

NORRIS H. WILLIAMS

PERSONAL DATA:

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Date and place of birth: 31 March 1943; Birmingham, Alabama

Family	wife	Nancy Fraser Williams
	children	Matthew Ian Williams Luke Fraser Williams

EDUCATION:

University of Alabama	Sept. 1961 - Aug. 1964 B.S.
Washington University	Sept. 1964 - May 1965
University of Alabama	June 1965 - Aug. 1966 M.S.
University of Miami	Sept. 1966 - Jan. 1971 Ph.D.

PROFESSIONAL EXPERIENCE:

Woodrow Wilson Fellowship, Washington University, 1964-65
Graduate Teaching Assistant, University of Alabama 1965-66
NSF Graduate Teaching Summer Fellowship, 1966
NDEA Fellowship, University of Miami, 1966-68
Smithsonian Institution Pre-doctoral Internship, at the Smithsonian Tropical Research Institute 1968-69
Research Assistant to Dr. C.H. Dodson 1969-71
Postdoctoral Research Associate, Laboratory for Quantitative Biology, University of Miami Jan. 1971-
Aug. 1971
Visiting Postdoctoral Research Associate, Department of Botany, Smithsonian Institution 1971-72
Research Associate, Fairchild Tropical Garden, Miami, FL 1972-73
Assistant Professor, Department of Biological Science, Florida State University 1973-78
Associate Professor, Department of Biological Science, Florida State University 1978-81
Associate Curator, Affiliate Associate Professor of Botany, and Keeper of the Herbarium, Florida Museum
of Natural History, University of Florida 1981-84
Chairman, Department of Natural Sciences, Florida Museum of Natural History, 1985-1994
Curator, Affiliate Professor of Botany, and Keeper of the Herbarium, Florida Museum of Natural History,
University of Florida 1984-present

MEMBERSHIPS IN PROFESSIONAL SOCIETIES:

American Association for the Advancement of Science
American Society of Naturalists
American Society of Plant Taxonomists
Association for Tropical Biology and Conservation
Botanical Society of America
Fellow of the Linnean Society of London
International Association for Plant Taxonomy
International Society of Chemical Ecology

HONORS:

Phi Beta Kappa
Sigma Xi
Woodrow Wilson Fellow
Honorary Life Member, American Orchid Society
American Men and Women of Science
President's Medal, University of Costa Rica,
Adjunct Research Scientist, Marie Selby Botanical Gardens
University of Florida Research Foundation Professorship 2002
Lankester Prize 2003, University of Costa Rica, for pioneering work on the ecology, evolution,
phylogeny, and systematics of orchids
José Cuatrecasas Medal for Excellence in Tropical Botany from the Smithsonian Institution 2009

RESEARCH INTERESTS:

- A. Molecular systematics and phylogenetics
- B. Systematics and evolution of the Orchidaceae
- C. Chemistry of floral fragrances
- D. Pollination mechanisms in Neotropical Orchidaceae
- E. Attraction of euglossine bees to floral fragrances and
pollination of aroids, gesneriads, and orchids by euglossine bees

PUBLICATIONS:

1. Hills, H.G., N.H. Williams, & C.H. Dodson. 1968. Identification of some orchid fragrance components. *Amer. Orchid Soc. Bull.* 37:967-971.
2. Dodson, C.H., R.L. Dressler, H.G. Hills, R.M. Adams, & N.H. Williams. 1969. Biologically active compounds in orchid fragrances. *Science* 164:1243-1249.
3. Williams, N.H. 1970. Some observations on pollinaria in the Oncidiinae. *Amer. Orchid Soc. Bull.* 39:32-43, 207-220.
4. Dressler, R.L. & N.H. Williams. 1970. The genus *Systeloglossum*. *Amer. Orchid Soc. Bull.* 39:323-329.
5. Dressler, R.L. & N.H. Williams. 1970. An overlooked genus in the Oncidiinae. *Amer. Orchid Soc. Bull.* 39:988-994.
6. Williams, N.H. & C.H. Dodson. 1972. Selective attraction of male euglossine bees to orchid floral fragrances and its importance in long distance pollen flow. *Evolution* 26:84-95.
7. Williams, N.H. 1972. A reconsideration of *Ada* and the glumaceous Brassias (Orchidaceae). *Brittonia* 24:93-110.

8. Hills, H.G., N.H. Williams, & C.H. Dodson. 1972. Floral fragrances and isolating mechanisms in the genus *Catasetum* (Orchidaceae). *Biotropica* 4:61-76.
9. Ayensu, E.S. & N.H. Williams. 1972. Leaf anatomy of *Palumbina* and *Odontoglossum* subgenus *Osmoglossum*. *Amer. Orchid Soc. Bull.* 41:687-696.
10. Williams, N.H. 1972. Additional studies on pollinaria in the Oncidiinae. *Amer. Orchid Soc. Bull.* 41:222-230.
11. Williams, N.H. & R.L. Dressler. 1973. *Oncidium* species described by Jacquin and the typification of *Oncidium*. *Taxon* 22:221-227.
12. Williams, N.H. 1974. Taxonomy of the genus *Aspasia* Lindley (Orchidaceae: Oncidieae). *Brittonia* 26:333-346.
13. Williams, N.H. 1974. The value of plant anatomy in orchid taxonomy. Pp. 281-298 in M. Ospina (ed.). Proceedings of the Seventh World Orchid Conference. Medellin, Colombia.
14. Williams, N.H. 1975. Stomatal development in *Ludisia Discolor* (Orchidaceae): mesoperigenous subsidiary cells in the monocotyledons. *Taxon* 24:281-288.
15. Dressler, R.L. & N.H. Williams. 1975. Jacquin names - again. *Taxon* 24:647-650.
16. Dressler, R.L. & N.H. Williams. 1975. El complejo oncidoglossum confusum. *Orquidea* 4:332-352.
17. Dressler, R.L. & N.H. Williams. 1975. Proposal for the conservation of the generic name *Phragmipedium* Rolfe (1896) (Orchidaceae), against *Uropedium* Lindley (1846). *Taxon* 24: 691-692.
18. Dressler, R.L. & N.H. Williams. 1975. Proposal for the conservation of the generic name 1779 *Oncidium* Swartz (Orchidaceae), with a conserved type species, *Oncidium altissimum* Sw. *Taxon* 24: 692-693.
19. Williams, N.H. and C.R. Broome. 1976. Scanning electron microscope studies of orchid pollen. *Amer. Orchid Soc. Bull.* 45:699-707.
20. Williams, N.H. & R.L. Dressler. 1976. Euglossine pollination of *Spathiphyllum* (Araceae). *Selbyana* 1:349-356.
21. Williams, N.H. 1976. Subsidiary cell development in the Catasetinae (Orchidaceae) and related groups. *Botanical Journal of the Linnean Society* 72:299-309.
22. Newton, G.D. & N.H. Williams. 1978. Pollen morphology of the Cyripedioideae and the Apostasioideae (Orchidaceae). *Selbyana* 2:169-182.
23. Williams, N.H. 1978. Pollen structure and the systematics of the Neotropical Gesneriaceae. *Selbyana* 2:310-322.
24. Williams, N.H. 1978. A preliminary bibliography on euglossine bees and their relationships with orchids and Other Plants. *Selbyana* 2:345-355.
25. Atwood, J.T. & N.H. Williams. 1978. The utility of epidermal cell features in *Phragmipedium* and *Paphiopedilum* (Orchidaceae) for determining sterile specimens. *Selbyana* 2:356-366.
26. Williams, N.H. 1979. Subsidiary cells in the Orchidaceae: Their general distribution with special reference to development in the Oncidieae. *Botanical Journal of the Linnean Society* 78:41-66.
27. Atwood, J.T. & N.H. Williams. 1979. Surface features of the adaxial epidermis in the conduplicate-leaved Cyripedioideae (Orchidaceae). *Botanical Journal of the Linnean Society* 78:141-156.
28. Pridgeon, A.M. & N.H. Williams. 1979. Anatomical aspects of *Dresslerella* (Orchidaceae). *Selbyana* 5:120-134.
29. Williams, N.H. 1979. Preface - The Various Contrivances by Which Orchids Are Fertilised by Insects, by Charles Darwin. Reprint of the 1862 Edition. Pp. V-XI. Earl M. Coleman, Publisher.

30. Ackerman, J.D. & N.H. Williams. 1980. Pollen morphology of the tribe Neottieae and its impact on the classification of the Orchidaceae. *Grana* 19:7-18.
31. Dodson, C.H. & N.H. Williams. 1980. *Konantzia*, A new genus in the Orchidaceae from western Ecuador. *Phytologia* 46:387-388.
32. Williams, N.H. 1981. Floral fragrance components of *Brassavola* (Orchidaceae). *Selbyana* 5:279-285.
33. Murrell, J.T., N.H. Williams, A.M. Pridgeon, & C.H. Dodson. 1981. Floral fragrances in *Angraecum* (Orchidaceae). *Selbyana* 5:286-290.
34. Williams, N.H., J.T. Atwood, & C.H. Dodson. 1981. Floral fragrance analysis in *Anguloa*, *Lycaste*, and *Mendoncella* (Orchidaceae). *Selbyana* 5:291-295.
35. Ackerman, J.D. & N.H. Williams. 1981. Pollen morphology of the Chloraeinae (Orchidaceae: Diuridae) and related subtribes. *American Journal of Botany* 68:1392-1402.
36. Williams, N.H. & W.M. Whitten. 1982. Identification of floral fragrance components of *Stanhopea Embreei* and attraction of its pollinator to synthetic fragrance compounds. *Amer. Orchid Soc. Bull.* 51:1262-1266.
37. Williams, N.H. 1982. The Biology of Orchids and Euglossine Bees. Pp. 119-171 in J. Arditti (ed.). *Orchid Biology: Reviews and Perspectives, II*. Cornell University Press. Ithaca, New York.
38. Dressler, R.L. & N.H. Williams. 1982. Proposal for the conservation of the generic name 1779 *Oncidium* Swartz (Orchidaceae) with a conserved type species, *Oncidium altissimum* Sw. *Taxon* 31:752-754.
39. Williams, N.H. 1983. Floral fragrances as cues in animal behavior. Pp. 50-72 in C.E. Jones and R.J. Little (eds.). *Handbook of Experimental Pollination Biology*. Van Nostrand Reinhold Company. New York.
40. Williams, N.H. & W.M. Whitten. 1983. Orchid Floral Fragrances and Male Euglossine Bees: Methods and Advances in the Last Sesquidecade. *Biological Bulletin* 164:355-395.
41. Williams, N.H., W.M. Whitten, & C.H. Dodson. 1984. Preliminary analyses of the floral fragrances of species of *Acineta*, *Houlletia*, *Lueddemannia*, *Lycomormium*, *Paphinia*, and *Sievekingia* (Orchidaceae). *Selbyana* 7:315-317.
42. Lindquist, N., M.A. Battiste, W.M. Whitten, N.H. Williams, & L. Strekowski. 1985. Trans-carvone Oxide, a monoterpene epoxide from the fragrance of *Catasetum*. *Phytochemistry* 24:863-865.
43. Williams, N.H., W.M. Whitten, & L.F. Pedrosa. 1985. Crystalline production of fragrance in *Gongora quinquenervis*. *Amer. Orchid Soc. Bull.* 54:598-603.
44. Gupta, M.P., T.D. Arias, N.H. Williams, R. Bos, & D.H.E. Tattje. 1985. Safrole, the main component of the essential oil from *Piper auritum* of Panama. *Journal of Natural Products* 48:330.
45. Williams, N.H. & W.M. Whitten. 1985. Advances and trends in orchid floral fragrance analysis. Pp.392-395 in K.W. Tan and J. McQuery (eds.). *Proceedings of the Eleventh World Orchid Conference*. Miami, Fl.
46. Whitten, W.M., N.H. Williams, W.S. Armbruster, M.A. Battiste, L. Strekowski, & N. Lindquist. 1986. Carvone oxide: an example of convergent evolution in euglossine pollinated plants. *Systematic Botany* 11:222-228.
47. Rodríguez Caballero, R.L., D.E. Mora-Retana, M.E. Barahona, & N.H. Williams. 1986. Géneros de Orquídeas de Costa Rica. Editorial Universidad de Costa Rica. 334 pp. In addition to my work on the Spanish botanical portion of the text, I translated the work into English. I received the President's Medal of the University of Costa Rica for this work.

48. Dressler, R.L., D.W. Hall, K.D. Perkins, & N.H. Williams. 1987. Identification manual for wetland plant species of Florida. *IFAS Special Publication-35*. University of Florida. 297 pp. Second printing 1991.
49. Williams, N.H. & W.M. Whitten. 1988. *Stanhopea panamensis*, a new species from Central Panama (Orchidaceae). *Lindleyana* 3:9-11.
50. Fritze, K.J. & N.H. Williams. 1988. The taxonomic significance of pollen morphology in the *Columnea* Alliance (Gesneriaceae: Gesnerioideae). *Annals of the Missouri Botanical Garden*. 75: 168-191.
51. Whitten, W.M., H.G. Hills, and N.H. Williams. 1988. Occurrence of ipsdienol in floral fragrances. *Phytochemistry* 27:2759-2760.
52. Whitten, W.M., A.M. Young, & N.H. Williams. 1989. Function of glandular secretions in fragrance collection by male euglossine bees (Apidae:Euglossini). *Journal of Chemical Ecology* 15:1285-1295.
53. Dodson, C.H., N.H. Williams, & W.M. Whitten. 1989. A new species of *Gongora* (Orchidaceae) from Ecuador. *Lindleyana* 4:30-32.
54. Hills, H.G. & N.H. Williams. 1990. Fragrance cycle of *Clowesia rosea* (Orchidaceae). *Orquidea* 12:19-22.
55. Whitten, W.M. & N.H. Williams. 1991. A new species and nomenclatural changes in *Gongora* sect. *Acropera* (Orchidaceae: Stanhopeinae). *Lindleyana* 6:109-112.
56. Whitten, W.M. & N.H. Williams. 1991. *Gongora escobariana* Whitten, a new species from Colombia, and the rediscovery of *G. sanderiana* in Peru. *Orquideología* 18:105-127.
57. Whitten, W.M. & N.H. Williams. 1992. Floral fragrances of *Stanhopea* (Orchidaceae). *Lindleyana* 7:130-153.
58. Hills, H.G., N.H. Williams, & W.M. Whitten. 1999. Fragrances of *Catasetum*. Pp. 263-272 in *THE WORLD OF CATASETUMS*. Arthur Holst (ed.). Timber Press. Portland, Oregon.
59. Whitten, W. M., N. H. Williams, & K. V. Glover. 1999. Sulphuryl fluoride fumigation: effect on DNA extraction and amplification from herbarium specimens. *Taxon* 48:507-510.
60. Anderson, J.E., J.F. Preston, D.W. Dickson, T.E. Hewlett, N.H. Williams, & J.E. Maruniak. 1999. Phylogenetic analysis of *Pasteuria penetrans*, a parasitic bacterium of root-knot nematodes, by 16s rRNA gene cloning and sequencing. *Journal of Nematology* 31:319-325.
61. Williams, N.H. & W.M. Whitten. 1999. Molecular phylogeny and floral fragrances of male euglossine bee pollinated orchids: a study of *Stanhopea*. *Plant Species Biology* 14: 129-137.
62. Castro, H.F., N.H. Williams, & A. Ogram. 2000. Phylogeny of sulfate-reducing bacteria. *FEMS Microbiology Ecology* 31:1-9.
63. Whitten, W. M., N. H. Williams, & M. W. Chase. 2000. Subtribal and generic relationships of Maxillarieae (Orchidaceae) with emphasis on Stanhopeinae: Combined molecular evidence. *American Journal of Botany* 87:1842-1856.
64. Wood, T. H., W. M. Whitten, & N. H. Williams. 2000. Phylogeny of *Hedychium* and related genera (Zingiberaceae) based upon ITS sequence data. *Journal of the Edinburgh Botanical Garden* 57:261-270.
65. Dressler, R. L. & N. H. Williams. 2000. *Chelyorchis*, a new genus. P. 1130 in Romero-González, G.A. and G. Carnevali Fernández-Concha. *Orchids of Venezuela: An illustrated field guide*. Second edition. Armitano Editores. Caracas, Venezuela.
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67. Sosa, V., M. W. Chase, G. Salazar, W. M. Whitten, & N. H. Williams. 2001. Phylogenetic position of *Dignathe* (Orchidaceae: Oncidiinae): evidence from nuclear ITS ribosomal DNA sequences. *Lindleyana* 16: 94-101.

68. Williams, N. H., M. W. Chase, T. Fulcher, & W. M. Whitten. 2001. Molecular systematics of the Oncidiinae based on evidence from four DNA sequence regions: expanded circumscriptions of *Cyrtochilum*, *Erycina*, *Otoglossum*, and *Trichocentrum* and a new genus (Orchidaceae). *Lindleyana* 16: 113-139.
69. Zomlefer, W.B., N.H. Williams, W.M. Whitten, & W.S. Judd. 2001. Generic circumscription and relationships in the tribe Melantheae (Liliales, Melanthiaceae), with emphasis on *Zigadenus*: evidence from ITS and *trnL-F* sequence data. *American Journal of Botany* 88: 1657-1669.
70. Chase, M.W. & N.H. Williams. 2001. Additional transfers to *Trichocentrum* Poepp. and Endl. and *Otoglossum* Garay and Dunst. (Orchidaceae: Oncidiinae). *Lindleyana* 16: 218-219.
71. Williams, N.H. & W. M. Whitten. 2001. Checking an orchid hybrid's background: The use of molecular data in determining parentage of hybrids. *Orchids* 70: 1056-1061.
72. Williams, N.H., M. W. Chase, & W. M. Whitten. 2001. Phylogenetic position of *Miltoniopsis*, *Caucaea*, a new genus, *Cyrtochiloides*, and relationship of *Oncidium phymatochilum* based on nuclear and chloroplast DNA sequence data (Orchidaceae: Oncidiinae). *Lindleyana* 16: 272-285.
73. Koehler, S., N.H. Williams, W.M. Whitten, & M.E. do Amaral. 2002. Phylogeny of the *Bifrenaria* (Orchidaceae) complex based on morphology and sequence data from nuclear rDNA internal transcribed spacers (ITS) and chloroplast *trnL-F* region. *International Journal of Plant Sciences* 163:1055-1066.
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75. Zomlefer, W. B., W. M. Whitten, N. H. Williams, & W. S. Judd. 2003. An overview of *Veratrum* (Liliales: Melanthiaceae) and an infrageneric phylogeny based on ITS sequence data. *Systematic Botany* 28(2): 250-269.
76. Carnevali, G., J.L. Tapia, N.H. Williams, & W.M. Whitten. 2003. Sistemática, filogenia y biogeografía de *Myrmecophila* (Orchidaceae). *Lankesteriana* 7: 29-32. Abstract.
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78. Williams, N.H. & W. M. Whitten. 2003. Molecular phylogenetics and generic concepts in the Maxillarieae (Orchidaceae). *Lankesteriana* 7: 61-62. Abstract.
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86. Zomlefer, W.B., W.M. Whitten, N.H. Williams, & W.S. Judd. 2006. Infrageneric phylogeny of *Schoenocaulon* (Liliales: Melanthiaceae) with clarification of cryptic species based on ITS sequence data and geographical distribution. *American Journal of Botany* 93: 1178-1192.
87. Whitten, W.M., M. A. Blanco, & N. H. Williams. 2006. Recircumscription of *Pityphyllum* (Orchidaceae: Maxillariinae). *ORCHIDS (Lindleyana)* 75:452-456.
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93. Williams, N.H., J. D. Ackerman, E. M. Fernández, & J. Llamacho. 2007. *Antillanorchis*: Its rediscovery and systematic position. *ORCHIDS* 76: 856-858.
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97. Chase M. W., Williams, N. H., Neubig, K. M., & Whitten, W. M. 2008. Taxonomic transfers in onciidiinae to accord with Genera Orchidacearum, Vol. 5. *Lindleyana* 21: 20-31.
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101. Neubig, K., N.H. Williams, W.M. Whitten, & F. Pupulin. 2009. Molecular phylogenetics and the evolution of fruit and leaf morphology of *Dichaea* (Orchidaceae: Zygopetalinae). *Annals of Botany* 104: 457–467.
102. Endara L., Williams N., & León-Yáñez S. 2009. Patrones de endemismo de orquídeas endémicas ecuatorianas: perspectivas y prioridades para la conservación. Pp 63-70, *In: Pridgeon, A. M., Suarez, J.P. (eds) Proceedings of the Second Scientific Conference on Andean Orchids*. Universidad Técnica Particular de Loja. Loja, Ecuador.
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- 107.

GENBANK SUBMISSIONS:

We have submitted over 9,000 gene sequences to GenBank to date from our research.

WEB SITE DEVELOPMENT:

In order to post a classification of the genus *Maxillaria* in preparation for an NSF proposal, I had to develop a web site (<http://www.flmnh.ufl.edu/natsci/herbarium/max/>), which I did between 12 December and 31 December 2001. This site is under the herbarium web site on the museum server and actually has grown to much more than just a Maxillariinae site.

For our unsuccessful grant proposal “COLLABORATIVE RESEARCH: Orchid tree: a phylogeny of epiphytes on the tree of life” I developed a web site <http://www.flmnh.ufl.edu/orchidatol/> which is available now.

For an unsuccessful grant proposal on the Pleurothallidinae, I developed (<http://www.flmnh.ufl.edu/herbarium/pleuro/>). “PHYLOGENETICS OF PLEUROTHALLIDINAE: resolving generic limits in a large group of small orchids.”

In order to post our classification and phylogeny of the Oncidiinae (Orchidaceae), I developed the web site (<http://www.flmnh.ufl.edu/herbarium/oncids/home/>) in spring 2011.

RECENT PRESENTATIONS:

1. PHYLOGENETIC RELATIONSHIPS WITHIN *PASSIFLORA* L. SECTION *CIECA* MAST. (PASSIFLORACEAE) BASED ON MORPHOLOGICAL AND MOLECULAR EVIDENCE. PORTER-UTLEY, K., W. JUDD, J. MACDOUGAL, M. WHITTEN, N. WILLIAMS. Paper presented by Utley. Botany 2001. Albuquerque, New Mexico.. International, Botanical Society of America.
2. A CLADISTIC ANALYSIS OF *CHARIANTHUS* (MICONIEAE: MELASTOMATACEAE) USING MORPHOLOGICAL AND MOLECULAR CHARACTERS. PENNEYS, D. S., W. S. JUDD, N. H. WILLIAMS, W. M. WHITTEN. Paper presented by Penneys. International, Botanical Society of America.
3. GENERIC RELATIONSHIPS IN ZYGOPETALINAE AND MAXILLARIINAE (ORCHIDACEAE). WHITTEN, W. M., N. H. WILLIAMS, R. L. DRESSLER, AND J. T. ATWOOD. Botany 2002. . Presented by Whitten. International, Botanical Society of America. Madison, Wisconsin 2002.
4. VARIATION IN FLORAL OIL COMPOSITION AMONG NEOTROPICAL ORCHIDS (ONCIDIINAE). SILVERA, K., W. M. WHITTEN, N. H. WILLIAMS. Presented by Silvera. International, Botanical Society of America. Madison, Wisconsin 2002.
5. MOLECULAR SYSTEMATICS, POLLINATION BIOLOGY, AND GENERIC CONCEPTS IN THE MAXILLARIEAE (ORCHIDACEAE). NORRIS H. WILLIAMS* AND W. MARK WHITTEN. Special invited talk at the Monocots3/Grasses4 conference Ontario, CA --- 31 March through 4 April 2003.
6. PHYLOGENY AND SYSTEMATICS OF THE MAXILLARIA MADIDA COMPLEX (MAXILLARIINAE, ORCHIDACEAE). S. KOEHLER*, R. B. SINGER, N. H. WILLIAMS, W. M. WHITTEN, A. P. SOUZA, & M. C. E. AMARAL., Ontario, CA --- 31 March through 4 April 2003.
7. MOLECULAR PHYLOGENETICS AND GENERIC CONCEPTS IN THE MAXILLARIEAE (ORCHIDACEAE). NORRIS H. WILLIAMS* AND W. MARK WHITTEN. 1st International Conference of Neotropical Orchidology. Jardin Botanico Lankester & Universidad de Costa Rica --- 21-25 May 2003. Special invited talk and moderator of session on Advances in Phylogenetics of Orchids.
8. MOLECULAR PHYLOGENETICS AND GENERIC CONCEPTS IN THE MAXILLARIEAE (ORCHIDACEAE). NORRIS H. WILLIAMS* AND W. MARK WHITTEN. Botany 2003, Mobile, Alabama. July 2003.
9. EVOLUTION OF PHOTOSYNTHETIC PATHWAYS IN THE ORCHIDACEAE: EVIDENCE FROM STABLE ISOTOPES AND PHYLOGENETIC ANALYSIS. K. SILVERA, L. S. SANTIAGO, E. A. G. SCHUUR, N. H. WILLIAMS, W. M. WHITTEN, K. WINTER. Ecological Society of America meeting 2003.
10. MOLECULAR PHYLOGENETICS AND GENERIC CONCEPTS IN THE MAXILLARIEAE. NORRIS H. WILLIAMS. Invited talk at the Latin American Orchid Show and Conference in Quito, Ecuador 5-8 February 2004.

11. PHYLOGENETIC STUDIES IN BRAZILIAN MAXILLARIINAE ORCHIDS. RODRIGO B. SINGER, S. KOEHLER, N. H. WILLIAMS, W. M. WHITTEN, MARIA DO CARMO E. DO AMARAL. International, Botanical Society of America. Snowbird, Utah, August 2004. Poster presented by Koehler.
12. *HUILAEA* AND THE BLAKEEAE (MELASTOMATACEAE): PHYLOGENETIC RELATIONSHIPS RECONSIDERED. PENNEYS, D. S., WHITTEN, W. M., WILLIAMS, N. H., JUDD, WALTER S. Poster presented by Penneys. International, Botanical Society of America. Snowbird, Utah, August 2004.
13. INFRAGENERIC PHYLOGENY OF *SCHOENOCAULON* (LILIALES: MELANTHIACEAE) BASED ON ITS SEQUENCE DATA. ZOMLEFER, W. B. , WHITTEN, W. M. , JUDD, W. S. , WILLIAMS, N. H. Poster presented by Zomlefer. International, Botanical Society of America. Snowbird, Utah, August 2004.
14. MOLECULAR SYSTEMATICS AND GENERIC CONCEPTS IN MAXILLARIINAE (ORCHIDACEAE), AND A POLYCLAVE KEY TO *MAXILLARIA* OF COSTA RICA. WHITTEN, W. M., WILLIAMS, N. H., ATWOOD, JOHN T. Poster presented by Whitten. International, Botanical Society of America. Snowbird, Utah, August 2004.
15. PHYLOGENY AND SYSTEMATICS OF THE BRAZILIAN '*MAXILLARIA MADIDA*' ALLIANCE (MAXILLARIINAE: ORCHIDACEAE): A GROUP GOT THE SHRINKS. KOEHLER, SAMANTHA, SINGER, R., WILLIAMS, N. H., WHITTEN, W. M., DO AMARAL, MARIA DO CARMO. Paper presented by Koehler. International, Botanical Society of America. Snowbird, Utah, August 2004.
16. RELATIONSHIPS WITHIN A TEMPERATE GENUS OF MELASTOMATACEAE: *RHEXIA*, THE MEADOW BEAUTIES. IONTA, G. M., WILLIAMS, N. H., WHITTEN, W. M., JUDD, WALTER S. Paper presented by Ionta. International, Botanical Society of America. Snowbird, Utah, August 2004.
17. GENERIC RE-ALIGNMENTS IN THE SUBTRIBE ONCIDIINAE (ORCHIDACEAE). NORRIS H. WILLIAMS. Invited talk at The First Scientific Conference on Andean Orchids, held 11-13 November 2005 in Gualaceo, Ecuador.
18. INFRAGENERIC PHYLOGENY OF *SCHOENOCAULON* (LILIALES: MELANTHIACEAE) WITH CLARIFICATION OF CRYPTIC SPECIES BASED ON ITS SEQUENCE DATA AND GEOGRAPHICAL DISTRIBUTION. ZOMLEFER, W. B, W. M. WHITTEN, W. S. JUDD, & N. H. WILLIAMS. 2005. Abstract 121. . Pg. 166 *in*: Contributed Papers, Systematics Session ASPT; Scientific Meeting, Botany 2005 Annual Meeting Program, Austin, TX. Available at:
<http://www.2005.botanyconference.org/engine/search/index.php?func=detail&aid=121>
19. MOLECULAR SYSTEMATICS OF *TELIPOGON* (ORCHIDACEAE: ONCIDIINAE). N. H. WILLIAMS, Poster Scientific Meeting, Botany 2005 Annual Meeting Program, Austin, TX.

20. EVOLUTION OF CRASSULACEAN ACID METABOLISM IN NEOTROPICAL ORCHIDS: LINKING ISOTOPES, GENETIC EXPRESSION AND HABITAT PREFERENCE. SILVERA, KATIA, WILLIAMS, N. H., WHITTEN, W. M., WINTER, K., CUSHMAN, J. C. Poster presented by Silvera. International, Botanical Society of America. BOTANY 2006, Chico California, July 29 through August 3, 2006.
21. GENERIC RELATIONSHIPS OF ZYGOPETALINAE (ORCHIDACEAE: CYMBIDIEAE). WHITTEN, W. M., WILLIAMS, N. H., DRESSLER, ROBERT L., GERLACH, GUENTER, PUPULIN, FRANCO. Poster presented by Whitten. International, Botanical Society of America. BOTANY 2006, Chico California, July 29 through August 3, 2006.
22. MOLECULAR SYSTEMATICS OF THE GENUS *DICHAEA* (ZYGOPETALINAE: ORCHIDACEAE). NEUBIG, K. M., WILLIAMS, N. H., WHITTEN, W. M. PUPULIN, F. Poster presented by Neubig. International, Botanical Society of America. BOTANY 2006, Chico California, July 29 through August 3, 2006.
23. GENERIC RE-ALIGNMENT IN THE SUBTRIBE ONCIDIINAE (ORCHIDACEAE). Norris H. Williams. International, invited talk at 19th World Orchid Conference, Miami January 23-27 2008. Also moderator for one session.
24. PLEUROTHALLIDINAE: HOW MANY GENERA? WESLEY HIGGINS AND NORRIS H. WILLIAMS. Invited talk at 19th World Orchid Conference, Miami January 23-27 2008. Presented by Wes Higgins.
25. SYSTEMATICS OF *SOBRALIA* AND RELATIVES: LARGE FLOWERS ARE LARGELY MISLEADING? NEUBIG, K. M., W. M. WHITTEN, M. A. BLANCO, L. ENDARA, N. H. WILLIAMS, S. KOEHLER, C. VAN DEN BERG. Invited talk at 19th World Orchid Conference, Miami January 23-27 2008. Presented by Neubig.
26. SYSTEMATICS OF MAXILLARIINAE. International, Invited talk at 19th World Orchid Conference, Miami January 23-27 2008. MARK WHITTEN, NORRIS WILLIAMS, MARIO BLANCO, SAMANTHA KOEHLER, RODRIGO SINGER, GERMÁN CARNEVALI, JOHN ATWOOD, KURT NEUBIG, LORENA ENDARA. Talk given by Whitten.
27. THE POSITION OF SOME MINOR GENERA IN THE SUBTRIBE ONCIDIINAE (ORCHIDACEAE). Norris H. Williams. International, invited talk at The Second Scientific Conference on Andean Orchids, 14-17 November 2007 in Loja, Ecuador.
28. PHYLOGENY AND GENERIC RECIRCUMSCRIPTIONS OF MAXILLARIA AND RELATED GENERA (ORCHIDACEAE: MAXILLARIINAE). International, invited talk at The Second Scientific Conference on Andean Orchids, 14-17 November 2007 in Loja, Ecuador. MARK WHITTEN, NORRIS WILLIAMS, MARIO BLANCO, SAMANTHA KOEHLER, RODRIGO SINGER, GERMÁN CARNEVALI, JOHN ATWOOD, KURT NEUBIG, LORENA ENDARA. Talk given by Whitten.

29. NEOTROPICAL ORCHID PHYLOGENETICS: RECENT ADVANCES. International, invited talk 31 October - 2 November 2007 The Royal Botanic Gardens, Kew "Orchid evolutionary biology and conservation - from Linnaeus to the 21st century". MARK WHITTEN, NORRIS WILLIAMS, KURT NEUBIG, MARIO BLANCO, BARBARA CARLSWARD, SAMANTHA KOEHLER, LORENA ENDARA, ROBERT DRESSLER. Talk given by Whitten.
30. EVOLUTIONARY MECHANISMS OF CRASSULACEAN ACID METABOLISM EXPRESSION IN NEOTROPICAL ORCHIDS. K. Silvera, W. M. Whitten, N. H. Williams, K. Winter, and J. C. Cushman. American Society of Plant Biologists. Western Section Annual Winter Meeting 2-3 February 2007. University of California, Davis. Paper presented by Katia Silvera.
31. EVOLUTION OF CRASSULACEAN ACID METABOLISM IN NEOTROPICAL ORCHIDS. SILVERA, KATIA, WHITTEN, W. M., WILLIAMS, N. H. NEUBIG, K. M., WINTER, K., CUSHMAN, J. C. BSA 2007, Chicago Illinois, July 7 – 12. Paper presented by Katia Silvera.
32. GENERIC RE-ALIGNMENTS IN THE SUBTRIBE ONCIDIINAE (ORCHIDACEAE). NORRIS H. WILLIAMS, W. MARK WHITTEN, AND KURT M. NEUBIG. 19th World Orchid Conference, Miami 2008. Presented by Williams.
33. SYSTEMATICS OF ONCIDIINAE(ORCHIDACEAE) AND THE EVOLUTION OF CAM. K.M. NEUBIG, W.M. WHITTEN, N.H. WILLIAMS, K. SILVERA, J.C. CUSHMAN & S. DALSTROM. BSA, Vancouver 2008. Presented by Neubig.
34. PHYLOGENETIC UTILITY OF YCF1 IN ORCHIDS: AN UNDERAPPRECIATED PLASTID DNA REGION. NEUBIG, KURT, WHITTEN, W. M., CARLSWARD, B. S., BLANCO, M. A., ENDARA, L., WILLIAMS, N. H., MOORE, M. International, Botanical Society of America. Vancouver, B.C. 2008. Poster presented by Neubig.
35. POLLINATION AND PHYLOGENY OF SUBTRIBE ONCIDIINAE (ORCHIDACEAE). NORRIS H. WILLIAMS, W. MARK WHITTEN, KURT M. NEUBIG. Third Scientific Conference on Andean Orchids, Quito, Ecuador 2009. Presented by Williams.
36. A PLASTOME-BASED PHYLOGENY FOR THE ORCHIDACEAE. GIVNISH, T. J., AMES, M., WILLIAMS, N. H., CLEMENTS, M., CAMERON, K. M., NEUBIG, K. M., WHITTEN, W. M., MOORE, M., PIRES, J. C., KINNEY, M.L S., LEEBENS-MACK, J. H., MCNEAL, J. R., ANÉ, C., DAVIS, J. I., DEPAMPHILIS, C. W., GANDOLFO, M., GRAHAM, S. W., STEVENSON, D. W., ZOMLEFER, W. B. International, Botanical Society of America. Snowbird, Utah. 2009. Presented by Givnish.
37. A PLASTOME- AND NUCLEAR GENE-BASED PHYLOGENY FOR THE ORCHID SUBFAMILY EPIDENDROIDEAE . Ames, M., Givnish, T.J., Clements, M., Williams, N. H., Pires, J. C., Kinney, M. S., Leebens-Mack, J. H., Ané, C., Davis, J. I., dePamphilis, C. W., Gandolfo, M., Graham, S. W., Stevenson, D. W., Zomlefer, W. B. International, Botanical Society of America. Snowbird, Utah. 2009. Presented by Ames.

38. PHYLOGENETIC UTILITY OF YCF1 IN ORCHIDS PART 2: BIGGER IS BETTER. NEUBIG, K. M., WHITTEN, W. M., WILLIAMS, N. H., MOORE, MICHAEL. International, Botanical Society of America. Snowbird, Utah. 2009. Poster, presented by Neubig.

39. EVOLUTION OF CRASSULACEAN ACID METABOLISM IN TROPICAL ORCHIDS: INTEGRATING ECOPHYSIOLOGICAL, PHYLOGENETIC, AND MOLECULAR GENETIC APPROACHES. KATIA SILVERA, M. WHITTEN, N.H. WILLIAMS, K. M. NEUBIG, K. WINTER, & J. C. CUSHMAN. International, Ecological Society of America, Albuquerque, N.M. August, 2009. Presented by Silvera.

40. A PLASTOME PHYLOGENY FOR ORCHIDACEAE AND ITS SYSTEMATIC IMPLICATIONS. PRESENTATION DETAIL. AMES, MERCEDES, WILLIAMS, NORRIS, MOORE, MICHAEL, LEEBENS-MACK, JIM, WHITTEN, MARK, NEUBIG, KURT, CLEMENTS, MARK, PIRES, J. CHRIS, STEELE, ROXANNE, GIVNISH, THOMAS. Evolution 2010 June 25-29, 2010. Oregon Convention Center. Portland, Oregon, USA.

41. PHYLOGENY AND EVOLUTION OF ORCHIDACEAE: A PHYLOGENOMIC PERSPECTIVE. AMES, M, WILLIAMS, N, LEEBENS-MACK, J, WHITTEN, M, NEUBIG, K, CLEMENTS, M, GIVNISH, T. International Botanical Congress. Melbourne, Australia. 23- 30 July 2011. Presented by Ames.

RESEARCH SUPPORT:

American Orchid Society (AOS) Fund for Education and Research. 1967. "**Field Work in Central America.**" \$600.

AOS Fund for Education and Research. 1970. "**Scanning Electron Microscope Studies of Orchid Pollen.**" \$969.

National Science Foundation. 1972-75. "**Vegetative Anatomy of the Oncidiinae (Orchidaceae).**" \$30,000.

1. FSU Committee on Faculty Research Support. 1974-75. "**The Interaction of Floral Fragrance Components and Euglossine Bees.**" \$3,140.
2. AOS Fund for Education and Research. 1976-78. "**Structure and Evolution of Orchid Pollen.**" \$2,000.
3. AOS Fund for Education and Research. 1976-77. "**Training Orchidologists for the Future.**" \$3,100.
4. AOS Fund for Education and Research. 1977-79. "**A Survey of Plicate Leaf Anatomy, Leaf Morphology, and Pollen Morphology of Selected Temperate Orchids of Northeastern United States.**" \$984.
5. AOS Fund for Education and Research. 1977-78. "**Training Orchidologists for the Future: Part II. Generic Considerations in the Zygopetalinae.**" \$3,730.
6. Southern Regional Education Board. 1977-78. "**Travel Expenses for Unusual Facilities.**" \$240.

7. FSU Foundation Grant. 1977-78. **"Chemical Ecology and Sociobiology of Euglossine Bees."** \$995.
8. National Science Foundation. 1979-82. **"Chemical Ecology of Euglossine Bees: The Role and Composition of the Mandibular Glands in Males."** \$65,856.
9. National Science Foundation. 1979-82. **"Pollen Morphology and the Systematics of the Neotropical Gesneriaceae."** \$56,221.
10. AOS Fund for Education and Research. 1983-86. **"Floral Fragrance Analyses of Species and Hybrids of the Stanhopea and Catasetum Alliances."** \$5,700.
11. Hewlett-Packard Corporation. 1986. **"Instrumentation for chemical ecology: computer system upgrade for GC/MS."** \$40,000 grant to my laboratory for a new computer system for our GC/MS.
12. National Science Foundation. 1986-89. **"Systematics of osmophore ontogeny and structure in euglossine-pollinated orchids."** \$120,000. I was Co-Principal investigator on this project with Dr. W.L. Stern.
13. National Science Foundation. 1987-89. **"Chemosystematics and pollination of *Gongora* (Orchidaceae)."** \$57,571 for first year, \$56,797 for second year, total award \$114,368. Extended through May 1990.
14. Ciba-Geigy Corporation. 1987. Donation of a 20'x 50' Lord & Burnham greenhouse for use in the orchid research program at the University of Florida. Value \$16,000.
15. American Orchid Society. 1997-98. **"Molecular approaches to the phylogeny of the Oncidiinae (Orchidaceae)"**. \$6,150. This seed money grant got my research on molecular systematics started.
16. National Science Foundation 1998-2000. **"Collection improvements for the University of Florida herbarium"**. \$115,032. This covered 104 new herbarium cases and help to process the backlog of material. We finished on schedule and actually did more than we had proposed.
17. National Science Foundation. 1999-2003. **DEB 0203316. "Molecular and morphological systematics of the subtribe Oncidiinae (Orchidaceae)."** \$25,000.
18. American Orchid Society. 2002-2004. \$10,802. **"What is *Oncidium*? Phylogenetics as a prelude to a revised classification of *Oncidium* and related genera."** This proposal is to sample ± 100 taxa currently classified in *Oncidium*, *Odontoglossum* and several generic segregates for the plastid regions *matK*, *trnL-F*, and the *atp β -rbcL* intergenic spacer region, to complement the nuclear ITS region already completed. This work is necessary to determine if we should maintain *Oncidium* and *Odontoglossum*, as well as recognize additional genera in the group, or should we merge all of these species into a large re-defined *Oncidium*. Before we make such drastic taxonomic changes, we need to have an abundance of data.
19. National Science Foundation. 2003-2007. **DEB 0234064. "Systematics of Maxillariinae (Orchidaceae): generic delimitation, pollinator rewards, and pollination."** \$300,000. Norris H. Williams & W. Mark Whitten. This project was to define genera and generic relationships in the subtribe Maxillariinae (± 600 species in the genus *Maxillaria* alone), one of the largest neotropical groups with large, amorphous, poorly defined genera. This covers

- field work, graduate student support, and sequencing costs for this project only. See the web site <http://www.flmnh.ufl.edu/natsci/herbarium/max/>.
20. National Science Foundation. 2006-2009. **DBI 0545232. "Enhancements Of The Genetic Resources Of The Neontological Collections At The Florida Museum Of Natural History"** \$263,244. One of three CO-PIs, three years. Pam Soltis, David Reed, Norris Williams.
 21. American Orchid Society. **"Molecular Systematics of the Neotropical Sobralieae: Parting the Reeds of Sobralia and Relatives"** \$7,096. December 2006-December 2009.
 22. American Orchid Society. **"Comparative chloroplast genomics of Orchidaceae"**. \$14,580. May 2007-December 2009.
 23. Florida Fish and Wildlife Conservation Commission **"Barcoding the flora of Florida: DNA identification of the invasive plants of Florida."** \$8,403. August 2008 - July 2009.
 24. National Science Foundation. **DEB 0956371. "Collaborative Research: BiSciCol Tracker: Towards a tagging and tracking infrastructure for biodiversity science collections"**. \$496,487. Reed Beaman, Nico Cellinese, Gustav Paulay, Steven Manchester, Norris Williams. 04/04/10, 48 months, awarded.
 25. Mellon Foundation. **"Digitizing Latin American & Other type specimens"**. \$32,000. 12/16/2010. Two years. Norris H. Williams & Kent D. Perkins.
 26. National Science Foundation. 2006-2009. **IOS 0543659. "Mechanisms of the Evolutionary Origins of Crassulacean Acid Metabolism (CAM) in Tropical Orchids"**. \$ 823,000. John Cushman, Karen Schlauch, Norris Williams, William Whitten.
 27. National Science Foundation. **DEB 1011357. "DISSERTATION RESEARCH: Speciation patterns in Scaphosepalum (Orchidaceae)"**. \$9,450. Three years. Lorena Endara & Norris H. Williams.
 28. National Science Foundation. **EF 1206394. "Digitization PEN: Digitization of North American Bryophyte and Lichen Specimens from Florida Herbaria at the University of Florida Herbarium (FLAS)"**. \$92,757. Three years, pending. Norris H. Williams, PI.

GRANTS AWARDED TO STUDENTS:

- Sigma Xi grants to K.J. Fritze (2), A.M. Pridgeon (1), W.M. Whitten (1).
- Smithsonian Institution Predoctoral Fellowship at the Smithsonian Tropical Research Institute to J.D. Ackerman.
- National Science Foundation Doctoral Dissertation Improvement Grant 1981-83 to W.M. Whitten.
"Floral Fragrances and Pollinators of the *Gongora Quinquenervis* Complex in Panama." \$7,500.
- Botanical Society of American award to Mario Blanco, 2004.
- American Society of Plant Taxonomists award to Mario Blanco, 2004.
- American Orchid Society, Furness Fellowship to Mario Blanco 2003-2005.
- KLARF Fellowship for one semester at the Royal Botanic gardens, Kew to Mario Blanco, 2006.

FIELD EXPERIENCE:

1965 Panama - Mar-Apr.
1967 Ecuador - June-Aug; Panama, Costa Rica, Nicaragua, Mexico - Sept-Dec.
1968 Panama - Jan-Feb; Mexico, Guatemala, El Salvador, Nicaragua - June-Sept; Panama - Sept-Dec.
1969 Panama - Jan-Aug; Ecuador - March.
1970 Surinam, Guyana - Mar-Apr; Ecuador - June-July; Guyana - Aug; Panama - Sept, Dec.
1971 Panama - Aug.
1972 Colombia - Mar-Apr; Panama - Apr; Mexico - Nov-Dec.
1974 Panama - Dec.
1975 Ecuador - Jan.
1976 Panama - Mar, Dec.
1978 Panama - Mar-Apr, July.
1979 Panama - Sept.
1980 Ecuador - Feb-Mar; Panama - Apr, Sept-Oct.
1981 Ecuador - Oct-Nov.
1982 Ecuador - Feb-Mar; Bolivia - Nov-Dec.
1983 Bolivia - July-Sept.
1984 Bolivia - Jan.
1987 Ecuador - Aug.-Sept.
1988 Ecuador - Nov.-Dec.
1989 Ecuador - Apr.-May, Nov.-Dec.
1990-1995 Ecuador, one month each year.
1995 Argentina - March.
1999 Argentina, Dominican Republic, Cayman Islands, Jamaica, Mexico.
2000 Ecuador
2002 Dominican Republic
2003 Ecuador Sept – Oct.
2004 Ecuador February
2005 Ecuador October - November
2006 Ecuador June
2007 Ecuador November
2009 Ecuador February

COURSES TAUGHT (AT FSU AND UF):

1973-74 Evolution, Field Botany, Introduction to Plant Diversity

1974-75	Introduction to Plant Diversity, Evolution
1975-76	Topics in Population Biology (Genetic Basis of Evolutionary Change), Evolution, Biosystematics, Experimental Botany
1976-77	Evolution, Introduction to Evolution and Ecology, Introduction to Plant Diversity
1977-78	Introduction to Evolution and Ecology, Origin and Evolution of the Angiosperms
1978-79	Introduction to Evolution and Ecology, Tropical Botany, Evolution, Population Biology, Scientific Photography, Plant Diversity
1979-80	Introduction to Evolution and Ecology, Field Botany, Speciation, Plant Diversity, Scientific Photography
1980-81	Evolution, Reproductive Biology of Flowering Plants
1982-83	Evolution
1997-2002	Molecular Systematics of Plants (each spring)

PREVIOUS GRADUATE STUDENTS:

Gilbert D. Newton, M.S. 1977.
 Karen J. Fritze, M.S. 1979.
 James D. Ackerman, Ph.D. 1981.
 John T. Atwood, Ph.D. 1981.
 Alec M. Pridgeon, Ph.D. 1981.
 W. Mark Whitten, Ph.D. 1985.
 Katia Silvera, M.S. 2002.
 Kurt Neubig, M.S. 2005.
 Iwan Molgo, M.S. 2011.
 Mario Blanco, Ph.D. 2011

CURRENT GRADUATE STUDENTS:

Lorena Endara, Ph. D.
Kurt Neubig, Ph. D.

GRADUATE STUDENT COMMITTEES:

Richard Abbott (Ph. D., Botany)
Mario Blanco (Ph. D., Botany, Chair of his committee) graduated August 2011
 Gretchen Ionta (Ph. D., Botany) graduated 8 August 2009
Kurt Neubig (Ph. D., Botany, Chair of his committee)
Lorena Endara (Ph. D., Botany, Chair of her committee)
Iwan Molgo (M.S., Biology, Chair of his committee) graduated August 2011

SERVICE AND COMMITTEE WORK:

Naturalist for three Saturdays for “**A T. Rex named Sue**” exhibit.
 Chair search committee for Assistant Curator of Lepidoptera 2004.
 Space and collections committee FLMNH.
 FLMNH Building/Renovation Steering Committee 2009.