

AGRICULTURE MAIN-LESSON AND BOTANICAL EXCURSION **by Linda Jolly**

In the beginning of the seventies, an expression emerged which was soon adopted widely in the entire Western world: namely, 'ecology'. Initially this term described the relationship between man and animal as well as the place where there was life (*oikos* - Greek house). But this original meaning increasingly came to encompass the relationship between man and nature, between individual human beings and groups of human beings (social ecology). At all events, the focus of interest are directed at the relationship between living organisms. This attention on relationships, i.e. on something prevailing between certain entities, points to a new way of looking at things, and at the same time to a shift in consciousness compared to the more traditional attitudes of earlier times.

Thus we are confronted with a question in our schools which is both legitimate and important, and that is: "What are you doing about ecology?" Of course one could respond to it by saying that the whole of Waldorf education is based on essentially ecological ideas, but what the students want to know is what our schools are doing in concrete terms to tackle ecological problems.

As a teacher of horticulture and biology I have had ample opportunity to learn from the pupils themselves what they associate with the word 'ecology'. Ecology to them means information about environmental problems, e.g. the pollution of air and water, etc. There is certainly no lack of awareness of this kind of 'ecology' among the pupils and one could easily be tempted to contribute even more to this type of information and awareness in the school context. Yet the multitude of catastrophic news items pouring out over our children today is apt to engender discouragement and pessimism - a fact acknowledged by many educators today. Young people long for real experiences of nature and what they want to feel is that they can do something towards saving nature. So the question must be: What can schools do to enable children to experience positive ecological actions of humanity in nature as a counterweight to all the disaster reports? How can we help the children to experience nature at a deeper level and attain a better understanding of the relationships between all living beings?

In the following I am describing some of our work outside the classroom, i.e. some of the things our school in Bergen, Norway does outdoors, in the context of our Class 9 agriculture main-lesson, as well as the botany excursion with Class 11. Both main-lessons aim to meet the pupils' need to experience nature for themselves and to gain some insight into the web of relationships which intimately connect our own existence with nature.

The work experience part of the agriculture main-lessons needs sound preparation in the classroom. After all, children should not just be sent out to work on the land without the preparation necessary to understand the manifold connections of rural life. Hence, at the end of Class 8, the classroom part of the agriculture main-lesson starts with a historical survey of the

development of agriculture (early settlement, domestication, plant cultivation, etc.) which will not be related in greater detail here.

Agriculture main-lesson - beginning of Class 9

After the summer holidays, Class 9 pupils, together with a number of teachers, go to spend some time on a biodynamic farm with mixed husbandry (Skillebyholm in Järna, Sweden). The main-lesson is now continued, following on from the previous term's introduction to the history of agriculture; now the focus is on the development of agriculture in northern regions where everything began a few thousand years later than it did in the civilizations of antiquity. As one travels through those landscapes of Norway or Sweden today which were developed and cultivated by man, it is not an easy thing to imagine that once upon a time the great woodlands were only broken up in a few places by a mountain peak or crest, or moors in some cases. There was no open land. It was the need for pastures for domestic animals as well as arable land which led to the creation of open spaces by means of fire clearing. This type of ground clearance has been confirmed by the sampling of pollen preserved in the moors. From this we also know that the original deciduous forests were relatively poor in species - about four species per square meter. These early plant communities had to make way for pasture plants comprising 36 species per square meter. This was followed by the development of meadow plant communities comprising 42 species per square meter. Alongside the plants there also emerged insects, small animals and birds, which found new sources of life there. Here we find motifs that are of relevance to our pupils: greater wealth and variety in nature was created through the work of human hands. The great wealth and variety still preserved in the landscapes of Scandinavia is made up of a mosaic of woodland, pasture and arable land. However all of this is not a product which, once created, will last forever. Such land use needs continuous cultivation. Without cultivation and without domestic animals, the uniform woodlands would take over again. The pupils can see this for themselves in nature and hence also understand an important viewpoint in the present public debate. What is at stake is the future of agriculture in the North. Together we devote ourselves to the study of some of the major meadow plants which are dependent on open land and we discover a multitude of organisms which in turn depend on these plants.

Then we continue our studies of the development of agriculture in the North and learn about the way of life on the large family farms of the Viking age. The important aspect to point out here is that all the fields were worked for the benefit of the whole community. In the Middle Ages the Cistercians played an important part in developing the cultivated landscape by draining the waterlogged land, channelling rivers, terracing steep hills, planting superior tree species and introducing medicinal herbs and vegetables, and probably also fruit trees and berry bushes.

The beginnings of 'modern' agriculture was associated with the introduction of the potato in the 18th century. The potato, an immigrant from the age of discovery, had been known in Norway for several generations, since 1750, before its value as a foodplant was discovered in 1820. This is when harvests

of four times the weight of grain fruits were achieved. Then it was discovered that one could do more with the potato than merely eat the tubers. Potato *schnapps* became a surplus product of big farmers, and thus the foundations were laid for a profit-oriented agriculture and the production of trade goods in the place of a craft which created a basis of life for generations of people. The production of spirits represented the beginning of specialization which took the place of the earlier forms of natural and self-sufficient husbandry. This gives the pupils the basis for an understanding of how the agricultural reforms of the present are linked to the industrial revolution and the mechanisation of labour.

Fertilization was a central task in the agriculture of the Middle Ages and it was regulated by law. The earlier *Frostatings Law* (about 950 A.D.) provided for fertilization in four-year-cycles. Animal husbandry (number per acre) was regulated by law in order to prevent soil impoverishment. Maintaining a state of balance between animals and arable land was considered essential for maintaining soil fertility.

The mineral theory of Liebig paved the way for a radical change in fertilization patterns. Liebig's analyses identified three chemical substances as promoters of plant growth. Phosphorus and potassium could be extracted by mining. The limiting factor was nitrogen. When it became possible after the First World War to produce nitrogen fertilizer industrially, agriculture and animal husbandry could be practised in isolation from each other. Thus, an ecological balance that had been maintained over several thousands of years began to shift.

The pupils will then learn about the group of farmers in Silesia who found that the introduction and increased application of artificial fertilizers led to problems in relation to animal fertility as well as to higher levels of degenerative diseases affecting cultivated plants. These farmers asked Rudolf Steiner for help to better understand these phenomena and to create new foundations for a profitable way of agriculture. Working on the farm itself gives the pupils an opportunity to understand in real terms what Steiner's concept of the farm as an organism, with a location-dependent state of balance between farm animals and plant production, actually entails. By now the pupils will have met all the 'inhabitants' of the farm and will have grasped the fact that its variety is the most important foundation for an ecologically responsible agriculture.

The main-lesson subject in the final week of our agriculture work experience project is the supply of foodstuffs in industrialised and developing countries. Against the background of reports and articles in newspapers and magazines as well as the fundamental question of "Why do we have so much and they so little?" we study food production from a global perspective. The use of non-renewable energy resources in conventional Western agriculture is compared to the so-called primitive systems of agriculture as well as to systems of agriculture based on ecological principles. We also study the consumption of natural resources in the production of animal produce - meat, eggs, cheese and milk - which are consumed in massive quantities in the West. This is

followed by a comparison with the consumption of resources in the context of plant-based production. We also take a look at the energy costs incurred on the route from the producer via the shops to the consumer. We pay close attention to the EU-debate about the free flow of goods and prices, as well as the agricultural situation of the developing countries in their former position as colonies and their present function as suppliers of certain raw materials. Questions of ownership, debt policy and the involvement of multinational companies must also be raised in this discussion.

In spite of the fairly comprehensive study of the development and position of today's agriculture, practical work is the most important element of our project in the country. Tackling practical tasks in all areas of the farm gives every pupil a proper experience of working together with nature to a set rhythm of time.

The pupils usually work in groups of five to six with one work leader from the farm or else a student from our Upper School. Students from Classes 11 or 12 or even older youths serve as good examples and encourage the younger ones to do their best. From a social point of view it is of great importance that the older pupils act as guardians for the children of Class Nine. In addition, some of our oldest pupils experience for the first time what it is like to act as teachers.

Artistic exercises are one part of the social ecology of this enterprise. These are either in music or theatre production. At the end of our sojourn on the farm we offer the results of this artistic work to our hosts as a leaving present. Practical work on the farm, evaluation of today's agriculture methods in relation to nature and joint artistic exercises combine to make the agriculture main-lesson a memorable experience that many pupils look back to with fondness. "This is how we should live every day" - a comment I would heartily concur with.

Botanical excursion with Class 11

The main objectives of the botanical excursion with Class 11 are working with nature experiences artistically and cultivating the perceptive faculties of the senses in a systematic manner. To this end we go to an island off the coast, at a time when the flowering period is at its peak. We take with us water colour paper and sketchbooks as well as plant identification books and magnifying glasses. We are aiming not just to become familiar with individual plants but also with an ancient landscape developed and cultivated by man, some of which is still preserved. Landscape as a kind of changing background scenery of our daily life is a state of affairs we often barely notice. We race through the landscape by fast means of transport without becoming aware of our environment.

It is the unusual and especially strong impressions which occasionally provide us with a nature experience, such as autumnal woodlands glowing in rich colours after a frosty night or leafy trees opening up to the spring sunshine in tenderest shades of green. That is why it is necessary that we go out into nature and experience things of this kind. Only then can we appreciate the

untiring work of previous generations, through which our cultivated landscape with its special composition has been created.

Our very approach to the island on the school's sailing schooner makes for an excellent start to this work. Sailing along the coast there are a lot of things to be discovered. The eye rests with pleasure on places where people still work the land and animals are put to pasture. The most beautiful and picturesque parts of the landscape can usually be found there. In selecting a motif one would normally start from the contrast between the open spaces created by human hands and the powerful untamed aspects of nature surrounding them. The old vicarage on the Fjelberg island where we are going to spend a week, is such a site: a little jewel in the shadow of a powerful *fjell*.

On arrival at the vicarage we start our painting exercises in order to then discover the landscape in a different way. We start with the meeting of light and dark (yellow and blue) on a sheet of paper. The diluted colours intensify at the opposite edges of the paper - an exercise which is not exactly foreign to our Waldorf pupils but can still engender something of an 'ah'-experience in the face of our green-clad landscape. On the basis of the imaginary landscape that now arises on our painted sheets of paper, we go out into the open and paint a picture of what we see. We can see how the light of the skies meets upon the heaviness of the earth, producing many shades of green on the horizon. A further step can be accomplished by practising with tones of green alone. How many nuances of green can be created in such a composition of colour? How much red is there in the green of nature? How far does green extend towards blue, red and yellow without losing its green? Afterwards one can take one's sheet of paper outside and paint the nuances of colour observable at the transition between woodland and meadow or between the many different types of plant that make up a hedge. In all these places one may experience 'seeing green for the first time'. All of a sudden, even the monotonous green of a commercial pine forest may speak a different language from the richly varied green of the neighbouring forest of leaved trees.

A blossom might stand out from the veritable sea of shades of green formed by the rounded roof of a deciduous wood. It will strike the observer as a foreign element, as something of a revelation. We come closer to that kind of experience through a painting exercise where certain areas are left blank in a 'sea' of green. Applying clear colours to these blank bits will bring to light the blossoms in a flowery meadow or a rhododendron hedge or even a rose bush! The colour contrast we experience by means of such exercises helps us appreciate how difficult it was for people before Goethe's time to understand what the blossoms actually have to do with the green from which they burst forth. After all, the blossom was so different from the rest of the plant that its connection to it was not taken for granted. It was Goethe who first recognised that the entire plant is formed out of the elements of stem and leaf. He saw that the calyx and petals represented metamorphosed forms of the leaf element. In the case of yellow and blue blossoms this can be understood without undue difficulty through colour exercises. In the case of red, it is helpful to occasionally examine individual petals or single reddish tinted

leaves of the remaining plant. And whoever tries to capture plants in painting will invariably find, whilst mixing his green from the basic colours, that every plant green has an admixture of red besides yellow and blue in it. In other words, the red blossom is already contained in the green of the rest of the plant in a hidden form. With this new experience in mind, we can now go out again and capture our impressions in paint - for instance of a natural meadow in the midst of mountainous terrain or of a strip of vegetation along a path. This can then be compared to an artificially fertilized piece of grassland.

What are our colour experiences in different locations?

We use chalk and crayon in order to highlight particular situations. We go out into an oak wood, for example, with dark paper and white pastels. If we then find a place where the gnarled trunk of the oak tree and its branches contrast with the lighter leafy sections, or with the sky above, we have an ideal motif for reflecting the form and character of the oak. Hatching the light areas of the motif will give prominence to the peculiar, heavy dark form of the oak. In other places we might notice how the light trunks and leaves of birch trees shine out against the darker background of the oaks - more impressions to be captured in charcoal drawings. In this case we work with the motif by hatching the dark background and leaving blanks for the white slender stems and the tender veil of leaves. Such exercises are an opportunity to work with the relationships between the different elements of a landscape, with the relationship between colours, between light and dark. This gives a sense of something as a whole, as opposed to being fixated on an isolated object. Thus this method is appropriate to the ecological way of looking we desire to attain. In the exercise with oak and birch a familiar form engenders a new discovery through the work with the spaces in-between. After an exercise of this kind the pupils have a wholly new basis for understanding the essential being of different plants.

After a few days of working systematically, the pupils may feel more free to find their own motifs in the surrounding landscape. It is important on such occasions to learn to perceive with the eyes and colour sense of others. For this reason we pin up our paintings every day and look at them together.

The pupils are also expected to notice details and become familiar with individual plant species. Drawing with pastels can be very helpful for learning concentrated and exact observation. Every pupil is supposed to draw up to twelve different plants. This also involves detailed drawings of different leaf shapes as well as sketches of petal configurations. Only after drawing several plants do we start using identification keys and discussing scientific classifications.

Leaf metamorphoses are a further subject of separate study. The leaf shapes emerge best when painted black on white paper. The spectrum of variation resulting from each pupil's series of leaves provides a good basis for discussing common 'themes', i.e. relationships between the plants. Through drawing we find a common expression of the characteristics of related plants. This is preferable to concentrating on outer features which are often

misleading. The pupils discover that rhythm, balance and harmony inherent in the world of plants can speak as evocatively as poetry. Auguste Rodin expressed it like this: "It is the artist who is truly familiar with Nature. The blossom engages him in a dialogue through the graceful curve of its stems and the harmonious play of its colours. Each blossom has an inner word bestowed upon it by Nature."

In conversation the pupils can also practise to perceive one another whilst practising plant perception. We start off by studying a certain plant together and go on to discuss the drawings we have pinned up. Now we discover how difficult it is to attain a sober and objective view when the imagination takes over. Others find a certain inner resistance to entering into the flow of movement and colour. The pupils help each other to overcome their one-sidedness and note their own progress from day to day.

At first, many pupils display a certain amount of anxiety and scepticism when faced with the task of practising a natural discipline in this manner. But the joy of discovery, as well as the feedback provided by artistic activity, invariably results in a positive working mood. The work day is frequently a lot longer here than an ordinary school day, but the pupils take this for granted. Their responses speak for themselves. On returning to school we arrange all our work in an exhibition which enables the younger pupils to share in what the older ones have been engaged in.

Ecology has something to do with the relationship between things in living contexts - with relationships between organism in the landscape, between organs in the human body, between people working together. Our excursions with Classes 9 and 11 make it possible for the pupils to become conscious of a positive and constructive relationship between man and nature. However, the whole enterprise will only be successful when there is real working together between the individual pupils as well as between pupils and teachers.

The Class 9 pupils grow through the work they carry out together with their teachers. They discover that the well-being of nature is something for which adults, too, are willing to sweat. The pupils from Class 11 appreciate a way of working together which involves their natural science teacher in the same amount of effort in producing drawings and paintings and where art teachers, too, have to struggle with Latin terms and identification keys.

On the final day we concluded our observations in the following way. The entire class walked the whole of the terrain and each work team presented its particular section of the land examined to the rest of the class by way of discussing the results of their joint research work. Thus the entire course of vegetation development was shown once more - stage by stage. The pupils' drawings and paintings were arranged to reflect the order of that development and exhibited in the study room - beautifully documenting twelve years of artistic contemplation.

In this way we tried to slowly approach and grasp the essence of landscape development, with the aim of recognizing the growing process of an organic entity, the unfolding of a landscape organism.

It seems extremely important to me that young people especially, who are expected to find their own bearings in the world in the near future, and who will in many cases even go to university, have a full understanding of the organic into which have flown their very own perceptions and experiences. I consider it important that they are enabled once more to grasp what has been experienced in thinking before they leave school to enter into a world where they will be exposed to all that life has to offer in terms of the abstract concepts and ideas of modern science.

Especially in the field of ecology where there is a lot of talk today about holism, or even the 'organism of the forest', 'lake', not to say the 'organism of the earth' it is of paramount importance to recognise fully the actual materialistic-mechanistic content of many, rather symbolic, references to 'eco-systems'. For the very same researchers who sell ecology as a holistic science will, in most cases in their lectures and publications, explain evolution or the process of succession in terms of actions and reactions of individual parts where, in the sense of a Darwinian struggle for existence, only the accidental advantage of survival fitness determines the individual being's overall course of development. The fact that in a succession, for instance, the later plant species substitute those preceding them, is usually explained by pointing out that the latter were more competitive under prevailing conditions of maturity and therefore pushed away the earlier ones.

If we applied such reasoning to the concept of organism in the case of an individual being, we would arrive - in analogy to this idea - at some utterly absurd statements: the second teeth, for example, would have to be viewed as competitors of the first teeth, or the replacement bones in man would be substituting their embryonal cartilaginous form as a result of the former's competitive advantage.

Observation and thought in the realm of the organic necessitates an eye for the essence and order of its phenomena which invariably are expressions of an all-encompassing formative principle. People who have never had an opportunity to school their perception in this way find it hard to counter the abstract-intellectual concepts of modern biology and are consequently ill-equipped for making a constructive contribution towards overcoming the true causes of our environmental crisis. For this is rooted in the utter inability of our modern world to relate inwardly to the living world.

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