this fissure, on it cooling down, will be kneaded by mastication articles of irritating food and drink, which will lead to caries round it. The progress of this may *erode* a segment of the tooth, or at last penetrate into the cavity and the pulp, and lead to inflammation and abscess; and none is a more virulent agent in doing this than hot tea. The simmering kettle may be seen on the hobs of the kitchen fires in the houses of the working classes in Yorkshire and Lancashire, who are much subject to caries of the teeth and dyspepsia, in consequence of the frequent imbibition of its hot contents all day. W. G. BLACK.

Edinburgh, May 17.

The Lowell Observatory, Arizona.

I LEARN—although I have not myself yet seen the note—that NATURE has been unwittingly led into the error of stating that Lowell Observatory, at Flagstaff, Arizona, is a branch of Harvard College Observatory. This impression had its origin in a press dispatch, and I am, with the approval of Mr. Lowell, correcting these wrong impressions when possible.

Mr. Percival Lowell—whose father is trustee of the Lowell Fund from which the cost of the Lowell Institute Lectures is defrayed—is himself an author ("Japanese Art and Customs") and a man of scientific training. He has himself worked out the plan for his observatory work, and will personally supervise and direct the investigations. His institution is one of magnitude, having 18 in. and 12 in. telescopes, and he is justly entitled to the credit. The misunderstanding seems to have arisen from the fact that he has employed two of the Harvard College Observatory assistants for the season, they having been granted leave of absence. I enclose Mr. Lowell's own statement, published yesterday, being his paper before the Boston Scientific Society, and really the first public official statement.

May 26. JOHN RITCHIE, JUN.

[The following description is from the enclosure referred to by Mr. Ritchie. We are glad to render Mr. Lowell the credit due to him.—ED.]

The Lowell Observatory, the construction of which is now almost completed, is situated in the territory of Arizona, near the town of Flagstaff, in longitude 112° west, latitude 35° north, at an elevation of 7300 feet above the sea. Its site is thus the highest of any large observatory in the northern hemisphere, the next in point of elevation being the observatory at Denver, 5400 feet. In latitude it is furthermore the most southerly of those north of the equator. But the chief advantage hoped for from its position is in the way of atmospheric conditions, the singularly dry and clear climate of Arizona commending itself to astronomical purposes.

The observatory buildings stand upon the eastern end of a spur of high land, which rises just to the west of the town and is connected at the back some fifteen miles away with the San Francisco Mountains that reach to a height of 12,500 feet. The buildings are thus protected from the north. To the east and south they overlook the town and the plain beyond, being about 300 feet above Flagstaff and a mile away from it in an air line. The hill and the surrounding country are covered in part by a sparse growth of timber. Trees about an observatory are usually considered an advantage, as such vegetation reduces the radiation from the ground and tends to equalise the daily extremes of temperature, thus giving steadier seeing. The land for the site has very generously been given by the town, and a road to the observatory is being built by the town at its own expense.

The buildings consist of the equatorial building and of the study, placed at a short distance away from it to leeward of the prevailing winds. This disposition of the buildings is in order to minimise the risk from fire, a serious matter in so isolated a situation.

The dome of the equatorial building is constructed on a system of parallel arches, after a design by Prof. W. H. Pickering, who has made a study of domes here and abroad. It is built of a framework upon which rests a cage of wire-netting, and over this is stretched a covering of canvas. One of the chief features of the dome is its lightness. Although it is thirty-four feet in diameter, the whole revolving hemisphere weighs but two tons. Some idea of its lightness and of the ease of moving it in consequence may be got by comparing it with the dome of the large equatorial at Harvard, which, though four feet smaller, weighs fourteen tons, or seven times as much. The whole revolves on the wheels of a live-ring. The dome was built here and, together with the pier, shipped out in pieces to Arizona. The study building will contain a general or reception room, two sleeping rooms, a photographic room and a tool-room.

The telescopic equipment consists of three telescopes of 18 inches, 12 inches and 6 inches aperture, respectively. The 18-inch glass is by Brashear, and is the largest objective Mr. Brashear has yet finished. Its focal length is 26 feet 4 inches. This is an unusually long focus, and length of focus is an advantage in an objective. It and the 12-inch one of Clark's are mounted in twin. The 18-inch will be used for usual and spectroscopic purposes, while the 12-inch will be chiefly employed photographically. The third glass, the 6-inch, is also by Clark, and is a fine objective. It has already done good work at Flagstaff by being the first of those in the northern hemisphere to catch the Gale comet the other day. Incidentally, it is a far travelled telescope, having been safely half round the world and back again before ever it started for Arizona. It is of the same size and quality as the one with which Burnham made himself the first of double-star observers. By the ingenuity of Mr. Clark it is mounted portably in equatorial, being thus rendered the largest of small telescopes, or the smallest of large ones, at pleasure.

The 18-inch has been carefully fitted by Mr. Brashear with various ingenious contrivances by Prof. Pickering for photometric and spectroscopic work. For micrometrical purposes, in addition to the micrometer proper, he has also had prepared plates minutely ruled, dotted and designed and then diminished by photography, to be introduced beside the image in the telescope, for direct comparison with the canals and lakes of Mars and other similar purposes, thus furnishing a second method for micrometrical measurement of such detail.

The Berthollet-Proust Controversy and the Law of Definite Proportions.

IN his able address at the annual meeting of the Chemical Society, the President spoke of chemical text-books somewhat scornfully. While I confess that I am not prepared to regard these books as "soul-destroying," one and all, I have long felt at least that the dogmatic exposition of the elementary laws of chemistry to which they have accustomed us is most unsatisfactory, and that a critical re-statement of first principles is much needed. To deal with the subject fully, would carry me far beyond the limits of a letter to NATURE; but it is proposed in the following communication to draw attention to certain serious misconceptions which have crept into modern text-books with regard to the Berthollet-Proust controversy and the Law of Definite Proportions, and to attempt to re-define somewhat more accurately the points which were at issue.

Berthollet, it is said in the text-books, held that the composition of a compound was not rigidly constant, while Proust showed that "the same chemical compound always consists of the same elements combined in the same proportions by weight," (a statement to be referred to later, as statement A); and this statement is regarded as an enunciation of the Law of Definite Proportions, against the acceptance of which Berthollet strove so hard. As a matter of fact it seems unlikely that Berthollet would have felt in the least inclined to contradict the statement quoted. He did not suppose for a moment that it *was* possible for two substances to exist which should be sufficiently alike in properties for them to be called the same chemical compound, and yet for these to differ sensibly in their quantitative chemical composition; yet this is what a denial of statement A amounts to. On the contrary, Berthollet, like Proust, held the opposite view, namely, that the physical properties of substances are necessarily correlated with their chemical composition, and therefore that two substances differing in their chemical composition have in general different properties and are not called by the same name. We find Berthollet making use of this view, for instance, in the course of an argument given in the "Essai de Statique Chimique," vol. i. p. 346. For he says in effect that if in certain cases we only find compounds of which the constituents are united in ratios, such as $x:y$ or $x:y_1$, among the infinite number of compounds of these constituents capable of existing, it is just because these combination-ratios correspond precisely to some physical property (*e.g.* insolubility) which renders the resulting substance easy of isolation, and takes it (to use the terminology of the time) beyond the reach of the chemical forces which caused its formation.