

the time of Young and Fresnel, the cultivators of this theory have been led to make respecting the mechanical constitution of the ether, and the forces by which transverse vibrations are produced. It was natural that various difficulties should arise upon such points, for transverse vibrations had not previously been made the subject of mechanical calculation, and the forces which occasion them must act in a different manner from those which were previously contemplated. Still, we may venture to say, without entering into these discussions, that it has appeared, from all the mathematical reasonings which have been pursued, that there is not, in the conception of transverse vibrations, anything inconsistent either with the principles of mechanics, or with the best general views which we can form, of the forces by which the universe is held together.

I willingly speak as briefly as the nature of my undertaking allows, of those points of the undulatory theory which are still under deliberation among mathematicians. With respect to these, an intimate acquaintance with mathematics and physics is necessary to enable any one to understand the steps which are made from day to day ; and still higher philosophical qualifications would be requisite in order to pronounce a judgment upon them. I shall, therefore, conclude this survey by remarking the highly promising condition of this great department of science, in respect to the character of its cultivators. Nothing less than profound thought and great mathematical skill can enable any one to deal with this theory, in any way likely to promote the interests of science. But there appears, in the horizon of the scientific world, a considerable class of young mathematicians, who are already bringing to these investigations the requisite talents and zeal ; and who, having acquired their knowledge of the theory since the time when its acceptance was doubtful, possess, without effort, that singleness and decision of view as to its fundamental doctrines, which it is difficult for those to attain whose minds have had to go through the hesitation, struggle, and balance of the epoch of the establishment of the theory. In the hands of this new generation, it is reasonable to suppose the Analytical Mechanics of light will be improved as much as the Analytical Mechanics of the solar system was by the successors of Newton. We have already had to notice many of this younger race of undulationists. For besides MM. Cauchy, Poisson, and Ampère, M. Lamé has been more recently following these researches in France.²⁵ In

²⁵ Prof. Lloyd's *Report*, p. 392.