The Ptolemy-Venus Double-Date:  

erimentum Crookis

Are Ptolemy’s Argonauts Right: Did His Proofs HAVE to Cheat?

Were His Data REQUIRED to Contradict Each Other?

Are Admittedly Fabricated Data THE GREATEST Astronomy?

---

The Ptolemy-Venus Double-Date:  

Experimentum Crookis

Are Ptolemy’s Argonauts Right: Did His Proofs HAVE to Cheat?

Were His Data REQUIRED to Contradict Each Other?

Are Admittedly Fabricated Data THE GREATEST Astronomy?

---

The Ptolemy-Venus Double-Date:  

Experimentum Crookis

Are Ptolemy’s Argonauts Right: Did His Proofs HAVE to Cheat?

Were His Data REQUIRED to Contradict Each Other?

Are Admittedly Fabricated Data THE GREATEST Astronomy?

---

The Ptolemy-Venus Double-Date:  

Experimentum Crookis

Are Ptolemy’s Argonauts Right: Did His Proofs HAVE to Cheat?

Were His Data REQUIRED to Contradict Each Other?

Are Admittedly Fabricated Data THE GREATEST Astronomy?

---

The Ptolemy-Venus Double-Date:  

Experimentum Crookis

Are Ptolemy’s Argonauts Right: Did His Proofs HAVE to Cheat?

Were His Data REQUIRED to Contradict Each Other?

Are Admittedly Fabricated Data THE GREATEST Astronomy?

---

The Ptolemy-Venus Double-Date:  

Experimentum Crookis

Are Ptolemy’s Argonauts Right: Did His Proofs HAVE to Cheat?

Were His Data REQUIRED to Contradict Each Other?

Are Admittedly Fabricated Data THE GREATEST Astronomy?
A3 Swerdlow & Gingerich are religiously determined never to admit their blatantly obvious logical loss of the Ptolemy controversy. Now unambiguously cornered, the flush forces of OrthoDoxy7 have, in selfdelusional response to a long cascade of crushing evidential disasters for Ptolemy-cultcowdom,8 laboriously concocted a nimbly elaborate, mimmormaze-sinuous (note fn 61), and hilariously self-contradictory9 bluff — inventing out of pure nothing a claim that Ptolemy had no other choice but to commit a detailed and conscious fraud (an example certain worshippers have taken rather too much to heart). The Muffia’s: scenario: to establish Venus’ orbit, Ptolemy needed Venus in certain configurations that didn’t actually occur, so he “shaded” (fn 52) the observational data to make them happen. Well, even were this a well-founded proposal, it is no excuse for faking data. And the following paper now shows something further: besides being (fn 10) amoral & irrelevant, the apologists’ laweryesque defense-strategy excuse isn’t even true. I.e., no ancient scholar “needed” to forge specially-placed data, since easily-obtainable regular real data fully sufficed for determining Venuses’ elements (see §G), if an able mathematician were doing the data-analysis. Which suggests why Ptolemy (like the dimmer end of his curiously varied spectrum of modern defenders) never figured it out, though as we show within (§§D4-E13) the problem can be solved graphically with ease.

A4 DIO wishes to thank supercomputer specialist Dennis Duke (Florida State University) who, during a conversation of 2002/6/28, suggested that we should look into how the ancients actually could have determined Venus’ orbit. His mass-data method (§5) was 1st distributed just a few days later (early July). On 2002/7/18, DR’s Ptolemaic-math iterative

1 Those who have sales-pitched Ptolemy as The Greatest ancient astronomer (fn 10) have been increasingly exposed as having persistently and ineducably (fn 35 & Rawlins 2002B fn 3) confused secondary work with primary — thus promoting derivative, plagiarized, and laughably bungled work as the central pinnacle of immortal original ancient science. (Ptolemists are adamantly convinced that no core of their work included the high math analyses in the Almagest could be a mere plagiarist. They seem utterly unable to handle the following just-too-complicated-for-archons alternate-hypothesis: if Ptolemy plagiarized hundreds of admirable star-data [a point now universally regarded as at least probable], then: mightn’t he also have plagiarized the admirable math analyses?) The eminent institutions involved in this Upper-Deadwood-inspired crusade — which has entailed systematic suppression & censorship (by Schaefer 2002 p.40) shunnings of heretics — comprise a Who’s-Who of academe: Harvard (my own school), Yale, Princeton, Brown, U/Chicago, Cambridge, Oxford U Press — all implicated in a mass-imposition that continues to make little sense but (fn 20) lots of dollars.


8 While claiming that Ptolemy had to forge data to find Venus’ orbital elements, both apologists (Swerdlow 1989 p.31 & Gingerich 2002 p.73 Fig.I) caption (of course have to admit (since faking positions requires elements) that Ptolemy (secretly) got these elements some other way — which contradicts their entire he-had-to-use-fake-data-to-establish-elements premis. (Further details at fn 22 & fn 52.) With appropriately deep gratitude, we must ask: outside of Muffinose literature or Saturday Night Live’s ornately-pratfalling Gerry Ford, how often does one have the jolly good fortune to encounter stuff like this? (One recalls the Prez-Ford’s puzzled reaction, when D.Hamill’s 1976 Olympic performance was worshipfully described to him as culminating in a double sitzspin & triple somersault; he replied: so what? — I’ve done that getting out of a cab.) Perhaps the most extraordinary part of the spectacle: neither the authors, nor the publishers, nor the MacArthur Foundation detected this imposition before launching it as the prizewinning pinnacle of (centrist) Hist.sci scholarship.

9 This point is gently made by Hugh Ogs’ unypian bad taste) the sculptor rendered Ptolemy’s eyes nearly completely shut — just the way one would depict a blind man. This charming little wooden statue may be found in Europe’s tallest cathedral, that in Ulm, Germany.

6 The Crucial-Test V-Bomb [Hey-Nobody’s-Perfect] How Claudius Ptolemy Could’ve Solved Venus’ Orbit Honestly Greatest Elongations Exceeded by Greatest’s Elongations by Dennis Rawlins

Can RN-DR be accused of cruelty to dumb animals, given the tightness of the evidential vise they’ve closed on the poor [Ptolemy defense-corps]? To watch prominent scholars thrashing about in such pathetic credibility-death agonies is akin to viewing Animal-Rights films of stoats caught in spring traps — trying to weasel out.1

[Scholars who wish never to find themselves in the excruciating&logbending position of Believers who’ve spent decades cornering themselves into having to keep forever alibiating Ptolemy’s stellar,2 etc pretensions, are urged to ponder DIO 10.2 p.83-84. Watching Muffiosi forgive sin after Ptolemy sin, B.Rawlins recalls Some Like It Hot’s finale: in-love Osgood hitch-pitches in-drag “Daphne”, who reluctantly protests that “she” smokes, dyes, is barren, etc. — But Osgood forgives all. Desperate, Daphne finally bellows the ultimate impedimentum-crucis-bomb: I’M A MAN!!! Osgood: Well, nobody’s perfect.]

A Muffiosi Laud Deliberate Fraud When You’re Cornered

A1 On 1983/6/4, at a conference in Aarhus, Denmark, DR announced6 that Owen Gingerich’s “Greatest Astronomer of Antiquity”— the infamous ancient plagiarist C.Ptolemy — had been faking “observations” with such prolificate-sloppy haste (similar cases: fn 14) that he actually gave (fn 24) the same Venus event 2 different dates over a month apart. [But Osgood Gingerich is still in love. . . .] In the long history of the oldest science, no (other?) astronomer ever pulled off a blunter so gross. And do not miss the central point: this unique test-of-integrity arrived in an already-existing-for-centuries context of professional astronomers’ multi-independently-founded suspicion that Ptolemy was an astronomical faker of equally unique massivity. (Ptolemy-defense lawyers feign obliviousness to all this, implying [§15] that these 2 uniquenesses’ connexion in the same Ptolemy is JUST A BIG ACCIDENT.) Ptolemy’s 136 AD Venus fake-pair — doubly-bungled and contradicting each other — is as pure an experimentum crucis as one gets in an ancient dispute. If this isn’t proof of fraud, what is? In a sane field, such a glaring, unambiguous blunder would prove Ptolemy’s long-suspected fakery beyond the slightest question, and the controversy would swiftly end. But, below, we will find that Ptolemy’s double-dating has instead handed us an equally unambiguous experimentum crookus, published right in history of science’s top journal (HistSciSoC’s Isis), showing that his defenders are now hopelessly beyond even the baldest evidential testing of their faith, and will twist & even (fn 12) wholly-invent whatever it takes (DIO 4.3 §115 fn 42) to escape reckoning.

A2 Adding to his double-dating farce, Ptolemy claimed that, with his very own putative6 eyes, he actually saw greatest elongations which were (§15) greater than greatest elongations, another historically unique astronomical-mathematical achievement.
method was sent (by fax) to Keith Pickering, Dennis Duke, & Hugh Thurston — and DR hinted to Thurston that he might be the ideal scholar on Earth to devise a geocentrist-Greek-geometry version of this approach; soon after, Hugh sent his deft proof (here at §7 §D, gutting OG’s Isis apology) to OG’s JHA, which took over 1/2 a year to find it errorless and so of course refused it. (It was instantly added to this DIO (§7, below), which was handed out a few weeks later at the 2003/6/19-22 Unir Notre Dame hist. symposium.)


B1 The History of Science Society’s Isis recently published Thurston 2002S, a detailed coverage of R.Newton-DIO findings in ancient astronomy. Following this article appeared Gingerich 2002 (composed by the Louis Agassiz of the evolution of ancient astronomy), attempting to blunt the Thurston article’s force, but conspicuously challenging not a digit of it. OG’s response never even mentions DR or DIO — the subjects of most of the article he’s “replying to” — this ducking Isis & Thurston’s generous & prominent display of DIO’s jewelbox of precise analyses & reconstructions (the distillate of several skilled scholars’ decades of devoted inductive researches in the ancient astronomy area), featuringtrim hypotheses’ fits to 1 part in ordmag 10000 and up (Thurston 2002S p.60: Hipparchos’ lunar numbers), 10000000000 (ibid p.62: AstromCuneo Text 210). [But note: the closest fit cited (ibid pp.61-62: Mars: 1-part-in-1000000000000 is false: see DIO 11.2 §4 p.30. However, the DR-discovered Mercury fit (DIO 2.1 §3 §C3) is even closer (1-part-in-1000000000000000 [a trillion!]) and since its input is totally attested (every digit is right in Almajest 9.3), its validity is now (DIO 11.2 §4 fn 21 item [b] unquestioned.) OG acknowledges no intelligence at all in these findings (not even in the 1/1000000000000-precision DIO 1.1 §6 reconstruction now on public display at the British Museum), instead discerning Greatest-

5 Lovagially gregarious academic power-operator Louis Agassiz was the leading US fence against natural selection because: [a] He was a religious fanatic in Harvard-professorial garb; [b] committed to an increasingly untenable position, he expended his creativity not upon progressive research but upon devising convincing-to-him alibis against each successive awful-enemy-evidence apparition. But he didn’t spread lies about dissenters, nor attack heretic #1’s character in anonymous ref-reports, while (DIO 9.1 News Notes) ducking face-to-face debate with him. Given Gingerich’s history (§& DIO 4.3 §15), he might be seen as the resurrection less of Agassiz than of Galileo-arrested Cardinal Bellarmino. Which ironizes the prominent rôle of Mennonite OG (no kneekjerk apologist for Holy Church) in PBS’ 2002/10/29 Nova on Galileo. (Though OG was among the saner commentators, watch him & Nova go with the myth [R溟mins 1991 P §3F] of stellar parallax as heliocentrism’s long-awaited alleged-watershed proof.) This show’s piety is so neatly ameliorates the Galileo Affair’s prime significances: [a] Exploratory reason vs evidence-immune [fn 13] religious faith. [b] A heaven-touting but earthly-.Atip &power-seeking institution’s centuries of concerted, lethally-brutal commitment to truth-suppression, isn’t an unloadable-at-later-convenience little oops. It forever destroys an eternal-truth-claiming Church’s intellectual & religious credibility. Nova portrays rebellious & strictly-bastard-standing Galileo as a “good Catholic”. (Establishment pol-scientists [e.g. R.Millikan, D.Hughes (DIO 1.7 §8 §B3, R.Jastrow] ever pseudo-mend religion&science, akin to missionaries’ notorious willingness to graft local religions onto theirs.) Nova joins Pope JP2 in exploiting Galileo’s statement that scripture cannot disagree with science, without astonishing such humor with the slightly relevant reflection that: had Galileo said otherwise, the intellectual zeroes of his day would have dragged him from his Church-decreed imprisonment, straight to the stake. Galileo got into enough trouble promoting astronomical dissent, without inviting independent harassment for theological heresy, too. (My Harvard SocSci prof S.Beere used to note: oldtime scholars might question either Church or State; but tolerance by at least one was required for advancement, so nobody thrived if alienated from both.) The situation was proclaimed to all by the then-recent [1600] burning-alive of Bruno, hero of rebellion against theological dictatorship, incredibly referred-to by Nova as a “new-age charlatan who denied the divinity of Christ”. This is just regurgitated 1913-edition Catholic Encyclopedia justification-apology for religious murder: see DIO 4.3 §15 fn 33 for the original CE source.

12 It appears to be hitherto unremarked that Gingerich’s explanation of Ptolemy’s “brilliant” (Gingerich 2002 pp.72&73) bungled fake is pure speculation: 100% gas — and in 100% disagreement with the 1st-hand representations of the very ancient astrologer whose integrity OG is supposedly defending, i.e., the “sole“ basis for the NS-OG theory is: evidence-contradicted scholars demand an escape-hatch, even if it is completely, utterly made-up — simply designed to the specs of necessity. (Similarly, see, e.g., fn 13 or [a different cult] DIO 9.3 §6 §A.) Ptolemy doesn’t (fn 18) provide any of the Swerdlow-Gingerich scenario. (In 1909, Twain [Essays ed. C.Neider] 1963 NYC pp.420f) gibed that Shakespeare-biographies were nearly-total “plaster-of-Paris”. But NS-OG’s biography of Ptolemy’s Venus is unequivally-total plaster-of-Swerdlow.) So we must here choose between 2 theories:

Theory A: Swerdlow&Gingerich are the greatest geni in our field’s history, to have elicited so much detailed understanding of Ptolemy’s mind, especially considering that he was carrying on his purported ingenuity “silently” (fn 57) according to Gingerich 2002 p.73. (OK, OK, there wasn’t spread lies about dissenters, nor attack heretic #1’s character in anonymous ref-reports, while (DIO 1.1 ibid B1) it. OG’s response never even mentions DR or

13 At least Swerdlow 1989 p.59 openly states that his alibis are “speculative”. But, after 1/3 century of denigrating Ptolemy-skeptics, Gingerich is now intensely aware that, if NS-OG’s baseless Venus speculation (vainly dodging clear Venustian proof that the skeptics were right all along about Ptolemy) isn’t accepted, then future scholar must condemn his long history of attacks upon the sanity of those who in fact turned out to more perceptive than he. Thus, in his mind, Venus-apology gas has become solid, immutable dry-ice Reality. (Similar unaged Mufa transformation: Rawlins 1991W fn 242.) So he quite naturally supposes that those who cannot share in the construct of his present-day reality can easily be branded a crank — a certainty bolstered by such other Harvard paragons of mind & matter.

14 Physical impossibility space&times warps regularly grace archontic charts. See DIO 1.1 §4 p.29 (preprint cited in Note [C]) & ibid §8 fn 16; Thurston 1998A §12K §16; DIO 10 §4C, Fig.9 fn 119.
B2 Hitherto unnoted: Ptolemy’s joke implies that Venus’ synodic motion stopped dead for 37º straight! — which tops even biblical Joshua, in the astronomical miracle dep’t.

B3 To a scholar not glued forever to a tragic longago initial mistake (and not even his own mistake) — thereby irrevocably face-committed, by decades of hyper-ironic slander of the very Ptolemy-skeptics now utterly vindicated — Ptolemy’s Venus disaster is simply a case where a Venus-Earth resonance (8-5) blocked kindergarten fabrication-options; as a result, the Almajest 10 Venus fakes were even more hilariously transparent than Ptolemy’s usual: his ignorant preference (for imposing an inappropriate method upon Venus) so cornered him that in ultimate desperation he had to cheat Venus’ actual 136º/11/18 elongation [from the mean Sun] upward by over 1 ½/4 [nearly seven times the Sun’s semidiameter]. (This apology’s.inspirer does admit the 136º for Ptolemy 1989 p.209.) Perhaps the worsted point here: the forged 136º/11/18 Venus geometric position disagrees by over 1 ½ with the very Venus orbit which Ptolemy faked it to “prove”.16 This seeming absurdity is just a natural upshot of Ptolemy’s clumsy attempt to force a ludicrously inapplicable simpleton-crude method upon a delicate orbit-determination problem, which had obviously already been solved years earlier by far better ancient analysts. (See other and parallel indications at 54f & fn 55, 54f c2, Rawlins 2003J 84f; also Rawlins 1996C 84f.6 and the inspired reconstructive-extrapolation of Jones 1999E p.258.) Both revealingly huge discrepancies are hardly deniable: see OG’s own Fig.4 at QJRAS 21/253 (1980) p.261, or Sverdlow at JHA 20:29 (1989) p.37 Table 1. The rms error of the eight Almajest Venus-greatestelongation“observations”is ordmag a degree.

B4 Given that Gingerich & Sverdlow call “silly”17 physicist R.Newton’s thoroughly founded conclusion that Ptolemy was a clumsy hoaxter, it is strange to see OG now claiming that Ptolemy’s Venus fakes (and Gingerich 2002 agrees that these allegedly-outdoor18 1st-hand “observations”are indeed based upon indoor concoctions) were just a matter of creating greatest elongations at mathematically convenient (if wildly false: §B3 places, an ever-so-clever19 ploy which Ptolemy was forced-into (equally-Ptolemai Noel Sverdlow confidently agrees)20 to crack an “otherwise essentially insoluble problem” (Gingerich

16 The figures of Sverdlow 1989 p.42 and DR agree on this, to the arcm.”

17 DIO 1.2 fn 18 & 13. DIO also (fn 23) calls RN’s views “offensive” & “absurd”.

18 Note clearly a key point here: if Ptolemy had said he calculated his Venus data, there would be no controversy. But instead, he claimed (fn 12&24) that he visually observed, in the outdoor sky, Venus positions which all parties now agree were computed indoors.

19 See §B1&F5.

20 Sverdlow 1989 p.35 (emph added): the 8º Venus-Earth resonance “makes the problem of finding greatest elongations ‘nearly a no-brainer’... even more difficult.” And p.36. Ptolemy’s observation-dates’ disagreement with (departure from) the truth “is not an error, but a compromise necessitated by the positions of the mean Sun required for the demonstrations.” Thus, poor Ptolemy HAD to forge reality into the positions he wanted. . . . In this MacArthur-grant-subsidized paper (published by Gingerich’s J.H.A.), Sverdlow (loc cit) also alibis that since (near maximum) Venus’ elongation changes merely 1/12 in 6º, “in no way could Ptolemy estimate the time” of greatest [maximum] elongation more accurately. (Gingerich 2002’s incomparable p.72 goes even further into legalblindnessland, claiming that one-degree-accuracy in observation is “what Ptolemy typically worked with” — a sleight which nearly confounds ordmag 0º.1 ancient observational accuracy with the ordmag 1º enormity of the most delicious Ptolemy fudge.) We have already previously (DIO 1.15 fn 20) dealt with the tragic pre-highschool mentalblindnessland adventure of Sverdlow 1979 pp.526-527 (in the journal of PhiBetaKappa), regarding estimation of maxima-times (solstices in that case), so I won’t reprieve the pathetic details here merely because he later repeated the folly under the MacArthur Foundation’s aegis. But I will comment that none of these occurs inaccuracies few weeks in Venus observations, leading to dishonestly-reported “observational” figures which are off by way over a degree. Moreover, what has uncertainty in time of greatest elongation (an error which can only reduce the elongation) to do with a faded “observation” which (95f[a]) exceeds the greatest elongation? It is on the basis of such then-politically-correct apologia that Sverdlow 1989 p.35 truculently concludes: “the selection of a particular date for true greatest elongation would be arbitrary in any case.” This conveniently-flexible, all-thumbs illusionism-prank is what the MacArthur Foundation funded (six-figure grant) to alibi an ancient hoaxer who so tanglefooted his Venus greatest-elongation fakes that the same 136 AD event ended up possessing two different dates thirty-seven days apart. (See fn 23. Again: what has 6º uncertainty to do with this? — especially for an effect which is not linear but nearly quadratic! Similarly: what has 1½/12 uncertainty (fn 20) to do with the Almajest 10 Venus hoax’s rampant ordmag 1º errors? I.e., why even bring up the 1½/12 alibi in the 1st place? — unless one is, heedless of coherent logic, just aiming to stack up as many alibis as possible, for deliberate hoax’s rampant ordmag 1º errors? I.e., why even...

21 See fn 59 for the critical importance of this point to historians. The openminded ones, anyway.

22 Keep in mind (fn 9) that Gingerich is not claiming that the actual solution was accomplished by Ptolemy’s fakes; no, OG thinks (Gingerich 2002 p.73 Fig.1 caption) that Venus’ elements were already known (otherwise, Ptolemy could not have computed his fakes) — by an unspecified method which of course is the one which Ptolemy should have explained in the Almajest. Never-say-die loyalists cannot face this self-evident point — or the equally obvious item: Ptolemy was not the ancient who found the Almajest Venus elements. (A point understood long ago by R.Newton 1985 p.12.) But at least we all now agree with R.Newton that the whole Almajest 10 Venus discussion is fraudulent.

23 As to those Ptolemaists who have attacked skeptics as cranks: we note in passing here [& fn 13] that the prime symptom of the crank mentality is rigid imperviousness to incoming contrary data. Some have also expressed disapproval of “polemics” (note irony of fn 17), as in an OG anonymous...
C Other Significant Oddities of Ptolemy’s Venus Presentation

The *Almajest* Venus chapters are peculiar in ways additional to merely supplying us with the nonpareil hilarity of double-dating\(^{24}\) the very same event.

C1 Ptolemy reports contemporary observations of Venus not taken by astrolabe. He does this for no other planet.

C2 Which explains another strange coincidence: of the five rare\(^{25}\) *Almajest* Catalog stars with \(1^\circ/4\) endings, 40% are used to measure the position of Venus. (See DIO 2.3 \$ fn 20. These five are the only stars whose positions we know he didn’t steal from Hipparchos.) This suggests that, when grossly (\$B3) forging these observations to make them agree with the requirements of his amusing Venus frauds, he in each of these cases did not change Venus’ reported angular distance from the reference star — but moved Venus where he wanted it by simply fudging the star’s position: the star’s shift just carried Venus with it.

C3 Further, when choosing a mean motion for Venus, Ptolemy most probably confused a sidereal and tropical period relation (Rawlins 1985K & Rawlins 1987 n.7) — which so affected the original highly accurate motion (see Rawlins 1985K) that it fell from one of the two best,\(^ {26}\) into ridiculous inaccuracy. (Note Rawlins 2003I \$E3.)

C4 One of Gerald Toomer’s most important discoveries is that the several tables of Venus’ mean motion are discordant (Toomer 1984 p.425 n.29). This is true for none of the other four planets.

C5 My conclusion is that much (if not all) of the *Almajest* Venus section was lifted from an ambitious but inferior source which Ptolemy did not use for the other planets.

D Solving the “Insoluble”: Muffia&Co. vs 10th Grade Math

D1 Gingerich 2002 p.2/2 alibis Ptolemy’s childishly botched (\$B3) fabrications of greatest elongations of Venus by saying that Ptolemy had (fn 57) to fake impossible positions for Venus in order to pry the planet into convenient line-ups — without which the orbital elements couldn’t be solved-for. Such an obviously false claim provides us one of the dizziest pinnacles of this rare treat of a paper.

D2 In fact, finding Venus’ orbital elements (and in the very same geometric style which Ptolemy himself adopted)\(^ {27}\) is obviously possible. The mean motion is easy to find from stationary point data. (See Rawlins 1987 n.28 & DIO 2.1 \$ fn 17. Any error in an adopted mean-longitude-at-epoch would so obviously affect stationary points’ positions that correction would be trivially simple.) Thus, the elements that required determination from greatest elongations were: the deferent’s eccentricity \(e\) & apogee \(A\), and the radius \(r\) of Venus’ epicycle. Now, it is typical of Ptolemy’s Euclidean-geometric approach that if he seeks \(n\) unknowns, he uses exactly \(n\) equations of condition. (So, in this case, he would have needed just three greatest elongation observations.) One of Ptolemy’s weaknesses (typical of a non-scientist) is a failure to understand the preferable of over-determination. (See Rawlins 1991W fn 224 & Rawlins 1996C fn 103.) We will now explain the method we have devised (for finding \(e, A, \) & \(r\) ) that follows this approach. It is chosen both for simplicity and for its nonanachronistically Ptolemaic character. Indeed, our Venus method is more\(^ {28}\) Ptolemaic than Ptolemy’s own Venus analysis (*Almajest* 10).

D3 The Ptolemy-alleged solar motion around the Earth is mathematically equivalent to terrestrial heliocentric motion. We will use this equivalence to simplify the problem conceptually — noting in passing that DR has long held\(^ {29}\) that the best ancient astronomers were heliocentrist anyway.

D4 We can then take three greatest elongation observations of Venus (preferably spaced very roughly 120° apart: \$G1) and graphically draw the line-of-sight for each: through the Earth’s position in its own orbit (a function of the solar mean longitude, a known function of time). Once we have these three lines, we simply determine a circle, the Venus orbit (the geocentrist’s “epicycle”), such that it is tangent to all three lines. Easy, since the bisectors of any of these three lines must go through the center of the circle we seek. So there will be three two-line intersections, all at the same point: the circle’s center. This key part of the problem can be accomplished graphically by a highschooler (less elementary mathematical equivalent: \$E3f), which is why it’s so inspirational to watch eminent professors deem this simple task “essentially insoluble” (\$B4).

\(^ {24}\) Those who have never consulted this ultimate Ptolemy blunder ought to look it up: *Almajest* 10.1 dates the 136 greatest evening elongation of Venus to 136/12/25, while on the very next page, at *Almajest* 10.2, he dates it to 136/11/18. See, e.g., Toomer 1984 p.470 vs p.471. Perhaps hitherto unhighlighted: Ptolemy not only gives contradictory dates/locations but also can’t even get his story straight as to what this “greatest” elongation itself was. *Almajest* 10.1 makes it 47°32’ (136/12/25), while *Almajest* 10.2 makes it 47°20’ (136/11/18). See \$I5 [a].

\[^ {25}\] Note added 2003. Hugh Thurston emphasizes that the 136 double-date disaster (reality 136/12/14 [Table 2 row 2] vs 136/12/25 [*Almajest* 10.1] against vs 136/11/18 [*Almajest* 10.2]) is not atypical in giving wildly false Venus dates & locations for greatest elongations. E.g., Ptolemy alleges he observed the 129 greatest morning elongation at (*Almajest* 10.2) \(t = 129/5/20, L = 55°25', V = 10°35'\); compare to real data of Table 1 row 1: errors about 2 weeks & well over 10°. And Ptolemy alleges he observed the 127 greatest morning elongation at (*Almajest* 10.1) \(t = 127/10/12, L = 197°13/15, V = 150°1/3\); compare to real data of Table 1 row 2: errors nearly 3 weeks & \(c.20°\).

\[^ {26}\] That’s 5 stars out of 1025 in the Ancient Star Catalog.

\[^ {27}\] The iterative geometric proof that forms the heart (\$G) of this paper has some similarities to the *Almajest’s* for the outer planets. (See Thurston 1994P.) So: why didn’t Ptolemy know this? Suggestion: others’ proofs for the outer planets were available to him, but the proof of Venus’ elements was not — which deprivation forced Ptolemy into inventing (or perhaps grabbing from some other bungler) the off-the-scale-funniest fumble of his entire career of hoaxery: see \$B1. Another possibility: the Venus situation is not so clear (though see \$7) when viewed geocentrically (see, e.g., Pedersen 1974 p.300 Fig.10.1), as against our choice here to (likewise Gingerich 2002 n.6) view it heliocentrically, which holds Venus’ orbit near one convenient place (\$D4); so, did Ptolemy’s false (geocentric) general view of the universe help cause his specific Venus-botch embarrassment?

\[^ {28}\] This happens because Ptolemy is busy with more than three “observations”, so that he can pretend he proved the equant’s validity from Venus. See fn 35.

E1 The Simple Eccentric Solution

E2 We start with the Earth’s circular orbit centered at (0,0) with unit radius, and we will use the data of Table 1 to locate (in the x-y plane) the center of Venus’ circular orbit. The opening steps are intermediate highschool math: the line corresponding to observation i (i running from 1 through 3) in Table 1 must go through the point

\[ x_i = -\cos L_i \quad y_i = -\sin L_i \]  

(1)

and the slope \( m_i \) (in the x-y plane) of line i is:

\[ m_i = \tan V_i \]  

(2)

The equation for line i is:

\[ y_i = m_i x_i + b_i \]  

(3)

Substituting eqs.1&2 into eq.3 determines \( b_i \) (line i’s intercept):

\[ b_i = y_i - m_i x_i \]  

(4)

— so we have now completely determined all of the three lines that will locate Venus’ orbit (since all three lines are virtually tangent to it):

\[ y_1 = m_1 x_1 + b_1 \rightarrow 0.0308 x_1 + y_1 = -0.7058 \]  

(5)

\[ y_2 = m_2 x_2 + b_2 \rightarrow 1.1363 x_2 + y_2 = +1.1307 \]  

(6)

\[ y_3 = m_3 x_3 + b_3 \rightarrow 6.0188 x_3 + y_3 = -4.2815 \]  

(7)

\[ \text{See fn 50, and R.Newton 1977 Tables XI.2 & XI.7-8; also pp.336-339. And note Gingerich 1980 Fig.4 & caption.} \]

E3 We next determine the intersections of the three possible pairings of these lines: pt.A = the intersection of lines 1&2; pt.B, lines 2&3; pt.C, lines 3&1. Again, this is early highschool math (standard 2 linear-equations-in-2 unknowns problem):

\[ x_A = +1.6614 \quad y_A = -0.7570 \]  

(8)

\[ x_B = -1.1085 \quad y_B = +2.3903 \]  

(9)

\[ x_C = -0.5972 \quad y_C = -0.6874 \]  

(10)

E4 Next, we find the longitudinal direction \( B_k \) (where k equals A, B, or C) of the bisector of the two lines passing through each of these points. Using the data in Table 1, we have:

\[ B_A = (V_2 + V_1 + 180^\circ)/2 = (131^\circ 21' + 358^\circ 14' - 180^\circ)/2 = 154^\circ 47'1/2 \]  

(11)

\[ B_B = (V_3 + V_2 + 180^\circ)/2 = (279^\circ 26' + 131^\circ 21' - 180^\circ)/2 = 123^\circ 24' \]  

(12)

\[ B_C = (V_1 + V_3 + 180^\circ)/2 = (358^\circ 14' + 279^\circ 26' - 180^\circ)/2 = 228^\circ 50'1/2 \]  

(13)

E5 We have already (back in §E2) performed an equivalent of the next step: a point and a direction determine a line (a bisector in these cases). Each line’s slope is the tangent of its \( B_k \) (§E4, eqs.11-13)

\[ m_k = \tan B_k \]  

(14)

Each line’s intercept \( b_k \) is then found (as in eq.4) by fitting the line to the point given in §E3; thus, we find the equation for each of the bisectors:

\[ y_A = m_A x_A + b_A \rightarrow +0.4707 x_A + y_A = 0.0250 \]  

(15)

\[ y_B = m_B x_B + b_B \rightarrow +2.1068 x_B + y_B = 0.0549 \]  

(16)

\[ y_C = m_C x_C + b_C \rightarrow -1.1436 x_C + y_C = -0.0044 \]  

(17)

E6 Solving the above equations as three pairs, we are gratified to find that all three intersections are identical, thus precisely placing the center V of Venus’ circular orbit in the x-y plane:

\[ x_V = 0.01827 \quad y_V = 0.01644 \]  

(18)

Since it is the deferent not the epicycle that is off-center in the Venus model, we simply translate the center negatively by the amounts indicated in eq.18 — in order to move Venus’ orbit onto the center (0,0) of the x-y plane. This makes the Earth’s orbit eccentric with an aphelion in the 3rd quadrant — which for a geocentrist fixes (180° distant) the deferent’s apogee \( A \), at a position given precisely by eq.18. Applying Pythagoras’ Theorem and an arcsec to eq.18, and (in ancient style) multiplying the eccentricity \( e \) by 60, we have located the deferent’s center at:

\[ e = 1^528' \quad A = 41^\circ 59' \]  

(19)

\[ 31\text{We are expressing our result far more precisely than could be supported by naked-eye input data, but for effect we are noting that the three answers of course agree mathematically on the nose.} \]
<table>
<thead>
<tr>
<th>Date &amp; Time</th>
<th>Greelong $G$</th>
<th>Solar Mean Longitude $L$</th>
<th>Venus’ True Longitude $V$</th>
</tr>
</thead>
<tbody>
<tr>
<td>138/07/09 20°</td>
<td>44°40'</td>
<td>106°10'</td>
<td>150°50'</td>
</tr>
<tr>
<td>136/12/14 01°</td>
<td>47°30'</td>
<td>261°36'</td>
<td>309°06'</td>
</tr>
<tr>
<td>132/02/21 23°</td>
<td>47°58'</td>
<td>329°44'</td>
<td>17°42'</td>
</tr>
</tbody>
</table>

**Table 2: Ptolemy-Era Venus Greatest Evening Elongations (Real Data)**

**E7** The radius of the Venus epicycle is then easily found by using any of the bisectors, starting with the half-angle $H$ between that bisector and either of the two lines it is half-way between. We check all three:

\[
H_A = \frac{(V_2 - V_1 - 180°)}{2} = 23°26'1/2 \\
H_B = \frac{(V_3 - V_2 - 180°)}{2} = -164°02'1/2 \\
H_C = \frac{(V_1 - V_3 - 180°)}{2} = -129°24' 
\]

Then, using our pre-translation data, we find the length $v_0$ of the vector from intersection $k$ (eqs. 8-10) to the pre-translation center of Venus’ orbit:

\[
v_A = \sqrt{v_A - v_A}^2 + (y_A - y_A)^2 = \sqrt{1.6431^2 + 0.7734^2} = 1.8161 \\
v_B = \sqrt{v_B - v_B}^2 + (y_B - y_B)^2 = \sqrt{1.1268^2 + 2.3739^2} = 2.6277 \\
v_C = \sqrt{v_C - v_C}^2 + (y_C - y_C)^2 = \sqrt{0.6155^2 + 0.7038^2} = 0.9349 
\]

**E8** Highschool trig then produces the Venus orbital radius $r_B$:

\[
r_A = v_A \sin H_A = 1.8161 \sin 23°26'1/2 = 0.7225 = 43°21' \quad 60°8'36'15'' \\
r_B = v_B \sin H_B = 2.6277 \sin 164°02'1/2 = 0.7225 = 43°21' \quad 60°8'36'15'' \\
r_C = v_C \sin H_C = 0.9349 \sin 129°24' = 0.7225 = 43°21' \quad 60°8'36'15'' 
\]

(The perfect2 agreement of all three calculations of $r_A$ is gratifying, but it is a mathematical not an empirical triple-verification.)

**E9** Merging the results of eq. 19 and §E8, we now possess all three of the Venus orbit elements we set out (§D2) to find — the epicycle radius $r$, as well as the deferent’s eccentricity $e$ and apogee $A$:

\[
r = 43°21' \quad e = 1°28' \quad A = 41°59' 
\]

**E10** However, the foregoing will not find the actual elements of Venus, because the eccentric model (even the equant model; §G) is not faithful to the actual motions of Earth (deferent) and Venus (epicycle). Thus, a different choice of observations at the outset (Table 1) can give a contrasting result. E.g., consider a trio of Ptolemy’s evening greatest elongations:

32 All the foregoing numerical developments were done to better than 1 part in a million, though presented here several ordmags more crudely. That is why a given calculation here&there may appear slightly inconsistent in the last place.

33 To be convinced of this at-first-surprising truth, one need only ponder an extreme case: a 99.9999%-eccentric-orbit (direct-moving) comet just inside the Earth’s orbit. If we start with a neat (nil-elongation) situation with the Earth at the longitude of the comet’s perihelion and the comet at aphelion, it is physically obvious that between then and comet-aphelion time (a little over 2 months after the time of the initial situation) — by which time the elongation is eastern — Earth observers have seen the comet at a greatest western elongation, though all western orbit-tangents during this time have been to the (long symmetric) half of the comet-orbit which the comet has not occupied. For other DIO examples of the heuristic utility of resorting to extreme cases, see: [a] DIO 10 fn 91, [b] DIO 2.3 §§A5&A7, [c] DIO 4.3 [13 fn 13. As for the time $t_F$ it takes a body (comet or whatever, starting from null relative velocity) to fall into the Sun from a distance of 1 AU: this question has appeared on freshman astronomy tests — and without providing the neat answer (the simplicity of which hints at how it can be instantly obtained): $t_F = 2^{-2.5}$ years.

34 Which is fortunate for our analyses of Venus, the planet with the smallest $e$ in the Solar System. And, though bigger, Earth’s $e$ is also ordmag 1°. For approximately Bodian $r$ and modest $e$, greatest elongations will on average (rms) be distant from tangency by an angle equal to ordmag the rss (root-sum-square) of the two planets’ $e$; so, even for the extreme Venus-Earth case, the errors are ordmag 1°, obviously contributing to roughness in our results for A (& etc.).
Table 3: Dionysian-Era Venus Greatest Evening Elongations (Real Data)

<table>
<thead>
<tr>
<th>Date&amp;Time</th>
<th>GrElong G</th>
<th>Solar Mean Longtd L</th>
<th>Venus’ True Longtd V</th>
</tr>
</thead>
<tbody>
<tr>
<td>-271/4/05 06h</td>
<td>46°53′</td>
<td>9°10′</td>
<td>56°03′</td>
</tr>
<tr>
<td>-265/8/31 07h</td>
<td>44°41′</td>
<td>154°38′</td>
<td>199°19′</td>
</tr>
<tr>
<td>-258/1/25 12h</td>
<td>48°09′</td>
<td>300°15′</td>
<td>348°24′</td>
</tr>
</tbody>
</table>

**G The Equant Iteration**

**G1** Once we adopt the equant model, the ability to arrive at a solution in one direct line (as in §E) vanishes — and we must iterate, as Ptolemy himself does (fn 27) for his analyses of the outer planets. To test the equant case, we will choose elongations from the Dionysian era (when the equant may have actually been used) — and we will use ones rather symmetrically separated. Table 3 provides the data for a sample equant investigation:

**G2** When we switch from the eccentric model to the equant model, we lose the luxury of starting from a known position on the deferent (as in eq.1); instead, we must initially estimate the deferent elements (e & A) and input the implied Earth position, in order to launch the analysis which produces an improved set of deferent elements — which we then re-input: standard iterative technique.

**G3** In order to save time, we will here start from the assumption of fairly accurate elements. But no matter where one starts out, the iteration will succeed — it just might require one or two more re-inputs to get the same result, which will be just as stable as one likes (conditional only upon the patience to keep iterating). Presumably aware that Venus’ orbit is nearly circular, and thus that the deferent elements had to be nearly those of the

---

35 See §E1. It might be objected that the reason we can here find our three Venus’ elements from three greatest-elongations (while Ptolemy needs over twice as many to fake his Venus derivation: fn 28) is that we’re assuming the equant model at the outset. Comments: a) The equant was obviously (see Evans 1984) discovered via Mars (e 12 times Venus' & 5 times Earth's), so Ptolemy too was assuming the equant model before he did his Venus math. (See NS’ & OG’s admissions that Ptolemy knew at least some of his Venus orbital parameters ahead of time: fn 52 here & Gingerich 2002 Fig.1 caption.) b) For either planet, the discovery of the equant could (§H2) have been based upon the fact that the equant model gives a much neater and more stable fit to observational data (than the eccentric model). For Venus, anyone will quickly see this by comparing results from testing the eccentric (§E) vs equant (§G) models upon several randomly chosen real greatest-elongation trios, using our program (p.54): eccentric-model scatter evaluated at §H1: equant-model scatter, at fn 48, the latter quite clearly an ordmag smaller. This dramatic contrast (not Ptolemy’s disastrously faked derivation) is the probable historical origin of the equant’s discovery, a point correctly perceived long ago by Toomer 1984 (p.474 n.12) and Evans 1984 (see also the latter’s well-written 1998 book). Over the years, various scholars have suggested that Ptolemy personally invented the equant to solve huge problems presented by nontrivially-eccentric planetary motion. Question: if he did, then why did he “prove” it (Almagest 10.1-3) via the most trivially-eccentric planet (Venus), and using a method which was so infantile and impossible that it required faking “observational” data into obviously nonexistent symmetries and other ridiculously pat arrangements? More broadly, Gingerich 2002 p.71 (confusing mere street-astrologers with the real astronomers that Ptolemy leched off of [fortunately for our ability to reconstruct genuine ancient astronomy]) opines that “It really does appear that Ptolemy’s work fundamentally changed the way planetary astronomy was done.” Hmmm. As mathematician Jerry Wolf recently (02/10/18) commented: do such folk also imagine Euclid invented the Elements?! Secondary-writer Gingerich’s ready confusion (fn 7) of mere secondary-sources with deep thinkers and intellectual pioneers is typical of the sort of elementary mis-step that can lead theoretically limited politician-scholars & clonies down blind-alleys (and repeated embarrassment-in-controversy disappointments) for wasted decades. On this almost-too-naïve-to-be-believed archonal-tradition, see DIO 6 1 fn 106.

---

Earth’s orbit, an ancient heliocentrist might well start with round values close to the real Earth elements then (e = 1°03.7, A = 64°2):

\[ e = 1° \quad A = 60° \]

(31)

Or, in cartesian coordinates, the Earth orbit center starts at:

\[ x_E = e \cos A = 0.008833 \quad y_E = e \sin A = 0.014434 \]

(32)

**G4** Since most discussions of the equant are long on diagrams (or series expressions) but short on exact equations, DIO will as a public service provide the process here, all on one line, eliciting true longitude \( \lambda \) from mean longitude \( L \):

\[ g = L - \lambda \rightarrow u = g - \arcsin(e \sin g) \rightarrow \lambda = \arctan[\sin 241.0°/\cos 241.0°] + A \]

(33)

where \( \lambda \) is the Sun’s true longitude (or, for the geocentric model, the true longitude of the epicycle’s center) — at a distance \( R \) from (0,0):

\[ R = \sqrt{(e + \cos u)^2 + (\sin u)^2} \]

(34)

For the 3rd L in Table 3, we apply eqs.33 & 34 to yield \((R, \lambda)\) (polar coordinates):

\[ g_3 = 300°15′ - 60° \rightarrow u_3 = 240°15′ - \arcsin(\sin 240°15′/60) = 241°.079 \]

(35)

\[ \lambda_3 = \arctan[\sin 241.0°/\cos 241.0°] + 60° = 301°.922 \]

(36)

\[ R_3 = \sqrt{(1/60 + \cos 241.0°)^2 + (\sin 241.0°)^2} = 0.9920 \]

(37)

Eqs.36 & 37 can be converted to cartesian coordinates:

\[ x_3 = R_3 \cos \lambda_3 = 0.5246 \quad y_3 = R_3 \sin \lambda_3 = -0.8420 \]

(38)

Since greatest-elongation-sighting line #3 goes through eq.38’s point at longitudinal angle 348°24′ (\( V_5 \) in Table 3), this line is now completely determined; so we can proceed much as we did back in §E: for any line, if we know [a] its slope (\( V \)) and [b] the coordinates of any two of its points, the 3rd line’s equation is determined as:

\[ 0.2053 \cdot x_3 + y_3 = -0.7343 \]

(39)

(analogous to eq. 7 in the foregoing eccentric-model development); and to find lines #1 & #2, one simply applies our equant-model eqs.35-39 to the data of the first two rows of Table 3. (The results will be analogous to our eccentric-model eqs.5&6).

**G5** And the rest of the process is parallel to §E’s development. (It is not continued in our text, but its details will be evident in the BASIC program printed at p.54.) It works for the equant model just as well as it did for the eccentric model. Again, the central step is finding a circle that is tangent to three known (greatest-elongation) lines: §E3ff. The eventual solution for the center of the Earth’s orbit in the Venus equant case (§G4) is, in cartesian coordinates:

\[ r_E = -0.000784 \quad d_E = +0.003286 \]

(40)

or, in polar coordinates:

\[ e = 0°.2027 \quad A = 103°.2 \]

(41)

For a genuine ancient heliocentrist, this entire procedure would be inherently flawed by its Ptolemaic presumption that the Venus epicycle is exactly uniform-circular — when one of the advantages (see Rawlins 1987 pp.237-238) of the heliocentrist scheme is that it permits Venus & Earth to each have orbital eccentricity. Thus, if this paper’s trio-method was actually used in antiquity, it was probably as just a heliocentrist’s first step (viewing from an already-known Earth orbit) towards determining Venus’ orbital elements. The actual historical evolution was probably: heliocentrists developed a full set of planetary elements — which were later corrupted by geoocentrists twisting them to pretend that all epicyclic motion was uniform-noneccentric. See idem.
At this point, we realize that $c_E$ and $d_E$ are simply the first gauging of our positional error (on the $x$-$y$ plane) in the initial estimate (eq.31) of the deferent (Earth orbit) center. So we now just shift that center according to the indication of eq.40 and then repeat the eqs.31-41 procedure — a method which (by repetition) will quickly reduce the error to virtual nullity. I.e., eq.40 will shrink to (0,0).

But trial shows that this iterative process’s convergence is at least an ordmag quicker if we alter the initial center by half of the vector $(c_E, d_E)$, not the full amount. Thus, the next turn in our iteration starts by merging eqs.32&40 according to that principle:

$$x_E = e \cos A - c_E/2 = 0.008333 - ((-0.000784)/2) = 0.008726 \quad (42)$$

$$y_E = e \sin A - d_E/2 = 0.014434 - ((+0.003286)/2) = 0.012791 \quad (43)$$

or:

$$e = 0^\circ.9290 \quad A = 55^\circ.70 \quad (44)$$

This $x_E$ and $y_E$ solution is then re-inserted into eq.33 and the process down to eq.44 is repeated — again & again, until satisfactory stability is attained. There is some oscillation of $c$ & $A$ as the iterative math swoops-in onto the correct solution. But after only three repetitions, the fit is already ordmag 1% — which would have been more than adequate precision in antiquity, given the likely uncertainty of the empirical input.

By contrast, there is very little flutter in the Venus epicycle radius $r$. On the initial assumed $c$ & $A$ (eq.31), it comes out as $r = 43^\circ.344$. Throughout the entire iteration, it hardly varies at all from the eventual exact solution, which for this case is $43^\circ.343$.

Continued iterative loops produce the following successive solutions:

$$r = 43^\circ.343 \quad e = 0^\circ.8916 \quad A = 55^\circ.59$$
$$r = 43^\circ.343 \quad e = 0^\circ.8811 \quad A = 56^\circ.18$$
$$r = 43^\circ.343 \quad e = 0^\circ.8806 \quad A = 56^\circ.51$$
$$r = 43^\circ.343 \quad e = 0^\circ.8817 \quad A = 56^\circ.61$$
$$r = 43^\circ.343 \quad e = 0^\circ.8824 \quad A = 56^\circ.61$$
$$r = 43^\circ.343 \quad e = 0^\circ.8826 \quad A = 56^\circ.60$$

The swiftness of convergence is obvious. Further looping settles in on a precise solution:

$$r = 43^\circ.343 \quad e = 0^\circ.8825 \quad A = 56^\circ.59 \quad (45)$$

which may be expressed as:

$$r = 43^\circ.21^\prime \quad e = 0^\circ.53^\prime \quad A = 57^\circ \quad (46)$$

It is possible that Ptolemy’s Venus woes were initiated by his unawareness of this step (and its importance to efficient iteration here), which is consistent with (fn 35) our contention that he did not discover the equant (our halving) from original analysis of Venus’ motion (a once-common belief).

Of course, the precision here is misleading, given the input’s empirical uncertainty and the limitations (see [F]) of the iterative procedure. However, the stability of the solution is not illusory. A measure of that: we have ignored apsidal precession (Earth and-or Venus) entirely in these analyses. (After all, the §G method is based upon data covering only 127-6). If we include it, eq.46’s results all shift by less than one part in 1000. So, since the effect is trivial and since we do not in any case know exactly what (if anything) real ancient scientists would have done about precession during this math, it seemed pointless to introduce such speculation into these investigations. A note in passing: if one injects reasonable noise into the input data [lines 70-90 at p.54] for honest computation of elements, the effects on induced $A$ and $r$ are trivial; on $e$, temperate.

That these eq.46 elements are not quite correct is inevitable since (see also §F) the method we are using here is attempting to simultaneously satisfy two elliptically-nonuniform effects (Earth’s motion & Venus’) with two non-elliptical models: an equant (Earth) and a uniform circular motion (Venus). (i.e., real nonuniform-motion of Venusian periodicity is not accounted for by anything in the Ptolemy model.) By contrast, if one applies the foregoing method (eqs.31-46) to greatest-elongation “observations” computed from Ptolemy’s Venus model, then the resulting solution (analogous to eq.46) will be very close to Ptolemy’s $r$, $e$, & $A$ (eq.49). Readers should test this for themselves. (Near sample results of such testing are provided in [F]2.) Especially Swerdlow & Gingerich. For now we come to a simpler test — not of orbital elements but integrity elements: will these much-exalted Experts have the guts to explore this easy demonstration that they have mutually disgraced the history-of-science field by years of prominent (and heresy-slanderig) promotion of their laughable claim that our highschool-math-level problem here is insoluble? Haven’t we been through this drama before? — see fn 40 — with the crucial differences that the previous player (an unexcelled scholar in his area) [a] was courageously concerned to set the record straight and [b] wasn’t habitually decreeing that disagreement from his opinion was a sign of insanity; scholarly kookery (!), or dishonesty. But, then, ever-obsessively-dedicated kook slayer Owen VanHelsing Gingerich is admittedly a very special case.

Reflections; and Appreciating The Greatest’s True Greatest

As we see by comparing eq.30 to eq.48, the eccentric solutions are quite sensitive to differences that the previous player (an unexcelled scholar in his area) was courageously concerned to set the record straight and wasn’t habitually decreeing that disagreement from his opinion was a sign of insanity; scholarly kookery (!), or dishonesty. But, then, ever-obsessively-dedicated kook slayer Owen VanHelsing Gingerich is admittedly a very special case.

35See the Amer Astr Soc-affiliated HAD’s H.A.D.News, which regularly showers Gingerich with swedish & technical-innocent insistence upon clinging to one’s central cult-tent, the spectacle of watching (e.g., DIO 1.1 §3 [D2]) Swerdlow accuse another scholar of being crank sets new records in the irony dept.’

36See discussion at DIO 1.2 §10. Same problem here: $x$ equations of condition will determine $x$ unknowns. What scholar posing as an authority in orbital matters would not know that?! The ancient computer of the “Ptolemy” proofs of the outer planets’ elements was obviously familiar with this ultra-elementary point.

37JHA 26.2:164 (1995 May). (See also DIO 6 §3 [H].)

38See DIO 4.3 §15 [Hb & Gingerich’s 2000 referee report on Thurston 2002S for Isis.

39In the present context (stubborn & technically-innocent insistence upon clinging to one’s central cult-tent), the spectacle of watching (e.g., DIO 1.1 §3 [D2]) Swerdlow accuse another scholar of being crank sets new records in the irony dept.’

40See, e.g., DIO 1.1 §3 [D2-D3 & §16 fn 5, DIO 1.2-3 fn 92 & 252. 41However, regarding likely historical chronology, See fn 35 item [a].

42See fn 35 item [b]. Also §5 [E4].

43In the Dionysios era: for evening greatest elongations, the mean of results for $e$ is $0^\circ.51’$ in a range of $0^\circ.50’$; for morning greatest elongations, mean is $0^\circ.57’$ in a range of $0^\circ.03’$. The program at p.54 will also automatically handle a mixed trio (morning&evening data): sample at lines 70-90.)

44Sample-testing of series of well-spaced evening and morning trios in the Dionysios era finds that the average for $A$ is $57^\circ$; evening $60^\circ$, morning $54^\circ$ (an asymmetry that varies according to era), with scatter-ranges under 4’. If one uses 3 consecutive evening greatest elongations or 3 consecutive morning greatest elongations, the configurations are less well-spaced — but the mean and scatter (of induced elements) are virtually identical to those for well-spaced elongations. Since numerous Dionysios-era trios produce $A$ very close to $55^\circ$, it would be tempting to consider that the result came through
The Greatest’s Venus

2002 July 18

DIO 11.3

±6° (rms 4°) — mere averaging of results from a few trios would have shown this. Thus, fairly consistent inductions of Venus’ e, A, & r would have required under a decade of careful observations. Indeed, 3 of the last 4 Venus elongations (138 evening, 140 evening, 140 morning) available to Ptolemy would have sufficed in barely two years! (He actually recorded [badly] both 140 events.) For these three greatest elongations, substituting real data into lines 70-90 of our p.54 program yields:

\[ r = 43^{\circ}24' \quad e = 0^{\circ}50' \quad A = 64^{\circ} \]

(47)

Note that our results (eqs.46&47) are in good agreement with the more reliable estimates found by R.Newton using least squares, fitting very extensively to the actual orbit of Venus (R.Newton 1977 p.311):

\[ r = 43^{\circ}22' \quad e = 0^{\circ}50' \quad A = 60^{\circ}12' \]

(48)

H3 Ptolemy’s values for Venus were (Almajest 10.1-3):

\[ r = 43^{\circ}10' \quad e = 1^{\circ}15' \quad A = 55^{\circ} \]

(49)

His alleged method of finding them was a childish forgery-of-reality, in order to make the problem simple enough for his limited mentality to solve it (note §B4’s hypothetical parallel dumb-down heliocentrist-forgery) — a hoax so bungled that its two dates for the same event (fn 24) accidentally disagreed by over a month, thereby creating a truly unquestioned Greatest:

THE most hilariously inept fraud in the entire history of astronomy.

References


DIO: The International Journal of Scientific History (www.dioi.org)


Alexander Jones 1999E. ArchiveHistExactSci 54:3-255.


D.Rawlins 1991P. Journal for Hysterical Astronomy


Thurston 2002S. Isis 93:5-38.

Gerald Toomer 1984, Ed. Ptolemy’s Almagest, NYC.


Appendix: A Boobonic Plague of Upside-Down-Apologia

I Instead of using the valid methods demonstrated here in §G or §J, Ptolemy preferred to fake Venus “observations” using a crudely-rearranged (utterly impossible-fantasy) version of the very theory he claimed he was trying to prove from the faked data. (If such a lying inversion of genuine empirical investigation [and plain truth] isn’t a crime against science, then there’s no such thing.) See, e.g., Gingerich 2002 or Swerdlov 1989. Both papers

52 Top-public-apologist O.Gingerich is now going about claiming his ecstasy in discovering that Ptolemy systematically “shaded” his purported Venus observations to make up for the inconvenient reality that Venus wasn’t actually at the greatest elongation point when & where his fraud required it to be. (Crucial-test-on-crucial-testing: does OG’s belated recognition of Ptolemy’s Venus frauds decrease [Rawlins 2003 fn 21] or increase or leave-fixed OG’s superlative rank of his ancient idol? See fn 55.) Likewise Swerdlov 1989 p.35: “the observation has been adjusted to the position the planet would have had if it were at greatest elongation”; p.42: data were “arranged”; p.54: Ptolemy “could not have observed some of the reported elongations”; p.54: “Ptolemy’s adjustments of whatever he observed were of the order of 1°”. But the strangest part of MacArthur-funded Swerdlov 1989 is (p.31): “Ptolemy must earlier have carried out analyses by quite different means . . . [to find] at least preliminary parameters”. (See fn 9.) Since the Almajest proofs of celestial parameters are patently phony, these numbers clearly had a different origin, but we continue to look in vain for the data (other
are by leading losers of the Ptolemy Controversy, who lack the simple integrity to admit their defeat.\textsuperscript{57} (But, then, their praise of Ptolemy’s fakery suggests that honesty is not quite at the top of these archons’ list of desirable human virtues.) Instead, they have painted themselves into the corner of having to say: well, OK, so Ptolemy did fake the data — how wonderfully clever of him! If you can’t believe this (and who would blame you?), then read both papers. (Some special enticement-sample logical-gems are collected in fn 52.)

\textbf{Bottom-lines for Ptolemy’s finding r, e, & A:} [a] He picked a terrible method (§B1). [b] He could only make it “work” by faking data (§B5). [c] He fumbled the fakes so badly that he even double-dated two (§B). [d] He had a poor\textsuperscript{53} eccentricity e.

\textbf{Gingerich 2002 p.72} nearly swoons in admiration of such achievements, designing the boldly-invert term “approximations” for Venus places that Ptolemy super-unapproximately faked in order to get them on-the-nose-exactly where his crackpot method needed them (emph added). Such approximations\textsuperscript{55} are characteristic of our most insightful scientists, who see them as a way to tackle otherwise intractable problems.” What are the standards

\textsuperscript{56}The (sometimes) illogical outgassings of Ptolemy’s (mostly) math-challenged defenders are taken seriously because some are at major universities. Readers who may on this basis have supposed that these gentlemen have some special understanding of orbital matters should notice the embarrassingly one-sided ratio of each side’s original research publications on dynamical astronomy in professional astronomical journals. (One would normally be very reluctant to bring up such a point — but if Mufosi somehow manages to find self-redempting to spend decades slandering\textsuperscript{56} those who merely disagree with them, then coldwater-reminders on genuine expertise are occasionally going to happen. Note that D\textsuperscript{10}O has always held that such imbalances do not prove that we are righter than Mufosi regarding the contended points between us. [See D\textsuperscript{10}O 1.3 §10 (3rd-last paragraph).] Our position is merely that the Mufa’s incessant and curiously aggressive we-are-The-authorities-around-here postureing just might perhaps be a slightly less than completely perfect guide to the truth. Unless we are seeking transparent inducement of which side is seeking with inward insecurity: “The Greatest’s Venus’ elongation from the mean Sun at 48\textdegree{}13, even though Venus never got beyond 48\textdegree{} at any time during its entire 140 AD evening-star cycle, a discrepancy larger than the lunar semidiameter, yet another genuine & impressive Ptolemy first (deserving rank almost up there with double-dating a celestial event): The Greatest’s elongation was greater than the greatest elongation. One can similarly describe Ptolemy’s 136/11/18 “observation”: how can he at Almajest 10.2 call 47°\textdegree{}13 the greatest 136 AD evening Venus elongation when — by his own massively disparate (fn 24) but immediately-adjacent Almajest 10.1 account — the greatest 136 AD evening Venus elongation was 1°75 higher (47°81/15) on 136/12/25? This, The Greatest ranks up one more\textsuperscript{57} greater-than-greatest elongation. (This
Familiarly, we are here confronted with two quite different Ptolemy superexcesses: fraud and bungling. [Nobody’s perfect.] R.Newton’s low evaluation of Ptolemy coherently solves both. (By contrast, Ptolemy’s Occam-defying, Osgoodly-impenetrable defenders continue [see similarly at DIO 4.3 §15 §F5, DIO 10 §J9 & fn 109] to have to concoct & juggle multiple distinct and disjunct alibis: fn 20&61.) E.g., for one of his two initial Venus proofs [either Altmagier 10.1 or 10.2], why couldn’t a smart faker have just used the nearly identical Venus 128/12/16 greatest evening elongation instead of the 136/12/14 one? This would have to earn fewer snickers than Ptolemy’s actual procedure: using the very SAME Venus 136 AD greatest elongation in two conflicting proofs, megacontradictorily.

NS-OG’s sober alibiing of Ptolemy’s Venus fumblefarces is akin to a defense-lawyer going into court to get-off a counterfeiter who was so stupidly careless that he accidentally printed Ben Franklin on both sides of his attempts at faking hundred-dollar bills. What lawyer (outside innermost JHA dum) would try to excuse such inept criminality by claiming that the bungled bucks showed immortal, greatest-technician-of-the-era BRILLIANCE?

A penchant for such almost-perfectly-inverted judgements seems to be bubonically infectious in the Muffoose circle. (See also, e.g., fnn 7&35, DIO 11.1 p.2.) Note that these cranial warps issue not from the Flat Earthers or the Scientologists but from highly placed professors at Harvard and the University of Chicago, and are regarded as utterances-of-genius by no less than the MacArthur Foundation.

We know (§5 §C2, Rawlins 1991W fn 123, or Swerdlow 1989 p.32) that Ptolemy got his Venus r from Pliny (77 AD) or his sources, and we found hints of Ptolemy’s e and A at eq.30 & fn 48, respectively. However, the more important point is: his e is not only wrong but the correct value could have been estimated in his own time — and with just two years of real elongation data (§H2) — by techniques (explained in our present paper and that [§7] following) comparable to those he said he used for the outer planets (fn 27).

So it is no longer relevant to claim that R.Newton was unhistorical in using modern math and computers to get his best-fit Venus elements (R.Newton 1977 p.311 Table XI.2). For, we have already demonstrated here by quantitative test that the ancient-style trio-based method of the present paper would have gotten virtually the same results as R.Newton, and from just a few years of careful observations — taken outdoors.

But it’s that italicized last condition that was always a problem with Ptolemy. For, as we know on other and even simpler evidence, “Ptolemy doesn’t seem to have allowed his eyeballs out at night.”

Based upon this cocky delusion, HamSwerdlow 1981 pp.62-63 heaps superior-airs scorn upon R.Newton: “[his] arguments make anachronistic demands on what someone in antiquity should have been able to do, e.g., Ptolemy should have found the elements for the planets that Newton had his computer nd in making a best-fit model for a series of accurate planetary positions in all orbital configurations.” Yet the present paper’s simple method could produce Venus elements very near those of R.Newton’s analysis, from 2½ of accurate g, elong data (§H2) plus a few minutes of math (§E13).

§H2 (§E13) successfully compared elements gotten from a mere trio (eqs.46&47) to the result (eq.48) of R.Newton’s Gaussian statistical fit (based upon dozens of Venus positions).

See Rawlins 1985G p.266 & fn 6 [& fn 6 here], where we show: just as Ptolemy gives 2 contradictory data-sets for the same Venus elongations (fn 14), he also gives 2 contradictory latitudes each for Alexandria (his own city!), Heliopolis, & Syene. (And his Mercury contradiction [Rawlins 1987 pp.236-237, Rawlins 2003J fn 34] is worse.) In closing, we recall: when in 1976, O.Gingerich plunged into defending Ptolemy (fn 12), he didn’t yet know of the Venus double-date contradiction. So, when, in 1983, Venus-disaster hit Ptolemy’s biggest fan (fn 5), OG could only react with an elaborately complex rationalization (§A3) to defend his original position. Which suggests a challenge: for Ptolemites’ next unOccamite trick, they should concoct another & equally fancy ad-hoc singular theory, sculpted specially to explain-away Ptolemy’s equally contradictory double city-latitudes, so as to again (like §6 [& see DIO 6 §I fn 47]) avoid accepting a simple but hated common theory. For the latitude & Venus contradictions, the common explanation is plain&coherent: plagiarist Ptolemy was Dr.Sloppy-Copy.

Based upon this cocky delusion, HamSwerdlow 1981 pp.62-63 heaps superior-airs scorn upon R.Newton: “[his] arguments make anachronistic demands on what someone in antiquity should have been able to do, e.g., Ptolemy should have found the elements for the planets that Newton had his computer nd in making a best-fit model for a series of accurate planetary positions in all orbital configurations.” Yet the present paper’s simple method could produce Venus elements very near those of R.Newton’s analysis, from 2½ of accurate g, elong data (§H2) plus a few minutes of math (§E13).

See Rawlins 1985G p.266 & fn 6 [& fn 6 here], where we show: just as Ptolemy gives 2 contradictory data-sets for the same Venus elongations (fn 14), he also gives 2 contradictory latitudes each for Alexandria (his own city!), Heliopolis, & Syene. (And his Mercury contradiction [Rawlins 1987 pp.236-237, Rawlins 2003J fn 34] is worse.) In closing, we recall: when in 1976, O.Gingerich plunged into defending Ptolemy (fn 12), he didn’t yet know of the Venus double-date contradiction. So, when, in 1983, Venus-disaster hit Ptolemy’s biggest fan (fn 5), OG could only react with an elaborately complex rationalization (§A3) to defend his original position. Which suggests a challenge: for Ptolemites’ next unOccamite trick, they should concoct another & equally fancy ad-hoc singular theory, sculpted specially to explain-away Ptolemy’s equally contradictory double city-latitudes, so as to again (like §6 [& see DIO 6 §I fn 47]) avoid accepting a simple but hated common theory. For the latitude & Venus contradictions, the common explanation is plain&coherent: plagiarist Ptolemy was Dr.Sloppy-Copy.