Note on the Structure of *Medicago sativa*, as apparently affording facilities for the intercrossing of distinct flowers.

By the Rev. George Henslow, M.A., F.L.S.

[Read November 16, 1865.]

In the flowers of this plant, the vexillum is inserted by a short claw, and is so folded as to leave a depression inside along the medial line. The alæ have slender claws, there being on the inside face of the limb of each petal a tooth-like process projecting forwards, and which is also produced backwards parallel to the claw. These latter backward extensions of the processes converge over the stamens, and pressing on the staminal tube confine it in its position. The petals of the carina present each a depression, which receives the process projecting forward on the inner face of the corresponding alary petal. The carinal petals cohere, and include the extremity of the staminal tube and pistil, together with the anthers.

The walls of the staminal tube are remarkably thick, its tissues being distended with fluid. The tissues become gradually thinner towards the edges of the fissure on the upper surface. The cells are of about the same shape and dimensions on both surfaces, being more or less oblong and united by oblique ends. The average length is ·00344 to ·0046 inch, and breadth ·00115 inch. Nine small bundles of spiral vessels pass into the extremities of the free portions of the filaments.

The tube is at first horizontal, the extremity being concealed within the adpressed petals of the alæ and carina; but if any object, as a pin, be directed down the channel formed by the vexillum, its point will be conducted into the small elliptical space between the alæ, and immediately in front of the backward extensions of the tooth-like processes. On pushing the pin further, it can scarcely avoid pressing against these processes in a lateral direction; the consequence is, that the tube is instantly released, and springing upwards strikes violently the vexillum, and dashes the pollen both against it and upon the pin, and then assumes a vertical position and a rigidly curved form.

The tenth or free stamen appears to have no independent elasticity, but is simply forced upwards and bent by the action of the coherent filaments. Having once become curved, it is impossible to straighten the tube so as to make it assume its original position, without causing a transverse fracture.

I have not been able to discover whether the curvature is caused

by distention of the cells on the convex side or a corresponding emptying of those on the concave, as no apparent difference could be detected either in the relative size of the cells or in the amount of moisture they relatively contained; for they all presented a similar appearance: but it is possible to examine them only after the tube has become curved; for the moment it is liberated from the petals, it instantly assumes that form. Possibly some such arrangement as the above may exist while it is in the horizontal condition, thereby retaining a state of unstable equilibrium, which is instantly destroyed by the process of erection and curvature.

The erection of the staminal tube is quite independent of the pistil, which may be severed from the receptacle without any displacement of the stamens by passing a scalpel through the enlarged orifice at the base of the slit on the upperside. On the other hand, if the pistil be subsequently removed, *i. e.* after the stamens are freed, it will be found to exhibit no elasticity or even tendency to become curved. Simultaneously with the erection of the stamens, and in consequence of the superior processes of the alæ being displaced, the alæ and carina immediately drop down, firmly locked together, and give that peculiar "gaping" appearance not uncommon amongst papilionaceous corollas. The petals of the carina also possess a strong inherent tendency to diverge and to become horizontal. This tendency seems to aid considerably the uprising of the stamens.

With regard to hive-bees sucking the nectar from the flowers of *Medicago sativa*, they were frequently visited by them, but in no instance could I find that they had power enough to set free the staminal tube. No opportunity of observing humblebees presented itself.

The peculiar property of the ejection of the stamens is common to all other species of *Medicago* that I have observed.

The natural inference that one would draw from the above-described structure of the stamens is, that it is in some way purposed to secure the intercrossing of distinct flowers; and observations made by Mr. Darwin on *Medicago lupulina** would seem

* Note on *Medicago lupulina*, communicated by Mr. Darwin:—

"I covered a number of plants with a net (which I know does not injure their seeding), and left others close by uncovered, and these were visited incessantly by bees. I could not compare their relative fertility with accuracy, on account of the easy shedding of the seed; but I gathered 150 not quite ripe pods of both; those from under the net weighed 77 grains, and those visited by the bees weighed 101 grains. No doubt the difference in the weight of the seed would have been considerably greater, as the pod is formed independently of the number of seeds."

to favour this supposition. But while this would seem to be effected by the stamens springing up in *Medicago*, as also in *Genista* and *Cytisus* (though in these two and, perhaps, other instances there appears to be no curvature of the staminal tube); the more general way would seem to be by the depression of the carina with or without that of the alæ. This has been already observed by Mr. Darwin and others in *Trifolium*, *Lupinus*, *Phaseolus*, &c., and by the present writer in *Onobrychis*, *Lotus*, *Lathyrus*, &c.

Hypothetical Origin of Diadelphous Stamens.—It would seem probable that the diadelphous condition of the stamens, and the fact that the sheath gapes at its base, favour the uprising of the bundle. Had the stamens been monadelphous, their future condition would be apparently more or less impeded by the corrugations on the upperside which would, on that hypothesis, have presented themselves. If the above idea be worthy of consideration, might not the diadelphous condition of other species, whose stamens have no power of erection, be regarded as instances of the retention of a particular structure whose function is in abeyance? while the greater degree of integration presented by the monadelphous species would seem to point to a further advance in structure by the complete fusion of the upper stamen with the anterior nine, so that those species which have diadelphous stamens would be in a transition state between entire freedom or differentiation (as in *Cercis siliquastrum*) and complete integration (as in *Ulex*, *Genista*, &c.).

Note on the Existence of the true *Cyperus Papyrus*, L., in Palestine.

By the Rev. H. B. Tristram, M.A., F.L.S.

[Read March 1, 1866.]

During my travels in Palestine in 1864, I was pleased to find a Papyrus growing luxuriantly by the shores of the Lake of Galilee, close to the Ain et Tîn, on the north of the plain of Gennesaret. Some stems which I measured exceeded 16 feet in length.

I afterwards found in the almost inaccessible marshes of the Huleh (the ancient Merom) many acres of the same plant. It is noticed by Dr. Thomson in his 'Land and Book,' who gives a fair popular description of the plant under its familiar Arabic name of "*Babeer*," but without knowing that the classical and