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Symposium 26 How birds sing

Introduction

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Birds possess a highly sophisticated communication system in the form of vocal signals. In recent years, the question of how these signals are produced has gained increasing attention. Intrinsically, this question is of great interest: how do birds produce their sometimes amazingly complex and varied vocalizations? Extrinsically, the question is highly relevant to other aspects of vocal communication. Thus, if one wants to understand the neurobiology of song and song learning, insight is needed as to how neural activity is translated into vocal signal. If, moreover, one needs to understand why particular vocalizations or vocal traits are correlated with singer quality, knowledge of causal links between physiology, morphology and sound production in the singer is essential.

Until recently, theories and models concerning the way birds vocalize were based on indirect evidence from analyses of the structure of vocalizations and inferences from syrinx morphology, combined with insights from physics. A major stumbling block to testing the models lay in the impossibility of examining sound production in a vocalizing bird because experimental interference prevented birds from singing. New technologies, however, now enable direct measurements of the processes occurring within an actively singing bird - an important and exciting breakthrough. Combined with data from increasingly sophisticated analyses of vocal signals, the ideas about how birds sing has changed rapidly. Several traditional hypotheses on vocal production have been proven wrong, and new ones are emerging. These concern, inter alia, such issues as the contribution of left and right halves of the syrinx to song production, the role of lateral labia rather than medial tympaniform membranes as prime sound sources, the role of vocal tract resonance in modulating the sound, and the discovery of nonlinear processes involved in sound production.

This symposium updates our understanding of vocal production in birds, bringing together studies on both songbirds and non-songbirds. The contributions deal with the mechanisms involved in sound production and add insights into how birds sing, demonstrating that knowledge about sound producing mechanisms can provide new perspectives on the function and evolution of vocalizations and, at the same time, raise new questions.