these elements—of which "argon" may be one—should exhibit properties differing chiefly in degree from the alternate palladium and platinum triplets; while hydrogen would appear as the primary of both systems of elements.

Dr. Gladstone's letter, which appeared in your issue of February 21, admirably puts the reasons for preferring an atomic weight of about 20 for argon to the higher number which Lord Rayleigh and Prof. Ramsay are now disposed to assign to it; but Dr. Gladstone seems to think that there is room for only one element, whereas three are possible, as I pointed out at the Oxford meeting, for the reasons given in the foregoing.

It will be seen from the illustration that an element with an atomic weight between 36 and 39 would belong to a third system of elements. But the sole ground for concluding that the atomic weight of argon lies between these points, is the ratio of the specific heats as determined by Kundt and Warburg's method. Lord Rayleigh and Prof. Ramsay found this ratio to be nearly equal to that afforded by mercury gas, the molecule of which is monatomic and density only half its atomic weight; hence they conclude that the argon molecule is monatomic, and that its density of nearly 20 represents but half the atomic weight. Now, while any opinion on this point, coming from the distinguished discoverers of argon, is of the highest value, it seems possible to attach undue weight to the very slender evidence afforded by the specific heats, for mercury at present is the only one of the known cases of monatomic elementary molecules in which the ratio of the specific heats has been determined. But, even admitting that the energy of the mercury and the argon molecules is chiefly translational, it is still conceivable that the argon molecule includes two atomic vortices so closely interlinked as to have a common centre, and therefore to enable the molecule to simulate a monatomic character. Such a structure would be consistent with great stability and, consequently, with exceptional chemical indifference. J. EMERSON REYNOLDS.

Trinity College, Dublin, March 19.

Variation in *Caltha palustris*.

READING the notice of Mr. Burkill's paper on "Variations in Stamens and Carpels," in NATURE of February 7 (p. 359), I remembered the following notes on *Caltha palustris*, which my wife and I made at Corfe, Dorset, June 11, 1891.

C. palustris: heads in pairs on a dichotomously branching stalk; number of follicles in each head, counted in several specimens, as follows:—

7 follicles on one, 4 on the other, of a pair. 8—5, 5—7, 5—6, 6—6, 6—7, 7—5, 9—9, 10—8, 11—8, 9—6.

Thus there is great variation. One stalk is longer than the other, of a pair, and it is presumed that in every case the shorter one flowers first. It will be noticed that in the above eleven instances, only two had the same number of follicles on both stalks. Of the remaining nine, three had most follicles on the longer of the stalks, and six had most on the shorter. Those on the shorter stalk were larger than those on the longer, presumably because older.

A second memorandum gives the results of fifteen more counts, all taken at random, thus (L. = longer, S. = shorter stalk):—

L. with most follicles.		L. and S. equal.		S. with most follicles.
L. S.		L. S.		L. S.
5—4	...	8—8	...	4—6
				4—8
9—8	...	5—5	...	6—7
9—7	...	10—10	...	8—10
		7—7	...	9—10
		10—10	...	7—8
				4—5

It accordingly appears that the later-flowering, longer-stalked head produced more follicles in just half the number of cases counted (13 out of 26), and the shorter-stalked head had a majority in only 5 cases, the remainder being equal.

In a *Bidens* found at Barbadoes (West Indies), on July 6 of the same year, there were similarly two heads, a long-stalked and a short-stalked, the latter flowering first. It would be interesting to get statistics of the numbers of akenes in the heads in this. The species was not certainly determined, but it is of the section of *B. bipinnata*. T. D. A. COCKERELL.

New Mexico (U.S.A.), February 24.

DR. M. FOSTER ON THE TEACHING OF PHYSIOLOGY IN SCHOOLS.[1]

THE teaching of science in schools has, it seems to me, two uses. The first is what I may call the "awakening" use. Many minds who feel no interest in the ordinary subjects of school learning, to whom the ordinary lessons appear as so much dull mechanical work, are at once stirred to intellectual activity when the teaching of this or of that science is presented to them. The second use is the more distinctly "educational," training use.

The minds of the young being, happily, differently constituted, one mind is especially "awakened" by one branch of knowledge, another by another. One boy or girl dates the beginning of his or her intellectual activity from the day on which he or she had a first lesson in chemistry. Another starts in the same way with botany. And the number of those to whom physiology thus serves as "awakening" knowledge, is, it seems to me, sufficiently great to render it desirable, by the introduction of the teaching of physiology into schools, to afford adequate opportunities for its exercising this benefical effect.

It follows that, taught from this point of view, physiology should be taught as a new independent subject, not demanding any previous knowledge; it should be presented as a wholly new field into which the natural mind may wander at will without any restrictions as to being qualified for entrance. It also follows that the teaching must be of a most elementary kind, that as much of chemistry or physics as is necessary for the comprehension of the physiological matters should be taught with the physiology, and, as it were, as a part of it, the pupil being led into chemistry and physics by his interest in physiology, and not being compelled to learn the one for which he or she perhaps does not, at present at least, care before beginning the other.

The instruction given, however elementary it may be, should consist in part of demonstrations and practical exercises. I need not enumerate these in detail, but they must necessarily be limited in scope; the dissection of a rabbit or some other animal to show structure, some little microscopic work, such as the microscopic study of the blood and of a few tissues, the examination of the structure and working of the heart, the mechanics and elementary chemistry of breathing, and the like. But all these demonstrations, like the rest of the teaching, I may repeat, should teach so much of chemistry, of mechanics, &c., as is needed, as a part of the physiological lesson.

As an "awakening" study, I am in favour of physiology being very widely taught; but, as almost necessarily follows from the view on which I have been dwelling, it ought not to be made a compulsory study. Made compulsory, it would as an awakening study lose much of its virtues. I do not hide from myself the fact that the present gross ignorance which prevails among most men and women as to the most elementary facts concerning their own bodies is most undesirable, especially perhaps as regards women; but I am most decidedly of opinion that it is better to meet this evil by encouraging the study of physiology than by making it compulsory.

Physiology, as a distinctly educational study, as a training for the mind, is a very different matter; and it is, in my opinion, in this aspect unsuitable for schools. The training for the mind which physiology affords is one, I venture to think, of no small value, but is one

[1] A short time ago, on my consulting him on behalf of a committee appointed by the Headmasters' Association, to draft regulations for major scholarships' examinations, Prof. Michael Foster was good enough to give me this statement of his opinion on the teaching of physiology in schools—a subject of great importance, but of great difficulty, regarding which much misconception prevails: it appears to me to be so valuable, that I have sought for and obtained his permission to publish it.—HENRY E. ARMSTRONG.