

scope, in the radiant fields of the starry heaven, as in the blossoms of the phanerogamia, and in the metallic oxyds, almost all the gradations of the prismatic spectrum between the extremes of refrangibility of the red and the violet ray. Ptolemy enumerates in his catalogue of the fixed stars six (*ὑπόκιρροι*) *fiery red* stars, viz. :* Arcturus, Aldebaran, Pollux, Antares, *a* Orionis (in the right shoulder), and Sirius. Cleomedes even compares Antares in Scorpio with the fiery red Mars,† which is called both *πυρρόδς* and *πυροειδής*.

Of the six above-named stars, five still retain a red or reddish light. Pollux is still indicated as a reddish, but Castor as a greenish star.‡ Sirius therefore affords the only example of an historically proved change of color, for it has at present a perfectly white light. A great physical revolution§ must therefore have occurred at the surface or in the photosphere of this fixed star (or *remote sun*, as Aristarchus

* The expression *ὑπόκιρρος*, which Ptolemy employs indiscriminately to designate the six stars named in his catalogue, implies a slightly-marked transition from *fiery yellow* to *fiery red*; it therefore refers, strictly speaking, to a *fiery reddish* color. He seems to attach the general predicate *ξανθός*, *fiery yellow*, to all the other fixed stars. (*Almag.*, viii., 3d ed., Halma, tom. ii., p. 94.) *Κίρρος* is, according to Galen (*Meth. Med.*, 12), a pale fiery red inclining to yellow. Gellius compares the word with *melinus*, which, according to Servius, has the same meaning as "gilvus" and "fulvus." As Sirius is said by Seneca (*Nat. Quæst.*, i., 1) to be *redder than Mars*, and belongs to the stars called in the *Almagest* *ὑπόκιρροι*, there can be no doubt that the word implies the predominance, or, at all events, a certain proportion of red rays. The assertion that the affix *ποικίλος*, which Aratus, v. 327, attaches to Sirius, has been translated by Cicero as "rutilus," is erroneous. Cicero says, indeed, v. 348 :

" Namque pedes subter rutilo cum lumine claret,
Fervidus ille Canis stellarum luce refulgens ;"

but "rutilo cum lumine" is not a translation of *ποικίλος*, but the mere addition of a free translation. (From letters addressed to me by Professor Franz.) "If," as Arago observes (*Annuaire*, 1842, p. 351), "the Roman orator, in using the term *rutilus*, purposely departs from the strict rendering of the Greek of Aratus, we must suppose that he recognized the reddish character of the light of Sirius."

† Cleom., *Cycl. Theor.*, i., ii., p. 59.

‡ Mädler, *Astr.*, 1849, s. 391.

§ Sir John Herschel, in the *Edinb. Review*, vol. 87, 1848, p. 189, and in Schum., *Astr. Nachr.*, 1839, No. 372: "It seems much more likely that in Sirius a red color should be the effect of a medium interfered, than that in the short space of 2000 years so vast a body should have actually undergone such a material change in its physical constitution. It may be supposed owing to the existence of some sort of *cosmical cloudiness*, subject to internal movements, depending on causes of which we are ignorant." (Compare Arago, in the *Annuaire pour 1842*. p. 350-353.)