I. Considerations on the Change of the Latitudes of some of the principal fixed Stars. By Edmund Halley, R. S. Sec.

Having of late had occasion to examine the quantity of the Precession of the Equinoctial Points, I took the pains to compare the Declinations of the fixed Stars delivered by Ptolemy, in the 3d Chapter of the 7th Book of his Almagest, as observed by Timocharis and Arisyllus near 300 Years before Christ, and by Hipparchus about 170 Years after them, that is about 130 Years before Christ, with what we now find: and by the result of very many Calculations, I concluded that the fixed Stars in 1800 Years were advanced somewhat more than 25 degrees in Longitude, or that the Precession is somewhat more than 50" per annum. But that with so much uncertainty, by reason of the imperfect Observations of the Ancients, that I have chosen in my Tables to adhere to the even proportion of five Minutes in six Years, which from other Principles we are assured is very near the Truth. But while I was upon this Enquiry, I was surprized to find the Latitudes of three of the principal Stars in Heaven directly to contradict the supposed greater Obliquity of the Ecliptick, which seems confirmed by the Latitudes of most of the rest; they being set down in the old Catalogue, as if the Plain of the Earth's Orb had changed its Situation, among the fixed Stars, about 20' since the time of Hipparchus. Particularly all the Stars in Gemini are put down, those to the Northward of the Ecliptick, with so much less Latitude than we find, and those to the Southward with so much more Southern Lati-
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Latitude. Yet the three Stars Polillicium or the Bulls Eye, Sirius and Arcturus do contradict this Rule directly: for by it, Polillicium being in the days of Hipparchus in about 10 gr. of Taurus ought to be about 15 Min. more Southernly than at present; and Sirius being then in about 15 of Gemini ought to be 20 Min. more Southernly than now; yet & contra Ptolemy places the first 20 Min. and the other 22 more Northernly in Latitude than we now find them. Nor are these errors of Transcription, but are proved to be right by the Declinations of them set down by Ptolemy, a observed by Timocharis, Hipparchus and himself, which shew that these Latitudes are the same as those Authors intended. As to Arcturus, he is too near the Equinoctial Colure, to argue from him concerning the change of the Obliquity of the Ecliptick, but Ptolemy gives him 33° more Northern Latitude than he now has; and that greater Latitude is likewise confirmed by the Declinations delivered by the above-said Observers. So then all these three Stars are found to be above half a degree more Southernly at this time than the Antients reckoned them. When on the contrary at the same time the bright Shoulder of Orion has in Ptolemy almost a degree more Southernly Latitude than at present. What shall we say then? it is scarce credible that the Antients could be deceived in so plain a matter, three Observers confirming each other. Again these Stars being the most conspicuous in Heaven, are in all probability the nearest to the Earth, and if they have any particular Motion of their own, it is most likely to be perceived in them, which in so long a time as 1800 Years may shew it self by the alteration of their places, though it be utterly imperceptible in the space of a single Century of Years. Yet as to Sirius it may be observed that Tycho Brahe makes him 2 Min. more Northernly than we now find him, whereas he ought to be above as much
much more Southernly from his Ecliptick, (whose Obliquity he makes $2\frac{1}{2}$ greater than we esteem it at present) differing in the whole $4\frac{1}{2}$ Min. One half of this difference may perhaps be excused, if refraction were not allowed in this Case by Tycho; yet two Minutes, in such a Star as *Sirius*, is somewhat too much for him to be mistaken.

But a further and more evident proof of this change is drawn from the Observation of the application of the Moon to *Pallicicum Anno Christi 509 Mart. 11°*, when in the beginning of the Night the Moon was seen to follow that Star very near, and I esteemed to have Eclipsed it. *ἐπέβαλε γὰρ ὁ ἁσιν τῇ ἰχνίᾳ τῶν διάλωμάτων μέρες τῆς νύκτας τῷ φερομένῳ τῇ περιστομένῳ μέρες*. i.e. *Stella apperita erat pari per quem ris cabatur limbus Lune illuminatus*, as Bulialdus, to whom we are beholden for this Antient Observation has translated it. Now from the undoubted principles of Astronomy, it was impossible for this to be true at Athens, or near it, unless the Latitude of *Pallicicum* were much less than we at this time find it. *Vide Bulialdi de Philolaica, pag 172.*

This Argument seems not unworthy of the Royal Society's Consideration, to whom I humbly offer the plain Fact as I find it, and would be glad to have their Opinion.

But whether it were really true, that the Obliquity of the Ecliptick was, in the time of *Hipparchus* and *Ptolemy*, really $22$ Min. greater than now, may well be questioned; since *Pappus Alexandrinus*, who lived but about 200 Years after *Ptolemy*, makes it the very same that we do. *Vide Pappi Collect. Lit. VI. Prop 35.*