640 stars of the sixth magnitude. The nebulous stars (*νεφελοειδεῖς*) of Ptolemy and of the Pseudo-Eratosthenian *Catasterisms* are mostly small stellar swarms,* appearing like nebulæ in the clearer atmosphere of the southern hemisphere. I more particularly base this conjecture on the mention of a nebula in the right hand of Perseus. Galileo, who, like the Greek and Arabian astronomers, was unacquainted with the nebula in Andromeda which is visible to the naked eye, says in his *Nuncius sidereus* that *stellæ nebulosæ* are nothing more than stellar masses scattered in shining groups through the ether (*areolæ sparsim per æthera fulgent*).† The expression (*τῶν μεγάλων τάξις*), *the order of magnitudes*, although referring only to luster, led, as early as the ninth century, to hypotheses on the diameters of stars of different brightness ;‡ as if the intensity of light did not depend on the distance, volume, and mass, as also on the peculiar character of the surface of a cosmical body in more or less favoring the process of light.

At the period of the Mongolian supremacy, when, in the fifteenth century, astronomy flourished at Samarcand, under Timur Ulugh Beg, photometric determinations were facilitated by the subdivision of each of the six classes of Hipparchus and Ptolemy into three subordinate groups; distinctions, for example, being drawn between the *small*, *intermediate*, and *large* stars of the second magnitude—an attempt which reminds us of the decimal gradations of Struve and Argelander.§ This advance in photometry, by a more exact determination of degrees of intensity, is ascribed in Ulugh Beg's tables to Abdurrahman Sufi, who wrote a work "on the knowledge of the fixed stars," and was the first who mentions one of the Magellanic clouds under the name of the White Ox. Since the discovery and gradual improvement of telescopic vision, these estimates of the gradations of light have been extended far below the sixth class. The desire of comparing the increase and decrease of light in the newly-

* *Ptol. Almag.*, ed Halma, tom. ii., p. 40, and in *Eratosth. Catast.*, cap. 22, p. 18: *ἡ δέ κεφαλὴ καὶ ἡ ἅρπη ἅναπτος ὁρᾶται, διὰ δέ νεφελώδους συστροφῆς δοκεῖ τισιν ὁρᾶσθαι.* Thus, too, Geminus, *Phæn.* (ed. Hilder, 1590), p. 46.

† *Cosmos*, vol. ii., p. 330, 331.

‡ Muhamedis Alfragani Chronologica et Ast. Elementa, 1590, cap. xxiv., p. 118.

§ Some MSS. of the Almagest refer to such subdivisions or intermediate classes, as they add the words *μείζων* or *ελάσσων* to the determination of magnitudes. (Cod. Paris, No. 2389.) Tycho expressed this increase or diminution by points.