



Review: [Untitled]

Reviewed Work(s):

Principles and Techniques of Contemporary Taxonomy. by D. L. J. Quicke
S. A. Cameron

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- GOLDMAN, N. 1993a. Statistical tests of models of DNA substitution. *J. Mol. Evol.* 36:182–198.
- GOLDMAN, N. 1993b. Simple diagnostic statistical tests of models for DNA substitution. *J. Mol. Evol.* 37:650–661.
- HARVEY, P. H., AND M. D. PAGEL. 1991. *The comparative method in evolutionary biology*. Oxford Univ. Press, Oxford, England.
- HASEGAWA, M., H. KISHINO, AND N. SAITOU. 1991. On the maximum likelihood method in molecular phylogenetics. *J. Mol. Evol.* 32:443–445.
- HEY, J., AND R. H. KLIMAN. 1993. Population genetics and phylogenetics of DNA sequence variation at multiple loci within the *D. melanogaster* species complex. *Mol. Biol. Evol.* 10:804–822.
- HILLIS, D. M. 1994. Homology in molecular biology. Pages 339–368 in *Homology: The hierarchical basis of comparative biology* (B. K. Hall, ed.). Academic Press, New York.
- HILLIS, D. M., J. P. HUELSENBECK, AND C. W. CUNNINGHAM. 1994. Application and accuracy of molecular phylogenies. *Science* 264:671–677.
- KUHNER, M. K., AND J. FELSENSTEIN. 1994. A simulation comparison of phylogeny algorithms under equal and unequal evolutionary rates. *Mol. Biol. Evol.* 11:459–468.
- LI, W.-H., AND M. GOUY. 1991. Statistical methods for testing molecular phylogenies. Pages 249–277 in *Phylogenetic analysis of DNA sequences* (M. M. Miyamoto and J. Cracraft, eds.). Oxford Univ. Press, New York.
- LOCKHART, P. J., M. A. STEEL, M. D. HENDY, AND D. PENNY. 1994. Recovering evolutionary trees under a more realistic model of sequence evolution. *Mol. Biol. Evol.* 11:605–612.
- PALOPOLI, M., AND C.-I. WU. 1994. Genetics of hybrid male sterility between *Drosophila* sibling species: A complex web of epistasis is revealed in interspecific studies. *Genetics* 138:329–341.
- RZHETSKY, A., AND M. NEI. 1992. A simple method for estimating and testing minimum-evolution trees. *Mol. Biol. Evol.* 9:945–967.
- TATENO, Y., N. TAKEZAKI, AND M. NEI. 1994. Relative efficiencies of the maximum-likelihood, neighbor-joining, and maximum-parsimony methods when substitution rate varies with site. *Mol. Biol. Evol.* 11:261–277.
- TEMPLETON, A. R. 1993. The “Eve” hypothesis: A genetic critique and reanalysis. *Am. Anthropol.* 95:51–72.
- TEMPLETON, A. R., K. A. CRANDALL, AND C. F. SING. 1992. A cladistic analysis of phenotypic associations with haplotypes inferred from restriction endonuclease mapping and DNA sequence data. III. Cladogram estimation. *Genetics* 132:619–633.
- WAKELEY, J. 1994. Substitution-rate variation among sites and the estimation of transition bias. *Mol. Biol. Evol.* 11:436–442.
- WU, C.-I., AND A. W. DAVIS. 1993. Evolution of postmating reproductive isolation: The composite nature of Haldane’s rule and its genetic bases. *Am. Nat.* 142:187–212.
- XU, S., W. R. ATCHLEY, AND W. M. FITCH. 1994. Phylogenetic inference under the pure drift model. *Mol. Biol. Evol.* 11:949–960.
- YANG, Z. 1994. Statistical properties of the maximum likelihood method of phylogenetic estimation and comparison with distance matrix methods. *Syst. Biol.* 43:329–342.
- YANG, Z., N. GOLDMAN, AND A. FRIDAY. 1994. Comparison of models for nucleotide substitution used in maximum-likelihood phylogenetic estimation. *Mol. Biol. Evol.* 11:316–324.

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Principles and Techniques of Contemporary Taxonomy.—D. L. J. Quicke. 1993. Blackie Academic & Professional, London. 311 pp. \$38.75 (paper).

The field of systematics, with its ever-increasing rigor in theory and methodology, continues to extend its influence into the other subdisciplines of evolutionary biology, notably ethology, ecology, population genetics, biodiversity, and conservation. Consequently, it is becoming ever more apparent that some form of training in the methods and principles of systematics should be required of all biology students, whether the aim is to produce professional systematists or simply to provide a conceptual background to those specializing in other areas of biology. The few colleges and universities that offer a course in systematics today often teach the subject with a focus either on classification or on theory. Few courses (although there are some excellent exceptions) integrate the nuts and bolts (the how-to of descriptive taxonomy) with the modern theory of classification and phylogenetics. As a result (or partly as a cause), there are few textbooks that cover the breadth of material required to teach a comprehensive course. Besides the widely used books by Mayr (1969, for zoology) and Wiley (1981), it is difficult to find a recent text suitable for a basic course in the theory and methods of systematics. Some texts (Radford, 1986; Stuessy, 1990) focus on plant taxonomy, others focus on molecular methods (e.g., Hillis and Moritz, 1990), and some conform to a manual or primer format but are restricted in coverage to cladistic methodology and theory (Forey et al., 1992). Still others emphasize the theoretical but lack many of the more practical aspects of taxonomic and nomenclatural procedure (Wiley et al., 1991). Until now, the most recent general text has been that by Mayr and Ashlock (1991; see review by de Queiroz, 1992). The new text by Quicke attempts to fill the need for a general textbook. It is written at a level suitable for beginners, for use by students of all organic kingdoms, and with an eclectic and relatively nonjudgmental tone toward competing ideas and methodologies.

This small, compact text is impressively comprehensive and up to date, considering the rate of advance in

the field. It provides a broad and fairly even-handed understanding of basic systematics issues, although this understanding would be superficial because of the breadth and depth of many of these issues. Hence, the book should be supplemented with selections from the primary literature and with practical exercises or a more advanced manual, such as that of Wiley et al. (1991) or some parts of Forey et al. (1992). Most discussions and diagrams are clear and simple, succinctly communicating the essence and rationale behind theory and methods. Most examples are brief, providing the reader with an idea of the gist of a technique or approach. Rarely is there more than a simple example provided to test a student's understanding of the material. However, abundant citations from the current literature augment many of the examples and ideas.

In the introductory chapter, Quicke nimbly discusses the major subdivisions within systematics, distinguishing taxonomy from the broader purview of systematics, and outlines the major directions and advances in the field since the appearance in the 1960s of numerical methods (phenetic and cladistic) and Hennigian theory. He goes on to discuss the assumptions and philosophy of cladistics, the use of parsimony criteria, and the usefulness of the phylogenetic (comparative) approach in generating testable predictions about evolution. A helpful device, carried on throughout the book, is the employment of bold letters to highlight important ideas defined in the text and in an extensive glossary. Chapter 2 (Characters, Taxa, and Species) is the longest and perhaps densest chapter in the book, covering the nature of characters, character coding, issues of homology, and species concepts. Each of these topics stands alone as an important aspect of systematics, hence a single chapter cannot hope to cover all of the issues. Quicke discusses the essential problems of character coding and addresses some of the problems and solutions for coding continuous characters. The section on homology suffers from brevity and the omission of important citations and associated concepts, such as paralogy and orthology. The brief summary of species concepts could have been more comprehensive by including the recognition concept of species (Paterson, 1985) and the cohesion concept (Templeton, 1989). Chapter 3, on phylogenetic reconstruction, cladistics, and related methods, has excellent coverage of the primary issues, including discussion of the important problem of phylogenetic reliability. Chapter 4 contains a brief description of the rudiments of phenetic methods in systematics. Chapters 5 and 6 deal with keys, and nomenclature and classification, respectively. Chapters 7–11 contain summaries of methods for obtaining and analyzing nonmorphological taxonomic characters useful for phylogenetic estimation, including cytotaxonomy (chapter 7), chemotaxonomy (chapter 8), immunotaxonomy (chapter 9), proteins (chapter 10), and nucleic acids (chapter 11). Chapter 12 includes a brief discussion of some of the problems involved in using fossil data for estimating phylogenies and lineage divergence times. The discussion also touches on the use of phylogenies for understanding geographic distributions of taxa and to detect coevolution. In the last chapter (13), Quicke

considers the critical roles of national and regional museums in biodiversity and conservation management. He excellently conveys the major problems most museums are experiencing in the current climate of shrinking budgets and gives some useful directives for resolving some of these problems. However, he overlooks the important role museums will have as depositories of specimens for molecular systematic research and as storage sites for voucher material from such research (Dessauer et al., 1990; Pääbo et al., 1992; Whitfield and Cameron, 1994).

Overall, the weaknesses of the book lie in the brief treatments accorded some important topics, such as aspects of homology, character analysis, computer-based phylogenetic methods, and statistical issues involving phylogenies. For any but the most basic course, supplemental readings would be necessary. There are a few errors in the text. Caminalcules are called "Caminacules" throughout. Typos are few, but see Figure 3.1 on p. 55; the caption (line 5) reads $p \gg q$, but it should read $p \gg r$ to make sense of the figure. Also, the name Janzen is consistently misspelled as Jansen in chapter 13. The title of the book is a misnomer; it should be "Principles and Techniques of Contemporary Systematics," particularly given Quicke's statement on page 1 that "Systematics . . . is really the subject of this book. . . ."! The book jacket is rather hideous, sporting an unattractive chartreuse background with purple lettering and a blurry lepidopteran on the front cover.

Fortunately, in this instance the old adage about not telling a book by its cover is suitably apt. The book has many strengths. Although not a rigorous and comprehensive treatment of methods, it presents a wide-ranging and thoughtful treatment of the many sources of systematic data. For example, many other current general texts do not adequately discuss DNA/DNA hybridization, cyto- and chemotaxonomic methods, immunological techniques, protein methods, etc. Although some of these methods are rarely used today, they nonetheless have been the basis of many earlier systematic analyses and students should know about them. Also, the text includes more comprehensive discussion of identification-key construction and nomenclatural and taxonomic problems in protists, bacteria, and viruses than is typical of general texts. In a trial run, I used the book as a supplemental text in a systematics course (Principles of Systematics) at the University of Arkansas. Students found selected chapters helpful in getting oriented, especially those chapters dealing with methods of obtaining and analyzing data. Currently, the book seems to be receiving poor distribution in the United States. As a short, concise, and broad-ranging introduction to systematics, it deserves wider recognition.

REFERENCES

- DE QUEIROZ, K. 1992. Review of *Principles of Systematic Zoology*, 2nd edition, by E. Mayr and P. D. Ashlock. *Syst. Biol.* 41:264–266.
- DESSAUER, H. C., C. J. COLE, AND M. S. HAFNER. 1990. Collection and storage of tissues. Pages 25–41 in *Molecular systematics* (D. M. Hillis and C. Moritz, eds.). Sinauer, Sunderland, Massachusetts.

- FOREY, P. L., C. J. HUMPHRIES, I. J. KITCHING, R. W. SCOTLAND, D. J. SIEBERT, AND D. M. WILLIAMS. 1992. *Cladistics: A practical course in systematics*. Syst. Assoc. Publ. 10, Clarendon Press, Oxford, England.
- HILLIS, D. M., AND C. MORITZ (eds.). 1990. *Molecular systematics*. Sinauer, Sunderland, Massachusetts.
- MAYR, E. 1969. *Principles of systematic zoology*. McGraw-Hill, New York.
- MAYR, E., AND P. D. ASHLOCK. 1991. *Principles of systematic zoology*, 2nd edition. McGraw-Hill, New York.
- PÄÄBO, S., R. WAYNE, AND R. THOMAS. 1992. On the use of museum collections for molecular genetic studies. *Ancient DNA Newsl.* 1:4-5.
- PATERSON, H. E. H. 1985. The recognition concept of species. Pages 21-29 in *Species and speciation* (E. S. Vrba, ed.). Transvaal Mus. Monogr. 4, Transvaal Museum, Pretoria.
- RADFORD, A. E. 1986. *Fundamentals of plant systematics*. Harper & Row, New York.
- RIDLEY, M. 1986. *Evolution and classification: The reformation of cladism*. Longman, London.
- STUESSY, T. F. 1990. *Plant taxonomy: The systematic evaluation of comparative data*. Columbia Univ. Press, New York.
- TEMPLETON, A. R. 1989. The meaning of species and speciation: A genetic perspective. Pages 3-27 in *Speciation and its consequences* (D. Otte and J. A. Endler, eds.). Sinauer, Sunderland, Massachusetts.
- WHITFIELD, J. B., AND S. A. CAMERON. 1994. Museum policies concerning specimen loans for molecular systematic research. *Mol. Phylogenet. Evol.* 3:268-270.
- WILEY, E. O. 1981. *Phylogenetics: The theory and practice of phylogenetic systematics*. Wiley, New York.
- WILEY, E. O., D. STEGEL-CAUSEY, D. R. BROOKS, AND V. A. FUNK. 1991. *The complete cladist: A primer of phylogenetic procedures*. Univ. Kans. Mus. Nat. Hist. Spec. Publ. 19, Univ. Kansas, Lawrence.
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Books Received

- Life History and Biogeography: Patterns in *Conus*.**—Alan J. Kohn and Frank E. Perron. 1994. Oxford University Press, New York. \$56.00 (cloth).
- Biology of the Heteromyidae.**—Hugh H. Genoways and James H. Brown (eds.). 1993. American Society of Mammalogists Special Publication 10. Available from Secretary-Treasurer, American Society of Mammalogists, Brigham Young University, Provo, Utah. \$65.00 (cloth).
- Seventy-five Years of Mammalogy (1919-1994).**—Elmer C. Birney and Jerry R. Choate (eds.). 1994. American Society of Mammalogists Special Publication 11. Available from Secretary-Treasurer, American Society of Mammalogists, Brigham Young University, Provo, Utah. \$50.00 (cloth).
- The Coevolutionary Process.**—John N. Thompson. 1994. University of Chicago Press, Chicago. \$49.00 (cloth), \$19.95 (paper).
- Taxonomic Catalog of the Ant Subfamilies Aneuretinae and Dolichoderinae (Hymenoptera: Formicidae).**—Steven O. Shattuck. 1994. University of California Press, Berkeley. (No price given)
- Chimpanzee Cultures.**—Richard W. Wrangham, W. C. McGrew, Frans B. M. de Waal, and Paul G. Heltne, eds. 1994. Harvard University Press, Cambridge, Massachusetts. \$39.95 (cloth).
- The Digestive System in Mammals.**—David J. Chivers and Peter Langer (eds.). 1994. Cambridge University Press, New York. \$84.95 (cloth).
- Analysis of Vertebrate Structure, 4th edition.**—Milton Hildebrand. 1994. John Wiley and Sons, New York. \$46.00 (cloth).
- Vertebrate Zoology: An Experimental Approach.**—Nelson G. Hairston, Sr. 1994. Cambridge University Press, New York. \$34.95 (cloth).
- Ecological Morphology: Integrative Organismal Biology.**—Peter C. Wainwright and Stephen M. Reilly (eds.). 1994. University of Chicago Press, Chicago. \$65.00 (cloth), \$22.95 (paper).
- Genes for Sale: Privatization as a Conservation Policy.**—Joseph Henry Vogel. 1994. Oxford University Press, New York. \$29.95 (cloth).
- Toxic Metals in Soil-Plant Systems.**—Sheila M. Ross (ed.). 1994. John Wiley and Sons, New York. \$125.00 (cloth).
- Aquaculture Development: Progress and Prospects.**—T. V. R. Pillay. 1994. John Wiley and Sons, New York. \$59.95 (cloth).