and elevating them in a conical form.   Against this doctrine, as exemplified in the most noted instances, strong arguments have been adduced by other geologists.   Yet the protrusion of fused rock by subterraneous forces upon a large scale is not denied : and how far the examples of such operations may, in any cases, be termed craters of elevation, must be considered as a question not yet decided.   On the supposition of the truth of Von Buch's doctrine, M. de Beaumont has calculated the relations of position, the fissures, &c., which would arise.   And Mr. Hopkins,[9] of Cambridge, has investigated in a much more general manner, upon mechanical principles, the laws of the elevations, fissures, faults, veins, and other phenomena which would result from an elevatory force, acting simultaneously at every point beneath extensive portions of the crust of the earth.   An application of mathematical reasoning to the illustration of the phenomena of veins had before been made in Germany by Schmidt and Zimmerman.[10]   The conclusion which Mr. Hopkins has obtained, respecting the two sets of fissures, at right angles to each other, which would in general be produced by such forces as he supposes, may suggest interesting points of examination respecting the geological phenomena of fissured districts.

[2nd Ed.]   [The theory of craters of elevation probably errs rather by making the elevation of a point into a particular class of volcanic agency, than by giving volcanic agency too great a power of elevation.

A mature consideration of the subject will make us hesitate to ascribe much value to the labors of those writers who have applied mathematical reasoning to geological questions.   Such reasoning, when it is carried to the extent which requires symbolical processes, has always been, I conceive, a source, not of knowledge, but of error, and confusion ; for in such applications the real questions are slurred over in the hypothetical assumptions of the mathematician, while the calculation misleads its followers by a false aspect of demonstration.   All symbolical reasonings concerning the fissures of a semi-rigid mass produced by elevatory or other forces, appear to me to have turned out valueless.   At the same time it cannot be too strongly borne in mind, that mathematical and mechanical habits of thought are requisite to all clear thinking on such subjects.]

Other forces, still more secure in their nature and laws, have played a very important part in the formation of the earth's crust.   I speak of the forces by which the crystalline, slaty, and jointed structure of

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[9] *Trans. Camb. Phil. Soc.* vol. vi. 1836.   [10] *Phil. Mag.* July, 1836, p. 2.