

ner? An assumption of the existence of such meteorological causes on the confines of our atmosphere is strengthened by the "sudden flash and pulsation of light," which, according to the acute observations of Olbers, vibrated for several seconds through the tail of a comet, which appeared during the continuance of the pulsations of light to be lengthened by several degrees, and then again contracted.* As, however, the separate particles of a comet's tail, measuring millions of miles,

* "What you tell me of the changes of light in the zodiacal light, and of the causes to which you ascribe such changes within the tropics, is of the greater interest to me, since I have been for a long time past particularly attentive, every spring, to this phenomenon in our northern latitudes. I, too, have always believed that the zodiacal light rotated; but I assumed (contrary to Poisson's opinion, which you have communicated to me) that it completely extended to the Sun, with considerably augmenting brightness. The light circle which, in total solar eclipses, is seen surrounding the darkened Sun, I have regarded as the brightest portion of the zodiacal light. I have convinced myself that this light is very different in different years, often for several successive years being very bright and diffused, while in other years it is scarcely perceptible. I think that I find the first trace of an allusion to the zodiacal light in a letter from Rothmann to Tycho, in which he mentions that in spring he has observed the twilight did not close until the sun was 24° below the horizon. Rothmann must certainly have confounded the disappearance of the setting zodiacal light in the vapors of the western horizon with the actual cessation of twilight. I have failed to observe the pulsations of the light, probably on account of the faintness with which it appears in these countries. You are, however, certainly right in ascribing those rapid variations in the light of the heavenly bodies, which you have perceived in tropical climates, to our own atmosphere, and especially to its higher regions. This is most strikingly seen in the tails of large comets. We often observe, especially in the clearest weather, that these tails exhibit pulsations, commencing from the head, as being the lowest part, and vibrating in one or two seconds through the entire tail, which thus appears rapidly to become some degrees longer, but again as rapidly contracts. That these undulations, which were formerly noticed with attention by Robert Hooke, and in more recent times by Schröter and Chladni, *do not actually occur in the tails of the comets*, but are produced by our atmosphere, is obvious when we recollect that the individual parts of those tails (which are many millions of miles in length) lie *at very different distances* from us, and that the light from their extreme points can only reach us at intervals of time which differ several minutes from one another. Whether what you saw on the Orinoco, not at intervals of seconds, but of minutes, were actual coruscations of the zodiacal light, or whether they belonged exclusively to the upper strata of our atmosphere, I will not attempt to decide; neither can I explain the remarkable *lightness of whole nights*, nor the anomalous augmentation and prolongation of the twilight in the year 1831, particularly if, as has been remarked, the lightest part of these singular twilights did not coincide with the Sun's place below the horizon." (From a letter written by Dr. Olbers to myself, and dated Bremen, March 26th, 1833.)