CONTENTS

	Preface	xiii
	Contributors	xvii
	Nomenclature	XX
PAF	RT I. DEVELOPMENT	
	Introduction	1
1.	Ecology of Passerine Song Development Donald E. Kroodsma	3
	Ecology and evolution in the laboratory? 4 A comparative approach to the ecology of vocal development 6 Evolution of vocal learning 10 Ontogeny, repertoires, and geographic variation among songbirds 11 Conclusions 19	
2.	Eco-gen-actics: A Systems Approach to the Ontogeny of Avian Communication Meredith West and Andrew King	20
	Songbirds: variations on too many themes? 21 Learning to walk: uncovering new pathways 22 Ecogenactics: uniting forces for change 24 Ecogenactics: the heuristics of change 37	
3.	Nature and Its Nurturing in Avian Vocal Development Luis F. Baptista	39
	Repertoire size 40 Stimulus filtering 41 Sex differences in learning 43 What is learned 44 Conclusions 59	

4.	Michael D. Beecher	01
	Laboratory studies of song learning 62 Field studies of song learning 64 The song-learning strategy of the Song Sparrow 67 Conclusions 74	
5.	Acquisition and Performance of Song Repertoires: Ways of Coping with Diversity and Versatility	79
2.00	Dietmar Todt and Henrike Hultsch	
	Performance of song repertoires by wild nightingales 80 How birds acquire song repertoires 85 Performance of song repertoires by hand-raised nightingales 93	
	Conclusions 94	
6.	Acoustic Communication in Parrots: Laboratory and Field Studies of Budgerigars, Melopsittacus undulatus	97
	Susan M. Farabaugh and Robert J. Dooling	
	What do we know about the behavior and ecology of wild Budgerigars? 98 Vocal behavior of Budgerigars 104 Budgerigar perceptual studies 107	
	Vocal communication in Budgerigars and other parrots 110 Vocal communication in parrots and songbirds 113 Conclusions 115	
PAF	RT II. VOCAL REPERTOIRES	
	Introduction	119
7.	Categorization and the Design of Signals: The Case of Song Repertoires Andrew G. Horn and J. Bruce Falls	121
	The psychology of categorization 121	
	Playback as a tool for studying categorization 128 From categorization of displays to the organization of display repertoires 132	,
	Conclusions 134	
8.	Comparative Analysis of Vocal Repertoires, with Reference to Chickadees Jack P. Hailman and Millicent Sigler Ficken	136
	How many types of vocalizations are in a repertoire? 137 How is vocal variety characterized? 140 Are repertoire elements evolutionarily correlated characters? 143	
	What information does variation encode? 144 Do related species have similar repertoires? 147 What difficulties arise in equating vocalizations? 150	

	How do species' repertoires differ? 151 What is "song" and how did it evolve? 154 What else can comparative studies offer? 157 Conclusions 158 Note on Terminology 159	
9.	Acoustic Communication in a Group of Nonpasserine Birds, the Petrels Vincent Bretagnolle	160
	Life histories and ethology of petrels 161 The nature and diversity of petrel vocal repertoires 162 Ontogeny and physical structure of calls, and possible effects of the environment 167 Pair formation and sexual selection 171 A major constraint on petrel calls: coding and decoding messages within a single call 175 Conclusions 176	
PAI	RT III. VOCAL VARIATION IN TIME AND SPACE	
	Introduction	179
10.	The Population Memetics of Birdsong	181
	Alejandro Lynch	
	Cultural evolution of birdsong 181 Applications 191 Conclusions 195	
11.	Song Traditions in Indigo Buntings: Origin, Improvisation, Dispersal, and Extinction in Cultural Evolution	198
	Robert B. Payne	
	Songs in a population of Indigo Buntings 199 Cultural evolution and birdsong 211 Conclusions 218	
12.	Vocalizations and Speciation of Palearctic Birds Jochen Martens	221
	Song constancy over large regions 222 Hybrid zones where regiolects come into contact 223 Parapatry of regiolects and local hybrid barriers 227 Constancy of acoustic characters across species boundaries 231 Reasons for acoustic changes 233 Acoustic changes on islands 235 Hypotheses 236 Discussion 237	
	Conclusions 238	

13.	Acoustic Differentiation and Speciation in Shorebirds	241
	Edward H. Miller	
	Background accounts: systematics and acoustics 242 Homologous features 245	
	Microevolutionary processes and patterns 247 Phylogenetic analysis 251 Conclusions 256	
14.	A Comparison of Vocal Behavior among Tropical and Temperate Passerine Birds	258
	Eugene S. Morton	
	Duetting, pair-bonds, and territoriality 259 Breeding synchrony and the evolution of extra-pair fertilization behavior 263 Factors associated with ranging, comparing tropical and temperate birds 265 Conclusions 268	
15.	Study of Bird Sounds in the Neotropics: Urgency and Opportunity	269
	Donald E. Kroodsma, Jacques M. E. Vielliard, and F. Gary Stiles	
	The urgency 270 Extraordinary opportunities 275 Conclusions 280	
PAR	RT IV. CONTROL AND RECOGNITION OF VOCALIZATIONS	
	Introduction	283
16.	The Neuroethology of Birdsong	285
	Eliot A. Brenowitz and Donald E. Kroodsma	
	The song control system in the oscine brain 286	
	The anterior forebrain pathway and song learning 286	
	Sex differences in song behavior and the song control system 291	
	Steroid hormones and the oscine song control system 292 Comparative studies of the neuroendocrine control of vocal behavior 294	
	Evolution of the vocal control system 295	
	Brain space for learned song 297	
	Plasticity in the song system 301 Conclusions 303	
17		205
17.	Organization of Birdsong and Constraints on Performance	305
	Marcel M. Lambrechts	
	Song organization in the Great Tit 305 Constraints on time components of song 307	
	Does energy or physiology constrain time components of song? 310	
	Constraints on composition and frequency components of song types 313 Does physiology or morphology constrain frequency components of song? 31	4

	Motor constraints and the evolution of birdsong 316 Conclusions 318	
18.	Bird Communication in the Noisy World	321
	Georg M. Klump	
	The mechanism of the detection of signals in noise 322 The active space of Red-winged Blackbird song: a case study 323 Common procedures used in laboratory studies on signal detection in noise 3 The bandwidth of bird auditory filters: critical masking ratios and critical bandwidths 327 Spectro-temporal release from masking 331 Spatial release from masking 334 The recognition of signals 335 Conclusions 337	24
19.	Sex Differences in Song Recognition Laurene Ratcliffe and Ken Otter	339
	Sex differences in song recognition 340 Is there evidence for sex differences in song recognition? 343 Relative pitch recognition in male and female Black-capped Chickadees 348 Conclusions 353	
20.	Vocal Recognition of Neighbors by Territorial Passerines Philip Kraft Stoddard	356
	Methods and assumptions of neighbor recognition studies 357 Do song repertoires interfere with recognition of neighbors? 368 Does song sharing affect recognition of neighbors? 370 True recognition or habituation to neighbor song? 372 Conclusions 372	
PAF	RT V. THE BEHAVIOR OF COMMUNICATING	
	Introduction	375
21.	Using Interactive Playback to Study How Songs and Singing Contribute to Communication about Behavior W. John Smith	377
	The underlying perspective 378 The initial comparative project 380 Further development of the comparative project 386 Conclusions 395	
22.	Dynamic Acoustic Communication and Interactive Playback	398
	Torben Dabelsteen and Peter K. McGregor	
	Vocal interactions within dyads of males 399	

	Designing and interpreting interactive playback 401 Future applications of interactive playback 405 Conclusions 407	
23.	Communication Networks	409
	Peter K. McGregor and Torben Dabelsteen	
	Background 409 Implications for signalers: directing and restricting signals 411 Implications for receivers: eavesdropping 413 Implications for signalers and receivers: alarm calls 416 Methods for studying networks 418 Wider implications of networks 422 Conclusions 424	
24.	The Dawn Chorus and Other Diel Patterns in Acoustic Signaling	426
	Cynthia A. Staicer, David A. Spector, and Andrew G. Horn	
	Hypotheses 427 Patterns 440 Toward a synthesis 449 Conclusions 452	
25.	Song and Female Choice	454
	William A. Searcy and Ken Yasukawa	
	Evidence for song preferences 455 Review of theory 460 Evolution of song preferences 467 Conclusions 472	
App	pendix. Natural Sound Archives: Guidance for Recordists and a Request for Cooperation	474
	Donald E. Kroodsma, Gregory F. Budney, Robert W. Grotke, Jacques M. E. Vielliard, Sandra L. L. Gaunt, Richard Ranft, and Olga D. Veprintseva	
	Current sound archives 476 What to include in natural sound archives 476 Documentation of recordings, or how to keep order 479 Recommendations for tape-recording wildlife sounds 479 Recommendations for storing tape collections 483 Obligations of major archives 485 Advice to the beginner (and the virtuoso) 486	
	Literature Cited	487
	Subject Index	565
	Taxonomic Index	576