, California. Sweetwater River Press, National City, California. [NOTE: Out of print. Nomenclature very outdated, but still useful in field.]
- Belzer, T. J. 1984. Roadside Plants of Southern California. Mountain Press Publishing Co., Missoula. [NOTE: A good, inexpensive assemblage of color photographs of common plants in our area. Recommended!]
- Brown, David E. (ed.) 198x. Desert Plants. Biotic Communities of the American Southwest - U. S. and Mexico. Boyce Thompson Southwestern Arboretum, P. O. Box AB, Superior, Arizona 85273. [Good reference for desert plants; costs only \$13.95]
- Conrad, C. Eugene. 1987. Common Shrubs of Chaparral and Associated Ecosystems of Southern California. Pacific Southwest Forest and Range Experiment Station, P. O. Box 245, Berkeley, CA 94701.
- Dale, Nancy. 1986. Flowering Plants: the Santa Monica Mountains, Coastal & Chaparral Regions of Southern California. Capra Press, Santa Barbara. In cooperation with California Native Plant Society.
- Holland, Robert F. 1986. Preliminary Descriptions of the Terrestrial Natural Communities of California. State of California, The Resources Agency, Department of Fish and Game. [Robert F. Holland, Ph.D., Vegetation Ecologist, Nongame-Heritage Program, Sacramento, CA 95814]
- Jaeger, E. C. 1941. Desert Wild Flowers. Stanford University Press, Stanford, California. [NOTE: Nomenclature is outdated, but descriptions and line drawings are very useful.]
- Munz, Philip A. and David D. Keck. 1973. A California flora and supplement. University of California Press, Berkeley. [This manual of California plants is now superceded by the new Jepson Manual, but still valuable.]
- Munz, Philip A. 1974. A flora of southern California. University of California Press, Berkeley. [Still a valuable reference, to use with Jepson. Copies may checked out from the SDSU library.]
- Ornduff, R. 1974. Introduction to California Plant Life. University of California Press, Berkeley. [Excellent reference to plant communities of California.]
- Rebman, J. P. and N. C. Roberts. 2012. Baja California Plant Field Guide. San Diego Natural History Museum w/ Sunbelt Publications, San Diego, California.
- Vasek, Frank C. 1982. A Vegetative Guide to Perennial Plants of Southern California. San Bernardino County Museum Association, Redlands, California.
- Wiggins, I. L. 1980. Flora of Baja California. Stanford University Press, Stanford, California. [NOTE: Needs work, but the only major manual available of this region.]

### ***Books on Cultivated Plants:***

- Bailey, L. H. 1951. Manual of Cultivated Plants. Macmillan Publishing Co., Inc., New York.
- Bailey, L. H. 1976. Hortus Third. Macmillan Publishing Co., Inc., New York.
- Graf, A. B. 1976. Exotica, Series 3. Pictorial cyclopedia of exotic plants from tropical and near-tropical regions. 9th ed. Roehrs Company, Inc., E. Rutherford, New Jersey, U. S. A. [NOTE: A more updated version is available in the science reference section of the library.]
- Graf, A. B. 1986. Tropica. Color Cyclopedia of Exotic Plants and Trees. 3rd Edition. Roehrs Company, Inc., E. Rutherford, New Jersey, U. S. A.
- Ritter, M. 2011. A Californian's Guide to the Trees Among Us. Heyday, Berkeley, California.

### ***Major References for Flowering Plant Family Descriptions and Relationships:***

- Harrington & Durrell. 1957. How to identify plants. Swallow Press, Inc.
- Heywood, V. H. 1985. Flowering Plants of the World. Prentice Hall, Inc., Englewood Cliffs, New Jersey.
- Lawrence, G. H. M. 1951. Taxonomy of Vascular Plants. Macmillan Co., New York.
- Mabberley, D. J. 2008. Mabberley's Plant-Book: A Portable Dictionary of the Higher Plants, Their Classification and Uses, 3rd edition. Cambridge University Press, Cambridge. [NOTE: Very useful; highly recommended!]
- Pool, R. J. 1941. Flowers and Flowering Plants, second edition. McGraw-Hill, New York.
- Porter, C. L. 1967. Taxonomy of Flowering Plants, second edition. W. H. Freeman, San Francisco.
- Radford, A. E., W. C. Dickison, J. R. Massey, C. R. Bell. 1974. Vascular Plant Systematics. Harper & Row, New York.
- Smith, James P. 1977. Vascular plant families. Mad River Press, Eureka, CA.