List of Figures

- 1 Title page: Origin and evolution of insect wings
- 2 Frontispiece: Homoplasy, enemy of phylogeny
- 3 Phylogenetic tree of Hexapoda and Insecta
- 4 Explanation of symbols for leg-derived structures
- 5 Arthropod leg-derived appendages and single leg groundplan
- 6 Paleozoic pterygotes bore short exites on upper leg segments
- 7 Evolution-homologies of hexapod leg segments
- 8 Comparison of Paleozoic and Recent insect limbs
- 9 Retention of Paleozoic leg segment pattern in Recent insects
- 10 Comparison of plesiotypic 11-segmented and reduced "7 segmented" legsjpg
- 11 Arthropod leg exites and Recent insect order Archaeognatha
- 12 Evidence for existence of the epicoxa
- 13 Leg exites in fossil and modern insects
- 14 Leg muscles for flight atttch to sclerites, not tergum
- 15 Prothoracic winglets and protowing model
- 16 Sides of pterygote abodmen are flattened leg segments
- 17 Insect ancestral head groundplan
- 18 Insect head and serial homology of its 6 segments
- 19 Pterygote head and position of epicoxa on it
- 20 Archaeognatha and Monura bear thoracic epicoxae
- 21 Permian mayfly head and epicoxal rim
- 22 Differences in Paleozoic insect heads
- 23 Crustacean and insect mandibles compared
- 24 Exites and endites in leg-derived mandibles
- 25 Composition of the mandible in Mandibulata
- 26 Evolution of anterior articulation in mandibles
- 27 Phylogeny of Arthropd mandibles
- 28 Components of mandibles
- 29 Beaks (rostra) of extinct Rostropaleoptera
- 30 Piercing-sucking mouthparts of extinct Rostropaleoptera
- 31 Wing organ homologues on insect abdomen
- 32 Abdominal epicoxal exites retained in mayfly nymphs
- 33 Nymphal wings articulated or fused to tergum
- 34 Epicoxae, exites, and endies in genitalia
- 35 Apterygota Zygentoma
- 36 Plesiomorphic pterygote wing articulation retained
- 37 Leg-derived appendages and most plesiomorphic wing articulation
- 38 Archeognatha and Monura both bear thoracic epicoxae
- 39 All pterygote leg-derived appendages share serially homologous segments
- 40 Carboniferous wingless insects bore abdominal vesicles
- 41 SEM's of Archeognatha structures
- 42 Extinct Paleozoic dicondylous order Cercopoda
- 43 Extinct Cercopoda, a jumping order close to Pterygota
- 44 Extinct order Cercopoda sister group of Pterygota
- 45 Most plesiomorphic extinct dicondylous order Cercopoda
- 46 Cercopoda, an undescribed specimen
- 47 Relationships between Zygentoma (=Thysanura) and winged insects
- 48 Diplura and Zygentoma Carboniferous fossils
- 49 Comparison of Recent and Paleozoic nymphs
- 50 Difference in Paleozoic and Recent wing development
- 51 Wing and leg anlage in fly larvae
- 52 Leg muscles enabling flight attach to epicoxal sclerites, not tergum

- 53 Diaphanopterodea; wing folding in early Paleoptera
- 54 Diaphanopterodea, most plesiotypic pterygote order
- 55 Evidence that pterygote nymphs bore mobile winglets
- 56 The giant mayfly nymph Bojophlebia
- 57 Giant mayfly nymph Bojophlevia fossil 1
- 58 Giant mayfly nymph Bojophlebia fossil 2
- 59 Flapping flight versus gliding
- 60 Gradual wing development in Megasecoptera nymphs
- 61 Evidence that all THREE pairs of wings are separate from terga
- 62 History of wing fusion to terga in Carboniferous Paleoptera
- 63 Arthopod leg groundplan composition
- 64 early wing development in Libellulidae
- 65 Pterygote protowing model from which all winggs can be derived
- 66 Epicoxae and epicoxal exites on prothorax and abodmen
- 67 Groundplan pattern of protowing articular sclerites
- 68 Compliation of wing muscles in Pterygota
- 69 Modification of protowing articulation in Pterygote lineages
- 70 Evolution in wing articulation to clades of Neoptera and Paleoptera
- 71 Most plesiomorphic wing articulation in Diaphanopterodea
- 72 Neoptera wing articulation derived from protowing
- 73 Arrangement of wing sclerites in Neoptera
- 74 Neopteran axillary sclerite 2Ax shows relationships
- 75 Variation in the third axillary 3Ax
- 76 Some Neoptera bear wing articulation separate from tergum
- 77 Neopteran hind wing veinal patterns and lineages
- 78 Neopteran phylogeny suggested by veinal patterns
- 79 Anojugal lobe and lineages
- 80 "Polyneoptera" of authors is polyphyletic
- 81 Neoptera veinal patterns-- key fusions near wing base
- 82 Orthoneoptera--a very unusual veinal patern
- 83 Protocoleoptera, elytral veination
- 84 wing folding in Coleoptera
- 85 Plesiomorphy in Neoptera, sclerites of humeral plate not fused copy
- 86 Tabanidae, Tabanus atratus wing base
- 87 Oldest Carboniferous dragonflies (Geroptera) bore prothoracic protowings copy
- 88 Extinct Geroptera, Carboniferous, Argentina FW & HW
- 89 Recent dragonfly, Uropetala carrovei, New Zealand FW & HW
- 90 Odonatoptera, the sister group of Ephemeroptera
- 91 Odonatoptera-- Recent and Carboniferous
- 92 Hydrolpaleoptera, diversification of anterior articular plate
- 93 Carboniferous giant mayfly, Syntonopterida, Bojophlebia
- 94 Oldest known Ephemeroptera
- 95 Paleoptera-- plesiomorphic arrangement of wing sclerites in mayflies
- 96 Paleozoic Ephemeroptera share 5 key characters with recent mayflies
- 97 Modern Ephemeroptera--wing structure nomenclature
- 98 Permian Protereismatidae share 5 key vein characters with Recent mayflies