

Shifts That Pass in the Night: Missed Opportunities in the Recent History of Linguistics and Biology

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I. PREAMBLE:

0. Practitioners of two disciplines which have previously borrowed from each other, sometimes quite insightfully, are understandably apt to expect that they will likewise notice — or at least hear about — subsequent innovative developments in the other field which are likely to bear productively on their own sphere of inquiry, and so one might assume this to be especially true of biology and linguistics, both of which have benefitted not only from exchanging many metaphors, as in (1), but also by converging on a number of more substantive notions, as in (2):
 1. Convergent (or nearly sconvergent) and borrowed terminology (cf. a. below), plus the same or similar constructs and methods —
 - a. morphology; phenetics/phonetics; genetic code, syntax of DNA, grammar of life (although this term is not used exclusively in biological circles);
 - b. arboreal (family tree) representations of relations;
 2. Convergent notions
 - a. both fields study objects which are in some sense maintained over time via replication (leading to the existence of diachronic correspondences between stages);
 - b. both fields propose reconstructions of prehistoric entities based solely on present-day evidence;
 - c. both fields seek to posit systematic relations and groupings among entities with historical validity.
 3. We find it especially telling that biolinguistic parallelism was recognized relatively early on — Darwin himself in (1871 [*The Descent of Man, and Selection in Relation to Sex*]: 59) stated: “The formation of different languages and of distinct species, and the proofs that both have been developed through a gradual process, are curiously the same”.
 - a. We argue here, however, that linguists as well as biologists have recently failed to capitalize on — or even recognize — certain innovations in each other's fields which would have allowed them either to make considerable progress within their own disciplines or to avoid unproductive impasses which had been hampering scholarly advances.
 - b. The present investigation is one outgrowth of a year-long study conducted by an interdisciplinary working-group at Ohio State University uniting evolutionary biologists with historical linguists, as described in (4):

4. The OSU Bio-Ling Study Group —

- Janda's interests in biology and in (mis-)applications of “punctuated equilibrium” to historical linguistics led to much of Janda & Joseph 2003 being devoted to biological issues; a happily convergent July 2003 invitation from John Wenzel of the OSU Dept of Entomology to his friend Joseph to speak in Wenzel's Phylogenetics Discussion Group on linguistic classification (since they were reading Rexova et al. 2003 on biological-cladistic methods as applied to Indo-European classification) led to meetings between some OSU small group of evolutionary biologists (Wenzel and John Freudenstein of the OSU Dept of Evolution, Ecology, and Organismal Biology, plus students, especially Christopher Randle (now post-doc at Univ. of Kansas)) and some linguists (Joseph and Janda of the OSU Dept of Linguistics, and Jim Unger of the OSU Dept of East Asian Languages & Literatures, along with students) to explore parallels between evolutionary biology and biological cladistics on the one hand and historical linguistics and language classification on the other.
- this developed into an interdisciplinary population of scholars forming into a joint study-group (augmented by Megan Daly, newly hired in Evolutionary Biology from Univ. of Kansas) — uniting historical linguists with evolutionary biologists with lots of other interested parties on campus, students and faculty alike — undertaking a year-long investigation of substantive parallels between the two disciplines, with numerous public events, some drawing audiences as large as 45.
- 5. As a result, we feel fairly certain that our conclusions, insofar as they express criticism, are fair to both sides and, insofar as they apportion praise, are indicative of positive results that could still be gained in the future. In this paper, we focus on two representative failures of biolinguistic vision since ca. 1950.

II. TYPOLOGY IN THE TWO FIELDS

6. One missed opportunity concerns biologists' failure to discern the early breakthrough that they could have achieved by adopting a life-science analogue of linguistic typology as it has been practiced during roughly the past fifty years, starting with the work of Greenberg and widening into a broad stream of research.
 - a. 19th-century linguistic typology tended to be like biological classification in focusing on a rather arbitrarily chosen group of parameters and attempting to classify languages as wholes (e.g., isolating vs. agglutinating vs. fusing), but Greenberg 1957, 1963, 1966 built on pioneering work by Sapir 1921 in general and by Trubetzkoy 1939 in phonology and began elaborating typologies for virtually every aspect of language in every linguistic subfield (e.g., semantics as well as morphology-syntax).
 - b. Lacking sufficient contact with linguistic typology of the 1950s and early 1960s, however, American biologists did not begin a significant migration away from the arbitrariness of non-phylogenetic, similarity-based classification until the 1966 publication of a translation (as *Phylogenetic Systematics*) of Hennig's 1950 *Grundzüge einer Theorie der phylogenetischen Systematik*.
7. To be fully explicit, though, there was another reason why typology as practiced by linguists would not have found great acceptance by biologists even if its name had not happened to be identical to that of a concept which had fallen from favor among biologists.
 - a. Namely, the biological concept that is closest to linguistic typology is phenetics (cf., e.g., Sneath & Sokal 1973).
 - b. Whereas we view the biological usefulness of (a biological analog of) linguistic typology as lying in its ability to express similarities and differences without regard to classification (phylogenetic or oth-

erwise), the approach called numerical phonetics was for some time seen as being a maximally objective and therefore virtually optimal basis for biological classification, superior to both phylogenetic and other classification schemes in this respect.

8. As for linguistic approaches to typology, compare the following:

- The Research Centre for Linguistic Typology (La Trobe University) has the mission of "putting forward inductive generalisations about human language".
- The Association for Linguistic Typology has the mission of promoting "the scientific study ^{of} cross-linguistic diversity and the patterns underlying it".
- Wikipedia defines typology as "the classification of languages by grammatical features".

9. What "types" are interesting or important?

- Would dividing languages into those that have [kæt] as sounds together signifying 'cat' be a useful division? How about languages with a labial sound in their phonemic inventory?
- Unusual characteristics can be used to define types: e.g., languages with no nasals.
- Correlating/correlated characteristics are valued by researchers (as leading to the recognition of implicational universals): e.g., the relationship between OV word order and ADJ-N order (cf. Greenberg 1966, Hawkins 198xx)

10. Nasal/Oral vowels and implicational scales:

	NASAL VOWELS?	ORAL VOWELS?
TYPE		
1	+	+
2	-	+
3	+	-
4	-	-

- which types exist? 1, 2
- which types do not? 3, 4 (but 4 is out, due — not to anything about nasality or orality in vowels — but due to it being defined as a language with NO vowels at all!).
- what implicational relations are there? +N → +O.

11. Consequences/enefits of typologizing for linguists:

- synchronically: define "possible human language";
- descriptively: identify range of diversity;
- diachronically: define possible range of movement from type to type;
- no genetic implications (at least none are intended by these methods, though inferences can always be drawn).

III. BIOLOGICAL MORALS FOR GRAMMATICALIZING MORPHEMES (EVEN IF THEY AREN'T ORGANISMS)

12. On the other hand, historical linguistics might have avoided much of the apriorism, circularity, and sterility besetting current "grammaticalization" "theory".if historical linguists had paid (more) attention to evolutionary biologists' discussions of such issues as:

- the (ir)reversibility of particular changes,
- the (in)constancy of change rates, and
- the reshaping of ritualized behaviors under varying ecological conditions.

13. That is, help in eliciting from grammaticalizationists the more differentiated theory that their subject matter already inherently demands could have been given via just a smattering of exposure to biological discussions — even popularizing ones like:

- Gould 1980 on Dollo's 1905 "law of irreversibility",
- Dawkins 1986 on the non-novelty of Eldredge & Gould's 1972ff. views as to rate, or
- Lorenz 1966 on Huxley's 1914 account of the courtship habits of the great crested grebe (*Podiceps cristatus*) —

14. For example, there apparently nothing that is irreversible in biological evolution:

- A proposed case of irreversibility for plants had to do with the idea that, once the xylem elements called "vessels" have evolved (from tracheids), they can never be lost (with the reason for this being that tracheids are so much more efficient for moving water around within plants than are tracheids — tracheids have membranes that water has to pass through, whereas vessels are open tubes essentially without limiting membranes).
- But it is now believed that some plants have in fact gone from having vessels back to having tracheids,
- In general, anyway, aquatic plants tend to lose vessels (they can afford to, because they are bathed in water all the time, in any case).

15. Further examples await you in the [biological] texts....

References

- Dawkins, Richard. 1986. *The Blind Watchmaker: Why the Evidence of Evolution Reveals a Universe Without Design*. New York City, New York: W. W. Norton & Company (1st edition). [Expanded edition 1996.]
- Dollo, Louis. 1893. "Les lois de l'évolution". *Bulletin de la Société belge de géologie, de paléontologie et d'hydrologie* 7.
- Dollo, Louis. 1905. "Les dinosauriens adaptés à la vie quadrupède secondaire". *Bulletin de la Société belge de géologie, de paléontologie et d'hydrologie* 19.6: 441-448. [< Dollo 1893.]
- Eldredge, Niles. 1985. *Times Frames: The Rethinking of Darwinian Evolution and the Theory of Punctuated Equilibria*. New York: Simon and Schuster.
- Eldredge, Niles & Stephen Jay Gould. 1972. "Punctuated Equilibria: An Alternative to Phyletic Gradualism". In Thomas Schopf (ed.), *Models in Paleobiology*. San Francisco, CA: Freeman, Cooper, and Co., pp. 82-115.
- Gould, Stephen Jay. 1970. "Dollo on Dollo's Law: Irreversibility and the Status of Evolutionary Laws". *Journal of the History of Biology* 3.2: 189-212.
- Gould, Stephen Jay. 1980. "Double Trouble". In his *The Panda's Thumb: More Essays in Natural History*. New York City, NY; W. W. Norton & Co., Inc, pp. 35-44. [Originally a "The View of Life" essay in *Natural History*.]
- Gould, Stephen Jay. 1981. "Evolution as Fact and Theory". *Discover Magazine* 2.5 (May 1981): 34-37. Reprinted in his *Hen's Teeth and Horses Toes: Further Reflections in Natural History*. New York City, NY: W. W. Norton & Co., Inc., 1984, pp. 253-262.]

- Gould, Stephen Jay. 2002. *The Structure of Evolutionary Theory*. Cambridge, MA: Belknap Press of Harvard University Press.
- Gould, Stephen Jay & Niles Eldredge. 1977. "Punctuated Equilibria: The Tempo and Mode of Evolution Considered". *Paleobiology* 3: 115-151.
- Gould, Stephen Jay & Niles Eldredge. 1993. "Punctuated Equilibrium Comes of Age". *Nature* 366: 223-227.
- Grafen, A. "Modeling in Behavioral Ecology". In J. R. Krebs & N. B. Davies (eds.), *Behavioral Ecology: An Evolutionary Approach*. Boston, MA: Blackwell Scientific (3rd edition), pp. 1-31.
- Greenberg, Joseph Harold. 1957. *Essays in Linguistics*. Chicago, IL: University of Chicago Press. [Also issued as *Viking-Fund Publications in Anthropology* 24.] [Reprinted 1963 (Phoenix Books series).]
- Greenberg, Joseph Harold. 1963. "Some Universals of Grammar, with Particular Reference to the Order of Meaningful Elements". In Greenberg (ed.), pp. 73-113.
- Greenberg, Joseph Harold. 1966. *Language Universals, with Special Reference to Feature Hierarchies*. The Hague: Mouton. (Janua Linguarum, Series Minor, 59.)
- Greenberg, Joseph Harold. 1974. *Language Typology: A Historical and Analytical Overview*. The Hague: Mouton. (Janua Linguarum, Series Minor, 184.)
- Greenberg, Joseph Harold (ed.). 1963. *Universals of Language: Report of a Symposium Held at Dobbs Ferry, New York, April 13-15, 1961*. Cambridge, MA: MIT Press, 1963 (1st edition). [2nd edition 1966.]
- Greenberg, Joseph Harold, Charles Albert Ferguson, & Edith A. Moravcsik (eds.). 1978a-d. *Universals of Human Language, Volume 1: Method and Theory, Volume 2: Phonology, Volume 3: Word Structure, & Volume 4: Syntax*. Stanford, CA: Stanford University Press.
- Hennig, Willi. 1950. *Grundzüge einer Theorie der phylogenetischen Systematik* [Deutsches entomologisches Institut, Berlin-Friedrichshagen (ed.)]. Berlin: Deutscher Zentralverlag.
- Hennig, Willi. 1966. *Phylogenetic Systematics* [translated (from the author's manuscript of a revised and enlarged version of Hennig 1950) by Delbert Dwight Davis & Rainer Zangerl]. Urbana, IL: University of Illinois Press (with a "Foreword" by Donn E. Rosen, Gareth Nelson, & Colin Patterson). [Reprinted 1979, 1999.]
- Horne, Kibbey M. 1966. *Language Typology: 19th and 20th Century Views*. Washington, DC: Georgetown University Press.
- Huxley, Julian Sorell. 1914. "The Courtship-Habits of the Great Crested Grebe (*Podiceps cristatus*), with an Addition to the Theory of Sexual Selection". *Proceedings of the Zoological Society of London* 35: 491-562.
- Lorenz, Konrad. 1966. *On Agression*. New York City, NY: Harcourt, Brace & World, Inc. (Helen & Kurt Wolff Books). [Translated by Marjorie Kerr Wilson from *Das sogenannte Böse: Zur Naturgeschichte der Agression*. Vienna: Dr. G. Borotha-Schoeler Verlag, 1963.]
- Mayr, Ernst. 1959. "Typological versus Population Thinking". From (pp. 409-412 of) "Darwin and the Evolutionary Theory in Biology". In Anthropological Society of Washington, [DC] (ed.), *Evolution and Anthropology: A Centennial Appraisal*. Washington, DC: Anthropological Society of Washington, 1959. [Reprinted in Mayr 1976, pp. 26-29.]
- Mayr, Ernst. 1976. *Evolution and the Diversity of Life: Selected Essays*. Cambridge, MA: Belknap Press of Harvard University Press.
- Mayr, Ernst. 1982. *The Growth of Biological Thought: Diversity, Evolution, and Inheritance*. Cambridge, MA: Belknap Press of Harvard University Press.
- Sapir, Edward. 1921. *Language: An Introduction to the Study of Speech*. New York City, NY: Harcourt, Brace and World.
- Sneath, R. R. & P. H. Sokal. 1973. *Numerical Taxonomy*. San Francisco, CA: W. H. Freeman.
- Trubetzkoy, Nikolai Sergeevich (Prince). 1939. *Grundzüge der Phonologie. Travaux du Cercle Linguistique de Prague* 7. [Published with the support of the Cercle Linguistique de Copenhagen and the Ministry of Instruction of the Czechoslovak Republic; reprinted in Nendeln, Liechtenstein: Kraus Reprint Corporation, 1968; translated by Christiane A. M. Baltaxe as *Principles of Phonology*. Berkeley, CA: University of California Press, 1969.]

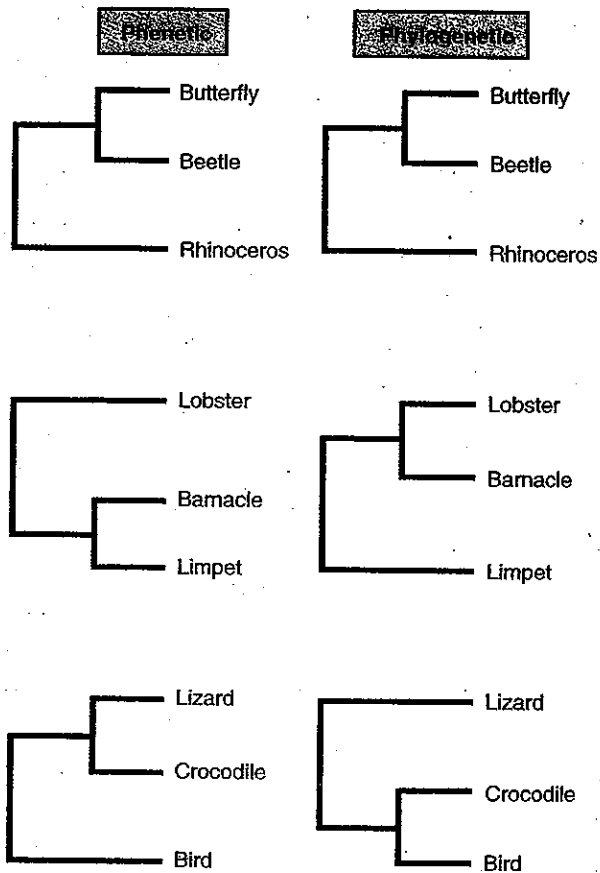


Figure 1 The phenetic and phylogenetic principles of classification may disagree. [Ridley 1996: 373 (Fig. 14.1).]

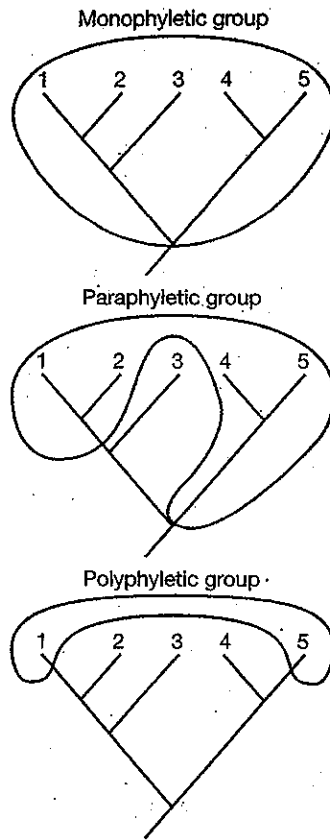


Figure 2 Monophyletic, paraphyletic, and polyphyletic groups. Taxonomic groups can be monophyletic, paraphyletic, or polyphyletic. Monophyletic groups, or clades, contain all the descendants of a common ancestor. Paraphyletic groups contain some, but not all, the descendants of a common ancestor. A polyphyletic grouping does not contain the most recent common ancestor of all the taxa.

In a cladistic classification, only monophyletic groups are named. In contrast, traditional taxonomic schemes occasionally assign names to polyphyletic and paraphyletic groups. [Freeman & Herron 2001: 456 (Fig. 13.10).]

Figure 2 Phylogeny of main vertebrate groups. Reptiles are a paraphyletic group, made up of turtles, lizards, snakes, and crocodiles. In this picture, [Ridley 1996: 384 (Fig. 14.7)].

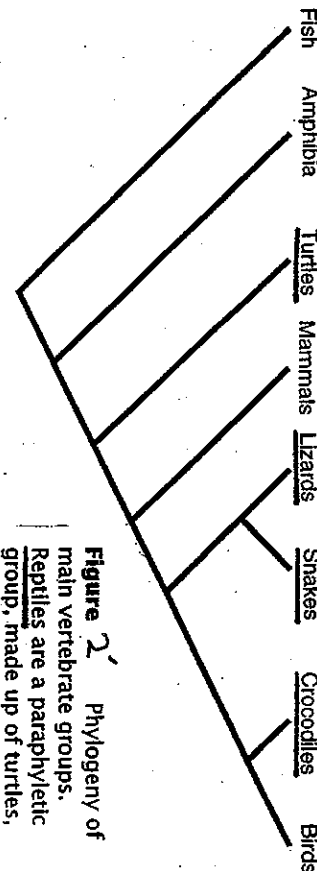


Fig. 3 ...[T]he chain of organismic events that extends from information to function. [Strickberger 2000: 243].

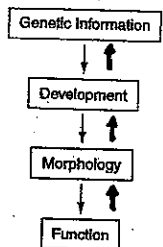


Figure 4 A simple relation exists between the phylogenetic (cladistic) classification of a group of species, and their phylogenetic tree. (a) The evolutionary history of seven species. (b) Their cladistic classification. (c) The formal Linnaean classification for species 5. This particular classification is only an example; depending on the detail in a particular case, different Linnaean levels might be used. [Ridley 1996: 381 (Fig. 14.5).]

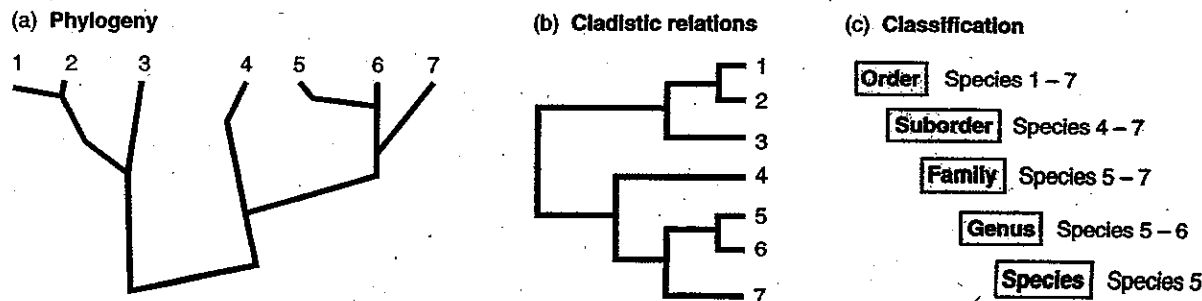


Table [Benton & Harper 1997: 48 (Tab. 3.1, Fig. 3.4)]

Character	Shark	Salmon	Frog	Lizard	Chicken	Mouse
1. Fins	1	1	0	0	0	0
2. Legs	0	0	1	1	1	1
3. Warm-bloodedness	0	0	0	0	1	1
4. Bone	0	1	1	1	1	1
5. Diapsid skull	0	0	0	1	1	0
6. Loss of larval stage	0	0	0	1	1	1
7. Lung or swim bladder	0	1	1	1	1	1
8. Amniote egg	0	0	0	1	1	1
9. Elongate neck vertebrae	0	0	0	1	1	0
10. Marginal teeth	0	1	1	1	1	1

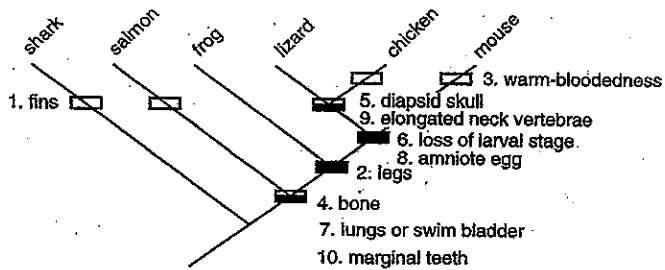


Fig. 5 The relationships of the major groups of vertebrates, tested using six familiar animals....! Postulated relationships, based on analysis of characters....

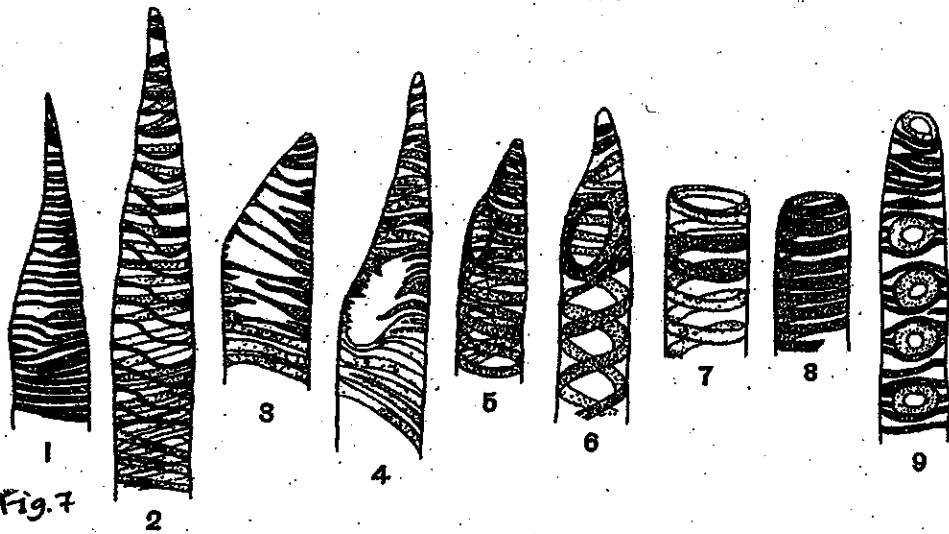
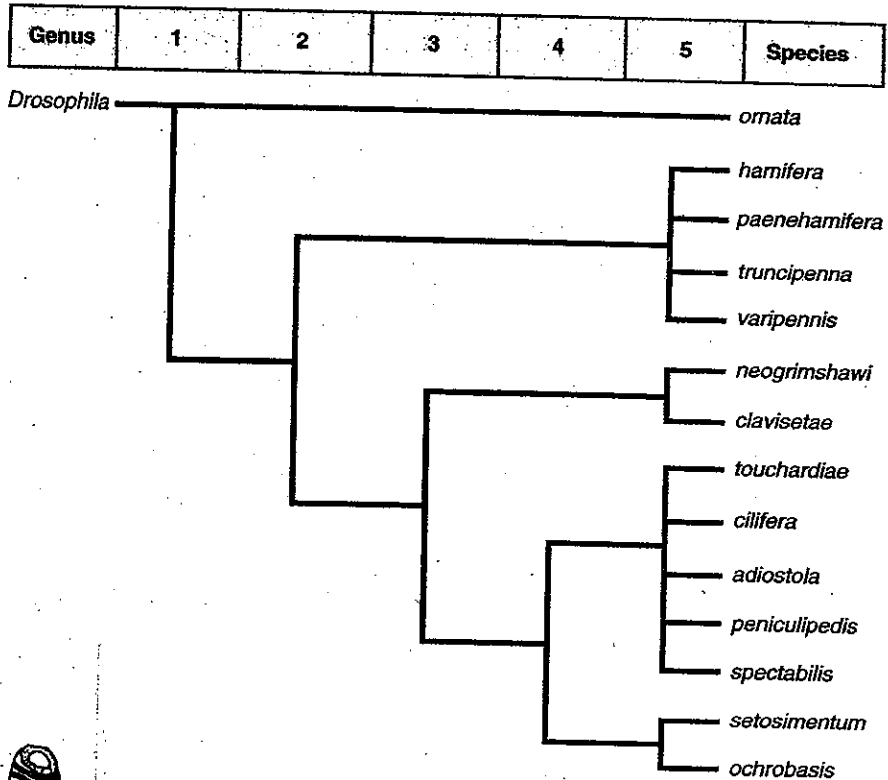


Fig. 7 and 8. Helicallly thickened vessel members with scalariform perforation plates.—Fig. 9 and 10. Helicallly thickened vessel members illustrating transitions between scalariform and porous perforation plates.—Fig. 11 and 12. Helicallly thickened vessel members with simple porous perforation plates.—Fig. 13 and 14. Helicallly thickened vessel members with truncated ends.—Fig. 15. Helicallly thickened tracheary element of *Gnetum*, showing circular bordered pits. [Bailey 1944: 423 (Fig. 1-9).]

Figure 6 Possible classification of the *adiostola* group of species of fruitflies. (Taken from the larger phylogeny of Hawaiian *Drosophila*) These 14 species are only a (large) part of the worldwide *Drosophila* fauna, which are themselves only a (large) part of the worldwide *Drosophila* fauna. What we know about their phylogeny would require at least five new levels between the genus and species level. [Ridley 1996: 386 (Fig. 14.8).]



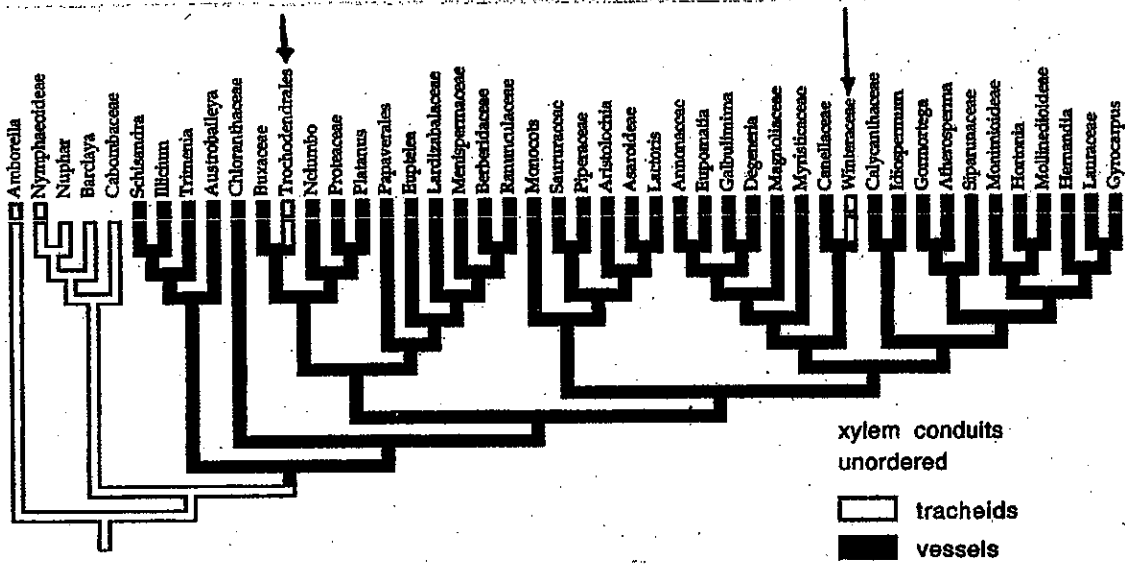


Fig. 8 The most parsimonious phylogenetic tree of Doyle and Endress (2000) from the combined analysis of three genes (*rbcL* + 18S ribosomal DNA + *atpB*, data set from Soltis et al. 1999) and morphology data matrix for early-diverging angiosperms showing the evolution of xylem vessels... [Feild et al. 2002: 466 (Fig. 1).]

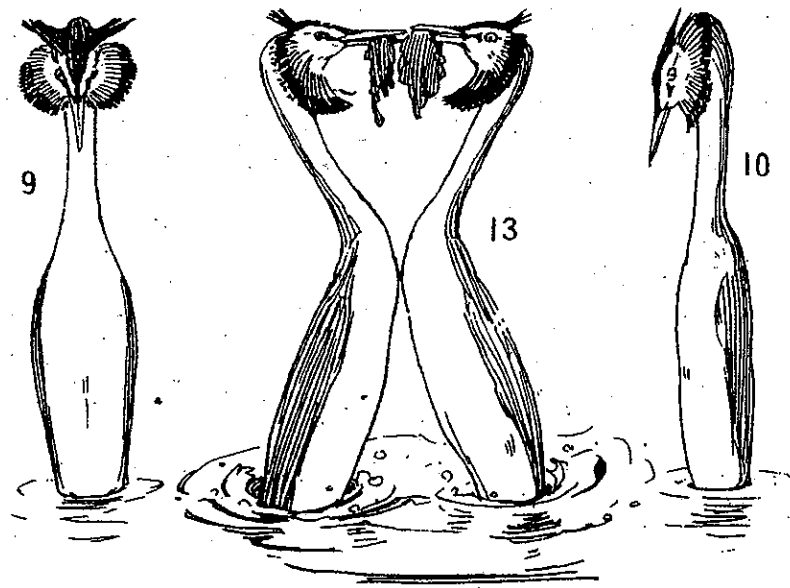


Fig. 9
 COURTING-HABITS OF PODICEPS CRISTATUS.
 [Huxley 1914: Plate II.]

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