found a little too large, because all the other small corrections have been neglected, such as the friction on the edges of the orifice, the temperature, the resistance of the air, &c.

In the memoir I have employed an approximative formula, which differs very little from the exact value, and which is formed by supposing that the velocities, in rectangular orifices, are as the square roots of the charges above their centres.

All these formulæ, however, suppose that the level in the reservoir remains constant, which is not the case in practice, except when the charge is ten, or twelve, times greater than the radius of the orifice. In small charges there is a depression of the level above the orifice, for which allowance must be made, in order to obtain exact results; for this reason it is necessary to multiply all the formula by a factor which depends upon the depression; by this means I obtain equations which are applicable, at the same time, both to great and small charges, and even to overfalls.

Finally, the different forms of the veins of water are determined by means of the theorem mentioned above, that the force of contraction is proportional to the radius of the orifice. Hence it follows that the contraction in the diagonal sections of a square orifice is greater than that in the sections passing through the centres of parallel sides, and as the contraction may be regarded as a force acting perpendicularly upon the axis of the vein, it follows that the particles of water in the larger sections approach the axis, whilst the particles, in the smaller sections, are farther from it, which explains the forms found by experiment.—*Comptes Rendus*, 15th January, 1844.

TRANSLATED FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

Report upon a Note relative to the Flexure of Beams Loaded in a Vertical Position; presented June 20th, 1842. By M. E. LAMARLE. Committee, Poncelet and Lionville.

In this note M. Lamarle has chiefly proposed to establish the following principles:—

1. The loads, which beams, loaded vertically, can support without permanent alteration, are independent of their lengths, and simply proportional to their sections, so long as the ratio of their lengths to the least dimension of their transverse section does not reach a certain limit.

2. Beyond that limit, and in all cases of practical application, the maximum load may reach, but can never exceed, the pressure corresponding to the initial flexure.

M. Lamarle also shows that (the pieces being supposed prismatic,) it is sufficient to know the greatest change in length compatible with the preservation of elasticity, in order to determine numerically the limit alluded to. He remarks beside that the results furnished, by calculation, accord with the facts generally observed, and that they imply the consequences announced by M. Duleau, in the following terms: "A rectangular bar pressed vertically, resists until the com-

pressing weight attains the value, $Q = \frac{\pi^2 c}{4 a^2}$. This weight causes the piece to assume a curvature in the direction of its smallest dimension, and it at once folds together." The deductions of the author rest essentially upon the analysis given by M. Lagrange, for the problem of the flexure of pieces loaded vertically, but by imposing the condition of not surpassing the force capable of producing a permanent alteration, and by expressing this condition numerically, M. Lamarle has introduced into the question an element of which advantage had not yet been taken to solve it practically. The introduction of this element fixes the degree of convergence of the series which are obtained, and permits the deduction from the general solution, of rules valuable to the builder.

We know, and Lagrange has proved, that the flexure of pieces pressed vertically, becomes possible only when the pressure has obtained a certain minimum value. If the pieces are prismatic, the load corresponding to the initial flexure, increases in the inverse ratio of the squares of their lengths. The contractions which it produces, independent of all flexure, are, therefore, more considerable in reference to the unit of length, in proportion as the pieces are stouter, and we may conceive that for a given cross section there exists always a length below which there is already an alteration of elasticity, even when the load is too small to cause a commencement of flexure. Hence the first principle announced by M. Lamarle.

Let us now consider the case of flexure, and let us suppose the ratio of the length to the smallest dimension of the cross section to be so great, that flexure may commence before a permanent alteration has taken place. In this case the strain *due to the effect of flexure alone*, increases as the versed sine; and M. Lamarle shows that an almost imperceptible increase of the pressure corresponding to the initial flexure, is sufficient to cause an instant alteration of the elasticity. Hence the second principle of the author, not absolute, but sufficiently general to include all the cases which might escape the first, under the circumstances usual in practical applications.

These two principles taken together, offer a satisfactory solution to the question of beams loaded vertically.—*Comptes Rendus*, 15th January, 1844.

On Madder. By M. GIRARDIN, Prof. Prac. Chem. at the Municipal School of Rouen.

In commerce the name of *Lizari* has for a long time been restricted to the entire roots of the madder, while that of *Madder* is applied to the pulverized roots.

The *Lizaris* are very little employed for the purposes of dyeing, and there is hardly any but the *Lazari* of Avignon, which is met with in the markets of France. The *Lizari* of Cyprus is actually of rare occurrence; that of Alsatia is never met with.

The powders called *madders* are distinguished according to their