

## APPENDIX III

*Coding and Description of Morphological Characters*

In the account given below, the following abbreviations are used for measurements, indices, and meristic counts: CI, cephalic index; ED, eye diameter; FCC, index of frontal carinal convergence; FCD, frontal carinal distance; FCI, frontal carinal index; FLI, funicular length index; FSC, fore femur setal count; HTI2, hindtibial index, using HW; HW, head width; LPI, lateral petiolar index; ML, mandible length; OLD, index of occipital lobe distance; PI, pronotal index; PNL, petiolar node length; SI, scape index; SLI (=SPL/PH), index of subpetiolar process length; SPI, index of subpetiolar process width; SSC, scape setal count. These terms are fully explained in Ward (1984).

NC.MORPH characters 1-15 are based on gap-coded mean differences of the following metric characters (number of gaps given in parentheses): HW (2), ML (1), FCD (2), PNL (1), CI (1), SI (1), FCI (1), PI (2), LPI (1), FLI (1), SLI (2). The gap-coding procedure was as follows: I used an a posteriori contrast test—Scheffé's test, as implemented on the SPSS package (Hull and Nie, 1981)—with an experimentwise alpha of 0.01. This test revealed homogeneous subsets of means based on comparisons among all possible linear combinations of the 18 species' means. I then assigned integral stepwise values (0, 1, 2, etc.) to completely *non-overlapping* subsets of means or sets of subsets. Finally, these values were recorded into additive binary code, as required by the MIX program. This conservative coding method resulted in the loss of some information; several measurements and indices were discarded because there were no discrete gaps between subsets of means. However, my intention was to code these morphometric characters in a manner which made them comparable to the remaining morphological characters. The latter encompass aspects of shape, sculpture, pilosity, and color, which were assessed qualitatively, and which tend to be non-overlapping and taxonomically diagnostic. These qualitative characters are described below (with quantitative bounds given where feasible). Multi-state characters were converted into additive binary code using the linear transformation series indicated here.

16. Frontal carinae (1) anterolaterally expanded and strongly converging posteriorly (FCC 0.70-0.80), (0) parallel or weakly converging posteriorly (FCC 0.80-

0.95). 17. Inter-occipital lobe distance (1) about half the head width (OLD 0.52-0.58), (0) more than 0.6 times the head width (Old  $\geq$  0.60). 18. Hind tibia (1) relatively long (HTI2 1.11-1.23), (0) relatively short (HTI2 0.85-1.10). 19. In lateral view, occipital lobe (1) conspicuously produced, broader than ED, (0) at most moderately produced, less broad than ED. 20. Petiolar node (1) with posterodorsal point, (0) without posterodorsal point. 21. In lateral view, posterior margin of subpetiolar process (1) convex or angled outward, (0) concave or angled inward. 22. Subpetiolar process consisting of (1) broad triangular or subrectangular keel, without spiniform point (SPI 0.44-1.23), (0) spiniform point (SPI 0.10-0.31) or very short and poorly developed. 23. Dorsum of head (1) longitudinally carinate, (0) longitudinally rugostriate with rugose. 24. Pronotal rugae (1) partially overlaid with fine, punctulate sculpture, (0) not overlaid with fine punctulae. 25. Pronotum (1) densely and irregularly striate, rugae weak, (0) not densely and irregularly striate. 26-28. Fourth abdominal tergite (111) shining, smooth, estriate, (011) shining, weakly striate to striolate, (001) opaque to subopaque, densely striate or striolate-imbricate, (000) opaque (matte), densely shagreened. 29, 30. Appressed hairs on fourth abdominal tergite (11) lacking, (01) sparse to moderately common, separated by their lengths or more, (00) forming a dense pubescent mat. 31-33. Erect setae (111) lacking on most of body dorsum, scapes, and femora (SSC 0, FSC 0), (011) present on body dorsum, but lacking on upper surfaces of scapes and femora (SSC 0-2, FSC 0), (001) present on body dorsum and on upper surfaces of scapes and femora (SSC 2-24, FSC 0-19), (000) abundant on body dorsum and appendages (SSC 20-34, FSC 17-26). 34. Erect pilosity (1) consisting of long, thin flexuous setae, (0) consisting of short, thicker, nonflexuous setae. 35-37. Body (111) unicolored, dark brown to black, with conspicuous greenish or violaceous iridescence, (011) unicolored, brown to black, without conspicuous greenish or violaceous iridescence, (001) bicolored, gaster contrastingly lighter than head and mesosoma, (000) bicolored, gaster and head contrastingly lighter than mesosoma. 38. Body appendages (legs, mandibles, antennae) (1) ferruginous brown to dark brown, usually not strongly contrasting with mesosoma, (0) pale luteous, strongly contrasting with dark mesosoma. 39. Workers foraging predominantly (1) on low vegetation, (0) on the ground. 40, 41. Nest located (11) in soil, with clay turret entrance, (01) in soil or logs, without turret, (00) arboreally.