Watson, S.

Posoqueria.

In ~~note~~ ~~of vol. 4~~ 1 of the vols of the Naturalist for 1869 & 1870 Mr. Charles Wright gives a ~~short~~ description ~~notice~~ of the flower of Posoqueria longiflora, having referred also to an article of Müller in Bot. Zeit. for 1866 upon the same subject. Some doubt still remaining in regard to the real method by which fertilization is effected ~~in this plant~~, Mr. ~~Wright~~ asked ~~called~~ my attention (in his absence) to the plant now in flower at the Botanic Garden, Cambridge, ~~and, in his absence, requested~~ The conclusions to which I have been brought are so curious that they seem worth communicating.

~~The flower, unopened, of natural size is represented in fig. 1,~~

This Posoqueria is a shrub of several feet in height, blooming ~~flowering~~ freely, the ~~flowers being in~~ in consequence close sessile ~~terminal~~ corymbs, the flowers horizontal or even drooping. ~~An opened~~ as it appears before opening is represented of natural size in fig. 1. — the slightly ~~unequal~~ ~~imbricated~~ fleshy ~~pointed~~ lobes of the corolla ~~forming~~

cases are called false dissepiments. C. DeCandolle in his Memoire & in the Prodromus calls them "dorsal" and the primary ones "ventrals", a phraseology which I have avoided, as they are not upon the outer dorsal side of the carpel but on the inner & ventral surface. They connect the central column with the "fissural" line but are never as high as the primary partitions, in C. amara reaching nearly to ½ the height of the nut, to ⅔ in G. regia, ⅓ in G. nigra & C. alba. In many species they are wholly wanting, as in G. cinerea & Japonica, C. oliviformis & myristicaformis.

Hollows ("lacunae") occur both on the inner surface of the outer walls & in many species in the dissepiments. The parietal lacunae lie between the fissural & commissural lines, one in each quadrant & always nearer to the fissure, or two & in that case the most strongly developed one nearest the fissure.

2/ ~~a firm safe protection to the stamens~~,
~~the~~ imbricated into a firm roomy hood some-
what gibbous at base + deflected
from the direction of the tube in
such a manner as to avoid con-
tact with either the filaments or
anthers. Upon the opening of the
bud the stamens are as shown
in fig. 2. – the anthers united ~~together~~
by their edges, the filaments unequal
and unlike. The lower filament is
stout + transversely flattened + is
inserted rather lower in the ~~mouth of~~ throat of
the tube than the others. The lower lateral
pair are also flattened but more curved
and less stout. The upper pair are
much more slender, rounded, bowed
into a complete semicircle and near
the upper end bent inward + downward at a right angle.
~~While in this position these filaments,~~
which are very elastic are subjected to
a strong tension, ~~that~~ but in opposite
or different directions. The tendency of
the lower stamen is to fly upwards, that
of the lateral ~~pairs~~ ones to fly away from
the centre + from each other. The~~y are~~ only
~~held together only~~ resistance to this
tension is the slight adherent force

of the edges of the anthers, aided essentially by a change of structure at the extremities where the cohesion is rather more firm, especially at the lower end, the anthers there terminating in short thin membranous folds which are in close contact. The anthers thus united form a single oblong cell filled with a mass of light dry pulverulent pollen.

If now the least additional pressure be applied in any direction, upon the anther cell, this state of unstable equilibrium of forces is disturbed, and there is an instantaneous change of position. Owing to the curvature of the lateral filaments the rupture commences along the line joining the upper anthers, beginning near the base, the lower anther is pushed violently upwards breaking free from its attachments on both sides, the lateral pairs still remaining united by spring aside, the partial straightening of the angular bend in the upper filaments gives a quicker & longer motion to the

apices than they would otherwise have. The entire pollen thus left upon the hollow surface of the lower anther is by its quick movement through half a circle thrown into the air & scattered to a considerable distance. The resulting position of the stamens is shown in fig. 3. — the lower filaments now lying close upon & covering the fringed mouth of the tube.

The force of this explosion, for such it is, may be estimated from an approximate measurement of the elastic power of the curved filaments. The lower filament brought back to its original position sustained in curved tightness a weight of over 50 grains & it required that weight to retain it in place. Exactly the same weight was needed to bring each lateral pair back to the centre, though the power of the individual filaments was unequal, the lower one sustaining 35 grains and the upper but a little over 15. The pollen was thrown a horizontal distance of nearly two feet.

The Spirochæa. Thus far appears to be purely mechanical, no irritability can be detected about the filaments; though indeed Mullen positively asserts that in his plant the inner surfaces of the upper filaments near the anther are so sensitive that it could not be touched without causing an explosion. This certainly is not the case here, though in-

Douglas was sent out by the Horticultural Society of London and all his specimens were sent to their society, but with the request that their publication might be transferred to Dr. Hooker, which wish was "to the fullest extent complied with". Yet it does not necessarily follows that Dr. Hooker had the full collection of Douglas's specimens from which to draw his descriptions, so that possibly while he had but "scales + bracteles" there were complete cones in possession of the society.

died we decided pursuit at any point will be endured. He may however probably have had another species in view, and his figures show some slight differences. His name (Martha fragrans) was a mere improvisation of his own for the occasion, in want of a better. In his opinion the agency of insects was necessary to the discharge of the pollen through their irritation of the filaments in their search for the nectar. Rich the exceedingly fragrant flowers secretes abundantly, but its mere weight upon the anthers, or without its agency any sudden jar or pressure, even the fall of a raindrop — is sufficient for the purpose. In fact it is not unfrequently the case that the pollen is discharged before the flower has opened.

4/ The question only remains as to the manner in which the pollen is conveyed to the stigma, which is deep within the narrow tube of the flower, the pistil never reaching above ~~half~~ its ~~length~~ middle — at least we have no evidence that the flowers are ever dimorphous in the relative lengths of the style & stamens. At the time of the ~~discharge~~ explosion it is evidently impossible that any pollen should reach the stigma of the same flower, for the direction of the projectile force is upward & the resultant position of the filaments over the mouth of the tube seems to cut off all future approach. Muller however noticed a fact which seemed to indicate a solution, viz. that within 24 hours after the explosion these long filaments had resumed its original position leaving the tube open to the approach of insects and Mr. Wright suggests the agency of the long nightmoth in conveying pollen to the stigma by means of its long proboscis. This moth is doubtless capable of reaching sufficiently deep into the tube to reach the stigma, but the ~~extreme~~ narrowness of the cavity, its continual moisture & the dense fringe of hairs encircling the throat would make the con-

agency of ~~the~~ pollen a matter of uncertainty.

The true solution appears to be sufficiently simple. Within 36 or 48 hours from the opening of the flower, the corolla ~~does not its fresh~~ has separated from the calyx and as a consequence of its originally drooping position has or soon falls. The style is withdrawn from the tube & remains, the stigma now being in a perfectly fresh condition & ready to receive the pollen. It remains in this condition at least a day and usually longer, but the meantime it is exposed to the showers of pollen from exploding anthers around it. To increase the chances the whole style is moist with nectar & a drop is often hanging from the ~~pendent~~ stigmas, so that if any grains of pollen strike anywhere upon its long the they are doubtless caught & probably find their way by gravity to the stigmatic surfaces. In this way cross-fertilization is secured independently of the aid of insects or any other agency

5/ exterior to the flower itself.

It is probable that the return of the lower filament to a position corresponding to that of the upper ones is due simply to the reestablishment of a similar cellular expansion force on the inner side of the filament in place of the similar one in the opposite direction which at first existed for a temporary purpose. It would seem at any rate, to have nothing to do with the process of fertilization.

That fertilization is effected in these short styled flowers is proven by its occurrence in case of the plants now in flower here, which have matured perfect seeds, and indeed the flowers of this season while yet in the greenhouse & mostly shut off from the visitation of insects show ovaries that appear to be fecundated. —

Sereno Watson

Cambridge, Mass.
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