My own early experience suggested a solution. Might I not deliver some well advertised public scientific lectures of a sufficiently light and sensational character to captivate the intellect by the natural bait of wonderment? If so, the systematic classes might be fed by their means.

My first idea was, considering the poverty of the Institute at that time, to charge twopence or threepence for admission to such lectures, but on communicating my scheme to Mr. Arthur Ryland, the Vice-President of the Institute, he improved it materially by suggesting that the charge for such lectures should be one penny, and that they should be called "Penny Lectures."

The Council assented to this, and on Jan. 22, 1856, I commenced the first course of Twelve Penny Lectures in the Lecture Theatre, Cannon Street.

The lecture theatre was crowded throughout the course, which served its intended purpose of supplying an outline of the grasp of Physical Science. This course was followed by others. I continued them every Tuesday evening during above nine months of each year until July 1863, when I left Birmingham. They were always well attended but with some degree of fluctuation. The smallest attendance was during a course on the Birmingham manufactures, and the best attendance when subjects connected with combustion, electricity, or my own travelling experiences were treated and well illustrated.

I do not at all presume to describe these lectures as nearly equal to the Manchester lectures that have been lately delivered. They were necessarily extemporised, as may be supposed from the fact that, with the exception of an occasional volunteer (four or five lectures per annum), I delivered them all myself, and at the same time conducted the Lectures on Chemistry, Experimental Physics, Junior and Ladies' Classes, and the Practical Analytical Class in the Laboratory, besides being compelled to supplement my very small salary by writing newspaper articles.

I mention this to show how much may be done by small means. The Institute was so poor at its beginning that I was obliged to fit the lectures to the small stock of apparatus we possessed, and lecture on whatever subjects I could best illustrate. The average outlay upon illustrating these early lectures did not exceed three or four shillings each.

Nevertheless their object was fulfilled. The Penny Lectures fed the Science Classes, which without such aliment would have been starved and extinguished in their infancy. Their success led to the establishment of the "Penny Readings" of the Midland Institute in 1857 or 1858, which were, I believe, the first of these entertainments that have since become so popular and so much degenerated. These again were followed by the Penny Arithmetic Classes and the other Penny Classes which have since formed one of the leading and most important features of good work done and doing in Birmingham.

The egotism of the above narrative will possibly be pardoned, seeing that the experiences of the early struggles of the Science Classes of the Midland Institute have been so often repeated where similar efforts have been made, and are likely to be continued so long as the prevailing inefficiency or total absence of scientific instruction in our primary schools remains. The success of these Penny Lectures, in spite of all their shortcomings, in creating a demand for more thorough instruction indicates an available means of rendering science classes successful in other places. My advice to all concerned in the promotion of such classes is that they should make no compromise in reference to the classes themselves, by attempting to bring *in them* the subjects down to the level of present requirements of the majority, but that instead of this, they should, by means of very popular, attractive, aye, even sensational public penny lectures, excite curiosity, and create an interest in science among those they desire ultimately to teach.

Being now in the confessional I may as well admit that I practised several small illegitimate devices to keep my audiences together, one especially copied from the young lady who occupied "the thousand and one nights," that of leading the subject up to some amusing experiment just at the end of the lecture, and then discovering that it was time to conclude, and therefore that the experiment must be shown next Tuesday. The small boys who occupied the front seats and applauded all the explosions soon found me out, but they came next week nevertheless, and some of these who at first were blue-fire pupils only, ultimately joined the classes and became satisfactory students. Therefore the Penny Lecturer should not be too rigidly regardful of his own scientific dignity, but Barnumise to some extent, when he can thereby advance towards the high object he seeks to attain.

"Should this meet the eye" of any disconsolate projector and manager of a failing Mechanics' Institution or similar effort, let him try Penny Lectures forthwith, not musical or dramatic lectures, but lectures on the most wonderful of natural phenomena, including as much scientific explanation as the audience can digest, and at the same time let him prepare to supply the solid class instruction for which such lectures should ultimately create a demand.

W. MATTIEU WILLIAMS

Belmont, Twickenham

Proposed Optical Barometer

I WAS led the other day to consider the possible effect of changes of barometric pressure on the ultimate destination of light passing through lighthouse refracting agents, and although I was satisfied that such changes cannot produce any effects of practical importance, the idea occurred to me that a glass prism might be used as a barometer. When a refracting prism is successively immersed in media of different refractive indices the ultimate angular deviation of the ray will, as is well known, depend in each case on the relative indices of the glass and the medium surrounding it at the time of the experiment. And as the refractive index of atmospheric air varies with its density, the amount of deviation of the refracted ray will be a measure of the density of the air, *i.e.* will give the means of ascertaining the reading of the barometer at the time.

If the ray of light were made to pass through a number of refracting and totally reflecting prisms the deviation would be increased. If with these prisms a microscope were combined the prisms might be used as a barometer. Or if the ray be received obliquely on a number of pieces of glass having parallel faces and slightly separated from each other, although there would be no angular deviation there would be horizontal displacement which would admit of being measured by a micrometer. How far such an application would be of practical value is certainly doubtful, as the effects of changes of temperature on the prism itself might interfere with the very limited range of the instrument. Or again, it is possible that easterly, westerly, or other currents—or perhaps differences in the hygrometric state of the atmosphere—may affect the index of refraction otherwise than by the mere changes of density which they produce. But if such be the case, the refracting prism will be useful in determining the existence and amount of such variations in the refrangibility of the atmosphere.

Edinburgh, Dec. 13

THOMAS STEVENSON

Seasonal Colour in Flowers

THE "blue of the wild hyacinth" (see vol. xiii. p. 129) is anticipated by the yellow of the primrose, the daffodil, the marsh marigold, the coltsfoot, the lesser celandine (*Ranunculus Ficaria*), and especially the winter aconite. We may add as contemporaries the buttercup, the yellow deadnettle, and the cowslip. The furze blooms in autumn and winter, and the golden broom in spring; the dandelion and the groundsel flower during the greater part of the year. The "deep scarlet of our summer flowers," represented in Britain by the poppies and the pimpernel only, is accompanied by the no less vivid blue of the cornflower, the wild chicory, the viper's bugloss (*Echium*), whose blossoms change from red to blue as they approach maturity, the flax, and the various campanulas. I say nothing of white flowers; but it is worth notice that the hepatica, bugle (*Ajuga*), and milkwort (*Polygala*), vary to almost precisely the same shades of blue, white, and pink, at quite different seasons.

R. A. PRYOR

Hatfield, Dec. 17

Glands of the Cherry Laurel

THE nectariferous glands on the back of the leaf of the cherry laurel (vol. xiii. p. 107) are present also, I believe, in all the Drupaceæ. The position is not in all cases the same; but when the glands are not found on the back of the leaf, they may be seen on the petiole. Ants may often be found drinking this leaf-honey; and I heard, two or three years ago, that the same attraction had brought many hive-bees to the laurels in a garden at Sidmouth.

E. H.

OUR ASTRONOMICAL COLUMN

VARIABLE STARS.—Nos. 2065-67 of the "Astronomische Nachrichten" contain another of Prof. Schönfeld's