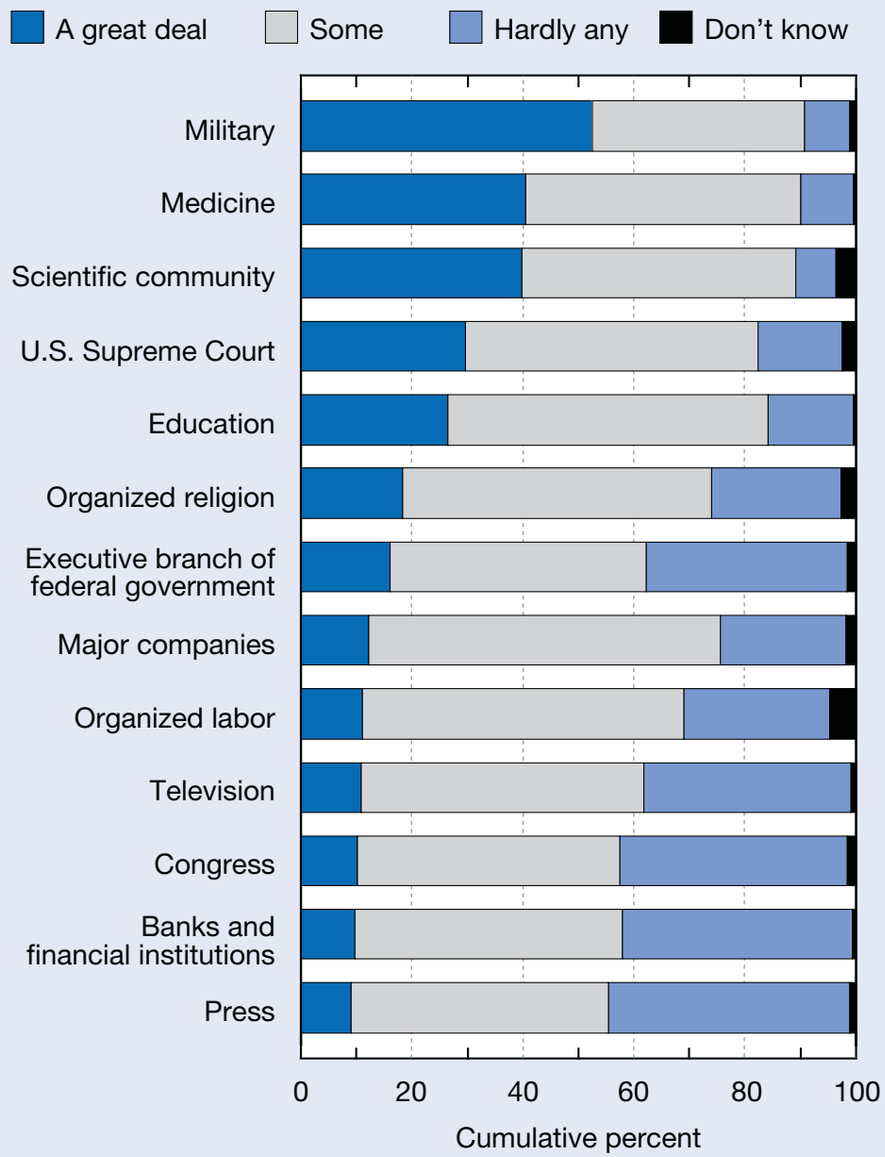
Public Trust in Science

Figure 7-15
Public confidence in institutional leaders, by type of institution: 2010

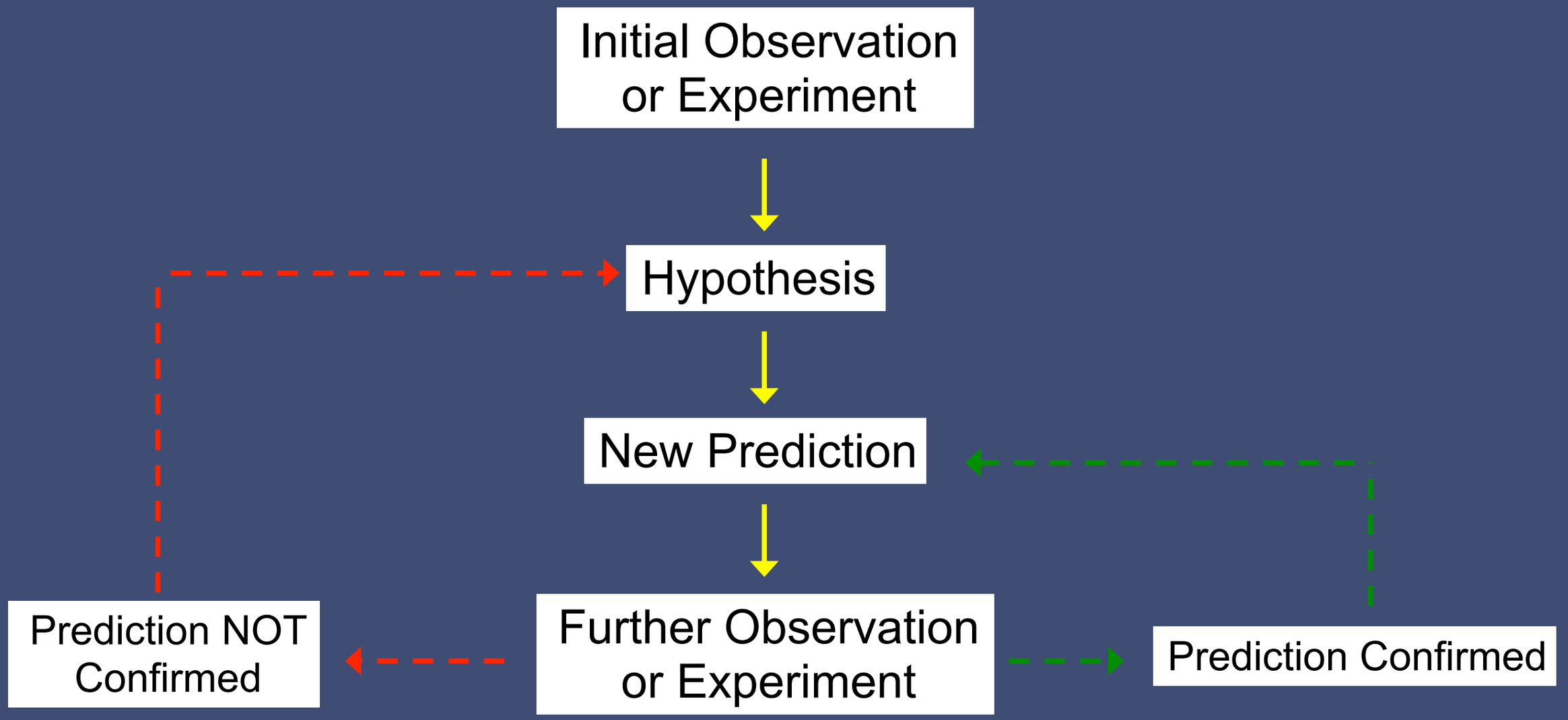


NOTE: Responses to *As far as the people running these institutions are concerned, would you say that you have a great deal of confidence, only some confidence, or hardly any confidence at all in them?*

SOURCE: University of Chicago, National Opinion Research Center, General Social Survey (2010). See appendix table 7-27.

Science and Engineering Indicators 2012

Scientific Method



If a ***single*** reliable, repeatable experiment disagrees with the predictions of a theory or hypothesis, then the theory or hypothesis ***must*** be discarded or modified

Scientific Method

- A scientist observes a new phenomenon that disagrees with her explanation or hypothesis. Following the scientific method, she should

A) Reject the observation since it does not agree with the theory.

B) Wait until someone develops an adequate explanation before announcing her observation.

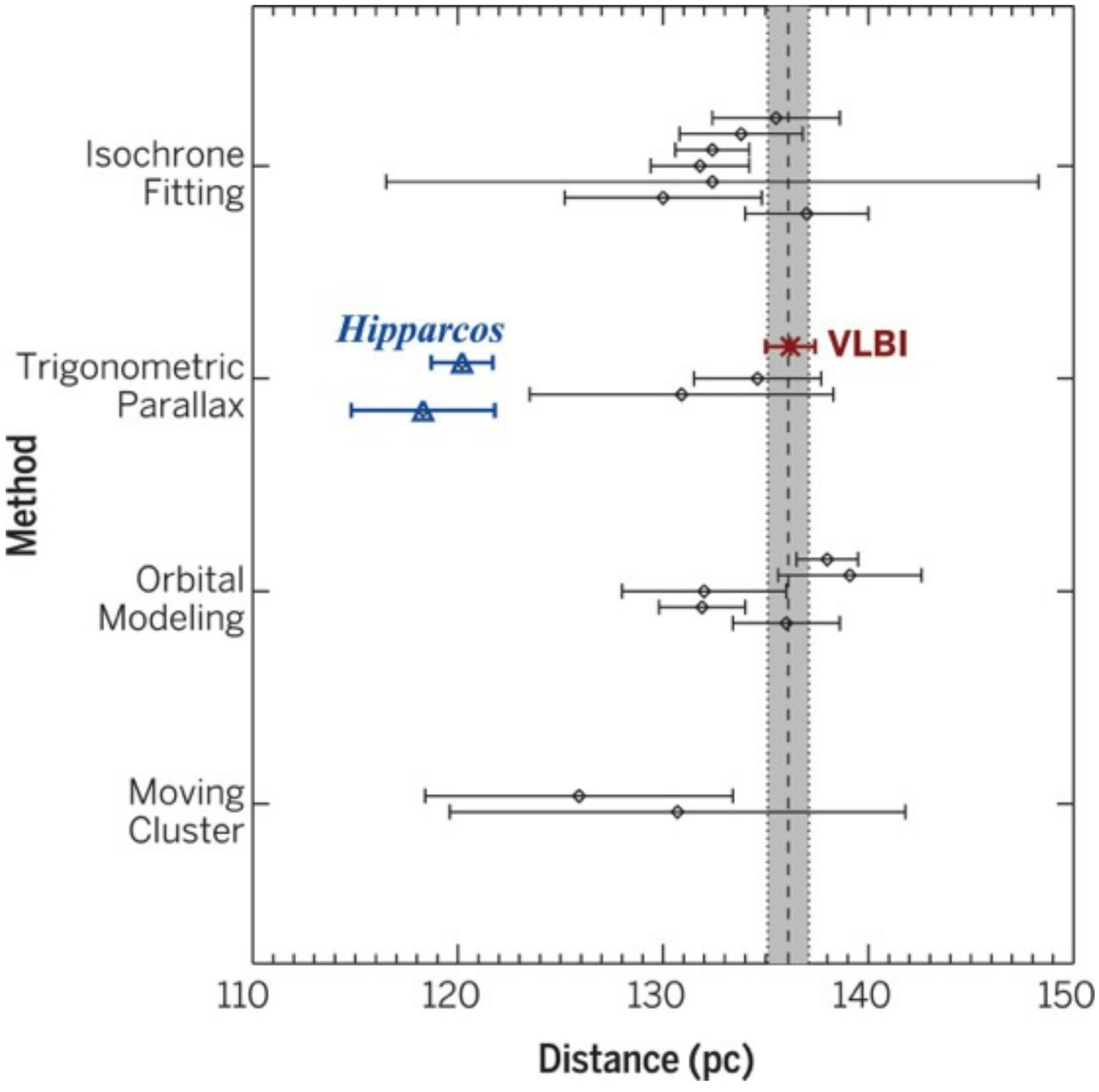
C) Do more experiments until she finds one that agrees with the theory.

D) Modify her hypothesis.

Scientific Method

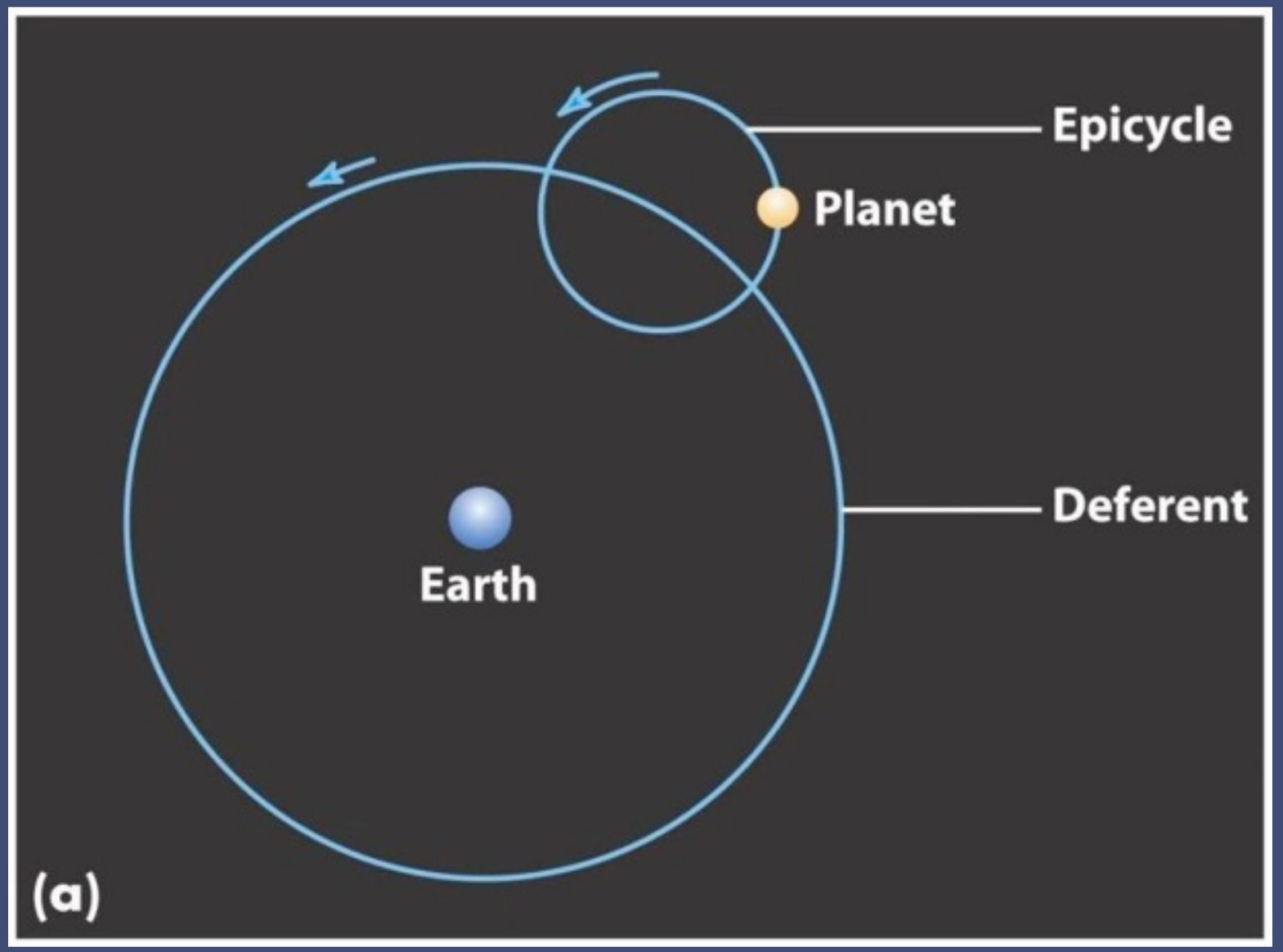
- Science is ***not*** just a collection of facts & figures
- It is really a ***process***
  - This is why astronomy (or any other hard science) is an important component of a liberal arts education
    - develop critical thinking and reasoning skills

Fig. 1 Pleiades cluster distances.Summary of Pleiades distances obtained through various methods.



C Melis et al. Science 2014;345:1029-1032

Epicycles & Deferents



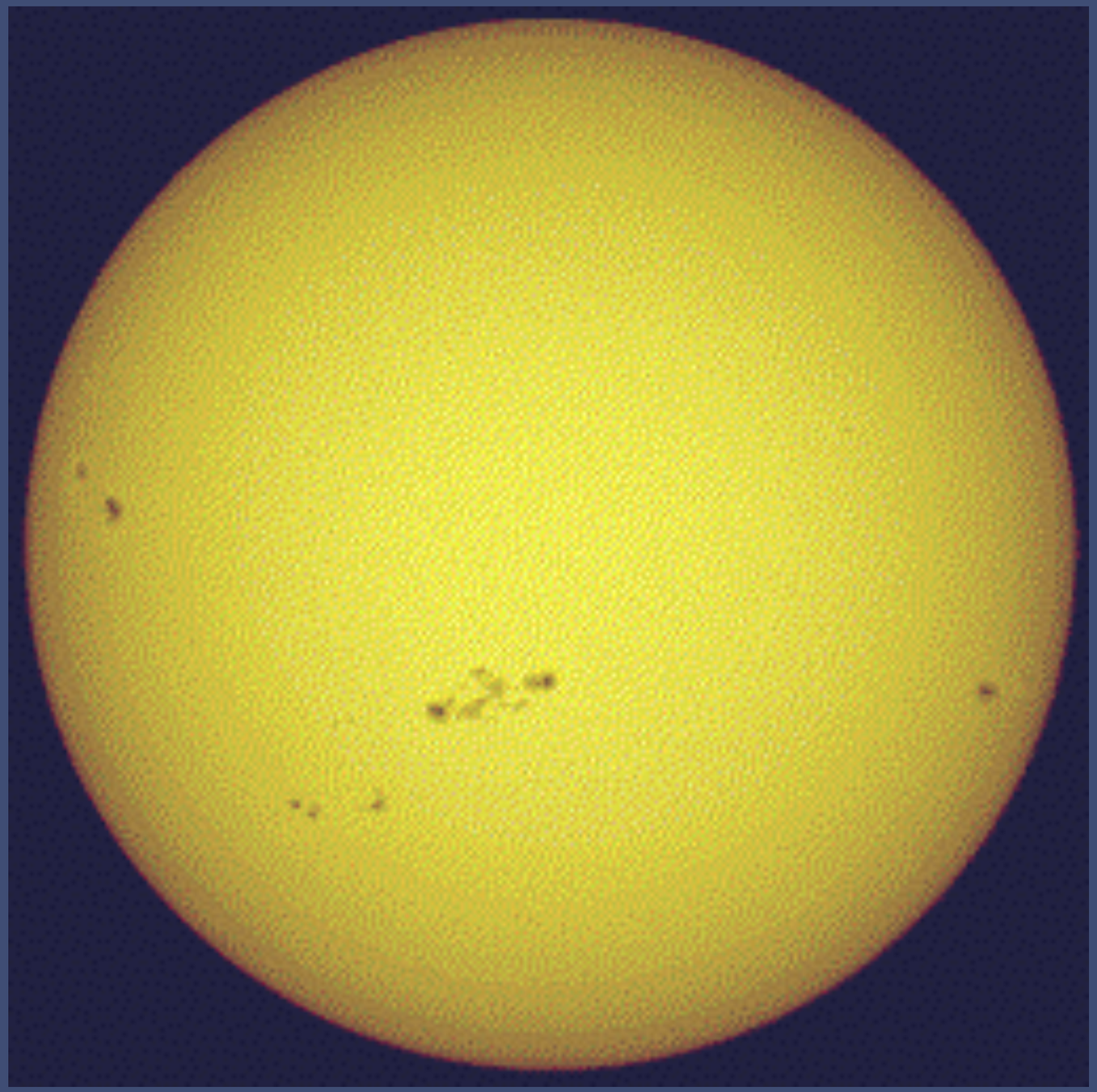
- Both models (Ptolemaic & Copernican) used epicycles & deferents
  - Needed in Ptolemaic model to explain retrograde motion and variable speed of planets across sky
  - Needed in Copernican model to explain variable speed of planets across sky

Galileo’s discoveries

- Moon has mountains

Galileo's discoveries

- Sun has spots



Galileo’s discoveries

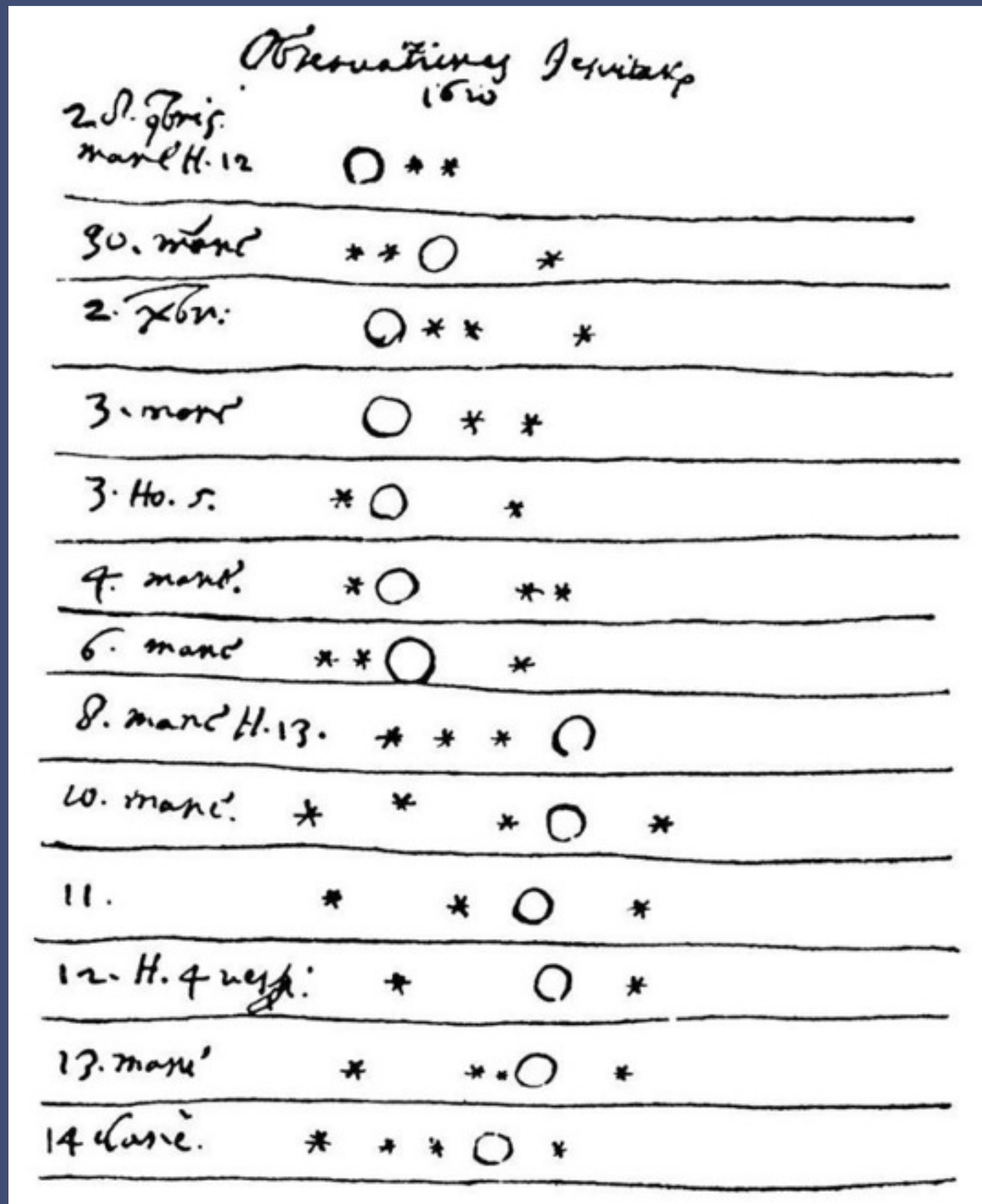
- Saturn has rings

Galileo's discoveries

- Milky Way is a collection of stars

Galileo's discoveries

- Jupiter has 4 large moons

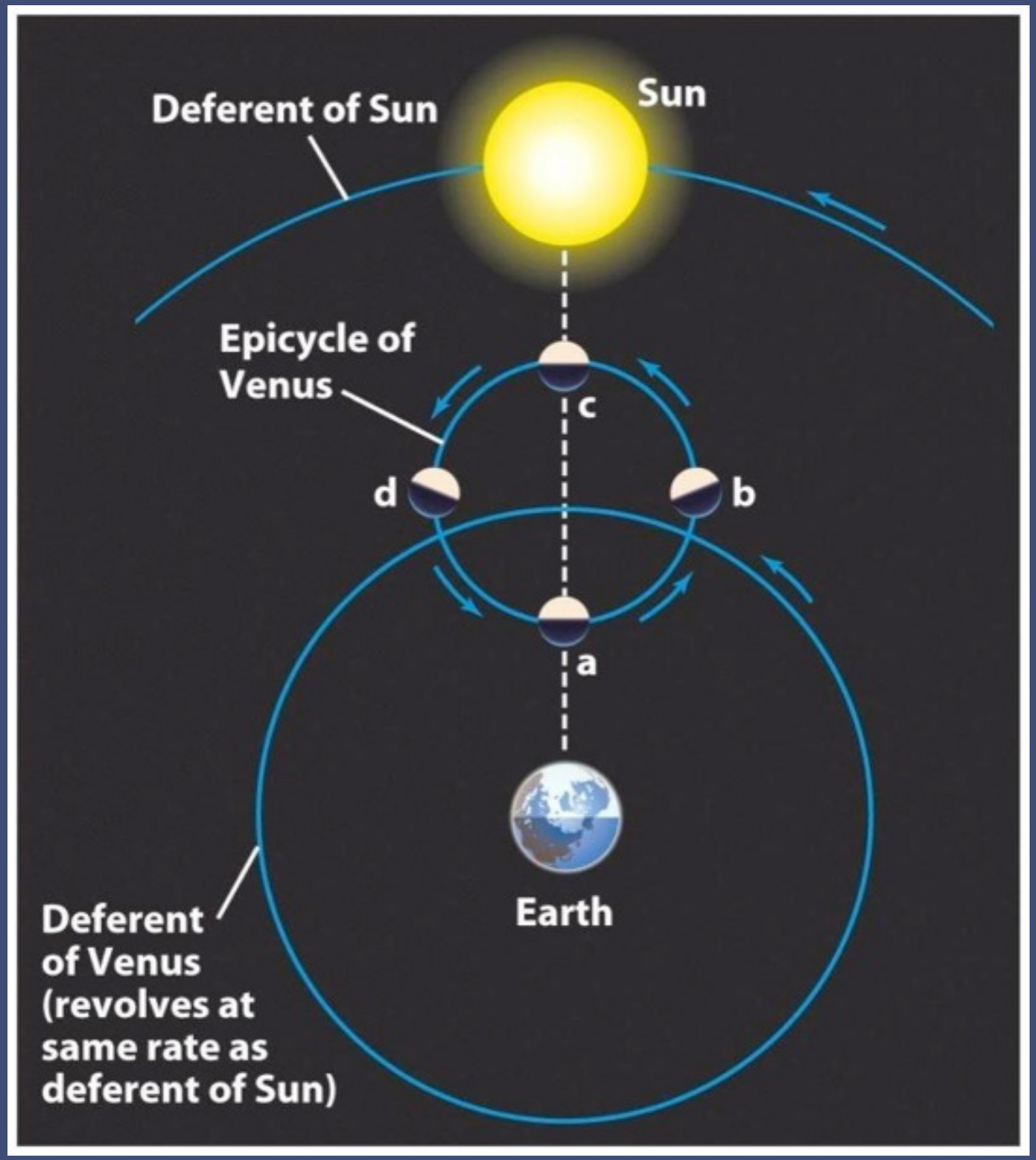


Galileo's discoveries

- Venus experiences phases like Moon

Phases of Venus

- Geocentric Model
  - –Venus is always found close to the Sun in the sky
  - –Sun & Venus must move along deferents at the same rate
  - –Can never observe "full" Venus



Phases of Venus

- Heliocentric Model
  - –Venus is always found close to the Sun in the sky
  - –Venus must be an inferior planet