

neighboring sea ?”\* In order to explain the necessity of the vicinity of the sea, recourse has been had, even in modern times, to the hypothesis of the penetration of sea water into the foci of volcanic agency, that is to say, into deep-seated terrestrial strata. When I collect together all the facts that may be derived from my own observation and the laborious researches of others, it appears to me that every thing in this involved investigation depends upon the questions whether the great quantity of aqueous vapors, which are unquestionably exhaled from volcanoes even when in a state of rest, be derived from sea water impregnated with salt, or rather, perhaps, with fresh meteoric water; or whether the expansive force of the vapors (which, at a depth of nearly 94,000 feet, is equal to 2800 atmospheres) would be able at different depths to counterbalance the hydrostatic pressure of the sea, and thus afford them, under certain conditions, a free access to the focus;† or whether the formation of metallic chlorids, the presence of chlorid of sodium in the fissures of the crater, and the frequent mixture of hydrochloric acid with the aqueous vapors, necessarily imply access of sea water; or, finally, whether the repose of volcanoes (either when temporary, or permanent and complete) depends upon the closure of the channels by which the sea or meteoric water was conveyed, or whether the absence of flames and of exhalations of hydrogen (and sulphureted hydrogen gas seems more characteristic of solfataras than of active volcanoes) is not directly at variance

\* [Although extinct volcanoes seem by no means confined to the neighborhood of the present seas, being often scattered over the most inland portions of our existing continents, yet it will appear that, at the time at which they were in an active state, the greater part were in the neighborhood either of the sea, or of the extensive salt or fresh water lakes, which existed at that period over much of what is now dry land. This may be seen either by referring to Dr. Boué’s map of Europe, or to that published by Mr. Lyell in the recent edition of his *Principles of Geology* (1847), from both of which it will become apparent that, at a comparatively recent epoch, those parts of France, of Germany, of Hungary, and of Italy, which afford evidences of volcanic action now extinct, were covered by the ocean. Daubeney *On Volcanoes*, p. 605.]  
—Tr.

† Compare Gay-Lussac, *Sur les Volcans*, in the *Annales de Chimie*, t. xxii., p. 427, and Bischof, *Wärmelehre*, s. 272. The eruptions of smoke and steam which have at different periods been seen in Lancelotti, Iceland, and the Kurile Islands, during the eruption of the neighboring volcanoes, afford indications of the reaction of volcanic foci through tense columns of water; that is to say, these phenomena occur when the expansive force of the vapor exceeds the hydrostatic pressure.