

INDEX

	Page
INTRODUCTION.....	9
 Part One: HISTORY, CONCEPTS, DISCUSSION AND CRITICISM	
• A Brief History of the Morphometric Synthesis. Fred L. Bookstein	15
Contents.....	17
Abstract	18
Introduction	19
Biometric Analyses of Size and Shape Measures	20
The Study of Shape Transformation.....	23
The Morphometric Synthesis 1983-1989	26
Lessons from History	34
Acknowledgements.....	37
References	37
• On Three-Dimensional Morphometrics, and on the Identification of Landmark Points. V. Louise Roth	41
Contents.....	43
Abstract	44
Introduction	45
Three Dimensions into Two.....	46
Orienting Specimens	47
Reconstructing 3 Dimensions from 2-D Images.....	50
The Choice of Features to be Used in a Comparison.....	51
Fundamental Requirements for Specifying the Locations of Landmark Points.....	53
Acknowledgements.....	59
References	59
 Part Two : DATA ACQUISITION	
• Building your own Machine Image System for Morphometric Analysis: A User Point of View. José M. Becerra, Elisa Bello & Antonio Garcia-Valdecasas	65
Contents.....	67
Abstract	68
Introduction	69
Machine Image Systems: An Overview	69

	Page
Criteria for a Machine Image System	71
Hardware	74
Video cameras	75
Still video and digital cameras.....	77
Scanners	78
Digitizers	78
Personal Computers (PCs).....	79
Monitors	80
Additional hardware	80
Images storage	81
Software	81
Software for data and image acquisition	81
Software for image transformation and compression	82
Test on Resolution, and Measurement Precision	
and Accuracy	83
Focal lenght and working distance selection	85
Software and accuracy	87
Conclusion	89
Acknowledgements.....	90
Appendix.....	90
References	91

Part Three: METHODOLOGY AND SOFTWARE

• Some Aspects of Multivariate Statistics for Morphometrics.	
Leslie F. Marcus	95
Contents.....	97
Abstract	98
Introduction	99
The Singular Value Decomposition and the Biplot.....	101
Hotelling's T^2 and Student's t	122
Analysis of Variance and Multivariate Analysis	
of Variance	125
Acknowledgements.....	127
References	129
• Relative Warp Analysis and an Example of its Application to	
Mosquito Wings. F. James Rohlf	131
Contents.....	133
Abstract	134

	Page
Introduction	135
The Method of Relative Warps.....	135
Computation of relative warps.....	136
Graphical presentations of the results of a relative warp analysis.....	140
Choice of metrics	143
Analysis of affine variation.....	144
An Example of Relative Warp Analysis Applied to Mosquito Wings	146
The dataset.....	146
Relative warps analysis, with $\alpha = 1$	148
Relative warps analysis, with $\alpha = 0$	152
Discussion.....	156
Acknowledgements.....	158
References	158
 • The Fractal Analysis of Shape. Dennis Slice	 161
Contents.....	163
Abstract	164
Introduction	165
Fractals and Fractal Analysis	166
What is a fractal?.....	166
What is fractal analysis?.....	168
Applications of fractal analysis in biological sciences.....	171
An Example	173
Materials and methods	174
A naive analysis.....	175
Reanalysis	179
Figure 4 revisited	181
Special Considerations.....	181
Data resolution.....	182
Step size distribution.....	183
Starting location	186
Standardization	186
Nonlinearities.....	188
Conclusion	188
Acknowledgements.....	189
References	189

Part Four: APPLICATIONS

• Ontogenetic Allometry of Threespine Stickleback Body form Using Landmark Based Morphometrics. Jeffrey A. Walker	193
Contents.....	195
Abstract	196
Introduction	197
Methods.....	199
Sample.....	199
Measurements	200
Allometry Paths.....	201
Variations	203
Results	204
Discussion.....	206
Acknowledgements.....	210
References	210
• Landmark Data: Size and Shape Analysis in Systematics. A Case Study on Old World Talpidae (Mammalia, Insectivora). Anna Loy, Marco Corti & Leslie F.	215
Contents.....	217
Abstract	218
Introduction	219
Material and Methods	220
Results	224
Measurement error	224
Sexual dimorphism.....	224
Population comparisons: distances	226
Landmark shape comparisons	229
Discussion.....	237
Acknowledgements.....	238
References	239

APPENDICES

• Knowledge for nothing: internet and bitnet resources. José M. Becerra	241
• Software. Leslie F. Marcus	257