

# Sensitive Crystallisation Method

*Each plant possesses the inherent power to create its own living form and pass it on to a being of its own kind. In crystals, we find the transition from the formless mineral world to the living capacity of the plant kingdom to produce forms.*

*Rudolf Steiner*

The Sensitive Crystallisation Method is used for examining the quality of samples from living nature. Its applications are in the field of seed and plant cultivation, and food and drug production. Together with capillary dynamolysis, circular chromatography and the drop picture method, sensitive crystallisation belongs to the so-called picture forming methods. These methods have in common that their outcomes are pictures. The different structures found in these pictures are so numerous and varied that by measuring and counting only, the 'totality' of the picture cannot be captured. Therefore, we compare the composition of a picture to a series of related pictures. Here it becomes evident that the person evaluating the pictures becomes part of this process by means of their own thinking. To put it in other words: a person's understanding of quality can be formed whilst working with the method. In this way, the method becomes the scene for our efforts to achieve an understanding of quality that is appropriate to both life and our culture.

## Milk quality – influence of the lactation period

The crystallisation pictures show that a cow does not just produce good or bad milk. The quality of the milk changes during a lactation period corresponding to the needs of the growing calf.



At the beginning of the lactation period, the formative capacity of the milk is large, the crystallisation picture is concisely structured, dynamically curved and fine structures occur in the space between the needle formations.



Towards the end of the lactation period the formative capacity of the milk decreases, the crystal structures become more network-like, the dynamics decrease and the fine structures disappear.

# Technique

*We had the incredible luck (or the incredible guidance), that the first crystallisation pictures already contained all the basic principles of the method. It took us many years of very careful and sometimes even boring detailed work to prove that our first hypothesis was correct in every detail and that no other arrangement would lead more perfectly to the proof of formative forces.*

*Ehrenfried Pfeiffer (Inventor of the method)*

A crystallisation picture is made by crystallising a mixture of a copper chloride solution and the water soluble organic extract to be investigated in a glass dish in a crystallisation chamber. The characteristics of the crystallisation picture depend on both the climatic conditions in the chamber and the properties of the organic extract.

**Excluding essential environmental influences from the crystallisation process – an experimental technique.**



The glass ring confines a part of the solution – a new little world arises containing a centre and needle formations that are peripherally oriented.



We zoom out to next level, the crystallisation chamber, where the crystallisation process takes place under controlled climatic conditions. Temperature and relative humidity can be regulated. The geometry of the chamber determines the air flows.



Needles of copper chloride – crystallised pure salt without an organic extract.

# Crystallisation pictures

*Often we meet the question, whether the copper chloride picture of a plant shows resemblances to the morphology of the living plant: we have not observed such outer morphological resemblances of the shape of a plant to her crystallisation picture.*

*Alla und Oleg Selawry*

The basic phenomena of crystallisation pictures are the branched structures that constitute the so-called dendritic phenomenon. We are familiar with the picture language of this dendritic phenomenon from very different realms of life, for example trees. By watching their typical way of branching we can indicate their species, environmental situation, location and sometimes even their biography. Analogously, the dendritic phenomenon in crystallisation pictures allows for statements about the sample under test.

## **Evolutionary stages of a tomato plant based on the morphology of the plant and of the crystallisation picture**

With an interval of two weeks, we twice tested by crystallisation the top leaves of a plant in a comparably early stage of their evolution. Over these two weeks the plant continued its regular growth. The characteristics of the crystallisation pictures significantly change between the first and the second harvest, which gives an insight in the evolution of the plant. The short-needled, spiky, denser-dendritic characteristics of the younger plant change into the long-needled, openly-curved characteristics of the older plant. In both cases, the formative capacity is large, because the dendritic phenomenon is expressed clearly.

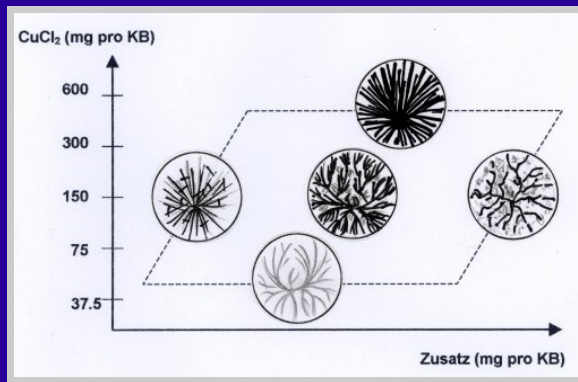


Younger tomato plant and crystallisation picture of the leaf extract



Older tomato plant and crystallisation picture of the leaf extract

## Concentration matrix and reference series



Concentration dependence of the dendritic phenomenon.

We arrange the crystallisation pictures that are obtained in what we call a concentration matrix by increasing on the one hand the amount of extract and on the other hand the amount of copper chloride. In this concentration matrix we find a certain area with dendritic structures, the so-called dendritic window. The optimum result of the dendritic phenomenon is endowed with the most varied forms of the main branches, the side branches and the fine structures. It is located in the centre of the dendritic window. Here the specific characteristics of the extract, and therefore the capacity of differentiation and sensitivity of the method, are most pronounced. Towards the borders of the dendritic window, in various ways the dendritic phenomenon is expressed less clearly.

The evaluation of crystallisation pictures is performed using reference series that are obtained by varying for example concentration, extract processing and factors that influence the growth of the plant, such as variety, ageing, and farming method used.

### Influence of storage conditions on the formative capacity of freshly squeezed orange juice

After one day of storage in the refrigerator a significant contraction of the picture field (area with a pronounced dendritic structure) occurs. After one day of storage in the deep-freezer the crystallisation pictures show an increased contraction of the picture field.



fresh



stored at +7°C



defrosted after storage at -13°C

# Evaluation of crystallisation pictures

*To the understanding (of the form vocabulary of copper chloride) we need the „schauende Urteilskraft“, we have to be in at the metamorphosis of the forms.*

Frieda Bessenich

The multiplicity of form at the level of both a single picture and a picture series is the most important qualitative sign of the crystallisation method. Hence the picture elements are not counted, but they are examined for their meaning within the whole picture. Using picture series, the influence of various conditions can be uncovered and possibly linked. In this way the view of the 'totality' is extended with respect to that obtained from a single experiment.

An example: fresh, heated and cool-stored wheat flour is examined. Heating causes a loosening of the picture characteristics with winding, almost curly, intensely branched needle formations. With cool-stored wheat extract we find crystallisation pictures with gestures of contraction: reduced picture field, networked inner zone and needle formations with few branches.

Different wheat flours respond differently to the treatments. Now we can judge on the one hand the influences of the temperature on the different wheat flour and on the other hand, if all examinations are taken together, the contexts 'heating' and 'cooling' of wheat flour.

## Influences of heat and cold on wheat flour



fresh sample:  
bundled structures



heated sample:  
gesture of loosening



cooled sample:  
gesture of contraction

## Formative capacity – a quality feature of the living

A plant transforms itself constantly. Its metabolism is an expression of both the outer environmental conditions and the inner processes of the plant. Single plant organs – as well as the whole plant – grow and die. A picked leaf is a snapshot of one particular plant, at one time of day and year, given stage of development, manner of growth, leaf position and so on. A single crystallisation picture is not a picture of the plant as such, but a current representation of qualities that change constantly during the plant's life.

The characteristics of the picture change with different growth and harvest conditions, as well as with the ageing of the plant extracts. This indicates a direct connection between the formative capacity of the plant extracts and the life processes of the plant. A similar connection can be supposed for the production and processing of food and drugs.

### Valerian (*Valeriana officinalis*) at different plant locations

Plant extracts with a large formative capacity have crystallisation pictures with a high degree of ordering, concisely structured and robust needle formations, a high branching frequency and a large picture field. The many centres in the leaf picture of the sunny location look as if a higher concentration of the extract has been applied, which was not the case. This again is an indication of an increased formative capacity. A decreased formative capacity leads to pictures with networked needle formations, less side branches, a lower degree of ordering and a reduced picture field. The leaves show a larger formative capacity in the sunny location. For the roots, however, we find the larger formative capacity in the shady location.



Leaf, shady location



Leaf, sunny location



Root, shady location

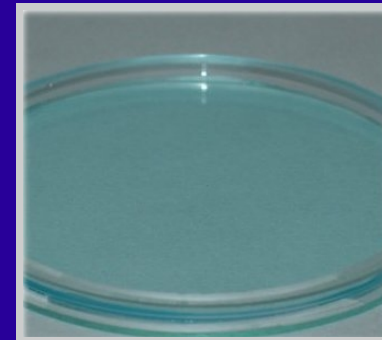


Root, sunny location

# Quality

The formative capacity of a plant can be judged by the crystallisation method. It is a description of the potential of the plant to develop its form. Form building takes place in the tension between the plant's autonomy and its capacity for adapting to the environment. Taken as a concept of quality, it captures a plant as an integral entity to which belong its species, the variety, its potential for development and that of its future generations. In this way, the concept extends our view to the interrelationship of factors involved in plant evolution, upon which we are able to form landscapes according to the needs of the plants. Here the involvement of the human being in quality becomes evident. Quality is no longer an objective entity that can be measured in the outside world, but has to be created and brought to light by human action. From this perspective, quality is always a cultural achievement.

Sensitive crystallisation is an experimental method that leads to a deepened understanding of relatedness. Therefore, it can contribute to decisions concerning the inter-connectivity of life in an increasingly complex world. To evaluate quality means to bring to light the influence of the different production processes and their mutual connections. The outcome will be less and less a mere 'good' or 'bad', but instead a most differentiated representation of 'how it is'.



# Impressum

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The brochure „Sensitive Crystallisation, a Method for quality assessment“ contains more detailed informations about the method. In „Elemente der Naturwissenschaft“ regularly articles are published on the subject of picture forming methods. They are available at the secretariat of the science section.