Bulletin of the Torrey Botanical Club, Vol. 27, No. 1 (Jan., 1900), pp. 37-39

The Crystals in Datura Stramonium L.*

By Henry Kraemer

The value of the study of the distribution of crystals of calcium oxalate in plants from a systematic standpoint has been demonstrated by R. V. Weltstein in an exhaustive study of the members of the family Umbelliferae. In some, if not all of the members of the family Solanaceae, are to be found in one or more elements (root, stem, leaf, etc.) cryptocrystalline crystals of calcium oxalate. These are also referred to by different writers as "Sable tetraédrique" or as "Krystallsand." In the genera *Atropa* and *Solanum* these crystals occur uniformly in some of the parenchyma cells of roots, stems and leaves. In some other genera, as in *Hyoscyamus*, these cryptocrystalline crystals may be replaced for the most part by monoclinic prisms or pyramids and in still other genera, as in *Datura Stramonium* L., by rosette aggregates and other crystals. The form of the crystals as well as their distribution in the members of the family Solanaceae will, no doubt, prove of significance in the developmental history of the genera comprising this order. In the root of *Datura Stramonium* L., we find in the parenchyma of the primary cortex, numerous cells which possess a very large number of small cryptocrystalline crystals of calcium oxalate which are more or less deltoid in shape and from 2–10 μ in their longest diameter. On account of the small size of these crystals there are likely to be some differences of opinion as to which system they belong. Vesque describes them as "Sable tetraédrique," indicating that they are hemiedral forms of the isometric system. But inasmuch as calcium oxalate crystals are only known to occur in the monoclinic or tetragonal systems it seems that they are probably hemiedral forms of either one or the other of these systems. It would appear that part of the crystal was formed and that the formation of the remaining part was either interrupted or disturbed. It is not at all unlikely that further investigations will demonstrate that they are hemiedral forms of the

* Presented at the Columbus Meeting of the American Association for the Advance-of Science.

monoclinic system. Instead of the crystals having a true deltoid form like a tetrahedron, one axis is frequently as much as twice as long as the other two axes. It may be mentioned that it is not unusual to find associated with these hemiedral forms crystals which resemble the octahedrons or hexahedrons of the isometric system, but the greater difference in the length of one axis indicates that they are either prisms or octahedrons of the monoclinic system. In the stem we find the same kind of crystals as well as a similar distribution of them that we noted in the root. The crystals may in some cases be larger, measuring as much as 15 μ in their longest axis. There are also present in some of the cells monoclinic prisms (about 20 × 5 × 5 μ) as well as rosette aggregates made up of about 12 of these prisms. In some specimens these prisms are replaced by acicular crystals (35 μ long) which may be united or aggregated to form large sphere crystals.

In the petiole of the leaf we find numerous hemiedral cryptocrystalline crystals (20 × 10 × 10 μ). There are, however, in addition many monoclinic prisms (14 × 10 × 10 μ) or pyramids (25 × 10 × 10 μ) or a few rosette aggregates of crystals (30 μ in diameter). In some specimens the hemiedral forms may be largely replaced by monoclinic prisms (15 × 4 × 4 μ) or pyramids (10 × 3 × 3 μ) or acicular crystals (35 μ in length). In the parenchyma of the nerves of the lamina there are many cells that possess cryptocrystalline crystals, but we also find large monoclinic pyramids (28 × 15 × 15 μ) and rosette aggregates (28 μ in diameter). There are also present in some specimens numerous small prisms and acicular crystals.

In the mesophyll of the leaf the cryptocrystalline crystals are entirely replaced by rosette aggregates (17 to 24 μ in diameter): one occurring in each parenchyma cell directly below the palisade layer.

In the parenchyma of the flower stalk we find very small rosette aggregates of crystals (10 μ in diameter). In the parenchyma of the calyx a few small prisms (1–3 μ long) and rosette aggregates (10–14 μ in diameter) are found.

In the parenchyma of the corolla are small prisms (2–3 μ long) and some small rosette aggregates. In the filaments of the stamens there are some exceedingly small cryptocrystalline crystals.

In the ovary a very large number of the cells contain cryptocrystalline crystals (2 × 1 × 1 μ) and in the region of the placenta or inner epidermis rosette aggregates (14 μ in diameter) may be found.

It is rather interesting to note that the cryptocrystalline crystals which are found in such abundance in the parenchyma of roots and stems of *Datura Stramonium* L. are replaced in part in the petiole and nerves of the leaves by prisms, pyramids and rosette aggregates of crystals and that in the lamina the prisms and pyramids evidently are united to form rosette-shaped aggregates only.

Not infrequently do we find in a cell containing cryptocrystalline crystals a large rosette-shaped mass of what appears to be an aggregate of small hemiedral crystals.

The fact that we find monoclinic prisms in *Hyoscyamus* and raphides in some instances in *Atropa* and *Solanum* is further indicative that all the various forms of crystals in *Datura Stramonium* L. are likewise of the monoclinic system.

That there is a close relationship between the different genera of the family Solanaceae is evidenced by the observations that some of the parenchyma cells of some of the elements of nearly all of the genera and species appear to contain hemiedral cryptocrystalline crystals. These are contained uniformly and in greatest amount in the genera of the Solaneae and Datureae and to the least extent in some of the genera of the Cestreae and Salphiglossideae, there being some exceptions to the last groups in *Vestia* (of the Cestreae) and *Anthocercis* (of the Salphiglossideae).