

rounded by *shallows* or penumbæ, where the action is more tumultuous."

The black spots, which are seldom round, almost always angularly broken, and characterized by entering angles, are frequently surrounded by halos or penumbæ, which exhibit the same figure on a larger scale. There is no appearance of a transition of the color of the spot into the penumbra, or of the latter, which is sometimes filamentous, into that of the photosphere. Capocci and Pastorff (of Buchholz, in Brandenburg)—most diligent observers—have both given very accurate representations of the angular form of the nuclei. (Schum., *Astr. Nachr.*, No. 115, p. 316; No. 133, p. 291; No. 144, p. 471.) William Herschel and Schwabe saw the nucleoid spots divided by bright veins or luminous bridges—phenomena of a cloud-like nature generated within the second stratum where the penumbæ originate. These singular configurations, which probably owe their origin to ascending currents, the tumultuous formation of spots, solar faculæ, furrows, and projecting stripes (*crests of luminous waves*), indicate, according to Sir William Herschel, an intense evolution of light; while, on the other hand, according to the same great authority, "the absence of solar spots and their concomitant phenomena seems to indicate a low degree of combustion, and, consequently, a less beneficial action on the temperature of our planet, and the development of vegetation." These conjectures led Sir William Herschel to institute a series of comparisons between the prices of corn and the complaints of poor crops,\* and *the absence of solar spots*, between the years 1676 and 1684 (according to Flamstead), from 1686 to 1688 (according to Dominique Cassini), from 1695 to 1700, and from 1795 to 1800. Unfortunately, however, we can never attain a knowledge of the numerical elements on which to found even a conjectural solution of such a problem; not only, as this circumspect astronomer has himself observed, because the price of corn in one part of Europe can not be taken as a criterion of the state of vegetation over the whole Continent, but more especially because a diminution of the mean annual temperature, even if it affected the whole of Europe, would afford no evidence that the Earth had derived a smaller quantity of solar heat throughout that year. It appears from Dove's investigations of the irregular variations of temperature, that extremes of meteorological conditions always lie

\* William Herschel, in the *Philosophical Transactions of the Royal Society* for 1801, part ii., p. 310-316.