Of the Penetration of a Hemisphere by an indefinite Number of equal and similar Cylinders. By Thomas Knight, *Esq. Communicated by Sir* Humphry Davy, *LL.D. Sec. R.S.* Read March 19, 1812. [*Phil. Trans.* 1812, *p.* 310.]

The problem which Mr. Knight here undertakes to solve, is to pierce a hemisphere perpendicularly to the plane of its base, with any number of equal and similar cylinders of such kind, that after the removal of these cylinders, the remainder of the hemisphere shall admit of exact cubature; and when the surface has been thus perforated, the remaining surface shall admit of exact quadrature.

But the solution of this problem, as well as of those contained in the preceding communication, was, of course, such as not to admit of being publicly read.

On the Motions of the Tendrils of Plants. By Thomas Andrew Knight, *Esq. F.R.S. In a Letter to the Right Hon. Sir* Joseph Banks, *Bart. K.B. P.R.S.* Read May 4, 1812. [*Phil. Trans.* 1812, *p.* 314.]

Some naturalists have supposed tendrils to be endued with some degree of perception, to which their propensity to approach neighbouring objects may be ascribed; and though others who have written on the same subject may have rejected this hypothesis, it does not appear to Mr. Knight that any direct experiments have been made similar to those which he here describes, for the purpose of ascertaining whether these motions may not be ascribed to peculiarity of organization, aided by the operation of external causes.

The plants selected for his experiments were, the Virginia Creeper, the Ivy, the Vine, and the Pea. When a young plant of the creeper, trained directly upwards, was placed alone in the centre of a forcing-house, its tendrils were all turned towards the north wall; but as this was out of their reach, they declined gradually, and ultimately fixed themselves on the upright stem beneath and upon its support.

When other plants were placed near the glass, their tendrils were always directed from the light, as in the former instance, although no object was within their reach on the dark side.

Mr. Knight next tried the effect of placing near them a piece of dark paper; to this they appeared to be strongly attracted, and when the paper was removed to a new position, the tendrils were found to follow it. When a piece of glass was substituted for the paper, the tendrils showed no disposition to approach it; but, on the contrary, when it was placed so as to reflect the light of the sun upon the tendrils, they appeared to be strongly repelled by it.

In making corresponding experiments on the ivy, Mr. Knight found the same propensity in its claspers to recede from the light; but it was necessary to place substances much nearer than in the former experiments for them to manifest any appearance of spontaneous motion.

When a young plant of the vine was placed under the same cir-

cumstances as the creeper, its tendrils manifested the same tendency to recede from the light. When first emitted, they pointed upwards; but the angle gradually increased, and ultimately they pointed directly downwards when no object was within their reach to which they could attach themselves. The ultimate direction was in all instances towards the darkness of the ground, whether the plants were trained upwards, horizontally, or downwards.

There was, however, this difference observable between the tendrils of the vine and those of the Virginia creeper: those of the vine could be made to return to any position which they had quitted, by changing the direction of the light; but those of the creeper never returned to a situation from which they had once receded; as the tendrils of the vine are, moreover, separated into two divisions, they do not often fail of coming into contact with adjacent objects; and the effect of contact is almost immediately visible. They bend more firmly toward the body, and attach themselves by twining round it.

The organization of the tendril, by which it is adapted to perform these motions, appears to the author very similar to that of the young succulent shoot. It is abundantly provided with vessels; and it seems not improbable that a very considerable quantity of the moving fluid of the plant passes through them, and that there is a close connexion between their vascular structure and their motion, as appears more especially in the act of grasping an object. The external pressure of the body on one side will probably impede the motion of the fluids on that side of the tendril, and occasion greater extension of the opposite side in giving passage to a greater proportion of sap. In conformity to this explanation, it is observed, that the sides of the tendrils that are in contact with the substance embraced are visibly compressed and flattened.

Observations on the Measurement of three Degrees of the Meridian conducted in England by Lieut.-Col. William Mudge. *By Don* Joseph Rodriguez. *Communicated by* Joseph de Mendoza Rios, *Esq. F.R.S.* Read June 4, 1812. [*Phil. Trans.* 1812, *p.* 321.]

After tracing the history of the several measurements that have been made from time to time in different parts of the world, the author observes, that little doubt would have remained as to the earth being flattened at the poles, had not the English measurement given an opposite result; the degree at the northern extremity being found equal to 60,766 fathoms, while that at the southern appeared to be 60,884.

Colonel Mudge's estimate of the linear measure of a degree is made by dividing the number of fathoms measured in linear extent of an arc by the number of degrees and parts of a degree ascertained by observations of stars. Don Joseph Rodriguez has followed a different course. He assumes as data the linear extent of Col. Mudge's base line, and the horizontal angles of his triangles ascertained by observation. He assumes, also, that the figure and dimensions of the earth