According to the researches of the latter the *observed* thermal effects of longitudinal stress on a wire is to be found by dividing the *theoretical* thermal effects by 1·61, since part of the work expended on a wire which is stressed longitudinally finds its equivalent in molecular effects which are not thermal. This view seems to be partly supported by some experiments made by the author on the viscosity of metals.

V. "Note on Boiling in a Vessel contained in a Water Bath." By Charles Tomlinson, F.R.S. Received May 31, 1884.

In the "Phil. Trans." for 1673, No. 97, among the "Acta Medica" of Dr. Bartholin, the twelfth is thus stated:—

"A contrivance of making water not boyl in the midst of boyling water, by hanging a narrow-mouth'd glass, half-full of water, in the midst of an Iron Kettle filled with water; whereupon the ambient water may by a strong fire be made to boyl, when as the water in the glass, though it be hot, yet will not boyl at all, though some few bubbles be seen at the bottom, which do all vanish before they come to the top."

In "Rozier's Journal" for 1773, p. 1, is a memoir entitled "Expériences et Phénomènes singuliers sur la Communication de la Chaleur, par M. Braun, de l'Académie de St. Pétersbourg." In this memoir, reference is made to a paper by Olaus Borrichius in the "Memoirs of the Academy of Copenhagen," entitled "Aqua in medio aquæ non ebulliens."

In M. Braun's experiments, a copper vessel was filled with water, and another copper vessel, containing water to the height of two-thirds, was placed in it, so that the level of the water in the outer vessel was above that in the inner. The water in the outer vessel was made to boil violently during upwards of an hour, and the water in the small vessel did not show the least sign of ebullition. It remained in fact 9° (De Lisle's ther.) below the temperature of the water in the outer vessel.

The experiment was also tried in vessels of glass, earthenware, iron, &c., with the same result. Also with different liquids, such as spirits of wine of various densities, contained in both vessels, when the temperature of the liquid in the smaller vessel was from 4° to 12° or 13° below that in the outer vessel. With various kinds of wine, the difference was 4° or 5°; with milk 7°; and with petroleum from 15° to 20°. These results, the author remarks, form a strange paradox, but may possibly be referred to the fact that the outer vessel is immediately in contact with the source of heat.

In "Watson's Chemical Essays" (vol. i, 5th Edn., 1789, p. 73, note) the experiment is again described in the following terms:—

"It is a very remarkable phenomenon that a vessel containing water will never *boil*, how long soever it be exposed to the action of *boiling* water. A common bottle is filled with water, and placed in a pan of water so that the mouth of the bottle be a little above the water in the pan. The pan is set on the fire, and its contents made to boil violently at 212° F., while the water in the bottle will only reach 202°."

In repeating this experiment, I used for the outer vessel a large wide-mouthed flask filled about two-thirds with water, heated by means of a spirit lamp; and for the inner vessel a glass tube, suspended by means of a string attached to the top ring of the retort stand which supported the flask. In this way the tube could be raised or lowered so as to place the level of the water contained in it above or below the level of the water in the flask.

The experiment, under this form, has been frequently repeated, and it was found that, in general, after the water in the flask had been boiling for some time, the temperature of the water in the tube was not more than $1\frac{1}{2}°$ or 2° F. below that in the outer vessel.

The inferior temperature of the water in the tube is evidently due to evaporation; and as there were no very clear ideas on this subject until the time of Dalton, the early observers regarded the result as paradoxical.

On covering the water in the tube with a layer of oil, the temperature rose to that of the water in the flask, and bubbles of steam escaped freely from the surface of the water through the oil.

The oil used was olive in one case, and a volatile oil of high boiling point, such as cajuput, in another. On passing the thermometer through the oil down into the tube, bubbles of steam were given off freely from the bulb and stem, thus further illustrating one of the points maintained in my paper on the action of nuclei in liberating vapour from boiling liquids, contained in the "Proceedings of the Royal Society," vol. 17, p. 240.

VI. "Notes on the Microscopic Structure of some Rocks from the Andes of Ecuador, collected by E. Whymper. No. III. Cotopaxi and Chimborazo." By Professor T. G. Bonney, D.Sc., F.R.S. Received June 6, 1884.

In regard to these two important volcanic mountains of the Ecuadorian Andes, Mr. Whymper has favoured me with some descriptive notes, which appear to me of so much interest that I incorporate them with but slight modification into my paper.