Artigo de revisão | *Review*

Form resemblance between the white-berried mistletoe (*Viscum album* L.) and five host trees

Correspondências morfológicas entre o Viscum album L. e cinco árvores hospedeiras

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ABSTRACT

The development of new forms of thinking, that enables us to participate in the creative processes of nature, became one of the most important tasks for the present time and the future. With this aim, the author presents his research in the Natural Science Section at the Goetheanum (Glashaus). On Goethian basis, the correspondence between white-berried mistletoe (*Viscum album* L.) and its host tree (*Malus domestica, Ulmus minor, Quercus robur, Tilia cordata* and *Pinus silvestris*) was investigated, searching what kind of host tree qualities are expressed by the different mistletoe forms. The methodology was: field observation, photography, artistic exercises and literature research. Some general aspects of the five trees species and the respective mistletoe types were portrayed in terms of their *Gestalt*. Finally it was compared the types, looking for the polarities that can serve as a starting point for an understanding of the qualitative relationship between mistletoe and host tree. It was possible to gather some evidences to support the two hypotheses: there are resemblances in terms of *Gestalt* between host trees and mistletoes and there are polarities between the mistletoe varieties.

RESUMO

O desenvolvimento de novas formas de pensar, que nos permite participar dos processos criativos da natureza, tornou-se uma das tarefas mais importantes para nossa época e para o futuro. Com este objetivo, o autor apresenta sua pesquisa na Seção de Ciências Naturais no Goetheanum (Glashaus). Em bases goethianas, foi investigada a correspondência entre o Viscum album L. e suas árvores hospedeiras (Malus domestica, Ulmus minor, Quercus robur, Tilia cordata e Pinus silvestris), buscando quais tipos de qualidades da árvore hospedeira são expressas pelas diferentes formas de Viscum album. A metodologia foi: observação de campo, fotografia, exercícios artísticos e pesquisa literária. Alguns aspectos gerais das cinco espécies de árvores hospedeiras e os respectivos tipos de Viscum foram retratados em termos de 'Gestalt'. Finalmente, foram comparados os tipos, buscando polaridades que podem servir de ponto de partida para a compreensão da relação qualitativa entre o Viscum e a árvore hospedeira. Foi possível reunir algumas evidências para apoiar as duas hipóteses: há semelhanças em termos de 'Gestalt' entre as árvores hospedeiras e o Viscum album e há polaridades entre as variedades de Viscum album.

In an expanded historical account of his botanical studies, Goethe sums up his impressions about the diversity of plant forms as follows:

> The variability of plant forms, whose unique course I had long been following, now awakened in me more and more the idea that the plant forms around about us are not predetermined and established; instead, we find allotted to them, along with their stubborn clinging to genera and species, a happy mobility and flexibility, enabling them to adapt themselves to the many conditions throughout the world which influence them, and to be formed and reformed in accordance with them.[1]

If we attentively observe the white-berried mistletoe (*Viscum album* L.), we can notice that its *habitus* can take different characters depending on the species of tree (deciduous trees, pines, firs) on which it is hosted.* In fact, from a taxonomical point of view, the European population is divided into three subspecies: *V. album* L. *ssp. platyspermum* Kell. (*ssp. album*) growing on hardwood trees; *V. album* L. *ssp. abietis* Beck. growing on firs (*Abies sp.*); and *V. album* L. *ssp. laxum* Fick. (*ssp. austriacum* Wiesb. Volmann) growing on pine trees and very rarely on spruces.[2] Here we have the different host trees acting as an environment of the mistletoe, influencing, forming and reforming it. But what is the nature of this environment? And how does the mistletoe relate to it?

First let us doa comparison between the growth types of trees and herbs. This will help to gain some insights on the nature of the tree and those variations among the mistletoe subtypes.

Trees present the so-called secondary growth (thickening of the stem) initiated by an increasing deposition of new cell layers by the lateral meristems (cambium and phellogen) around the shoot axis. This constitutes the basic difference in relation to the primary growth of herbs through a sort of 'mitotic dropping' of the shoot apical meristem. However, there are two moments during the life of the tree that we find a correspondence with the herb-like type of growth. First, in the seedling phase, the tree is rooted in the earth and grows vertically producing new fresh green leaves as the herb also does, but quickly undertakes a hardening process that leads it closer to a mineral state than a vegetative one. As far as the tree develops, new leafy shoots are put forth by the buds in spring. Again, at this moment, the new annual shoots correspond to the annual herb sprouting from the earth and blossoming every year. But now the difference is that the herbs and tree seedlings grow rooted in the earth and the annual shoots of the tree live, without any proper roots, on a woody substrate that can be considered of the same nature of the earth substrate, but in an evolved-form.

Here we arrived at an important point. The mistletoe bush is composed by a set of annual shoots that, in the same way of the annual shoot of the tree, lives on this heaped up substrate and takes benefit (through its haustorial system) from the cambial activity of the tree (the invisible root of both tree and mistletoe annual shoots). Hence, the *Viscum* mistletoe is able to grow on different types of 'soil', and once more, the following quotation from Goethe brings light on this topic:

> Here variations in soil come into consideration; richly nourished by valley moisture, stunted by the aridity of heights, entirely protected against frost and heat or inescapably exposed to both of them, the genus can be modified to the species, the species to the variety, and the latter in turn to other varieties ad infinitum, and at the same time the plant is restricted to its own realm.[1]

In this sense we may consider that each host tree, as a 'heaped-up soil', provides a specific condition for the form-expression of the mistletoe.[3] So given this host specificity, one can ask the following: how can I perceive what kind of 'host tree qualities' are expressed by the different mistletoe forms, so that I could become aware of these correspondences of images between mistletoe and host tree? This question is directly connected with the methodological aspect of this study and will serve as a guideline to explore two different hypotheses: (H1) Are there resemblances in terms of *Gestalt* between host trees and mistletoes? (H2) Are there polarities between the mistletoe varieties?

The strongest host tree specificity among the mistletoe bushes was found in the pine mistletoe. This type of mistletoe is considered a different subspecies and when it is compared with the mistletoes from the four deciduous trees, it is easy to notice great differences. The differences between the mistletoe bushes on the deciduous trees are subtler but a variety of predominant gestures can be distinguished among them and in connection with their respective host trees. For example, when we compare individual mistletoe bushes growing on different apple trees, and even on the same tree, they show a great plasticity in terms of branching pattern, size, shape and color of the leaves. But as a general gesture they share in their leaves the same gesture of torsion of the trunk and leaves of the apple tree.

METHODOLOGY

Both hypotheses (H1 and H2) mentioned above were explored through different approaches such as:

- *Field observation.* The aim of the observation is to have an exact impression of the mistletoe and host trees. This is the source of our empirical data.
- *Photography.* With this tool, we can register a variety of details and some relevant aspects of the plants.

*The terms habitus and form-expression are used here as synonyms of the German word *Gestalt*, which can be understood as the general impression that we have through the appearance of the plant form. But the study of the plant *Gestalt* provides not only a characterization of the form but also of other qualities of the plant, such as, warmth, coldness, strength, weakness and so on.

- *Artistic exercises.* Drawings and paintings were done during the observations in the field and afterwards by memory.
- *Literature research.* This is an important aspect of any scientific work since that enables us to compare our results with what other previous researches have already found about the mistletoe and host trees.

Together they may give us a wide range of different (but also complementary) perspectives of the five species of mistletoe trees observed (*Malus domestica, Ulmus minor, Quercus robur, Tilia cordata and Pinus silvestris).* The trees are all located at the surroundings of the Goetheanum (Dornach, Switzerland), Klinik Arlesheim, Hiscia´s garden and Ermitage Park (Arlesheim, Switzerland).

In the following, some of the general aspects of the five trees species and the respective mistletoe types (*Ulmus, Quercus, Tilia, Malus and Pinus*) will be portrayed in terms of their *Gestalt.* The next step will be done in the direction of finding the host tree - mistletoe specificity or correspondence; and finally we will compare the types, looking for the polarities that can serve as a starting point for an understanding of the qualitative relationship between mistletoe and host tree.

It is worth to mention here that a great part of the results presented in this section came out of observations of solitary trees in the areas mentioned before, with the exception of *Pinus silvestris* which was studied in an area of a natural reserve at the Eremitage Park. So briefly the work will be developed as follows: (1) Portrayal of the host trees and mistletoes. (2) Finding the resemblances between them. (3) Comparing the mistletoe types.

RESULTS AND DISCUSSION

Ulmus (the elm tree)

This tree brings into harmony two very different, if not opposite, features: strength and softness. If we start looking at how the ramification of the branches occurs we can have a glimpse of that apparent contradiction.

Despite the fact that the base of the trunk is relatively longer and thinner comparing with the others species (for example, with the oak) it still presents a firmness and strength in its structure. The branches at the bottom of the tree, close to the base of the trunk, exhibit a convex growth and the base of the crown almost reaches the ground with their leaves covering great part of the tree (Figure 1A and 1B). Some branches in the middle of the tree have a horizontal disposition, and those more above have a diagonal tendency. The ramification of the main branches, that have that diagonal growth, starts more at the upper part of the tree. They spread out to all directions in a fluid movement without breaks, ending on the terminal hairy brownish-gray shoots. This upper region of the tree, in contrast with the lower one, gives us the impression of softness because the branches are slender and stretched with more space between their leaves. However, they still have certain strength and stability that is also present in the trunk all over the ramification. This can also be seen in the degree of flexibility of the leaves, they are rigid at the base and soft in the rest of the blade.

If we look the tree in the late summer from a distance of five meters approximately, we can notice that in the middle of the tree there is darkness and in the periphery the forms become lightened. This is a result of the leaves concentration around the central stem of the tree. The outside leaves are very present to the eyes. This is related to another striking feature that is the ordered and symmetrical distribution of the elliptical-acuminated leaves with their serrated margins. It presents distichous phyllotaxis which means that the leaves diverge by approximately 180 degrees and alternate in two opposite rows, forming a 'two-dimensional plane' (Figure 1C). This has an effect on the general appearance of the whole foliage, and contributes with that impression of harmony of the elm tree.

Even on a single leaf, it is possible to encounter the double personality of the elm. In the simple leaf there are different textures between the abaxial and adaxial face. The first one is hairy, white green with prominent venation (where the hairs are located). The adaxial face is smooth, dark green, with sulcate venation, slightly coriaceous. Depending on the node, the asymmetry of the leaf (very characteristic in this species) is located on the right or left side.

During the fall the tree bears green and yellow leaves and is one of the latest to lose its yellow leaves, but during the spring (beginning of March) is one of the first to start the process of flowering. We can see that the lower parts of the tree have more leaves than the upper parts in the autumn.

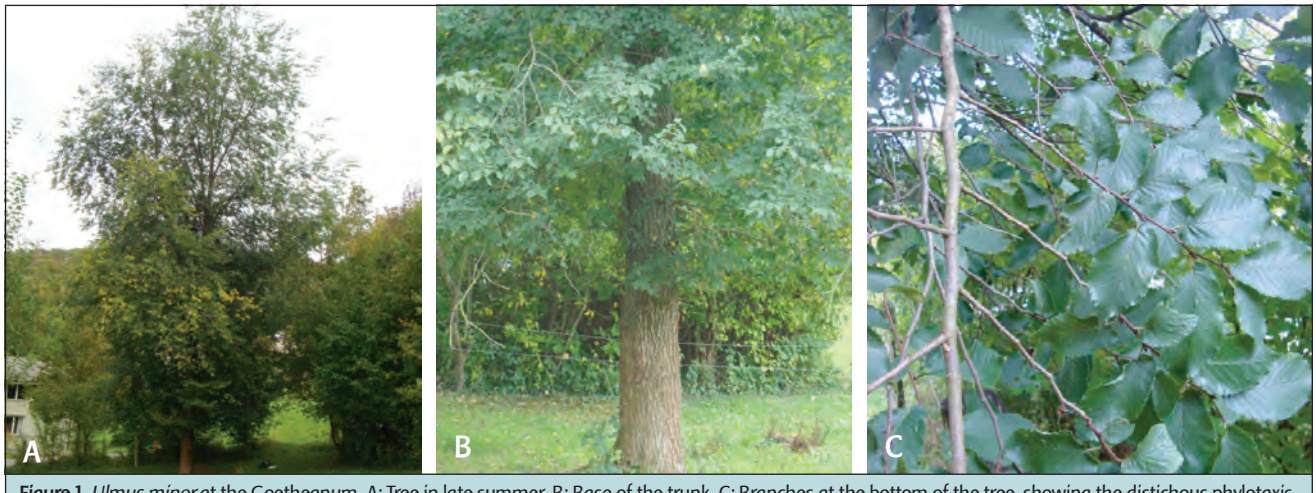

Figure 1. *Ulmus minor* at the Goetheanum. A: Tree in late summer. B: Base of the trunk. C: Branches at the bottom of the tree, showing the distichous phylotaxis.

These leaves also spend more time to fall down completely. At the same time there is an overproduction of cork on the trunk and on some young branches at the bottom of the tree while in the upper branches the bark is very smooth. In the annual shoots is even possible to see some hairs. This is particularly the case in the variety *Ulmus minor var. suberosa*.

These characteristics exemplify again the strength quality of the lower parts close to the trunk in contrast to the upper parts. Whether in the single leaf or in the tree as a whole, the elm tree shows, on different levels of organization, a flexible character through this balance between strength (more pronounced in the petiole and trunk) and softness (especially in the tip of the leaf blade and in the upper branches). The elm tree brings in its expression something that we could experience in ourselves as tranquility and equilibrium.

Elm mistletoe

It is interesting to see that the mistletoe bushes on the elm tree have their distribution concentrated mainly on the central area of the tree closer to the trunk. Some of the bushes occur on the lower branches, but this could be also due to cultivation. They form a cluster with just few bushes growing apart of it. The clusters, as well the individual bushes, have an irregular spherical form. They are not so dense and there is a relative empty space between the slender internodes and the stretched leaves of their shoots so that we can still see what it is behind the bushes as a background (Figure 2A and 2B). Although it is possible to find many forms in the leaf-realm, the predominant gestures of the leaves of the elm-mistletoe are expressed by the tendency to elongate themselves trying to reach the farthest possible point in the space. The surface of the leaves is also spread in such way that it seems they were combed by the wind. This urge to reach and fulfill the space is ended by an acumination at the tip of the leaf. Thereby it repeats somehow the gesture of stretching of the whole elm tree, as well as the balance between strength and softness of the upper branches of its host (Figure 2C).

Quercus (the oak tree)

Two species of oak tree were observed: *Quercus robur* and *Quercus petrea*. As many others representative genus of *Fagaceae* both has a wide distribution in Europe. *Q. robur* has flowers and fruits with long peduncles (the common name of this tree is pedunculated oak) and leaves with a short petiole. The reverse occurs in *Q. petrea*; it has very short peduncles and long petioles. The form of the crown and the leaf lobes are also different in these two species. However, some essential characteristics of both species will be described. The oak tree is represented in many ancient cultures as a symbol of strength and power. For example, the Greeks associated it to their Sun god Zeus, the Romans to Jupiter and the Germanics to the *Donnergott Thor*. Just from the beginning of our observation this becomes evident in the strong and short trunk. If we compare with the trunk of the elm tree, we discover that the strength that we have talked before makes sense in relation to the upper parts of the elm tree. But in relation to the oak's trunk, it is actually slender and 'upstretched'. The trunk of the oak is thick and 'down-compressed' (Figure 3A). With this respect, we can also see that the production of cork is more pronounced in the oak's bark (Figure 3B).

Figure 2. A: Elm mistletoe bush. B: Detail of the leaves. C: Mistletoe bearing elm tree.

Figure 3. A: Detail of the strong and compressed trunk and main branches. B: Detail of the bark.

Now turning our attention to the annual shoots, we also have the quality of strength expressed in different manners: the oak's leaves are the less flexible and they have the strongest smell in relation to the other species studied here. This low flexibility gives us the impression of a process of hardening. During the winter, the oak takes a long time to lose their leaves, and actually in the end of the winter we can find many trees that have not given up of their dead-brown leaves. The shoots present a spiral alternate phyllotaxis by which the terminal leaves are gathered closer to each other, the internodes are shortened, and there are many scars at the base of each one of the annual shoots. This fact shows us the same process of compression in the case of the trunk and leads us to understand a further point: how the ramification occurs in these trees. The oak tree has a monopodial ramification, which means a growth dominance of one apical meristem of the annual shoot where, in the case of the oak shoots, there is an accumulation of buds. In *Q. robur* these buds are pointing to different directions and most of the shoots that develop from them dies. Due to this the oak's branches assume that 'turbulent' pattern of ramification. When we follow the path from the trunk to the annual shoot we will find many changes of direction of the branches forming some right angles (Figure 4).

Figure 4. A: Accumulation of buds on the apical shoot of *Quercus robur*. B: The irregular and turbulent aspect of the branching.

Another important aspect is the comparison of its tree architecture with that of the elm. The elm has the tendency to form a pyramidal crown, which is large at the bottom and stretched at the top. In the oak, the tendency is more in the direction of an oval-rounded crown. This quality of roundness of the oak's crown is also expressed for example in the unfolding of the leaf, leaf-lobes, flowers and fruits (especially in the organ surrounding the fruit called *cupula*) (Figure 5). Moreover, in the oak tree there is a massive production of leaves, giving to us the impression of a dense and bulky crown. In contrast, the elm tree presents a more thinned crown with less density of leaves. However, in the oak tree the leaves are arranged more over the periphery of the tree so that if we go under the crown we see a more empty space between the main branches (Figure 6). In the case of elm tree there is a less dense crown but the leaves are concentrated around the trunk and main branches.

Jan Albert Rispens also articulates a series of phenomena in the world of the oak tree and develops further the concept of "creating one's own space" (*Eigenraumbildung*) from Wolfgang Schad[3] in order to show, as he summarizes:

> How oaks can been seen as trees with excessive energy that establish their own space and doing so also create it. Like no other tree, oak provides a substantial (and the same time spatial) basis for the life of countless creatures, making physical existence possible for them. The basic gesture that correspond to this in human beings endowed with selfhood is the inner mood of voluntarism'.[4]

The oak mistletoe

Although we can find in ourselves that inner mood of voluntarism in correspondence to the gesture of the oak of creating the possibility of development for a great variety of life-forms, this seems to be not the case for the development of the mistletoe on oak trees.

In his *Historia naturalis* (Liber XVI, 95), Pliny the Elder (23-79 d.C.) not only wrote of the way in which mistletoe was especially venerated by the Druids of Gaul, but also referred to the rarity of

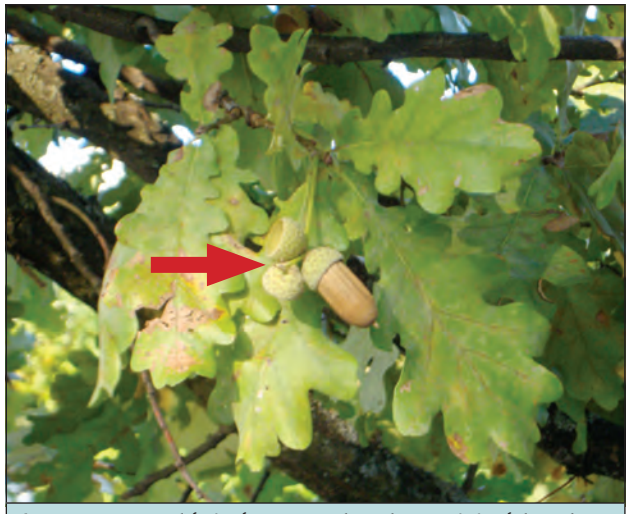

Figure 5. Leaves and fruit of *Quercus robur*. Characteristic of the oak tree family (*Fagaceae*) is the cupula, an organ surrounding the fruit (red arrow).

Figure 6. The dense crown on the periphery of the tree and the empty space between the branches.

mistletoe bearing oaks.[5] To this day, *Viscum album* rarely grows on oaks (*Quercus robur* and *Q. petrea*). Systematic searches in France, by Hartmut Ramm and co-workers, allowed identifying more than 200 mistletoe bearing native oaks (*Q. robur* and *Q. petrea*).[6] But these were isolated individual specimens well removed one from the other and the low number of registered trees among the huge oak populations in the main areas where the mistletoe is found does show that native oaks are largely resistant to *Viscum album*.

Nowadays, theses specimens of mistletoe bearing native oak provide the source of material for mistletoe cultivation on oaks. In the Hiscia Institute for Cancer Research, this work has been done for many years. It was from the oak trees of Hiscia's garden that I was able to make my observations of this type of mistletoe.

The general form of the bushes presents a rounded and dense aspect, with an impression of being 'heavy' especially the older ones that usually are lying down with a gesture of having a lot of 'weight on their backs'. They produce leaves in abundance and the branches have hardened internodes that can easily be broken. Despite the fact that the oak mistletoe presents a weaker aspect, it is still possible to see that the mistletoe inherited from the oak tree the excess energy for producing substance. The bushes are rich in materiality. For example, the leaves are broad, large, thick, and in certain cases, with a succulent aspect. The internodes are also thick, but they present different length, both elongated and shortened.

One aspect that drew my attention in relation to these bushes was the gestures of the leaves. Within the qualities already described about the oak, the roundness of the crown, leaf-lobes and fruits can also be found in the movement of the mistletoe leaves. These large leaves exhibit many curvatures with a circumvolution tendency (Figure 7).

Tília (the lime tree)

As the oak tree, the lime has also a strong short trunk but the bark has a lighter gray color with less cork production than the oak. The lime tree, differently from the oak, has a pronounced convex curvature of the lower branches. They present a horizontal tendency (orthotropic growth) with a curvature in which the branches grow

Figure 7. The roundness quality of the tree is also expressed in the gesture of the oak mistletoe leaves.

down (convex growth) very close to the ground with the terminal shoots acquiring again a vertical direction. The branches at the middle and top of the tree maintain a continuous vertical tendency (plagiotropic growth) with a more delicate curvature also in the final portion of the branches that can be either concave or convex, and with the terminal shoots showing sharp contours in the winter sky. This branching pattern as a whole gives to the lime crown a wide upwardly rounded-conical shape (Figure 8).

Figure 8. *Gestalt* of a specimen of *Tilia cordata* in fall (left) and winter (right).

Now if we look at each single branch we find that they exhibit (in opposition to the oak type of branches) what is called a sympodial growth in which the axis is built up by a linear series of shoot units with each new distal shoot unit developing from an axillary bud sited on a previous shoot unit.[7] This sympodial development plays an important part in the rounded aspect of the crown of the lime tree.

In general, trees can also assume different forms depending on the environmental conditions, as Buess has shown, for example, in the case of the tree communities on the southern and northern slopes of the Gobenmatt, near Arlesheim (Switzerland).[8] The lime trees on the southern slopes are almost all crown, with no definite stem. Their growth is crooked and bushy. On the north side, the main feature is the tall, straight, 'unbranched' trunk. The crown and its fine branches are relatively small and limited to the upper part.

However, it is in the open spaces, where the lime tree grows without the company of other trees, that the roundness of the crown and the gently curving branches acquires their full expression. During the winter, when the tree have already lost all leaves and there is a stark contrast between the contours of the tree's shape and the background, these roundness of the crown and curvatures of the branches become even more evident.

In this sense, we can find in the heart-shaped leaf a resemblance with the form of the crown. But looking more carefully at the leaves, we can still discovery some others relationships. The leaf is simple, serrated and acuminated (the indentations are also acuminated) with long petiole, very flexible blade and it has a pleasing aroma if we mash it up. Flowers also produce these pleasing scents in the summer. As the elm tree, the lime tree has also an asymmetrical blade at the base and the leaves have different sizes along the shoot and different colors on their sides (dark green on the adaxial face and pale green on the abaxial one). There are many hairs on both sides of the leaf and also on the shoot. The presence of hairs reappears, in an intensified way, on the velvety covering tissue of the fruits. The pinnate venation is more salient on the abaxial face with the presence of acarodomatia on the central nervures. The anastomosis of the nervures is more prominent than in *Quercus* and *Ulmus*, showing a resemblance with the juxtaposition of the branches in the crown. The pale yellow leaves fall very quickly from October to November, remaining only the distinctive brown bracts and velvety fruits on the tree, and forming a wonderful brownish yellow circle bed of leaves on the ground around the tree.

Studying the leaves, we realize another convergent aspect in relation to the branches and crown of the lime tree. In all of them we can see a movement towards the periphery (spreading outwards) that ends in an enveloping tendency (Figure 9). This spreading-enveloping movement together with the pleasant scents of the flowers and of the green leaves of the summer and the warm yellowish brown colors that the tree assumes in the fall could be described as a 'warm hug' gesture that invites us to contemplate and rest.

Figure 9. In the leaves of the lime tree we are also able to notice the gentle curvatures exhibiting an enveloping tendency. On the right side, the detail of the dry and velvety infructescence of *Tilia cordata*.

The lime mistletoe

The results of the lime mistletoe are based on my observations of a solitary lime tree (*Tilia cordata*). Apparently, this tree does not show completely the typical rounded-conical shape of a solitary lime crown. Although it has a more irregular pattern, probably due to kind of exposition to the sun on the place that it has grown, some branches for example that has developed more intensively still have the round enveloping gesture. The same is valid for the individual leaves.

However, if we approach this tree during the late summer without paying the right attention to it, we overlook the fact that under the now yellowish green leaves there is a great amount of mistletoe bushes with their fresh and also yellowish green leaves and unripe greenish white berries that grows on different branches, occupying all possible spaces of the tree. Only in fall when the host tree begins to lose their leaves, that this extensive population of *Viscum* is unveiled to our unsuspecting eyes. This is again the expression of the enveloping gesture of the lime tree that hides the mistletoe inside

its crown (Figure 10A and 10B). At the same time in summer, we have the opposite impression of the appearance of the mistletoe on a willow tree (*Salix sp*) on the west side of the Glashaus. The dark green of the round mistletoe bushes appears clearly in stark contrast with the pale white olive green leaves of the tree (Figure 10C).

The mistletoe bushes on the lime tree show a considerable space between their shoots and this gives us an impression of a less dense bush if we compare with the bushes on *Salix*. This is also the case in relation to the elm mistletoe bushes described before. Moreover the lime mistletoe bushes have a tendency to develop a round but more irregular form although we find in some young bushes a symmetrical dichotomy of the branches. For example, I collected a young bush of mistletoe of around six years old and I could observe a very vigorous plant with a symmetrical pattern of the shoots. In general we can also observe large and rounded-elliptical leaves showing in a certain way the quality of roundness of the lime tree (Figure 11).

Malus (the apple tree)

Malus domestica presents a short trunk, with a brownish thin bark, that is slender than the other trees described above. At the base of the crown, the branches are older and longer with a horizontal orientation. Some prominent young shoots at the top and periphery of the tree keep the vertical orientation in their growth. The branches are twisted, and in a similar gesture, the short trunk also exhibits a torsion that causes an impression of a tension in the growth process. The leaves are alternated in a spiral along the shoot and also do not exhibit a regular disposition on the branches. In the same shoot, each leaf has a different size and shape. This gives us the opposite sensation of that of harmony in the symmetry that we find in the phyllotaxis of the elm tree.

The apple tree produces a great amount of leaves, forming a dense crown with a sort of freshness vitality. The dark green color of these leaves when illuminated in a sunny day of summer reflects a more yellowish color, giving a light-warm sensation of the crown (Figure 12B). In the fall the leaves assume different colors; green, yellow, orange, red and brown (Figure 12A). This enhances our sensation of the light and warm element in the tree, and in an imaginative way we can see in the colored circle of leaves that fell on the ground around the apple tree as a reflection of the form and activity of the sun. These three qualities, freshness, light and warm, are intensified in the 'fruit' (apples are actually pseudofruits) creating other qualities, for example, those connected with our organoleptic senses such as moisture (apple juice), color (yellowish red of the fruit skin), taste (the glucose and other compounds), and smell (the characteristic aroma of the apple).

If we could briefly resume all these characteristics, we should say that the apple tree is a plant full of vitality. For instance, if a gardener does not take care of his orchard pruning them properly, there will be an overgrowth of the branches and the crown of the tree can be transformed into a brume-like shape. On the other hand, if the gardener proceeds intensively in pruning the tree in order to increase the

Figure 11. A young mistletoe bush (around six-year-old) from a lime tree displaying its rounded-elliptical leaves.

Figure 10. A: *Tilia platyphyllos* in fall. B: *Tilia platyphyllos* in winter. C: A specie of *Salix* in autumn behind the Glashaus in which we see a strong contrast between its leaves and the mistletoe bushes .

Figure 12. A: *Malus domestica* and its colorful crown during the fall. B: The freshness of the yellowish green leaves showing also their light warm aspect in a sunny day of early fall.

yield, he is also shortening the life-time of the tree. It is not by chance that when somebody is ill we usually bring an apple to that person. An apple has this quality of vitality and health. This vitality may give us some hints in the observation of the apple mistletoe.

The apple mistletoe

If we compare individual mistletoe bushes on different trees or on the same one, we notice that they have a great plasticity in terms of form, branching pattern, color, size and leaf shape. But as a general gesture we find in the leaves the same gesture of torsion of the trunk and leaves of the apple tree (Figure 13). In a general sense we can also say that these bushes have a tendency to get a more yellowish-green color in their leaves, showing a warm characteristic.

Another overall impression of this type of mistletoe, that has a close resemblance with the apple tree, is the vitality of the mistletoe bushes. Such vital resemblance is expressed by the uprightness of the shoots, the tenacity and freshness of the leaves and the harmonious roundness of the bushes. As occurs also with the crown of the apple tree, the mistletoe bushes give us an impression of density, being visible in the overabundance of leaves and fruits.

Pínus (the pine tree)

Differently from the previous observations that were done mainly on solitary trees, the study of the scot pine tree (*Pínus sylvestris*) have provided the opportunity to observe this species in the context of an oak beech community on the slopes of the Schönmatt hill at the Eremitage valley, in Arlesheim (Figure 14). This shows an interesting aspect of the pine tree appearance in relation to the other deciduous tree species of the community forest in the transition of summer to autumn. Those 'five hundred pine trees' were all the time very present to the eyes giving the form and color of the local tree community. Also together with the other trees and elements of the hill, they actively create the mountain-like concrete space of the landscape. But at the same time, especially for a naive observer or someone not acquainted with the local flora, the pine trees were submerged in the color and form of the oaks and beeches crowns in the summer. Only when the fall begins to approach with the abscission of the canopy leaves that this population of pine trees starts to distinguish itself from the deciduous trees, giving us its full appearance with their outstanding evergreen needles.

Figure 13. The torsion gesture of the leaf-crowded and dense apple mistletoe bush.

Figure 14. Oak and pine trees community of Schönmatt in the Eremitage valley, Arlesheim (Switzerland).

The pine has the most mineral-like character among the trees studied here. This can be seen in connection with the Schönmatt environment nature, a sunny southern slope with shallow dry soils and many rocky outcrops of limestone; and in relation to some aspects of the tree, such as: strong roots near to the surface, a dominance of the trunk (Figure 15), the sclerotized shoot-like character of the leaves (the 'needles') and the hardening of the cones (strobilus).

The general aspect of a pine tree is a conical form with a dominant straight and long central trunk with whirls of twisted and relatively weak branches. Only the older pines abandon this general aspect, forming a more individualized crown shape similar to deciduous trees. This fact contributes with the submerged appearance of the pines trees in the summer, making us confused about the identity of them. The older the tree, the more intensified is the production of a gray brown cork in the lower parts of the trunk, that differentiate themselves from the reddish brown bark of the upper parts of the trunk. In the autumn, the reddish color of the bark on the upper trunk and branches, contrasting with the silver green needles gives the pine tree the appearance of a warmth and light-filled space.

In the lower trunk we can also see many old branches that have already died. The branches along the trunk have different sizes and growth directions. In the middle of the tree the branches are bigger and thicker. They have a more horizontal orientation and there is a lot of space between them. At the top of the tree, the young branches are crowded, shorter, thinner, and they present a more vertical growth. The terminal shoots of the side branches have an upwardly curvature forming clusters of little green bushes. The apical portion of the central stem of the tree loses the straightness of the lower parts of the trunk, and grows with some curvature to the sides. In this region we see many young short branches that together form a round shrub-like 'crown'.

Figure 15. *Pinus sylvestris.* The warm contrast of colors between trunk and leaves.

The pine mistletoe

When we approach the slopes of the Schönmatt hill from a certain distance, but not so far away, it is not difficult to distinguish some yellowish green spheres resembling bird's nests or royal crowns at the very top of many pine trees (Figure 14). These are mistletoes that grow on the terminal branches of the trees. The mistletoe embryos are dispersed by birds (for example, we were able to observe the species *Turdus pilaris* in this area), and those embryos that stick on the apical shoots have their development facilitated because the younger branches that grow from the apical shoots are thinner. In this way it is easier for the mistletoe to develop its haustorial system. The mistletoes on the lower branches of the tree have an advanced age and most of them are already dying together with the branches.

The form of the mistletoe bushes at the top of the tree is rounded conical with a more irregular pattern, and they show a certain resemblance with the clusters of pine leaves that grows upwards like small bushes (Figure 16A and 16B). If we look closer, the resemblance is even stronger in the sense that the mistletoe also forms needle-like leaves (Figure 16C). The internodes are shortened too, so that the bushes as a whole are smaller in relation to the mistletoe bushes of the deciduous trees. The mistletoe on pine trees, in this way, exhibits the strongest host tree specificity among the species studied here.

Figure 16. A: The pine mistletoe bush (red arrow) seen from below is easily confused with the pine tree bushes of the upper branches. B: Mistletoe at the top of a young pine tree. C: The needle-like leaves of the pine mistletoe.

Table 1. Host trees.

Species/ character	*Ulmus*	*Quercus*	*Tilia*	*Malus*	*Pinus*
***Gestalt* in General (Shape Outline)**	Pyramidal form (straight at the upper parts of the crown, wide in the middle and straight again at the base).	Oval rounded with a dense and lush crown; strong and short trunk.	Rounded or heart-shaped crown in solitary trees.	Pyramidal rounded, wide at the base of the crown and straight at the top.	Conical, but does not exhibit the typical crown of the other conifers.
Branching	Sympodial, regularity in the phylotaxis, slender branches.	Monopodial, irregular pattern with many changes of direction of the branches.	Sympodial, branches exhibiting gentle curvatures.	Monopodial, irregular, growing upwardly.	Monopodial, strong and long trunk surrounded by twisted branches; conglomeration of thin branches at the top.
Movement	Strechting: a solid foundation of the trunk that smoothly extends into tapered but stable branches.	Turbulent: abrupt changes of direction in the branching; a urge for occupying the spaces but with a truncated or compressed appearance of the form.	Enveloping: delicate curvatures that provide shelters.	Torsion: a spiral movement in the trunk as someone squeezing the water out of a wet laundry.	Uprightness: of the long, dry and hardened trunk.
Main characteristics	Strength and softness in balance; we can experience an inner mood of 'tranquility and equilibrium'.	Hardness, not flexible, strong experience of the inner mood of 'voluntarism'.	Flexible, with pronounced curvatures on different levels of organization (crown, branches and leaves); 'warm hug' gesture; welcoming mood.	Torsion in the trunk, vitality in the upward growth of the branches, light and color in the leaves and fruits.	Preponderance of the trunk; mineralization: 'hardening gesture'; warmth in the contrast of the red trunk and the silver-green leaves.

Table 2. Mistletoe types.

Species/ character	*Ulmus*	*Quercus*	*Tilia*	*Malus*	*Pinus*
Bush habitus	Rounded but with an irregular outline shape; not so dense (sparse).	Rounded, dense, with an impression of being 'heavy'.	Rounded, sparse (considerable space between the shoots) with the broad leaves very present on the periphery of the bush.	Rounded, dense with many leaves, fruits and long internodes.	Smaller, rounded-conical but with an irregular outline, dense shortened internodes.
Leaves	Stretched, thin, acuminated at the tip.	Large, broad and thick, circumvolution tendency.	Rounded, broad and thick.	Stretched at the base and rounded at the tip; thick.	Small; thin, 'needle-like'.
Main character	Stretching tendency	Excess of substance	Roundness and symmetry	Torsion	Contraction and hardening

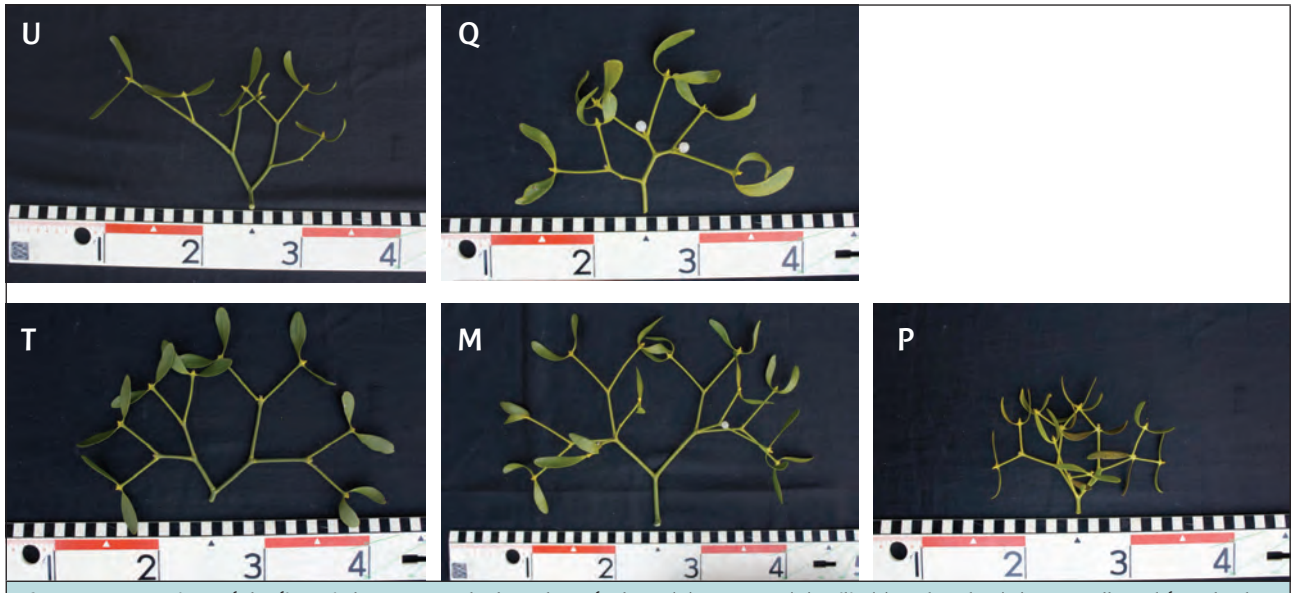

Figure 17. Comparison of the five mistletoe types: The branches of *Ulmus* (U), *Quercus* (Q), *Tilia* (T) and *Malus* (M) were collected from bushes of 6 years old approximately; and the *Pine* (P) from a nine years old.

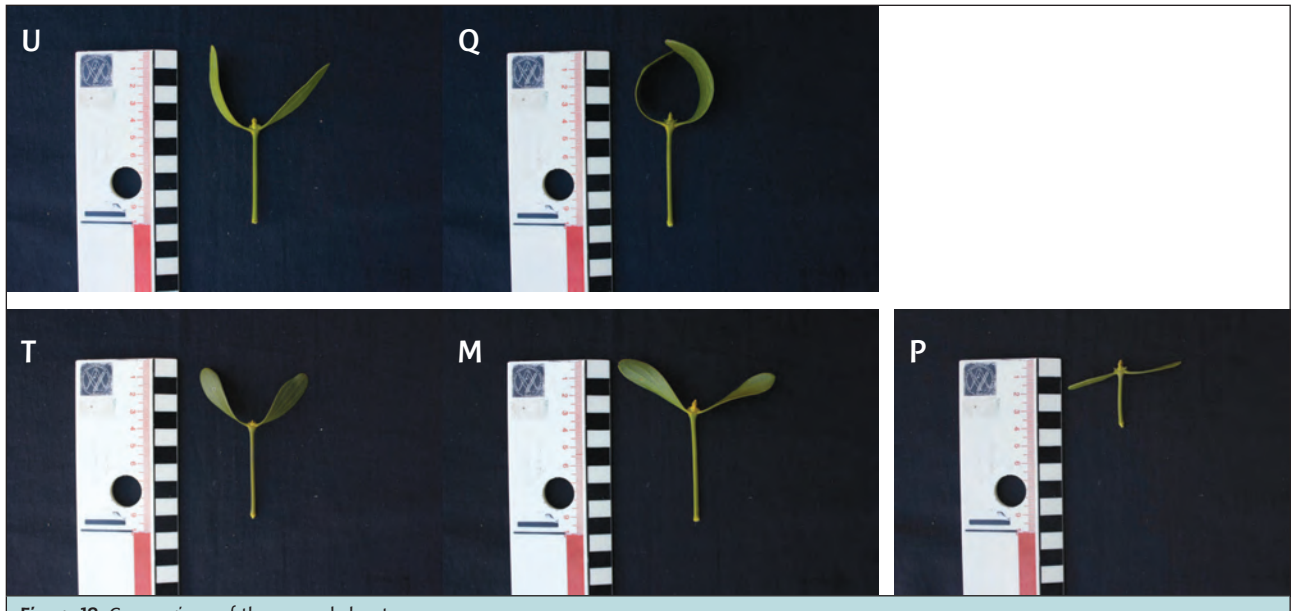

Figure 18. Comparison of the annual shoots.

CONCLUSION

The Tables 1 and 2 summarize the hosts and mistletoes characters.

Despite the necessity of further investigations, it was already possible to gather some evidences to support the two hypotheses (H1: there are resemblances in terms of *Gestalt* between host trees and mistletoes and H2: there are polarities between the mistletoe varieties).

As we have seen the strongest resemblance was found between pine mistletoe and pine tree. This is particularly expressed in the contraction and hardening gesture of the needle-like leaves of both mistletoe and pine tree. But this same gesture also appears as a general impression of the whole tree and the habitus of the mistletoe bushes. There is a formative dominance from the trunk that is expressed not only in the sclerotic leaves but also in the hardening of the strobilus (pine cones). In the mistletoe the internodes are shortened and hardened creating a compact bush. Moreover, both share and express the warmth quality of the sunny environment of

the Schönmatt slope. We can see this through the contrast of the red color of the trunk and silver green of the pine needles; and the yellowish green of the mistletoe that stand out at the top of the canopy (Figure 14).

The elm mistletoe also presents a notorious resemblance in relation to its host tree. If we compare their form expression we find that the stretching movement in the branching of the elm tree is again present in the gesture of the elm mistletoe leaves. In the gesture of both elm tree branches and mistletoe leaves, we are able to experience a balance of strength and softness.

In the case of the other three mistletoe types, it was more difficult to establish correspondences with their host trees. However, a variety of possibilities can be added here. For instance, the vitality of the apple tree (that can be seen in the force of the upwardly growth of the young branches and the dense light-filled crown with their colorful leaves and fruits in the autumn) is expressed in the mistletoe, for example, by the uprightness of the shoots, the tenacity and freshness of the leaves and the harmonious roundness of the bushes. The common movement of torsion in the trunk of the apple tree becomes also a predominant gesture in the realm of the mistletoe leaves. In the oak mistletoe is possible to see that it has inherited from the oak tree the excess of energy for producing substance. The bushes are rich in materiality. For example, the leaves are broad, large, thick, and in certain cases, with a succulent aspect. The gesture of circumvolution of the leaves may also have some connections with the roundness quality of the oak tree and its organs. The heart-shaped roundness of the solitary lime tree takes shape again in the symmetrical rounded-elliptical form of the mistletoe leaves. The strongest difference among the mistletoe bushes was found between the pine mistletoe and the mistletoes from the four deciduous trees (Figure 17). In fact, pine trees and deciduous trees are sources of two subspecies of mistletoe, respectively *V. album ssp. platyspermum* and *V. album ssp. laxum*. The differences (and polarities as well) between the mistletoe bushes on the deciduous trees are more subtle but a variety of predominant gestures can be distinguished among them, especially in the leaf realm (Figure 18).

Particularly interesting is the polarity of characteristics between elm and pine mistletoe. As we have discussed before the latter exhibits a smaller and dense bush with shortened internodes and its leaves assumes the needle-like form of the leaves of its host. This can be considered an expression of the process of hardening that takes influence from the formative dominance of the trunk in the scot pine tree. In contrast, the elm mistletoe presents a sparse bush with its slender internodes and stretched leaves that give us the impression of being combed by the wind and showing the combination of softness and a flexible strength.

As the pine mistletoe, the oak mistletoe also has the hardening process in the internodes and leaves, not so much expressed in its form but actually in the concentration of substance, for example in the broad and thick leaves. This gives it the aspect of being heavy and dense in contraposition of the sparse and soft character of the elm mistletoe bush with its thin and stretched leaves.

The lime and apple mistletoe also have broad and thick leaves as the oak mistletoe, but they differ from the latter in the sense that they present a more symmetrical and harmonious bush, and they differ from each other in terms of density of the bushes and movement in the leaves. The apple mistletoe has a dense bush with many leaves exhibiting the torsion movement, and the lime mistletoe has a sparse bush with the leaves having a more plane disposition.

From this range of qualitative descriptions, I think that it could be possible to develop further investigations into the direction of a medical application in the mistletoe therapy.

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Conflict of interest statement

There is no conflict of interest.

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