birth to two great applications of his principle—the search, through the study of the spectra of distant stellar sources of light, after the ingredients which are present in those distant luminaries, and the search, through the study of the flames of terrestrial substances, for new spectral lines announcing yet undiscovered elements."[1] Whilst in these two independent directions an enormous amount of new knowledge has been accumulated, the mechanical explanation through which Sir G. Stokes anticipated these phenomena, and the further applications of this principle by him, have done much to confirm the conviction, that in looking upon light as a vibratory mode of motion, we are on the road towards an adequate description of these phenomena.

[1] To this principle we owe the spectrum analysis of stellar atmospheres and the discovery of new chemical elements, of which no fewer than six have been identified by this method, beginning with cæsium and rubidium (found by Kirchhoff and Bunsen in the waters of some mineral springs). The suggestion of Doppler, mentioned above (p. 10, note), has only become fruitful through the invention of the spectroscope. Colour differences originating through the change of the frequency of vibrations depending on cosmical velocities in the line of sight, could not be discovered by the most sensitive eye. In the spectrum, however, shown by the spectroscope, "not only the colours of the bright lines have been altered, but their position in the spectrum relatively to a fixed point of reference as well. . . . The measurement of the displacement of spectral lines in consequence of the altered refrangibility of the rays is the only method yet known which possesses sufficient accuracy for determining the motions of objects in the line of sight. Thus far it has not been possible to produce in the laboratory velocities high enough to occasion a perceptible displacement of the lines" (Scheiner, *loc. cit.*, p. 148). And as Doppler's principle in acoustics was proved directly by Buys Ballot through the whistle on moving railway trains, so it has been proved directly in optics by observing the displacement in the lines of the solar spectrum, when this is derived from the outer rays of the sun's disc, the light-giving parts moving in the line of sight towards or away from the observer in consequence of the rotation of the sun round its axis. "The resulting velocity of the surface of the sun is found to agree very closely with the results of direct observations of the revolution of the spots, thus practically furnishing a proof of the correctness of Doppler's principle" (ibid., p. 149).