

Materials and Methods

Over 30,000 specimens belonging to genera treated at one time or another in either the subfamily Phthiriinae or Usiinae were examined. Species examined during this study are listed below under each genus considered. Specimens were borrowed from or examined in the following institutions and private collections (abbreviations of institutions in parentheses are used henceforth in the text): American Museum of Natural History, New York (AMNH); Australian National Insect Collection, CSIRO, Canberra (ANIC); Bishop Museum, Honolulu (BPBM); British Museum (Natural History), London (BMNH); Neal L. Evenhuis, Honolulu (NLE); J.C. Hall, Riverside, California (JCH); Humboldt Museum, Humboldt Universität, Berlin (HMB); Museum National d'Histoire Naturelle, Paris (MNHN); Museum of Comparative Zoology, Cambridge, Massachusetts (MCZ); Natal Museum, Pietermaritzburg (NATAL); Snow Museum, University of Kansas, Lawrence (SNOW); South African Museum, Cape Town (SAFR); Texas A & M University, College Station (TEX); United States National Museum of Natural History, Washington, D.C. (USNM); Universidade de São Paulo, São Paulo (USP); University of California, Berkeley (UCB); University of California, Riverside (UCR); University of Minnesota, St. Paul (MINN); University of Tel Aviv, Ramat Aviv (ISRAEL); Zoological Institute, Academy of Sciences of the USSR, Leningrad (ZIL); Zoological Museum, Lund University, Lund, Sweden (LUND); Zoologisk Museum, Copenhagen (ZMC).

Adult specimens were critically examined for morphological characters using a stereo dissecting microscope. Antennae, mouthparts, and male and female genitalia were prepared for illustration by dissecting in 10% KOH and rinsing in 5% acetic acid. Male genitalia were then placed in a spot plate with glycerine for illustration and detailed examination. Antennae, mouthparts, and

female genitalia were mounted on slides and examined under compound microscope. Illustrations were made using a camera lucida.

Immature stages are known only for a few species of Phthiriinae and Usiinae (DuMerle, 1975) and no new information on the biology or morphology of the immatures was found in this study. Owing to the paucity of immature material available for study, characters based on pre-imaginal stages could not be used in this study.

Adult morphological terminology follows that of Hull (1973) and Hall & Evenhuis (1980). Female genitalic terminology follows Theodor (1983), except that what Theodor termed the vaginal furca is here interpreted as the vaginal apodeme of Emden & Hennig (1970). The reader is referred to Figures 4–9 for general morphological features and associated terminology used in this work.

Cladistic analyses using the principle of maximum parsimony were performed on the genera of the subfamilies Usiinae and Phthiriinae to estimate phylogenetic relationships of the taxa involved. The program used was PAUP (Phylogenetic Analysis Using Parsimony), PC version 2.4.1 (Swofford, 1985). Options employed during the analyses included MULPARS, SWAP=GLOBAL, and HOLD=10. These allowed for global branch swapping among ten initial trees in a search for equally parsimonious trees. Character state polarities were determined using outgroups (Watrous & Wheeler, 1981; Maddison et al., 1984; Clark & Curran, 1986).

Two separate data sets were analyzed: (1) on the genera of the Usiinae, and (2) on the genera of the Phthiriinae. Twelve terminal taxa based on 22 characters were used in the analysis of the genera of the Usiinae, and 10 terminal taxa based on 29 characters were involved in the Phthiriinae analysis.