Science, Nature and Beauty

Linda Jolly, 2005

To be asked to hold a course which combines science with art at Schumacher College is both challenging and a bit frightening. As teachers in Norway we were excited and curious about this place and what sort of people who would wish to participate. Would we be able to translate our work with plants to something coherent in the English language? What would the participants expect from the course? What questions will they have and what are they open for? The course began on Sunday evening, the 23rd of October as an autumn storm blew leaves past the windows.

It did not take the group a long time to find their way from being pupils to being colleges on a common discovery trail. Schumacher College was an excellent framework for what we wished to do. The park and gardens gave us good opportunity for nature studies, and the emphasis on ecology and sustainability enriched the content of the course. We worked together from ten o'clock in morning to one o'clock in the afternoon, ate lunch together with the rest of the college and continued to work with exercises until four thirty in the afternoon.
While some participated in the preparation of the meal, most of the course participants worked on further until dinner at six thirty. The students worked with enthusiasm and eagerness with the exercises in observation, drawing and painting of plants and landscape.

The course of the work

After a short introduction concerning some of the motives for what we wanted to do, all of the students made two sketches of two well known trees - birch and oak. This is one of the ways one can use drawing as a tool for observation - putting to test what one has seen. The next day began by looking at the sketches of tree form, leaf form and seeds done the evening before. A characteristic "picture" of the trees grew out of our observations. The contemplation of form, movement and expression would become a foundation for our work during this week. We strived to take seriously everything which we can observe with our senses.

We studied the development of the plant from the seed to the fruit. We began by looking at the seeds, and after a time for individual observation, we gathered descriptive words for seeds. When we felt that we had an adequate picture of the observable characteristics, we went on to associative words and phrases concerning seeds. The seed as the smallest stage in the development of the plant, the contracted point, seemingly as mineralized as a stone, hiding an enormous potential: This is an indication of the picture which arose from our study.

We turned thereafter to drawing with charcoal. We practiced making dynamic lines, both straight and curved. The exercises culminated in the drawing of a sphere, placed on a surface such that it had weight, and shaded in regard to light which falls on a three-dimensional object.

Day 2

We began by looking at the growth of the roots. Roots are difficult to observe. We used drawings which were made through use of glass-walled boxes as an aid in observation. The roots search onwards, stretching monotonously further and further with an enormous strength and vitality. Here the plant is "line" which through repetition weaves a dense carpet in the soil.

Later we did exercises in painting. The green colour which is a product of light (yellow) from above meeting the dark primary colour (blue) from below easily becomes a landscape. Through grounding the sheets with rose colour in the next exercise, and laying surfaces with yellow and green on top, we could work with a spectrum of green nuances. After a wandering through wood and meadow, the next challenge was to do a water-colour painting outside in the autumn landscape.

In the evening the seed leaves (cotyledons) became an object for our study. These leaves are rounded and simple, a "childish" and undifferentiated green surface which is easily distinguished from the true leaves which follow.

Day 3

The next day was used for study of leaf metamorphosis - the transformation of form which can be seen in the series of leaves from the first to the last before the flower. We were able to define the transformation in terms of four different "movements" which were woven together in the progressive change of form. The first leaves nearest the soil lengthened and stretched away from the main stem at the same time as the surface of the leaf widened on both sides of the main rib. A differentiation of form increased in the following leaves leaving more complex, divided leaf surfaces. A new form element characterized the leaves nearer the flower:

the leaves became smaller, the form more "pointed" as the weight of the leaf surface sank nearer to the stem aand the leaf stalk disappeared.

The leaves on the stem of the plant exist in unending variation, but we see none the less a common pattern which we can recognize in completely different plants. This pattern is what Goethe called leaf metamorphosis. Although we see a pattern which is obvious even to a child, the leaves are separate and do not change into one another. Each leaf is a finished form which develops independently of the other leaves. But each leaf must also undergo a change of form during growth. How is this change related to the metamorphosis of the leaves on the stem?

We studied drawings done of the growth of individual leaves starting from the formative region in the bud to the finished leaf. Here we found the same elements of form as we had seen in the progression of the leaves up the stem, but in the opposite order. While each leaf begins as a tiny pointed spear-form, it becomes divided and differentiated before it widens and lengthens towards the end of its development. This "real" metamorphosis of each leaf which is a physical continuum, corresponds to a causal relationship where one stage is the source of the next. But how can the metamorphosis of the leaves on the stem be understood where the leaves are separate and form none-the-less a pattern which is obvious?

The clue to understanding the "ideal" metamorphosis, the metamorphosis of all the leaves on the stem, lies not in the past as in a casual relationship, but in the future appearance of the flower. We can observe the many variations and subtle progression in leaf form appearing in plants sown in the early spring compared with the rapid change of form in a few leaves before the flowering at the height of summer. The appearance of the flower seems to determine the rate and degree of change in the leaves that enfold before the process of flowering begins. Thus we have to types of "movement" in the two types of metamorphosis: A transformation of form from the past to the present in the development of each leaf, and a transformation of form from the future to the present in the pattern of the leaves on the stem.

The students drew the progressive leaf forms on individual annual plants - a time consuming process which demands patient care for details. Later that day we did an exercise with drawing of trees on dark structured paper with white pastel colours. Through lightening up the background and allowing the form of the trees to arise as dark contrasts, we can deep our appreciation for the form expression of the different trees. Both the black outlines of the leaf form and the "negative" drawings of the trees contributed to our work with observation of plant form.

Day 4

Every morning we took time to look back on what we had done the day before. The drawings and paintings were hung on the walls so that we could see everything which had been done. We learned of each other's approach and understanding of the phenomenon which was being studied. In this way each person's own observations could be enriched by the observations of the others so that we could progress as a group.

The day after our work with leaf metamorphosis, we tried using our inner imagination to review what we had observed. This "exact fantasy" is what Goethe described as his method to allow his sense perceptions to "speak" for themselves. It is a process quite opposite to the usual speculation as to causes and connections in what we have observed and it requires individual practice to be able to bear the fruits of a better understanding of processes in nature.

We turned our attention to the flowers. It was not difficult to find descriptive words for flowers. Flowers form a vessel which is more 3-dimentional than the leaves. In addition there are many attributes which we cannot find in the green plant: odour, colour and taste (nectar). Flowers also affect us much more than the green part of the plant. It is therefore that the associative words for flowers are almost infinite in number.

The metamorphosis of flowers was studied through the help of cultivated roses which show us signs of breeding "improvements". We could observe transitions between the sepals and the petals, as well as between the petals and the stamens and anthers. This confirmed Goethe's observation that the plant has only one "organ" - the leaf which transforms in form, colour and function. In the flower we could also see a new expansion from the sepals to the petals, and a new contraction from the petals to the stamens and anthers and _____ in the middle of the flower. Exercises with charcoal drawing gave us a further basis for understanding the rhythmical placement of leaves and petals in spiral patterns.

Day 5

The last day only allowed time to draw the threads of our work together and get perspectives on what we had done. One motif for working with plant metamorphosis a la Goethe is to facilitate an enlivening of our connection to nature. Through an experience of participation in the processes of nature we can perceive the possibility of another relationship than that of a spectator who is always "outside" these processes. As teachers we will only be able to communicate this experience in as much as we ourselves practice a type of "devotion" to the phenomena. Through work with that which Goethe called "exact fantasy" as a deepening of observation, we can participate in the growth and forming of the plant. Goethe described this as

"recreating in the wake of ever-creating nature". Drawing or painting can be used as tools which help us towards an experience of participation in nature. Our everyday concepts and ways to see things are set aside by being forced to observe with a pencil or paint brush. We make room to see with new eyes.

My own experience with this has given me a foundation for guiding youth and adults in a process of observation. As a student I wished to become better acquainted with plants and used lunch breaks to sit with paper and pencil in the garden. Schools in the US had no time for art exercises in my childhood. The race to moon against the Russians emphasized science at the cost of arts and crafts. Neither did I have any contact with painting and drawing from home. But plants stay still, are patient and relatively easy to achieve a resemblance on paper. One day as I sat and drew at a quiet and hidden place in the garden, I became aware of an experience which was difficult to describe in words. I "knew" suddenly what poetry was, what music was and that plants live in the same vital stream. Poetry and lyrical writing had been much of a closed book in my logical/analytic schooling. Even my musical training had made use of quite unmusical methods. But now, in a fraction of a second as I drew a plant, I felt with an unshakable conviction that I knew what music and poetry were and that the growth of the plant revealed the same processes. How can one communicate experiences with such an intuitive character? This experience was decisive for me and gave me a direction in my further studies, but it is first now that I can dare to try to articulate what I saw.

Goethe described the growth of plants in such a way that by practicing his way of looking we can come closer to our dormant intuitive aptitude. In the footprints of the growth of the plant from seed to fruit, we see something which resembles the cycles of the year, the rhythm of the day and the biography of a human being. This is not experienced as speculation, but as patterns which we recognize.

In Goethe's biography and in his poetry we can see his emphasis on transformations and metamorphosis. From Goethe's letters and diaries we know that he was not only occupied with the transformation of leaf form as he was travelling in Italy. He was also engaged in reflections concerning man's biography and how a person could grow and transform them- selves throughout life. We accept this as a basic tenet today, but Goethe's reflections must be seen in view of an age where children were seen as small adults and people were synonymous with their professions. Goethe went back to Germany and wrote several "development novels" - such as Wilhelm Meister and The Young Werther.

Perhaps the best known work of Goethe which he worked with throughout his life, is the play "Faust". Faust makes a pact with the devil who attends him with all possible earthly delights. If he can get Faust to say "enough, now I am satisfied, I want to continue exactly like this", the devil will win Faust's soul. But Faust, as everything else in the living world in a process of transformation, does not say "stop". The metamorphosis continues. His life goes on and the devil loses his bet.

This recognition of transformation as a principal human life is a foundation for a teacher who must develop the ability to change and growth with his/her pupils. With this basic attitude a teacher can also be enabled to pass on to the pupils what life is about: to dare to make mistakes and go on, to never be finished, to never feel that one knows everything there is to know. In life long learning, the school is but one station on a path.

Being a part of Schumacher College during this work supported the central themes. This is not a hierarchically structured community such as we recognize in most of society. At Schumacher no one is too good to be able to wash the toilets or to participate in other daily tasks. We are challenged in our conventional ways of living by being a part of the Schumacher Community. Here community is created through sharing tasks which we might not be used to - an excellent framework for a study of metamorphosis.

To round off, I want to try to build a bridge between the exercise of artistic, intuitive observation and an active cultivation of nature. In addition to working as a biology teacher for youth, I have had the pleasure of working outside with children and leading then into experience with gardening and agriculture. Both the senses and intuition are schooled in a relationship based on responsibility for the living earth, plants and animals. Through such practical work done side-by-side with teachers, the pupils can receive a concrete experience of connection, of coherence. By participating with their hands in the cultivation of the earth, the pupils have a chance to transform their relationship to physical work, nutrition and nature and be assisted to an understanding of a path where they are able to transform their own lives.