

Preface

Copeia has maintained a manuscript category entitled “Comments” for some time, but with little usage. In order to spur interest in the journal via exchange of ideas on timely topics of particular interest to the readership, I have solicited the following commentaries on the topic of evidence in phylogenetic systematics. The opening comment was written in early 2009 in response to Mooi and Gill’s abstract and oral presentation at the 2008 ASEH meetings in Montreal. In the future, I expect to publish such comments and debates on a semi-regular basis and invite any and all readers with suggestions and contributions for potential consideration to contact me in advance of manuscript submission.—Scott Schaefer, *Editor*.

The Transitioning State of Systematic Ichthyology

Prosanta Chakrabarty¹

THE publication of Smith and Craig’s (2007) percomorph phylogeny has sparked a controversy within the systematic ichthyology community (Mooi and Gill, 2008). This controversy reveals a substantial rift between some classically trained ichthyologists that only trust morphology and those ichthyologists comfortable with using morphology and modern molecular systematics. Although no rebuttal or criticism has been published to Smith and Craig (2007), the fish systematics sessions at the 2008 Joint Meeting of Ichthyologists and Herpetologists implied that an open debate about the direction of our field is in order. The 2008 meeting included lively (sometimes contemptuous) debate, and revealed that some think that systematic ichthyology is moving too quickly from its rigorous organismal roots into a messy era of molecular taxonomy. The real point of contention is over what kinds of data are acceptable as evidence for changing higher-level fish taxonomy. Mooi and Gill (2008) state, “Altering taxonomy based on such fluid constructs [molecular characters] is problematic, particularly as there has been no attempt to provide character definitions for identified groups based on testable synapomorphies.” I argue that contrary to this statement, Smith and Craig’s (2007) contribution is more transparent in showing tested evidence derived from phylogenetic analysis than other well known higher-level systematic studies in ichthyology.

What is controversial about Smith and Craig’s (2007) publication was not necessarily the phylogenetic relationships they recovered but their revision of long-standing percomorph taxonomy using a phylogeny derived from molecular characters. Although the relationships presented in Smith and Craig (2007) were in some cases surprising, they are generally comparable to what others have recently recovered (Dettl and Lecointre, 2004; Miya et al., 2005; Smith and Wheeler, 2006).

Mooi and Gill (2008) argued against Smith and Craig (2007), and similar molecular work, insisting that synapo-

morphies were not presented and that support indices (bootstrap, Bremer, etc.) are mistakenly used to measure phylogenetic robustness—in lieu of homology. Mooi and Gill state, “Without evidence (characters) for nodes, there is no way to choose among these competing topologies.” Mooi and Gill’s (2008) call to present phylogenies with molecular characters mapped onto them is shortsighted, and their notion that statistical support is the sole metric for comparison of molecular phylogenies is wrong. Although molecular and morphological characters are utilized equally in support of hypotheses of relationships, molecular characters cannot be presented in the same way on a phylogeny because of the enormous number of transitions associated with these data. Molecular characters are typically represented as 5 character states, (e.g., A, C, T, G; insertion/deletion) and are characteristically highly homoplasious over large-scale phylogenies (i.e., consistency indices of ≤ 0.3 are typical). Little can be learned from displaying all transitions and transversions onto a molecular phylogeny, except that there are many of them on each node. What Mooi and Gill are perhaps arguing for is better transparency in these molecular phylogenies so that the evidence can be more easily examined. To this, I would argue that phylogenies such as Smith and Craig (2007) are far more transparent, repeatable, and scientific than our previous standard. Our previous standard for what justified rearranging and naming higher-level fish taxonomy included phylogenies derived from subjective evolutionary taxonomy. These early attempts do not represent the products of phylogenetic analyses as they lacked optimality criteria for choosing among alternative hypotheses of relationships.

The higher-level percomorph relationships that have been most cited in ichthyology (Greenwood et al., 1966; Rosen, 1973; Lauder and Liem, 1983) are important summaries of how morphological features are distributed among a scattering of taxa, but not from any formal analysis of features (i.e., the relationships are not derived from

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Submitted: 24 September 2008. Accepted: 24 May 2010.

© 2010 by the American Society of Ichthyologists and Herpetologists DOI: 10.1643/07-10-087a

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Table of Contents Systematic Ichthyology

1. Understanding the eBook Systematic Ichthyology
 - The Rise of Digital Reading Systematic Ichthyology
 - Advantages of eBooks Over Traditional Books
2. Identifying Systematic Ichthyology
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Systematic Ichthyology
 - User-Friendly Interface
4. Exploring eBook Recommendations from Systematic Ichthyology
 - Personalized Recommendations
 - Systematic Ichthyology User Reviews and Ratings
 - Systematic Ichthyology and Bestseller Lists

5. Accessing Systematic Ichthyology Free and Paid eBooks
 - Systematic Ichthyology Public Domain eBooks
 - Systematic Ichthyology eBook Subscription Services
 - Systematic Ichthyology Budget-Friendly Options
6. Navigating Systematic Ichthyology eBook Formats
 - ePub, PDF, MOBI, and More
 - Systematic Ichthyology Compatibility with Devices
 - Systematic Ichthyology Enhanced eBook Features
7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Systematic Ichthyology
 - Highlighting and Note-Taking Systematic Ichthyology
 - Interactive Elements Systematic Ichthyology
8. Staying Engaged with Systematic Ichthyology
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Systematic Ichthyology
9. Balancing eBooks and Physical Books Systematic Ichthyology
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Systematic Ichthyology
10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine Systematic Ichthyology
 - Setting Reading Goals Systematic Ichthyology
 - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Systematic Ichthyology
 - Fact-Checking eBook Content of Systematic Ichthyology
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning

- Utilizing eBooks for Skill Development
- Exploring Educational eBooks

14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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