2 Derek Turner

- **Introduction**
  - Lewis, asymmetry of overdetermination: later affairs seldom overdetermine earlier affairs, but earlier affairs usually overdetermine later affairs
  - Cleland: asymmetry means historical science is epistemically equal to experimental science
  - Author : 1. Cleland's conclusion doesn't follow from asymmetry of overdetermination; 2. Historical science is epistemically inferior to experimental science in one sense
- **Lewis on Asymmetry of Overdetermination**
  - Defines overdetermination and argues it is asymmetrical between past and future
  - This is a metaphysical thesis, not epistemological
- **Cleland's Argument**
  - Historical science exploits overdetermination of past by present
  - Experimental science copes with underdetermination of future by past
  - Therefore, the two methods are epistemically equal
- **Why Causal/Metaphysical Overdetermination Does Not Rule Out Epistemic Underdetermination**
  - Example of broken window : local underdetermination.
    - shows asymmetry of overdetermination is compatible with epistemic underdetermination
- **Local Underdetermination Problems in Historical Science**
  - local underdetermination problem: *incompatible, empirically equivalent theories*
  - Examples: a) Caytonia plant structure (tree, vine, shrub, or herb?) b) Relating dinosaur footprints to skeletal taxonomy c) Snowball Earth vs. high-obliquity hypothesis for Neoproterozoic glaciation d) Adaptationist hypotheses for avocado fruit evolution
- **How Historical Processes Destroy Information**
  - Many geological/historical processes destroy information (e.g., fossilization, erosion)
  - This leads to underdetermination in historical science
- **temporary underdeterminism: A Fossilized Dinosaur Heart->**
  - But still illustrates power of background theories about information destruction
  - Leads to new underdetermination problems (e.g., evolution of dinosaur hearts)
- **The Roles of Background Theories in Historical vs. Experimental Science**
  - In historical science, background theories limit epistemic ambitions
  - In experimental science, background theories expand epistemic possibilities
  - This difference leads to more underdetermination in historical science-> epistemically inferior
- **Conclusion**
  - Asymmetry of overdetermination doesn't support Cleland's conclusion
  - Different roles of background theories give reason to think historical science is epistemically inferior in one sense
  - Author doesn't claim historical science is less scientific or less worthy, only that it faces more local underdetermination problems

3 Wylie

1. **Introduction**
   - Underdetermination of theory by data is well-known in philosophy of science

- Data and potential data are also underdetermined
- Vertebrate fossils as a case study of underdetermined potential data
  - Fossils embedded in rock, requiring expert judgment to distinguish
  - Preparators use nonstandard techniques to reveal fossils
- Research question: How do scientists overcome underdetermination of potential data?
- Methodology: Ethnographic study of paleontology laboratories

2. **How specimens are underdetermined**
   - Fossil preparation involves subjective decisions about fossil vs. rock
     - Example of trace fossils being overlooked
   - Preparators use nonstandard, individualized techniques
     - Lack of universal training, credentials, or manual
   - Scientists omit preparation details from publications
     - Contrast with other sciences that detail data preparation methods
3. **How specimens are made**
   - Example of "good" preparation: Jay's work
     - Microsorting to find tooth fragments
     - Repairing a horse ancestor skull
   - Example of "bad" preparation: Henry& Accidental damage to new dinosaur species
     - Volunteer preparator mistook snout for rock
     - Scientists had to explain damage in publication
   - Example of suspicious preparation: Archaeopteryx controversy
     - Accusation of fraud by Hoyle and Wickramasinghe
     - Defense by museum staff and preparator
4. **How specimens are made reliable**
   - Currently: 1)Separating data producers from data interpreters
   - Comparison to bubble chamber operators and Manhattan Project workers

- 2. Omitting preparation details from publications
  - Creates distance between preparation and knowledge claims
- Proposed solution: preparators write Unpublished preparation records
  - List of tools, materials, techniques, and preparator's name
  - Added to internal specimen databases
  - Referenced in publications

5. **Conclusion**
   - Three layers of underdetermination: theory, data, and potential data
   - Underdetermination as a potential strength: relevance to more research
   - Need for transparency about how specimens and data are made
   - Creating preparation records would improve specimens' epistemic value
     - Preserves separation of preparation and research
     - Provides crucial information for understanding specimens