

within a mile of Sienna, there existed a bed of microscopic shells analogous to those found on the shores of Rimini.

Later on, Soldani examined with a magnifying glass the clay of the tufa and sands of SOLDANI. North Italy, and produced his essay on the nautiloid layers of Tuscany,¹ and thus enriched science with descriptions and drawings of a multitude of shells belonging to minute marine animals, always looked upon as nautili and ammonites, an error perpetuated till 1835. As he assigned no particular names to these diversified forms, which he described and represented with care, and even grouped according to certain analogies, Soldani did not contribute to advance the knowledge of them as much as he might have done had he applied to them the then well-known nomenclature of Linnæus. From 1789 to 1797 he published another very considerable work² on the microscopic shells found on the shores of Giglio, Elba, and other islands. He observes in this work that these small bodies are not young specimens, which grow with age, but perfect adults; the various species occupy various depths, and this explains, he adds, why those in a fossil state are not found mixed indifferently in all the strata.

The hypothetical ideas of some Arab writers, and the observations of Pytheas and PROGRESS OF Posidonius on the causes of tides have been already noticed.³ In the sixteenth century KNOWLEDGE there was marked progress in the knowledge of these phenomena; men began to RESPECTING THE study the local peculiarities of the tides, as shown by the instructions given by Cabot TIDES. for the Polar explorations (1553), according to which the time when a particular tide set in was to be noted down for each port. It was owing to observations of this nature that a body of facts was gradually grouped together on which to establish the theory of tidal phenomena. Galileo connected them with the rotation of the earth on its axis; Francis Bacon found their explanation in the configuration of the terrestrial masses of the Old and New Worlds. Simon Stevin is nearer the truth, for he can already foretell for each port the hour of the tide by means of lunar phases. Kepler, in the Introduction to his *Astronomia Nova*, recognises the dependence of the tides on the attraction of all the heavenly bodies. Descartes came next with his theory of the eddies of ether, which Varenus accepts as being the best explanation of the phenomena of flux and re-flux. Lastly, the publication of Newton's *Principia* produced a complete modification in this branch of science, and the works of MacLaurin, Euler, and Bernouilli, competing for the prize offered by the Academy of Sciences of Paris in 1740, added new mathematical elements to the theoretical ideas of the time.

Observations on marine currents increased as people began to abandon coasting,

¹ Saggio orittografico ovvero osservazioni sopra le terre nautilitiche ed ammonitiche della Toscana, Siena, 1780.

² Testaceographia et zoophytographia parva et microscopica [4to, with 179 plates], Siena, 1789-1797 (cited by d'Archiac).

³ See pp. 15, 21, 37.