mospheric strata, and even the smallest amount of water they contain, of scrutinizing the depths of the ocean and its rocks by means of a tourmaline plate,* and, in accordance with Newton's prediction, of comparing the chemical composition† of several substances‡ with their optical effects. It will be sufficient to mention the names of Airy, Arago, Biot, Brewster, Cauchy, Faraday, Fresnel, John Herschel, Lloyd, Malus, Neumann, Plateau, Seebeck, ... to remind the scientific reader of a succession of splendid discoveries and of their happy applications. The great and intellectual labors of Thomas Young more than prepared the way for these important efforts. Arago's polariscope and the observation of the position of colored fringes of diffraction (in consequence of interference) have been extensively employed in the prosecution of scientific inquiry. *Meteorology* has made equal advances with *physical astronomy* in this new path.

However diversified the power of vision may be in different persons, there is nevertheless a certain average of organ-

is by means of such a methodical sequence of observations that we may acquire exact ideas regarding the physical constitution of the sun." (On the Envelopes of the Sun, see Arago, in the *Annuaire pour* 1846, p. 464.) I give all the circumstantial optical disquisitions which I have borrowed from the manuscript or printed works of my friend, in his own words, in order to avoid the misconceptions to which the variations of scientific terminology might give rise in retranslating the passages into French, or any other of the various languages in which the *Cosmos* has appeared.

* "Sur l'effet d'une lame de tourmaline taillée parallèlement aux arêtes du prisme servant, lorsqu'elle est convenablement située, à éliminer en totalité les rayons réfléchis par la surface de la mer et mêlés à la lumière provenant de l'écueil." "On the effect of a tourmaline plate cut parallel to the edges of the prism, in concentrating (when placed in a suitable position) all the rays of light reflected by the surface of the sea, and blended with the light emanating from the sunken rocks." See Arago, *Instructions de la Bonite*, in the *Annuaire pour* 1836, p. 339 343.

† "De la possibilité de déterminer les pouvoirs réfringents des corps d'après leur composition chimique." On the possibility of determining the refracting powers of bodies according to their chemical composition (applied to the ratio of the oxygen to the nitrogen in atmospheric air, to the quantity of hydrogen contained in ammonia and in water, to carbonic acid, alcohol, and the diamond). See *Biot et Arago, Mémoire sur les Affinités des Corps pour la Lumière*, Mars, 1806; also *Mémoires Mathém. et Phys. de l'Institut*, t. vii., p. 327–346; and my *Mémoire sur les Réfractions Astronomiques dans la Zone Torride*, in the *Recueil d'Observ. Astron.*, vol. i., p. 115 and 122.

‡ *Expériences de M. Arago sur la puissance Réfractive des Corps Diaphanes* (*de l'air sec et de l'air humide*) *par le Déplacement des Franges*, in Moigno, *Répertoire d'Optique Mod.*, 1847, p. 159–162.