

# ***Notes on the Reconstruction of Extinct Animals***

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The webtext is divided into four sections covering each of the major categories of methodologies in paleobiology. Links are provided within the webtext to articles in the literature that employed specific methodologies.

## **Section 1: Paradigms Lost & Found (basic techniques)**

- Methods of Reconstruction
  - Analogies & Homologies
    - Cladistics
    - Soft Tissue Correlates
  - Modeling
  - Contextual Evidence
- Morphospace & Axes of Variation
- Levels of Reliability
- Fossilization & Information Loss
  - History of a Fossil
  - Informational Biases
  - Fossilization Environments
  - Preservation Potential
  - Preservational Processes
- Animal Form & Function
  - Symmetry
  - Embryonic Body Plans
  - Heterochrony
  - Thermal Strategies

## **Section 2: The Problems of Size (scaling relationships)**

- Simple Shapes
  - General Measurement Equation
  - Non-Linear Scaling
  - Isometry and Independence
  - Allometric Scaling
- Complex Shapes
  - Fractal Measurement Equation

- Fractal Scaling
- Types of Allometry
- Geometric vs. Dynamic Similarity
- Decoupled Scaling
- Complications

### **Section 3: The Quest for Speed (locomotion)**

- Adaptations to Sessility
  - Conical Armor
  - Lidded, Plicate Apertures
  - Positioning & Attachment Structures
  - Other Innovations
  - Other Sessile Animals
- Biomechanics of Swimming
  - Streamlining
  - Water Displacement
    - Recoil Locomotion
    - Axial Locomotion
    - Appendicular Locomotion
- Biomechanics of Running
  - Leg Postures
  - Foot Postures
  - Estimated Walking and Running Speeds
- Biomechanics of Flying
  - Airfoils
  - Aspect Ratio and Wing Loading
  - Passive Flight
  - Powered Flight
    - Flapping Flight
    - Slope Soaring
    - Thermal Soaring
  - Wing Beat Frequency

### **Section 4: Ingestion by Any Means Possible (feeding)**

- Suspension Feeding
  - Sieving
  - Aerosol Filtration Theory
- Raptorial Appendages
  - Mechanical Advantage
  - Velocity Ratio
- Herbivores vs. Carnivores
  - Jaw Morphology
  - Tooth Morphology and Dentitions

- Sense Organs
  - Digestive Tracts
- Dietary Evidence
  - Cololites, Coprolites and Bromalites
  - Bite Marks and Boreholes
  - Tooth Damage
  - Phytoliths
  - Molecular Evidence