

‡9 Tycho Detects Ptolemy's 1000-Star Theft:

Thus Precisely Demonstrating 100^y Into the Future the Magic Astronomy Pioneered: PREDICTION High-Accuracy Precession Discovered At Last — Without Telescope or Reliable Timepieces Tycho's Theft-Exposure Enables Pioneer Advance

A Tycho's Ptolemy Exposé Discovers Correct Precession

A1 Tycho Brahe is best remembered among scientists for his improvement of the theory of the Moon's motion, reducing lunar tabular errors from the order of a degree to a matter of a few arcmin. When attempting like improvement in stellar astronomy, he found that the prediction of stars' places was confused by medieval theories ("trepidation"), simultaneously complicated, contrived, & inadequate. He discerned that the confusion's source was simple: Ptolemy's clumsy fakes, whose grossly false star positions were due to his having stolen Hipparchos' 1025 star catalog, while mis-precessing its celestial longitudes — causing a mean error exceeding a full degree in Ptolemy's version!

A2 Over the 2 2/3 century interval since Hipparchos' 128 BC catalog, Ptolemy for his own 137 AD catalog had precessed Hipparchos' stars at 1°/cy instead of the correct rate, 1°.38/cy. So, upon realizing that Ptolemy had "usurped" (J.Dreyer, Ed. 1913-1929 *Tychonis Brahe Opera Omnia* 3:337) Hipparchos' catalog, Tycho removed Ptolemy's 1°.1-flawed fakes from his data-base & thereby made the epochal discovery that precession was virtually constant. He ultimately figured that precession during the interval from Hipparchos to his own time had been 51''/year (vs actual average 50''.00/year over the 17 1/4 centuries), an error in precession of merely 2% (vs Ptolemy's error of nearly 30%). That Tycho's clever & unprecedented achievement isn't better known today is obvious: the unlocking key was his detecting a huge theft by Ptolemy, who persists as an untouchable sacred icon to today's selectively science-betraying science establishment: ‡8 §A2.

B A Few Tycho Fakes & Shortcomings

B1 By an odd irony a few stars ended up in Tycho's 1004-star catalog which were faked Ptolemy's way: precess the longitudes & leave the latitudes alone. The positions of the 1st six stars in Ophiuchus and the longitudes of all four in Centaurus were so generated. The methods of these fabrications are obvious from *DIO* 2.1 ‡4 Tables 1&2 (1992).

B2 While Tycho — as catalog supervisor — is technically responsible, it seems improbable that someone of such rigorously high standards would pollute with fakes his sacred mission of measuring the universe. His assistant, Christen Longberg ("Longomontanus") presumably knew that some among Tycho's team had cut corners, for he later issued a catalog that was a 777-star selection from Tycho's stars, deleting the suspect ones (& then some). [*Don't miss* Robert Van Gent's scrupulous listing of Tycho's complete star catalog, which even includes Kepler's supplement to it.] The moral difference between Ptolemy and Tycho is brought home by realization that Ptolemy's star catalog is 99% fabricated-plagiarized (mostly from Hipparchos) — while Tycho's is 99% non-fabricated.

B3 Despite the high precision of so much of Tycho's work, there are some oddities. His solar parallax (*DIO* 3 fn 70) was, ironically, for a solar distance of c.1000 Earth-radii, Hipparchos' value (*DIO* 1.3 eq.23), whose accuracy was exceeded even in an-

tiquity by the 10000 Earth-radii distance of Aristarchos-Archimedes and Poseidonios (www.dioi.org/au.pdf §C4).

B4 Generally, Tycho's adopted obliquity was (*DIO 3* fn 39&49) $23^{\circ}31'1/2$ for zodiacal stars, $23^{\circ}31'$ elsewhere (though actual obliquity then was $23^{\circ}29'1/2$), oddly erroneous for a fundamental quantity, presumably caused (*DIO 3* fn 70) by his error (§B3) in solar parallax. Tycho pretended not to be a heretical heliocentrist, by proposing that planets other than Earth went around the Sun — but ducking persecution by claiming that his planet-dominating Sun goes around the Earth! But, combining this oddity with his extremely high opinion of Copernicus, one may reasonably guess that Tycho was a heliocentrist who chose not to risk his good and productive life by saying so publicly.

C Daring to Predict: The Magic That Astronomy Pioneered

C1 Based on his $51''$ /year precession (vs $50''.20$ /year actually), Tycho precessed — 100^y into the future — a selection of 100 stars' positions taken from his decades-long-compiled 1601.03-epoch catalog of 1004 stars. The 100-star tables for 1601.03 & 1701.03 can be conveniently found at *DIO 3* Tables 22&23 (1993), in both equatorial&ecliptical coordinates, along with great-circle errors.

C2 Impressively, only 5 of the 100 stars in the 1701.03 table had great-circle errors exceeding $0^{\circ}.1$. (None of the 100 stars were that erroneous for 1601.03.) No one in the history of astronomy had previously been so able — not to mention so daring — as to commit himself that confidently. And justly. [Note added 2022/6/15. His massive predictive-success would not have worked unless he was right about Ptolemy, thus *we have a previously unperceived new test-proof of the fraudulence of The Greatest Astronomer of Antiquity*.] Such courage was characteristic of Tycho's forceful, aggressive personality. He defied convention by, e.g., neglecting to wed the mother of his children, and fighting a 1566/12/29 blade-duel with M.Parsbjerg that cost Tycho much of his nose. In this connexion, the rôle of chance in scientific history is discussed at ¶1 fn 27. (And see historian-of-science Victor Thoren's admirable 1990 biography of Tycho: *Lord of Uraniborg*, Univ Cambridge.)

C3 Tycho's achievements were the product of rigorous perfectionism, which resulted in a star catalog that was a virtual miracle, considering that its creation occurred without the use of pendulum clocks or telescopes. By repeated scrupulous measurements using *daylight* Venus as a stepping-stone, the longitude of his catalog's anchor star, Hamal (α Ari), was correctly placed with respect to the Sun (whose northward crossing of the Equator determines 0° longitude, the Vernal Equinox) — *to a minor fraction of an arcmin*. This was far better than competitor Wilhelm IV's $6'$ systematic error (J.Dreyer *Tycho Brahe: a Picture of Scientific Work in the 16th Century* pp.352-353) in his smaller star catalog — whose random error was, however, slightly better than Tycho's (Przemysław Rybka *Katalog Gwiazdowy Heweliusza*, Warsaw, Chap.4).

C4 Tycho's perfectionism inevitably led to aggravation that his star catalog had unavoidably missed all the stars south of the antarctic circle of his home island (Hven). He even went so far as to seek funds for cataloging stars around the celestial South Pole. (H.Ræder & E.&B.Strömgren 1946, Eds., *Tycho Brahe's 1598 Description . . . Instruments & Scientific Work* pp.114-115.) Tycho's rigor inclined him to principles that bear remembrance. One of his mottos was:

It's not what you seem, but what you are.

(On the wall of the Tycho Museum, pointed out by Danish scientist Hanne Dalgas Christiansen, during the 1994 May 28 Rawlins family visit to Hven.)

C5 And, directly to the heart of scholarship's value, lure, & transcendence (*DIO 3* p.3):

Neither wealth nor power, but only knowledge, alone, endures.