

**Anthroposophy's etheric forces: exploring the relation between  
music and plant-growth**

by

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## **Declaration**

I declare that this work has not been previously submitted in whole, or in part, for the award of any degree. It is my own work. Each significant contribution to, and quotation in, this dissertation from the work, or works, of other people has been attributed, and has been cited and referenced.

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

*When science tells of the very intricate chemical and physiological nature of plants, it is pointing to a realm of harmonious relations, describable in terms of number and proportion – such as the constant and multiple proportions of chemical reactions. But the organising factor in the realm of growth and life, in all living organs, is also describable in scientific terms. This organising factor assigns to each organ of the plant – to leaf and root, fruit and flower – its specific form. Fascinated during recent decades by the intricate relations inherent in the structure of matter, scientists have neglected the study and recognition of those forces which arrange matter into the shape and pattern of living things.*

*(Pfeiffer 1980:3)*

## **Abstract**

In practices of non-modern, non-Western agriculture, music making has played various roles in crop growing. Contemporary modern experimentation and practice point to a modern Western interest in the possible links between music and plant-growth. Disparate experimental pilot studies show that the music-plant nexus merits a more thorough investigation than it has had. This dissertation makes use of anthroposophical ideas about the natures of living growth and sound in order to develop an understanding of how and why music and plants might be linked. An understanding of anthroposophy's etheric forces is found to be useful in exploring the rationale for the music-plant correlation. Eurythmy (which also stems from anthroposophy) and specifically the eurythmic work of Tanja Baumgartner contribute towards a practical understanding and possible implementation of the theories.

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# Chapter One

## Rationale and research design

### 1.1 Introduction

There is evidence that in practices of non-modern, non-Western agriculture, music making has played a role in crop growing (Seaman 1967; Diallo & Hall 1989; Stobart 1992; Stobart 1994; Stobart 2000; Stobart, 2006; Gioia 2006; Small 2008; Mushava & Mudinzva 2008; Nzewi 2010). Likewise, contemporary experimentation and practice point to a modern Western interest in the possible links between music and plant-growth (Singh 1962; Clarke 1963; Retallack 1973; Tompkins & Bird [1973] 2002; Weinberger & Measures 1979; Creath & Schwartz 2004; Eckiki *et al.* 2007; Baumgartner 2008; Jacob 2008; Appelbaum 2009; Hindmarch 2009; Rickett 2009). There exists no comprehensive discipline dedicated to finding conclusive proof of the music-plant link. However, disparate pilot studies indicate that this is a field worth pursuing: Dunn (2001), for example, predicts that in coming years the scholarly world could begin to pay stronger attention to the influence that music has on its natural and social environment.

Despite the above studies, no systematic enquiry into music's role in agriculture has been conducted in South Africa (Nexus 2010). Many indigenous knowledge systems of Southern and greater Africa incorporate music into daily life in a way which is not (or increasingly less) apparent in Westernised areas (Diallo & Hall 1989; Agawu 1996; Agawu 2003; Pewa 2005). Indeed, historical and contemporary reports of functional music and of belief in the production-enhancing powers of music, including in many cases in the context of agriculture, represent geographical areas as disparate as South Africa (Pewa 2005; Cancellotti 2005), Malawi (Janzen 2000:61) Mali (Diallo & Hall 1989), in Africa, and elsewhere in Bolivia (Stobart 1992; Stobart 1994; Stobart 2000; Stobart 2006), native North America (Gioia 2006), China and Japan (Gioia 2006), Russia (Seaman 1967), Bulgaria (Kurath (1956), Maori New Zealand (McLean 1996:96) and Western Europe (Frazer [1890] 1981; Gioia 2006). For modern scientific thought to relegate the intuition which guides such widespread functional musical practices to superstition and therefore to neglect further enquiry seems unscholarly.

### 1.2 Objective: towards an explanation of the music-plant nexus

While a study of music's relationship to plant-growth could be experimental in nature, the question would still remain as to how the link between music and plant-growth can be

comprehended and explained. A theoretical understanding of the connection between music and plant-growth could contribute to further experimental studies, and could inform a comprehensive modern practice of agricultural music.

Steiner<sup>1</sup> ([1906] 1983; [1904] 1994; [1923] 1995; [1924] 1958) acknowledged the validity of intrinsic knowledge systems. His biodynamic<sup>2</sup> farming method is one example of how he applied anthroposophical understanding to penetrate old cosmologies such that elements of them could be appropriated into contemporary practice (Pfeiffer 1958:15; Steiner [1924] 1958: 20, 85). A similar approach would be to apply anthroposophical thinking to contribute to an understanding of the role of musical sound in non-modern agriculture, and to encourage a modern scientific enquiry into how ancient principles could be transformed in such a way as to be applicable to modern practice.

It could be that the living energies observable in plants, referred to in Steiner's anthroposophy as etheric life forces (Steiner [1906-1923] 1983:24; Steiner [1924] 1958:137; Wachsmuth 1932:56ff; Poppelbaum 1952:217; Steffen 1961:47; Grohman 1968; Bockemühl 1985:131ff; Proctor 1997:20), can be influenced by musical sound, manifesting as physical effects in

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<sup>1</sup> Following an academic training, culminating in a doctorate in philosophy, Rudolf Steiner, (1861 – 1925) began developing a spiritual philosophy called 'anthroposophy' (meaning 'wisdom of the human being'), which he claimed to be based on the insights he gained into life through his heightened powers of cognition. He believed that anthroposophy was based on fully scientific thinking, due to his phenomenological or empirical approach to spiritual knowledge and because he claimed that anyone following his systematic method for developing their thinking would be able to perceive the spiritual realities he described. He worked through anthroposophy to find viable, practical solutions to the challenges presented by modern life, in diverse fields including education, agriculture, economics, medicine, science, architecture and art. Today thousands of schools, clinics, farms and other organisations, worldwide, are based on the principles of anthroposophy (Adams 1992: 185, Usher 2006 cover page).

<sup>2</sup> Biodynamics is a farming method stemming from Steiner's anthroposophical insights, initiated by questions posed to Steiner by farmers in Austria in the early 1920s (Pfeiffer 1958:5ff; Steiner ([1924] 1958). Practised worldwide (cf Soper 1996; Proctor 1997; Joly [1999] 2005; Abouleish 2004), it incorporates an understanding of the energetic or spiritual factors present in organic processes. The methods include regular application to the growing crops of specific solutions referred to as "compost preparations". These are used in minute proportions (either directly in the compost heaps or in water solutions sprayed onto the crops), and are understood to act as forces rather than as substances (Steiner [1924] 1958:90;). In other words, the fertilising element of these compost preparations is their energetic activity as opposed to their physical substance. This is different from materialistically orientated conventional farming practices, where quantities of fertilising chemicals are applied to crops with the understanding that the plants absorb these into their physical organisms, stimulating growth. These practices were being developed in the early 20<sup>th</sup> century at the time that Steiner started the biodynamic movement (Pfeiffer 1958:9) and continue to be opposed to the biodynamic tenets of today (Proctor 1996). In biodynamics, compost preparations are used to build humus and establish a living soil structure, and to establish the right conditions for crops to draw from soil and cosmos what they need (Pfeiffer 1958:11). Non-physical characteristics of plants, animals, soil, and all life-processes are taken into account and worked with.

plants' structures. It is possible that this could be because sound itself originates from the same energies as those present in living growth (Wachsmuth 1932:145).

The possibility that etheric life forces could explain a link between music and plant-growth is supported by Baumgartner's (2008) experiments with speech-eurythmy<sup>3</sup> gestures and their effects on plant-growth. While the aim of most experiments in the field (for example, Singh 1962; Retallack 1973; Ekici *et al.* 2007) is to show what specific effects music or sound has on plant-growth, Baumgartner's motive was not simply to show the effect, but rather to demonstrate, through observation, that eurythmy influences plant-growth owing to the existence of etheric life energies. As will be discussed, that is because eurythmy gestures are meant to be the embodiment of sound of either a musical or a spoken nature (Sponheuer 2009). Given that eurythmy involves as much gesturing of musical- as it does of spoken-sound, Baumgartner's work raises questions as to whether music, too, has an effect on plants through etheric activity. Baumgartner experimented with speech-eurythmy<sup>4</sup> gestures, while this study builds on her findings about the role of the etheric forces in plant-growth as reflected in sounded rather than eurythmically gestured music.

A link between music and plants is evident in old and new contexts, which leads to the research question of this study: *Can Steiner's conception of the etheric life energies, present in both plant life and sound phenomena contribute to an explanation for music's reported influence on plants?*

### **1.3 Personal motivation**

The initial impetus for this dissertation arose in 2007 when, after two years spent pursuing a career as a classical piano accompanist in Cape Town and Amsterdam, I volunteered to work on the biodynamic farm Borjrali<sup>5</sup> in Kacheti Province, Georgia (Eastern Europe). The Georgian, French and Swiss people with whom I worked at Borjrali expressed surprise that a

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<sup>3</sup> Eurythmy is an artistic movement form developed in the early twentieth century by Rudolf Steiner and a handful of his pupils. It expresses visually, through movement, the living forms present in speech and music, as perceived by anthroposophy (Usher 2006:3; Sponheuer 2009:1; Spiegel & Sponheuer 2008:2)

<sup>4</sup> Speech-eurythmy, discussed in Chapter Five, is the type of eurythmy that aims to make visible, through gestures and movements, qualities of spoken sound; tone-eurythmy is the other type of eurythmy, which does the same for music.

<sup>5</sup> Borjrali, a pioneering biodynamic initiative, no longer exists in the form in which I knew it, although its founding members continue to pioneer biodynamic farming in another Georgian province. One of its aims was to counter the insurgence of chemical-based agriculture in Georgia (which has an ancient agricultural history), and to support traditional farming methods by merging them with biodynamic methods.

classical musician was enthusiastically involving herself in menial (and sometimes heavy) farm work. To me it made perfect sense: half way through my BMus degree, in 2002, I had become interested in biodynamic farming as an ecologically restorative, regenerative and therefore health-giving practice. I had attended workshops and read the basic literature on biodynamic agriculture (Steiner [1924] 1958; Soper 1996; Proctor 1997; Keats 1999; Joly [1999] 2005) and looked for opportunities to experience the methods first-hand. I had also developed a love of the Georgian language and music, and was delighted to be able to combine these interests at Borjrali. The explanation I gave my hosts for my being there was that at the back of my mind there was a question: how could I combine my music training with biodynamics and eventually base my life's work on both?

The enthusiasm of my hosts' response came as a surprise. Jean-Jacques Jacob, the French/German co-leader of the Borjrali initiative, had already been practising eurythmy in his farmyard and fields,<sup>6</sup> and saw great potential for using music in agricultural production processes. He said:

Traditional music and songs are inspired by the harmony of microcosm and macrocosm: they arise from the old mysteries. The elemental beings were nourished by the singing and music making of people. Today it is no longer a given; people now have the task to create something new out of the new mysteries which can bring new order in the world (Jacob 2008).<sup>7</sup>

To Jacob and others involved in biodynamic agriculture, such as Small (2008) and Hindmarch (2009), elemental beings or non-physical beings in the natural world – sylphs, salamanders, gnomes and undines of old knowledge (Steiner [1908-1924] 1995) – are a living energetic reality, acknowledged for their part in life processes.

Alexander Baumgartner, a Swiss co-volunteer at Borjrali, also encouraged my search for an appropriate combination of music and agriculture. He described his mother's experiments (Baumgartner 2008) using eurythmy gestures in the presence of growing plants that had shown a strong correlation between the two. He and Jacob encouraged me to find ways of bringing music into agriculture.

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<sup>6</sup> I witnessed his use of the "M" gesture/movement to encourage strong and painless growth of the horns of a calf. He also showed me the use of the "M" and "L" gestures in a field of vegetables, which he said benefited from the harmonising and life-giving effects of eurythmy. The eurythmy gestures are explained in Chapter Five.

<sup>7</sup> Free translation from German.

When the opportunity arose to investigate the topic for my dissertation, it became clear that a firm foundation in anthroposophical literature would be essential to understanding the principles on which Jacob based his work and philosophy, and which underpin Baumgartner's work. It also seemed important to find specific examples from the history and ethnography of agricultural practices demonstrating the use of music to facilitate crop growth, and to question precisely how musical energy affects the physical structure of plants. Inspired by Baumgartner's work, I decided to investigate the possibility that, as with eurythmy, music's effect on plant-growth is mediated by what anthroposophy terms the etheric formative forces.

#### **1.4 Research design**

The research methodology consists of a study of relevant literature, and formal and informal interviews.

Much of the dissertation is based on a comparative consideration of diverse published and unpublished materials, with the focus on anthroposophical resources with specific reference to the etheric forces and eurythmy. Literature on and related to perceived relationships between plants and music forms a backdrop to the comparative discussions that underlie this research.

Apart from conducting an in-depth study of relevant literature, it also became clear that some key knowledge could only be found through interviewing individuals involved in agriculture, eurythmy and other relevant disciplines. I conducted five formal and four informal interviews. The formal interviews were with the following people:

- Hylton and Wendy Appelbaum, who own and run a commercial wine farm in Stellenbosch where they broadcast music to some of their vines twenty-four hours a day, as discussed in Chapter Three;
- Rob Small, founder of the Cape Town based township greening and food garden project *Abalimi Bezekhaya*. Small's background is in anthroposophy and he has an extensive knowledge of biodynamic and perma-culture farming methods. He agreed with Jacob's idea, quoted above, that "elemental beings were nourished by the singing and music making of the people," and was strongly in support of "a new artistic

impulse to penetrate the old forms” (Small 2008) – in other words, of an appropriate modern way of applying the practice of music in an agricultural context;

- Karoline Rickett, a Swiss eurythmist from Dornach, who, on a fruit farmer’s request, had treated several hundred juvenile apple trees with eurythmy gestures as part of a study on the validity of bringing eurythmy into agriculture;
- Tanya Baumgartner, a Swiss curative eurythmist whose experiments showing the effect of speech-eurythmy gestures on plant-growth were conducted primarily to prove to the conventional scientific world the reality of the etheric body (present not only in plants, but in animals and humans too), and to encourage incorporation of this knowledge into conventional medical practice;
- Raymond Auerbach, a community upliftment organic farming co-ordinator and rain-water conservancy consultant based in Kwazulu-Natal. He provided useful insight into the value of Zulu traditional work songs.

Informal interviews and discussions were held with the following people:

- Martin Mushava and Gerry Mudinzva: this was an impromptu interview held at their stall in a market in Harare where they were selling *mbiras* and other musical instruments. In the course of conversation, I asked them whether they knew anyone who made music for the benefit of crops. Their affirmative answers led to a discussion in which I learned that these men believe that music is linked to agriculture in several ways, and is practised like this in certain villages in Zimbabwe, including where they grew up.
- Meki Nzewi, a Nigerian ethnomusicologist and master musician. His knowledge of the influence of music on sub-Saharan agriculture is extensive and he has travelled widely in Africa. He is known for his singular approach to African music and its embedded functionality in daily living.
- Avice Hindmarch, a biodynamic farming proponent based in Hermanus, who, like Rob Small, is strongly in support of a musical element being introduced into farming. She convinced me to organise a workshop and discussion on the role of the arts in farming, which I did in May 2009.

- Silke Sponheuer, with whom I have worked for several years at Cape Town's Kairos Eurythmy Training Centre, and whose elucidation and insights into the eurythmical aspect of my dissertation are most valuable. I also draw on her recent (2009) Masters dissertation.

## 1.5 Challenges of the research

In ethno-musicological output, numerous studies make mention of musical practices said to be linked to plant-growth. Seldom, however, is this link the main focus of the study. Stobart is an exception here: his study examines this link extensively, yet he remarks on the scarcity of similar examination in ethno-musicological studies: "It is [...] surprising, given the extent to which growing crops and herding have dominated human history, how few ethnomusicological studies have dedicated more than passing reference to relations between agricultural and musical production" (Stobart 2006:5). Whilst I have gleaned interesting examples from ethno-musicological literature of *how* music and plants correlate, I have had to look elsewhere for an explanation as to *why* this might be the case.

Of the available sources of methods and findings of various experiments conducted to observe the effects of music on plant-growth (for example Singh 1963; Tompkins & Bird [1973] 2002; Retallack 1973; Weinberger & Measures 1979; Creath & Schwartz 2004 etc, discussed in Chapter Three.), the aim is primarily to establish what the effects are. Except for Baumgartner's work (discussed in Chapter Five), I found no experiment conducted to establish the *cause* or reason for such an effect. Since this dissertation aims to establish the reason for music's reported effect on plant-growth, I have relied on Baumgartner's theories which are based on anthroposophical thinking.

Because Steiner's anthroposophical literary output is vast, I have had to narrow down my research to the most salient material. Since anthroposophy has only in the last five to ten years become recognised in broader academic circles,<sup>8</sup> and academic/anthroposophical output is scarce, it was necessary to find my own way to express anthroposophical ideas in familiar academic terminology. I have a long co-incidental background in anthroposophy, having attended Waldorf primary and high schools, and having worked as a pianist and violinist for

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<sup>8</sup> The anthroposophically founded literary contribution of Owen Barfield (1957; 1963) to academia in the last third of the twentieth century is an exception. In the light Barfield sheds on beliefs and perceptions lost and gained through modern materialist scientific rationality his work substantiates some of this dissertation's topics.

Cape Town's Kairos Eurythmy Training Centre for close on ten years. I have also been lucky enough, over the years, to have been at the receiving end of my mother's Rhythmical (or Hauschka) Massage profession: a kind of massage founded in anthroposophical wisdom. I have therefore been in a position to observe the far-reaching potential of anthroposophical thinking to underscore many disciplines. Often the ideas are revolutionary (for example the concept of the ethers in Chapter Four and the understanding of sound as stemming from etheric activity) and have not become widely accepted. It has been a challenge for me to penetrate the complex anthroposophical thought-processes in a relatively short time, and to fashion them into a coherent academic argument for an audience who might never have encountered anthroposophy. Despite my exposure to anthroposophy, I had not investigated its tenets in any systematic way prior to this dissertation, and I have discovered it to be more extensive and multi-faceted than I had thought. The principles of anthroposophy take time, imagination and open-mindedness to grasp, and it is a fascinating challenge to convert the material, which encourages an imaginative, pictorial approach to nevertheless rational thinking, into an academic argument which it seems requires a more abstract rationalism than anthroposophy does.

As indicated earlier, the aim of this dissertation is to contribute to an understanding of why music affects plant-growth. Baumgartner's 2008 experiments have guided my search, but she was working with eurythmy and not audible sound. I have therefore had to translate her principles and examine whether they could equally relate to audible musical sound. Because understanding and describing eurythmy and its tenets is a challenge, applying eurythmical theories to audible music presents further difficulties.

## **1.6 Chapter outline**

Following the present chapter, which serves as an introduction to the study and gives background and personal motivation for the dissertation, Chapter Two offers a discussion of various non-modern non-Westernised agricultural contexts where performance of music has gone hand-in-hand with agricultural production. Those involved in these processes have been reported to suggest that music is performed in order to benefit plant crop growth. Chapter Two also considers different ways in which music is believed to have contributed to crop abundance. The work of Stobart (1992; 1994; 2000; 2006) informs much of the content of the chapter.



Chapter Three presents various twentieth and twenty-first century experimental studies looking into whether – and in which ways – musical sound affects plant-growth. An example in which a contemporary South African agriculturalist broadcasts recorded music to growing crops is also presented. His reasons for doing so are discussed, and related to what seems to be a growing scientific enquiry into the capacity of musical and other sound to affect plant-growth.

Chapter Four gives an overview of Steiner's explanation of etheric forces. It is included as a means to introduce the reader to anthroposophical concepts that are central to my dissertation. It introduces and characterises the etheric forces, understood in anthroposophy as constituting the energetic basis of living entities as well as sound phenomena, and suggests these as a possible explanation for the link between music and plant-growth.

Baumgartner's experiments, discussed in Chapter Five, are used to show that speech-eurythmy's gestures (which, through human agency, manifest the effects of the etheric life forces described by Steiner) have remarkable effects on plant-growth. Because speech-eurythmy gestures are the embodiment, so to speak, of spoken sound, and because eurythmy also has a musical component, the question is posed whether music likewise, through etheric activity, might have an effect on plants. Suggestions are given as to how this may be possible, and ideas for further research in this field are put forward.

Chapter Six concludes the dissertation. It reviews the ideas and findings of the preceding chapters, and summarises which questions have been answered and how, and which questions would require further investigation before conclusive answers could be reached.

## Chapter Two

### Non-modern, non-Westernised agricultural music contexts

*The old instincts have been lost. Intellect has lost all the old instincts – has exterminated them. That is the trouble with materialism – people have become so intellectual, so clever. When they were less intellectual, though they were not so clever, they were far wiser; out of their feeling they knew how to treat things, even as we must learn to do once more to approach the wisdom that prevails in all things.<sup>1</sup>*

#### 2.1 Introduction

Henry Stobart (1992; 1994; 2000; 2006), upon whose research of the musical practices of a small rural Bolivian community much of this chapter is based, highlights a paucity of research regarding the place of music in old school agricultural practices. According to Stobart:

It is [...] surprising, given the extent to which growing crops and herding have dominated human history, how few ethnomusicological studies have dedicated more than passing reference to relations between agricultural and musical production (Stobart 2006:5).

What Stobart reveals through his in-depth study of the music-agriculture link in a contemporary rural hamlet in Andean Bolivia, can be compared to similar practices – current and/or historical – that link music and agriculture in various other geographical locations. This chapter begins with an overview of where, how and by whom musical traditions have been linked to agriculture. It then looks at specific ways in which musical performance is believed to be linked with the procurement of abundant crops, as described by Stobart and, as a comparison with his research, as evident in other regions world-wide, either historically or contemporarily. In conclusion, this chapter poses the question as to whether the tenets underlying such wide-spread use of music for agricultural purposes are founded merely on pre-enlightenment superstition (cf Frazer [1890] 1981:31-32; cf Campbell 1975:857ff), or whether there is sound insight underlying these old practices which may validate a modern enquiry into the phenomenon of music's effect on plant-growth.

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<sup>1</sup> Steiner [1924] 1958:131.

## 2.2 Overview of some links between musical traditions and agriculture

In Kalankira,<sup>2</sup> a rural hamlet in Northern Potosí, Bolivia, the music making of the Quechua speaking, subsistence farming community is intrinsically linked to agriculture (particularly to the growing of potatoes) and is believed to order the seasons and cycles of production (Stobart 1994:35). Such seasonal, agriculturally-based music making is not peculiar to Kalankira: according to Stobart, many parts of Andean Bolivia are populated by people whose “musical instruments, genres and dances alternate seasonally and are explicitly linked with regulating atmospheric conditions and the cycles of agricultural production” (Stobart 2006:4).

Stobart, a western-classical musician and ethnomusicologist, attests to having witnessed in Kalankira certain climatic changes caused, according to the musicians, by the use of specific instruments (Stobart 1992:73). For example, the *pinkillu* flutes, which the Kalankirans play during the wet season, are believed not only to call forth rain, but are also explicitly said to “help the crops to grow” (Stobart 1992:73).

His studies reveal a thriving musical tradition, the foundation of which is a conception of musical sound as integral to life processes, rhythms and patterns. Kalankiran musical performance is closely linked with the everyday objects and activities that inspire it. Stobart emphasises the differences between this kind of musical expression and that common to Westernised, industrialised societies, which he describes as being “abstracted away from everyday objects and activities” (Stobart 1994:35). Kalankira’s music reveals an approach to ecology not common in the industrialised world (Stobart 1994:35). In his initial attempts to discuss with members of the Kalankira community the various forms and functions of their music, Stobart found that for these people to speak about music as anything but integral to life and its rhythms is a foreign concept. Neither of the two principal indigenous languages of the

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<sup>2</sup> Stobart refers to the name ‘Kalankira’ as ‘true fiction’ in that in most of the official documents and maps in which the area is mentioned it is spelled *Cayanguera* (in Spanish) or *Qayankira* (in Quechua or Aymara). The Quechua-speaking people amongst whom Stobart lived and worked say the name comes from the sound produced by ringing rocks (producing sound when struck) situated on a hill above the hamlet. They are said to make the sound “*kalan kalan*”. Stobart says: “In the name ‘Kalankira’ I bring together local beliefs about sound production and its link with identity – central concerns of this book – with Quechua, rather than Spanish, orthography” (Stobart 2006:11).

Andes (Quechua and Aymara) contain a word equivalent to the English “music”, which refers to different instruments and genres in a single category (Stobart 2006:4)<sup>3</sup>. Stobart says:

[M]usical genres tend to be closely connected with particular performance contexts. For most people the mention of an instrument or genre locates it within broader cycles of transformation, alternation or (re)production, such as the human life cycle [or] the agricultural year [...] (Stobart 2006:4).

Diallo and Hall (1989), Kubik (1994:249-250), Agawu (2003:8), Cancellotti (2005:21ff) and Pewa (2005:83ff) describe forms of music making in Africa. For all of them, as for Stobart, the functionality of music making extends beyond the expressive and aesthetic purpose of concert hall music, or the commercial, expressive, sometimes self-serving functions of chart music.

While these descriptions of music making do not necessarily involve agriculture, they do depart from a view of music as being enjoyed purely aesthetically. In this way they relate to the music making Stobart describes as being “not abstracted away from everyday objects and activities” (Stobart 1994:35). Diallo (Diallo & Hall 1989), a Malian traditional musician, considers the discrepancies between a modern mainstream approach to music making and the specific musical culture in which he was raised and trained: “The star system of Western popular music goes very much against the standards of conduct for the village musician with which I was raised” (Diallo & Hall 1989:196). In Mali’s Fienso village in the mid 1900s, Diallo’s formative years, music was performed for the specific purposes that arise in everyday life to which music can be of benefit, for example the healing arts; courage on the battleground; initiation processes, and hard physical labour such as hoeing fields.

Activities not involving music are rare in a Minianka village [such as Fienso]. Wherever they work, the Minianka dance and sing. Music softens a hard existence. It is present in daily life for work, births, deaths, marriages and baptisms. Music is involved in the rituals of the secret societies, and in the healing of mental illness (Diallo & Hall 1989:109).

Cancellotti (2005:22) considers the place of music in the context of San cultural traditions: like in other hunter-gatherer societies, according to Cancellotti, the San practice of dance and music serves more than aesthetic and recreational purposes, “embodying as they do a dense cultural and phenomenological reality situated at the intersection of nature, culture and society” (Cancellotti 2005:22). Music, like life processes, unfolds itself in time progression, so that each moment is linked to the previous, and makes sense according to its place in the

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<sup>3</sup> Slobin and Titon (1992:1-2) mention a comparable absence of a general word for music in Rosa, a Yugoslav Macedonian village.

stream of time. As much as music's inherent logic or meaning is inexplicable by means of quantitative scientific rationality, so is life itself – that which is not inanimate – unrelated to neat, modernist physical laws. Therefore it is fitting that, in pre-modern-scientific communities, music “[is] performed within the context of [...] people's life activities”. (Pewa 2005:83 in reference to Zulu music traditions).

The sources above refer to African musical traditions, comparable to those described by Stobart in Kalankira. Examples of functional music exist on all inhabited continents, some applying to agriculture, others applying to other types of functional music.

- The old ritual songs of Russia, according to Seaman (1967:8), can be divided roughly into two types: *bytovye* songs for everyday life events, and seasonal songs such as *kolyadki* and *vesnyanki*. *Bytovye* comes from the Russian *Bytovy*, which Seaman describes as “an untranslatable term, but having the sense of anything pertaining to everyday life” (Seaman 1967:8; see also Slobin 1992:171). The Russian seasonal songs Seaman describes, which relate directly to agriculture, will be discussed later in this chapter.
- Best ([1925] 1972) and McLean (1996) depict Maori musical traditions as including various types of everyday and functional music, for example hauling songs, paddling songs, lamentations, game songs and incantations. Agricultural work songs such as the digging songs termed “*koo kuumara*” (lit. dig sweet-potato) were often performed after an incantation to Rongo, the god of agriculture (McLean 1996:96). The term “*koo kuumara*” has been used by different musicologists to apply to different types of singing: to describe call-and-response work songs sung while working the fields, and also to describe “a charm when planting crops” (McLean 1996:96).
- Chatwin (1987) explores the Australian Aboriginal song lines, music that maps out the terrain and its landmarks and species. He describes their music making as “a memory bank for finding one's way about the world” (Chatwin 1987:108).
- Victor Schauberg<sup>4</sup> observed a Swiss peasant farmer in the early 1900s intoning ascending and descending motifs into his natural crop-fertiliser spray according to an “ancient Alpine tradition” (Bartholomew 2003:229) known as *Tonsingen* (Coats

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<sup>4</sup> Victor Schauberg was an Austrian environmental visionary at the turn of the twentieth century whose ideas are increasingly recognised by environmentalists today.

1996:268).<sup>5</sup> Doing this was reportedly believed to energise the liquid and therefore to enhance the growth of the crops on which it was sprayed.

- Frazer ([1890] 1981) gave various examples from Western, Eastern and Central Europe of agricultural rites and festivals in which singing, dancing, and sometimes instrumental music played a part. One example amongst those he describes is the annual spring festival in the village of Lipkowitz in what is now the Czech Republic. He described the following: girls dressed in white adorn their hair with the first spring flowers and lead an especially adorned and flower-crowned girl chosen to be the “queen” throughout the village. The girls leading the queen may not stand still, but must keep whirling and singing during the procession, in which the queen’s task is to announce the arrival of spring to every house and wish those living there good luck and blessings, for which presents are given (Frazer ([1890] 1981:93). According to Kurath (1956), similar spring festivities were held in Croatia and Bulgaria. In times of drought too, young dancers and singers led by a girl adorned with leaves and flowers would proceed through the villages “to invoke rain and fertility” (Kurath 1956:288). The leader was known as *Dodole* in Croatia and *Perperuna* in Bulgaria.
- Gioia (2006:39) mentions songs and dances believed to contribute “in some metaphysical manner to the growth of crops” that were common amongst those Native Americans for whom cultivation was a major food source. The Cherokee, Iroquois, Seminole and Creek all performed their own versions of a cultivation dance known as the “green corn dance” which was believed to elicit an abundant crop (Gioia 2006:39). According to Gioia, song and dance has been linked with agricultural practices throughout the traceable history of farming. Apart from being crucial to the rites of agricultural communities, Gioia mentions music as “solidifying the social bonds, bringing order and organization into the art of cultivation, intervening with the gods, and placating the creatures of the earth” (Gioia 2006: 35). He emphasises that providing accompaniment to the movements of physical agricultural labour was not the only goal of agricultural songs: while ploughing, harvesting, threshing and grinding all inspired musical traditions, “the agricultural life also possesses a spiritual component related to the fertility of the land, reflected in ritualistic practices that also typically require music” (Gioia 2006:35-39).

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<sup>5</sup> More detail about the intonation process appears in Section 2.3.2.

The above examples, of functional music-making firstly in Africa and secondly on other continents, demonstrate that Stobart's research in highland Bolivia falls into a general picture. However, unlike Stobart, the above researchers in most cases do not focus on music's place in agriculture; they simply mention it in passing. None but Gioia (2006) rest more than fleetingly on the specific nexus between music and agricultural production; neither do they raise the following questions:

- Given that diverse populations have used musical sound in an agentive, functional manner, why is it that in modern industrialised living the knowledge and practice of functional music plays, if any, so sidelined a role?
- If music has a generative, formative influence on growing plants, how and why does this come about?

These questions motivate much of the present study and underpin its hypothesis.

### **2.3 Specific ways in which musical performance is linked with the procuring of abundant crops**

As described above, the musical-agricultural practices in Andean Bolivia, and in particular in Kalankira, are comparable with belief structures and practices, historical or current, other geographical locations. This section considers specific examples of the music-agriculture nexus common to various of the world's populations. Examples (in Section 2.3.1) of songs, dances and incantations intended to control weather conditions and maintain the seasonal patterns relied upon in farming practices are followed (in Section 2.3.2) by examples of music believed to directly affect growing crops.

#### **2.3.1 Music played to control the weather: calendrical music**

Stobart attests to having witnessed "to [his] astonishment" climatic changes caused by music making in highland Bolivia (Stobart 1992:73). There, he reports, the year is divided "in agricultural and musical terms" (Stobart 1994:37) into two seasons: the wet, growing season (from November until mid-March) and the cold, dry season (from mid-March until the end of October). The association of specific musical genres with specific times and contexts (alluded to in Section 2.2) is particularly evident in the seasonal use of music – "a practice common to many parts of the southern and central Andes" (Stobart 1994:37).

Stobart describes having observed a “huge variety” of instruments, some of which are believed to attract the rain, and others the frost or dry weather (Stobart 1992:73): *pinkillu* flutes and *kitarra* are believed to call the rain clouds, while *wauqu* or *jula-jula* panpipes and *siku* panpipes and the shrill sounding *charango* are played to blow the wet weather clouds away, bringing clear sky and the frosty conditions of June and July. Wet weather and dry weather instruments are reportedly hidden away during the season in which they are not used, because their sounds are believed to be detrimental to the growth process of the crops if played at inappropriate times.

Stobart further notes a close connection between seasonal instruments and the potato crop yield, potatoes being the indispensable staple of the area: “the potato [...] is not viewed as a mundane staple, but is central to the structuring of musical expression” (Stobart 1994:35). Documenting the analogy drawn between potatoes and the rainy season *pinkillu* flutes, he explains that the flutes are said to be alive because they have many holes – the holes being those stopped and unstopped by the players’ fingers to “give life and form to a melody” (Stobart 1994:40). The holes of the flute are equated with the sprouting eyes of the potato – the more eyes, the better the regenerative power of the potato. Dry season instruments, like the different panpipes, do not have holes and are said to be dead. These are equated with the freeze-dried potatoes of the winter months, and therefore not with growth and rejuvenation. He further elaborates:

The associations between [the] rainy season instruments and potato plants are often most explicit. In the Sacaca region of Northern Potosí I have seen wooden *pinkillu* flutes carved with the images of potato plants. Also, throughout the region, many types of rainy season guitars (*kitarra*, *talachi*, *guitarilla*) are decorated with the image of growing plants, usually suggesting the form of a flowering potato plant (Stobart 1994:38).

Older men complained to Stobart that young men in the industrialised town of Macha were playing their guitars all year through, causing the weather to have been unpredictable and harvests poor in latter years. The seasonal use of music in potato and other crop growing is gradually becoming a thing of the past: the state education system, rural development agencies, and local radio stations, broadcasting in Quechua and Aymara, “rarely (if ever) respect this essential Andean method of ordering time and way of life” (Stobart 1994:40).<sup>6</sup>

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<sup>6</sup> This echoes Small’s (2008) observation of the current decline in the use and appreciation of Xhosa agricultural worksongs based on beliefs in music’s agentive power in agriculture comparable to (if not precisely the same as) those of the Kalankirans. Small sees this decline as symptomatic of a general “change in consciousness” evident in the developing world, where individuals tend towards becoming “nations unto themselves” concurrently with a tendency towards rationalisation of thought processes to the exclusion of intuitive knowledge. Rob Small is the founder of Cape Town based township greening project *Abalimi Bezekhaya*, an extensive and successful project focussing on environmental and social upliftment



The seasonal use of music that Stobart describes as “essentially Andean” seems to be comparable to the widespread phenomenon of seasonal songs and dances. The Greater European spring festivals documented by Frazer ([1890] 1981), and Kurath (1956) are examples of music-making related to changing seasons.

Seaman (1967:138), referring to early Russian folk songs, says the following:

An interesting light on the role played by these early songs is revealed by the following anecdote. Professor Rubtsov, the Russian folklorist, told me that once he came across some folk singers in a remote district and asked an old man what they were singing. The old man looked most indignant. ‘Singing? We aren’t singing!’

‘Now come, *batyushka*. What do you mean “you aren’t singing”. What are you doing, then?’

‘We’re calling in the spring. That isn’t singing!’

The oldest of the documented Russian ritual songs can be divided more or less into two categories: those for everyday rituals such as dance songs, singing games and funeral laments, and the seasonal songs, represented mostly by the *kolyadki* (Seaman 1967:8). These incorporate the *vesnyanki* songs (*vesna* = spring) sung by girls at dawn after the seasonal ritual of calling in the spring (comparable with the Bulgarian *Perperuna* festival mentioned above); the springtime *khoroovods*, or round dances, which traditionally last for seven weeks as spring progresses to summer; the *zhnivnye*, harvest or reaping songs, into which category fall the *dozhinochnye* songs sung in conjunction with the harvest festival and the last sheaf’s blessing (Seaman 1967:10).

Comparable to the Russian (including the Ukraine and Belo-Russia) *kolyadki* are the seasonal songs of Serbian, Czech and Bulgarian musical traditions (the *koleda*); the Romanian *colinda*; and the Albanian *colendre*. These names all stem from a common root: the Greco-Roman New Year or midwinter festival named *kalanda* or *calandae*. These were songs that, like the music played on specific wet or dry weather instruments in 21<sup>st</sup> century Kalankira, ushered in the rhythmical, cyclical events of nature so deeply mirrored in and by human experience.

Schlosser (2002) has documented photographically Lovedu and Venda life in South Africa’s Northern Transvaal, providing images of Lovedu Queen Modjadji III, “the most powerful

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through organic food gardening. Small’s background is in anthroposophy and he supports biodynamic study and application in South Africa.

rainmaker of southern Africa” (Schlosser 2002:4) and her successor Modjadji IV, photographed in 1953 and 1959 respectively. The Rain Queens, who possess the “mystic power of transforming the clouds into rain” have a long matrilineal history and have been revered for centuries in southern Africa (Jensen Krige & Krige 1943:2). Queen Modjadji IV died in 2005, and an heiress is still awaited <Modjadji>. One of the queen’s main services is to ensure rain. Each November she presides over this ceremony at her royal compound in Khethlakone village <Modjadji>. Jensen Krige and Krige (1943) described some of the institutions of Lovedu society early in the twentieth century. These included the *gomana* drum cult, “the primary function of which is to secure rain” (Jensen Krige & Krige 1943:126), and the *vyali* “fertility and rain cult” which is inter-associated with the *vyali* “initiation cult” (Jensen Krige & Krige 1943:139). When it was held (depending on when the initiates came of age) it lasted for a whole year – a full agricultural cycle. The singing of *vyali* songs is believed to bring rain. In 1938-1939, even before the summer rains had fallen, it was said in Uulovedu that the year would be one of plenty, on account of the *vyali*. These expectations were more than realised, since not only was the summer rainy, but even the winter, normally dry, was exceptionally wet (Jensen Krige & Krige 1943:140).

### **2.3.2 Music played specifically for crop growth**

This section looks at ways in which musical sound has been used to directly influence crop growth in non-industrialised societies.

Gioia (2006:39) says: “Among Native American tribes that practised cultivation as a major source of food, the communities often possessed traditional songs and dances that they believed contributed in some metaphysical manner to the growth of the crops.” Likewise in Kalankira: Stobart describes the playing of the *pinkillu* flutes not only to call forth rain, but also to help the crops to grow. While staying in Kalankira, Stobart (1992:73) performed some virtuosic Western Classical recorder pieces as his contribution to music making in the village. “[The people] treated them with indifference or comments such as ‘Why don’t you blow properly?’ I was not achieving the kind of sound quality, rich in overtones, that they listen out for in their instruments.” Overtones are believed by the Kalankirans to be most important in the musical sound that informs the growth energies of crops, and, according to Stobart, are brought out in their music more strongly than in the Western Classical music to which he was accustomed, in which virtuosity is often more important than sound quality.

In the Swiss Alps in the late nineteenth century, Victor Schauberger (mentioned above) recorded his observations of an Alpine Swiss old-school farmer, using “an ancient Alpine tradition” (Bartholomew 2003:229) known as “*Tonsingen*” (Coats 1996:268).<sup>7</sup> Schauberger’s reason for studying this particular farmer’s methods was that the quality of the crops in his fields far surpassed those in his neighbours’ fields (Coats 1996:268). The farmer used a method of fertilising his fields comparable, in some respects, to methods employed by biodynamic farmers today (Bartholomew 2003:229; see also Joly [1999] 2005:55ff; Proctor 1997:54ff; Soper 1996:39ff):<sup>8</sup> small amounts of aluminium-bearing clay were added to a barrel of water, which he stirred vigorously, creating a vortex. He then abruptly changed the direction, creating a vortex in the opposite direction. This process was repeated numerous times. With the anti-clockwise direction, the farmer chanted a rising motif into the mixture, and with the clockwise direction he chanted a descending motif. In this way he potentized<sup>9</sup> his fertilizer, reportedly “building up a creative energy in the water’s memory” (Bartholomew 2003:230). This mixture was used in a spray to fertilize the fields. Coats (1996) says: “With tonsingen [...] we are concerned with the encapsulating of the harmonies of the chanting (as formative energy) in the water’s ‘memory’ [...] which must be transferred to the waiting plants before the resonances abate and the water ‘forgets’”(Coats 1996:268).

Another area in which the music-agriculture link is evident, is in music played for the benefit of supernatural beings believed to assist in producing a good harvest. Music is performed to give thanks, praise and appeasement to supernatural beings, be they gods, ancestors, or nature spirits. Gioia (2006:40-41) describes this type of music as “combining spirituality with practical efficacy by intertwining a decisive intercession with higher powers with a purely human thirst for music as a force for social bonding. Above all, both remind us how song [...] can be a potent force [...] in offering access to the divine currents [...]”. McLean gives an example from the Maori music traditions of an incantation to Rongo, the god of agriculture. The so-called “*whakatopatopa kuumara*”, was “an incantation performed by the

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<sup>7</sup> The German word “*Ton*” means either clay or sound/tone, which is interesting in that both music and clay are important in the *Tonsingen* tradition. Lumps of aluminium rich clay were stirred in water, their properties invigorated by the dynamic vortex stirring. This solution was used as a fertilising spray over the fields and crops; the chanting of tones was believed to have equally fertilising properties (Coats 1996:268).

<sup>8</sup> Contemporary biodynamic preparation-stirring methods are similar to the one described by Schauberger. However, the contents of the mixture are different, and it is not common practice to chant into the preparation as the Alpine farmer did.

<sup>9</sup> This is a homeopathic principle: the original remedy substance is stirred between dilutions, increasing its potency (Bartholomew 2003:229).

priest as he walked along the boundary of the *kumara* (sweet-potato) plot. Neglect of this ritual was thought to bring disaster through failure of the crop” (McLean 1996:96).

In a Harare market in December 2008, two Zimbabwean *mbira* players and stall holders, Martin Mushava and Gerry Mudinzva, spoke to me about the significance of musical traditions in their home village. In their experience, growing up in rural Zimbabwe, they said music making has two main uses in everyday life. Firstly, work on the fields involves long hours and hard physical labour. Farming equipment is not mechanically or technologically advanced; most of the labour is accomplished using energy generated by the human organism alone, and music – mainly song – is used for its capacity to lighten the workload.<sup>10</sup> Secondly, and pertinent to this section, music is made to give thanks to the ancestral spirits who communicate guidance to those farming the land. Particularly at harvest time, according to Mushava and Mudinzva, music is played and sung and danced to give thanks to the ancestors, the Almighty, and the earth. According to them, people living in remote villages of Zimbabwe still practise music in these ways today.

## 2.4 Conclusion

The various examples of music and agriculture in pre-industrialised practices, and the fact that they are by-and-large mentioned only in passing within greater contexts, validate Stobart’s observation of a research gap in this field. This chapter has given examples, from all inhabited continents, of the traditions of pre-industrialised peoples that associate music-making with agriculture, and more specifically, to engender abundance. These cases illustrate examples of the following specific agriculturally based practices, each one evident, historically or contemporarily, on more than one continent:

- calendrical music believed to direct seasonal climatic changes;

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<sup>10</sup> This view is supported by Auerbach (2009), who, in an interview, spoke of having to fetch a large, full milk tank from a neighbouring farm in Kwazulu-Natal, and load it onto his truck. He, in the position of “boss” began to give out orders as to how best to achieve this hefty, physical task, but was interrupted by one of the workforce which consisted of Zulu men. A song was started, one with a strong, rhythmic component, and in a short space of time, and in what Auerbach refers to as a “seemingly effortless” manner, the tank was on the truck. Auerbach suggested that the tank was in fact carried by air which was set in motion by the rhythm of the singing. Small (2008), speaking of time spent working the land with Xhosa co-workers, said he remembered rhythm as the element of their work songs that most carried the work. For him, it is the relation of the microcosm of musical rhythm to the macrocosm of what he terms a cosmic rhythm – incorporating the movement of the planets, the seasons, etc. – which brought the great energy to the work. Something greater than the physical came in with the music.

- musical sound played directly to effect optimal crop growth;
- music performed for the benefit of supernatural beings believed to assist with agriculture.

Many of these practices are falling away in the twenty-first century, especially in westernised, industrialised areas. This raises the question: is there an awareness or insight into the energetic potential of sound to affect living matter that is neglected or lost in industrialised societies? Or does industrialisation and modern scientific thinking have the ability to prove that music cannot affect living growth directly or indirectly (e.g. by affecting weather patterns) and that practices based on this belief are unfounded and therefore outdated?

The next chapter looks at a modern approach to agricultural-musical practices, based on experimental, discursive enquiry – as opposed to intrinsic tradition, as in the above examples.

## Chapter Three

### Twentieth and twenty-first century experiments into music and plant-growth

*Now it is beyond doubt that where organization is concerned, the harmonic figures of physics are in fact essentially similar to the harmonic patterns of organic nature.<sup>1</sup>*

#### 3.1 Introduction

Chapter Two looked at ways in which people in pre-industrialised geographical locations used and use music in an agricultural context, emphasising that there exists little research focusing specifically on those traditional agricultural practices to which music is essential. Moreover, none of the several references cited in Chapter Two investigate in any depth the validity of the underlying principles of agricultural music. Stobart (2006) is an exception, whose descriptions of Kalankiran beliefs regarding the essence of all living things (called *animu* in Quechua) being linked to musical sound, which is also believed to contain *animu*, are discussed in Chapter Four. However, Stobart's enquiry into the mechanism of sound's effects on growing plants is limited: he discusses the Kalankiran understanding of the music-plant link, but does not directly investigate the chasm between their practices – comparable to the several similar practices discussed in Chapter Two – and the mainstream modern western approach to farming, in which music plays no part.

This chapter presents the fact that although the use of music in agriculture is declining, there is a renewed interest in the subject, and a growing number of modern scientific enquiries into whether and how musical or other sound affects the growth processes of plants has been in circulation since the 1960s. A sample of these is discussed to show the different ways in which the issue has been approached. At the end of the chapter is a brief case study of commercial South African wine-farmers Hylton and Wendy Appelbaum, who have looked into some of the modern studies on sound and plant-growth. Based on these, as well as on Ernst Chladni and others' theories regarding the formative capacity of sound, the Appelbaums play recordings of Baroque instrumental music in their vineyards twenty-four hours a day. Their practice and aspects of its rationale are discussed.

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<sup>1</sup> Hans Jenny (cited in <Perry>).

### **3.2 Experiments investigating the effects of musical and other sound on living plant organisms**

This section describes a core sample of existing studies into the effects of specific sounds on aspects of plant development.

#### **3.2.1 Retallack (1973): the effects of different music on plant-growth**

In the late 1960s, Dorothy Retallack (1973) conducted controlled experiments in the Biotronic Environmental Chambers of Temple Buell College in Denver. Initially, she aimed to determine the musical pitch most beneficial to healthy plant-growth. To this end she transmitted the note F relentlessly for eight hours in one chamber holding a sample of plants; for three hours intermittently in another, and, as a control sample, no sound in a third chamber. Plants in the first chamber died within two weeks, but the second showed healthier and more abundant growth than those in the control sample.

The results were controversial in the biology department at Temple Buell, prompting another team of students to conduct an experiment broadcasting music from two different radio stations to two samples of summer squash plants, over a period of eight weeks (Tompkins & Bird [1973] 2002:153-157; Retallack 1973). The squash plants exposed to rock music reportedly grew away from the speaker and climbed towards the glass walls of their chamber. The plants in the other chamber, exposed to the music of Beethoven, Haydn, Brahms, Schubert and other classical composers, reportedly grew toward the speaker, even twining themselves around it. Continuing the rock versus classical music trials, Retallack found that plants exposed to heavily percussive music tended to be stunted in their growth, or else to grow excessively tall but with very small leaves; those exposed to classical music, however, tended to thrive and grow into healthy, balanced specimens. The plants to which rock music was played also used more water than those to which classical music was played, even though their root growth was significantly sparser and shorter than the abundant roots of the “classical” plants (Tompkins & Bird [1973] 2002:153-157; Retallack 1973).

Later experiments showed that plants exposed to J.S. Bach’s organ music tended to lean approximately thirty-five degrees toward the speakers, while those exposed to Ravi Shankar’s Indian classical sitar playing bent at angles of sixty degrees to reach toward the speaker. Jazz, too (in this case Duke Ellington and Louis Armstrong), reportedly had an enhancing effect, while plants exposed to country and western music remained the same as those in a control

sample. A further experiment that aimed to establish whether the dissonance of the twelve-tone music of Schoenberg, Webern and Berg had the same negative effects on root growth as percussive rock music had had, showed that this was not so: while the twelve-tone plants did not bend toward the speakers, their root growth was comparable to plants in a control sample.

Initially coming up against scepticism and ridicule from professors and fellow students, Retallack's findings later caused a sensation in the popular press, and controversy amongst scientists, whose responses were varied. While some were excited to share their own reports with Retallack, others stated that they had been "ridiculed professionally" if people believed what the press was telling them about Retallack's conclusions (Tompkins & Bird [1972] 2002:158-159).

Whether the 1970s United States scientific world was too caught in a materialist mentality to grant that plants could be influenced by non-material sound energy, or whether Retallack's experiments lacked the necessary rigour to impress this scientific world, can be questioned. Retallack's claims nevertheless support Pearl Weinberger's suggestion, that "basic farm equipment of the future will include an oscillator for production of sound waves and a speaker" (Tompkins & Bird [1973] 2002:152). Weinberger based this suggestion on a four-year experimental programme conducted in the mid-1960s, with her colleague Mary Measures, at Canada's Ottawa University. Their goal was to ascertain the effect of high-frequency audible vibrations on two wheat species (Weinberger & Measures 1979; Tompkins & Bird [1973] 2002:151-152; Ekici *et al.* 2007:369). Retallack's reports echo the claims of Singh (1963), whose music-plant experiments, conducted in Madras, India, a decade before Retallack's, showed the effect of Indian classical music on plant-growth. Indeed it was Singh's (1963) work that had inspired Weinberger and Measures' (1979) experiments.

### **3.2.2 Charnoe (1972): a technological sound approach**

Scotland-based Z.P. Charnoe carried out a commercial experiment in 1972, studying the effects of sound waves on the sprouting of barley seeds with a view to marketing the idea and equipment. Charnoe designed and patented apparatus for treating seeds sonically in order to accelerate and regulate germination, and to "induce plants to grow more quickly" (Charnoe 1972). The motivation for designing this apparatus was to produce more food, faster. Charnoe (1972:1) says:



In the various branches of agriculture and horticulture, much time, money and effort is expended in attempting to induce seeds to germinate faster and more uniformly and to induce plants to grow more quickly. The benefits of such acceleration of the metabolisms of plant organisms are self-evident and are becoming increasingly important in a world where there is an increasing demand for more food produced faster than is done conventionally.

Charnoe's first enquiry was to find which electronically produced sound frequencies would affect seeds favourably, in the following way:

The seeds are bombarded with sound whose frequency is varied over a range. The sound level transmitted and reflected by the seeds is detected to determine which frequencies are best absorbed by the seeds. The "favoured frequency" is then selected from the best-absorbed frequencies by the application of an interrogating current passed through selected [...] seeds while subjected to [these] frequencies, the resistance characteristics of the respective seeds indicating which frequency is the [overall] "favoured frequency" (Charnoe 1972:1).

Charnoe's patent application describes apparatus that could then apply this "favoured frequency" to larger quantities of seed. In a similar manner he developed a second method for finding and applying the best sound frequency to stimulate plant-growth.

The results of his experiments using optimal sound frequencies on plants and seeds showed that (Charnoe 1972:4-6):

- Seed germination and plant-growth has been accelerated in barley, wheat, tomatoes, beets, carrots, spinach, radishes, green onions, celery, lettuce and avocados, which, compared to control plants, are approximately 3 times (2.4 to 3.1) larger;
- Associated with applying sound is the observation that dormancy of seeds is decreased and germination rates are more uniform;
- Plants subjected to sound usually remain free of insect pests;
- Growth can be retarded where desired, for example, in the case of weeds.

Charnoe's approach to the use of sound in agricultural procedures will be revisited in Chapter Four, where it will be shown to be underpinned by a very different set of assumptions to those presented in that chapter. Charnoe's approach is to use technological, electronic sound production, which he believes affects the seeds through the decibel levels and frequency vibration rates: this is different from Baumgartner's non-technological experiments discussed in Chapter Five, which are based on the same understanding of the non-physical but living components of plants as discussed in Chapter Four.

### **3.2.3 Hou and Mooneyham (1999): agri-wave technology**

Hou and Mooneyham (1999) coined the term “agri-wave technology” to describe their agricultural method whereby they combine microelement fertilisers with sound wave frequencies to treat growing plants, “the effect of the sound wave [being] more than that of the fertilizers, but the best function [being] a combination of the two” (Hou & Mooneyham 1999:131). Length, width, weight, sugar content, and vitamin A, C and B content of spinach plants are all reported to have increased in treated plant samples as compared to control samples of untreated plants, and rot diseases apparent in the control plant samples were not there in the treated samples (Hou & Mooneyham 1999:131). It is, however, questionable whether the validity of these examples holds because the sound “treatment” was coupled with physical fertiliser. Nonetheless, it does provide an example of a modern, scientific interest in the power of sound as related to the growth of crops.

### **3.2.4 Creath and Schwarz (2004): seed germination bioassay**

In a series of five experiments conducted in 2002, Creath & Schwarz (2004) examined and compared the effects of musical sound, pink noise and healing energy on the germination of okra and zucchini seeds. They allowed groups of 25 seeds at a time to germinate under strictly controlled conditions, using acoustically shielded, thermally insulated, dark, humid growth chambers, in which humidity and temperature were regulated every 15 minutes. “The objective marker was the number of seeds sprouted out of 25 seeds counted at 12-hour intervals over a 72-hour growing period” (Creath & Schwarz 2004:113). The rate and event of germination within the groups of acoustically and energetically treated seeds were compared, one group to another, as well as each group to a control group which was not treated in any way.

The musical sound used was a 74-minute CD of selections from R. Carlos Nakai and Paul Horn, described by Creath & Schwarz as gentle music incorporating nature sounds such as birdsong and echoes, and performed primarily on Native American flutes. The pink noise consisted of a repeated three-minute track originally intended to test loudspeakers by a German audio company. “Its power spectrum is close to white noise, with the lowest frequencies rolling up and the highest frequencies rolling off” (Creath & Schwarz 2004:116). Both musical sound and pink noise were administered 16 hours a day, and the seed chambers in which no sound was played nevertheless had identical speakers inside to minimise

disturbance factors. The so-called healing energy used was a therapeutic modality founded in America in 1994, called Vortex Healing. Vortex Healing is recognized by the American Associated Bodyworks and Massage Professionals, and claims to trace its roots to a man named Mehindra who lived 5600 years ago in India. It is a bioenergetic therapy, in which the practitioner “focuses intention on what is needed for the receiver, while being open to act as a channel for divine energy ” (Creath & Schwarz 2004:116). This was administered to one seed group for 15 to 20 minutes, twice daily, for the duration of each three-day trial. A total of 14 trials were run, testing 4600 seeds.

The results showed musical sound to prompt a significant increase in the number of seeds sprouted, compared against pink noise and the untreated control group, while there was no significant difference between seeds exposed to pink noise and the untreated control group. Healing energy also had a significant influence compared with the control and pink noise groups, with a “magnitude of effect comparable to that of musical sound.” (Creath & Schwarz 2004:116).

Creath and Schwarz conclude that the musical sound and “healing energy” used in their experiment had significant and replicable effects on the germination of both zucchini and okra seeds when compared to a control group. They rule out the cause of the different germination rates of the various groups of seeds as being attributable to temperature differences between chambers, petri dish position, growth chamber position, or persons scoring the seeds (Creath & Schwarz 2004:120). In their words:

This study suggests that sound vibrations (music and noise) as well as biofields (bioelectromagnetic and healing intention) both directly affect living biologic systems, and that a seed germination bioassay has the sensitivity to enable detection of effects caused by various applied energetic conditions (Creath & Schwarz 2004:116).

### **3.2.5 Ekici *et al.* (2007): effects of different musical intervallic tendencies on root growth and mitosis<sup>2</sup> in onion plants**

Nuran Ekici and several fellow researchers published a report in *The Asian Journal of Plant Sciences* (2007) on experiments conducted at Turkey’s Trakya University, to determine “the effects of different musical elements on root growth and mitosis in onion (*Allium cepa*)”

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<sup>2</sup> Mitosis n. (pl. mitoses) Biology: a type of cell division that results in daughter cells each with the same number and kind of chromosomes as the parent nucleus. ORIGIN C19: mod. L., from Gk *mitos* “thread” (Oxford 2008)

(Ekici *et al.* 2007:369). They used recorded classical music by Mozart, Wagner, Mussorgsky, Chopin, Tchaikovsky, and Schubert. They set up three experimental samples: a control sample, to which no music was played; a second sample exposed to “strong, complex, rhythmic[ally] accent[ed] classical music” (Ekici *et al.* 2007:369) with repetitive second and fourth intervals; and a third sample to which lyrical music with extensive fifth, seventh and octave intervals was played. There were four replications of each sample. The growing onions were exposed to their respective sample-specific music for ten days, six hours a day. At the end of these ten days, the root length was averaged from twenty measurement readings. The mitosis (cell division) was counted off frozen slides made at the end of the ten-day period.

The reported results are that both samples exposed to music show faster mitosis and longer root growth than the control sample and that, of the two music samples, the second (with fifth, seventh and octave interval prevalence) shows the fastest root growth and mitosis.

The five experiments mentioned thus far give a chronologically ordered sample of the various experiments conducted in the field since the mid twentieth century.

### **3.3 Functional music in modern agricultural practice: the Appelbaum case study**

A recent *Mail and Guardian* article (4<sup>th</sup> June 2010), entitled “Mozart for microbes”, describes the introduction of piped Mozart opera music into a German sewage plant facility, with the aim being to “stimulate the activity of microbes that break down the waste”. The expected financial savings of the sewage plant, owing to the effects of the music, are reported to amount to one thousand Euros per month. Swiss overseer of the project, Anton Stucki, is reported to claim: “Mozart managed to transpose universal laws of nature into his music. It has an effect on people of every age and every cultural background. So why not on microbes? After all, they’re living organisms, just like us” <Stucki>.

Stucki’s work amounts to a modern practical application of what experiments such as those mentioned above investigate. The Appelbaums’ practice at their farm *De Morgenson* constitutes a similar case, and interestingly, when asked why they have chosen to play only Baroque and early classical music to their vines, Hylton Appelbaum (2009) gave a similar explanation to Stucki’s. Appelbaum said: “It makes sense that we should use it. There is a logic in the [Baroque] music which seems to relate to the logic of nature”.

De Morgenson is a ninety-one hectare wine estate situated on prime wine land in Stellenbosch

near Cape Town, owned and farmed by Hilton and Wendy Appelbaum. The Appelbaums have installed a system of sixteen weather-resistant loud-speakers, positioned in one of their vineyards. Recorded Baroque and classical instrumental music is piped through these speakers twenty-four hours a day, seven days a week. There are corresponding speakers in an area of the cellars where grapes from the serenaded vineyard are placed in barrels to ferment. The play-list lasts approximately one week without repetition, and all music is instrumental; no vocal music is played, according to the preference of the Appelbaums. The music is played day and night without a break, except for any necessary maintenance to the sound system.

In an interview with Wendy and Hylton Appelbaum in June 2009, they explained that the use of music in their vineyards has an experimental slant (albeit without a clearly enunciated scientific methodology). In Hylton Appelbaum's words:

I just decided to give it a try because it seems to make sense. There has been talk of this kind of thing for some time, and experiments and articles on it, and we just decided to give it a go [...]. We don't know of any others playing for vines or any other crop (Appelbaum 2009).

The experimental slant takes form as follows: the four-hectare vineyard in which the sixteen loudspeakers are placed lies close to a second vineyard of the same size, planted with the same grape variety, and of identical aspect. This second vineyard is not serenaded. Its proximity to the serenaded vineyard admittedly allows for a certain amount of musical overflow, depending on wind strength and direction, but nothing near the quality or clarity of the music available to the serenaded vineyard. By comparing the growth, harvest and vintage of the two vineyards, the Appelbaums hope to ascertain whether, to what extent, and hopefully also *how* exposure to music affects their vines. No specific results are intended, although what they explained as underlying their endeavour points to certain forms of music being beneficial to plant-growth and productivity, as is discussed later.

In the interview, Hylton Appelbaum said: "Sound waves manifest themselves. There is evidently a link between plants and sound. I do believe it works [to play music to benefit the growth of the vines] but I am neither a scientist nor a musicologist." No conclusive results had been reached at the time of the interview, since only one harvest had been made since the music system had been installed at De Morgenzon. However, provisional results had been reached: the Appelbaums explained that, during the first year of what they called "musical fertilisation", the grapes on the four acres exposed to music had ripened later and more consistently than those on the neighbouring "control" vineyard. This, they said, was of benefit

to the winemaking process for two reasons: firstly, later ripening allows for more exposure to the sun, which increases flavour; and secondly, the consistent or homogeneous ripening decreases the labour involved in separating ripe from unripe grapes before the wine making process begins. They attributed this tentatively to the fact that music was played to the vineyard.

In the interview, the Appelbaums presented a varied list of experiments and theories that contributed to their decision to play music to their vines (cf their website <Appelbaum>) The experiments used by the Appelbaums as background to their practice (some of which are detailed above in Section 3.2) are comparable to several other 20<sup>th</sup> and 21<sup>st</sup> century experiments in the same field (for example Singh 1963; Weinberger & Das 1972; Weinberger & Measures 1979; Martens & Michelson 1981; Weinberger & Burton 1981; Collins & Foreman 2001; Bochu *et al.* 2004; Creath & Schwarz 2004; Mi Jeong Jeong *et al.* 2007; Baumgartner 2008; Stucki 2010;), which show a modern Western discursive interest in the music-plant nexus that Chapter Two presented as being, or having been, intrinsically understood amongst several different groups of non-Westernised people. The theoretical background behind the Appelbaums' work moreover leads towards what is further discussed in Chapters Four and Five: possible explanations as to how music's assumed influence on plant-growth takes place.

While no formal enquiry into the music-plant link exists yet, and while there is as yet no established discipline of application, it is clear that a growing platform exists for such enquiry and the formulation of such a discipline. As a means of suggesting some of the concerns of such a new discipline, the following section looks at the theoretical background to the Appelbaums' practice, some of which relates directly to the theoretical background I propose in Chapters Four and Five as an explanation for the music-plant nexus.

### **3.4 The Appelbaums' theoretical background**

As mentioned above, Hylton Appelbaum (2009) explained his choice of Baroque music by referring to its inherent logic, which he claimed "seems to relate to the logic of nature". He also mentioned the Fibonacci series as being evident in Baroque music, especially that of Bach. The Fibonacci succession (1;1;2;3;5;8;13 etc., in which each number in the series is the sum of the two previous ones, and each number from 5 upwards divided by the previous number approximates one decimal-point more accurately the elusive "golden section" or

“*phi*”), has been observed to be evident in many natural forms, including, for example, leaves, pine-cones, and sea shells (Coats 1996:65ff).

Appelbaum offers no detail as to how the Fibonacci series, as evident within musical compositions, might either correspond to or affect the plant world or plant-growth. Neither does he specify where the Fibonacci series is evident in music, except his mention in the interview of J.S. Bach’s use of the “golden section” as well as the Fibonacci succession. However, in his comment about the logic of Baroque music corresponding to the logic of nature, and similarly in Stucki’s (2010) comparable comment about Mozart having transposed universal laws of nature into his music, there lies the seed of an explanation as to the link between musical and natural forms.

Taking the plant world as a specific area of nature in which to observe these “universal laws”, Bockemühl’s (1977:131) conceptualisation of plants is useful. It reminds us that plants are in a constant state of movement and transformation, much as music is: “It is not enough to describe the plant – using more or less static concepts – as a spatiotemporal structure; the plant must be grasped as an entity in perpetual transformation” (Bockemühl 1977:131). Such a picture of plant life is a necessary prerequisite to be able to follow the argument that weaves through the following chapters: that plants, in their developmental nature, share a common denominator with musical sound: a living continuity of formation.

Appelbaum’s tenet, comparable to Stucki’s, that nature is governed by mathematical laws and that certain music, being governed by similar laws, possibly cooperates with plant-growth in a way that may aid the growth of plants exposed to it. The well-known story of Pythagoras realising, through hearing the sounds of a blacksmith’s variously sized hammers striking an anvil, that musical intervals are directly related to mathematical relationships, is part of Appelbaum’s explanation. Pythagoras, whose “work gave a scientific basis for later musical theory in the West, established the connection between music and mathematics. His work was rediscovered and celebrated in the Middle Ages” (Menuhin & Davis, 1979:36). Boëthius (480-526A.D.), according to Appelbaum <Appelbaum>, followed Pythagoras’s assertion and divided science into seven disciplines: grammar, dialectics, rhetoric, arithmetic, geometry, astronomy and music. The first three completed what he called the *trivium*, which had to do with language; the last four, which he named the *quadrivium*, had to do with numbers. Music, for Boëthius, thus constituted audible numbers. The *quadrivium*, of which music was a part,

attempted, according to Heninger 1977:126), to “organise the diversity of creation into a comprehensive scheme”.

### **3.5 Chladni’s sound figures and imagery of the formative principles of sound**

Heninger’s interpretation of the organising intentions of the *quadrivium* is reflected in the work of Ernst Chladni (1756-1827), work that Appelbaum (2009; <Appelbaum>) cites as an illustration of the ways in which sound can be perceived to achieve a formative effect on matter. Chladni’s sound plates, described below, demonstrate what Heninger (1977:126) explained was the aim of Boëthius’ *quadrivium*. The Chladni sound plates are a consistent visual revelation of the organising, structuring nature of vibration.

Chladni discovered that a violin or cello bow, drawn perpendicularly across the edge of a square metal plate, produces clear tones, their pitch determined by the point at which the plate is stroked by the bow and/or stopped at another point by the player’s finger. He further found that if the metal plate is covered with sand or any other fine granular substance, the tones and their corresponding vibrations usher the substance into definite, reproducible figure formations on the plate’s surface. These formations have become known as the Chladni figures (Wachsmuth 1932:143). Different tones create vastly different patterns with both linear and curved geometric patterns becoming visible through sound’s formative influence. During the twentieth century, Hans Jenny developed Chladni’s principles in his extensive study of sound waves, to which he gave the name “cymatics” <Perry2002>, <Cymatics>. He applied sound to static plates through a crystal oscillator, covering the plates with various substances in which the sound waves effected consistent forms, and he documented the results with photography and film. His results are more varied and elaborate than Chladni’s due to his use of technology, but a similar principle applies. Referring to Jenny’s cymatics, Perry <Perry2002> says:

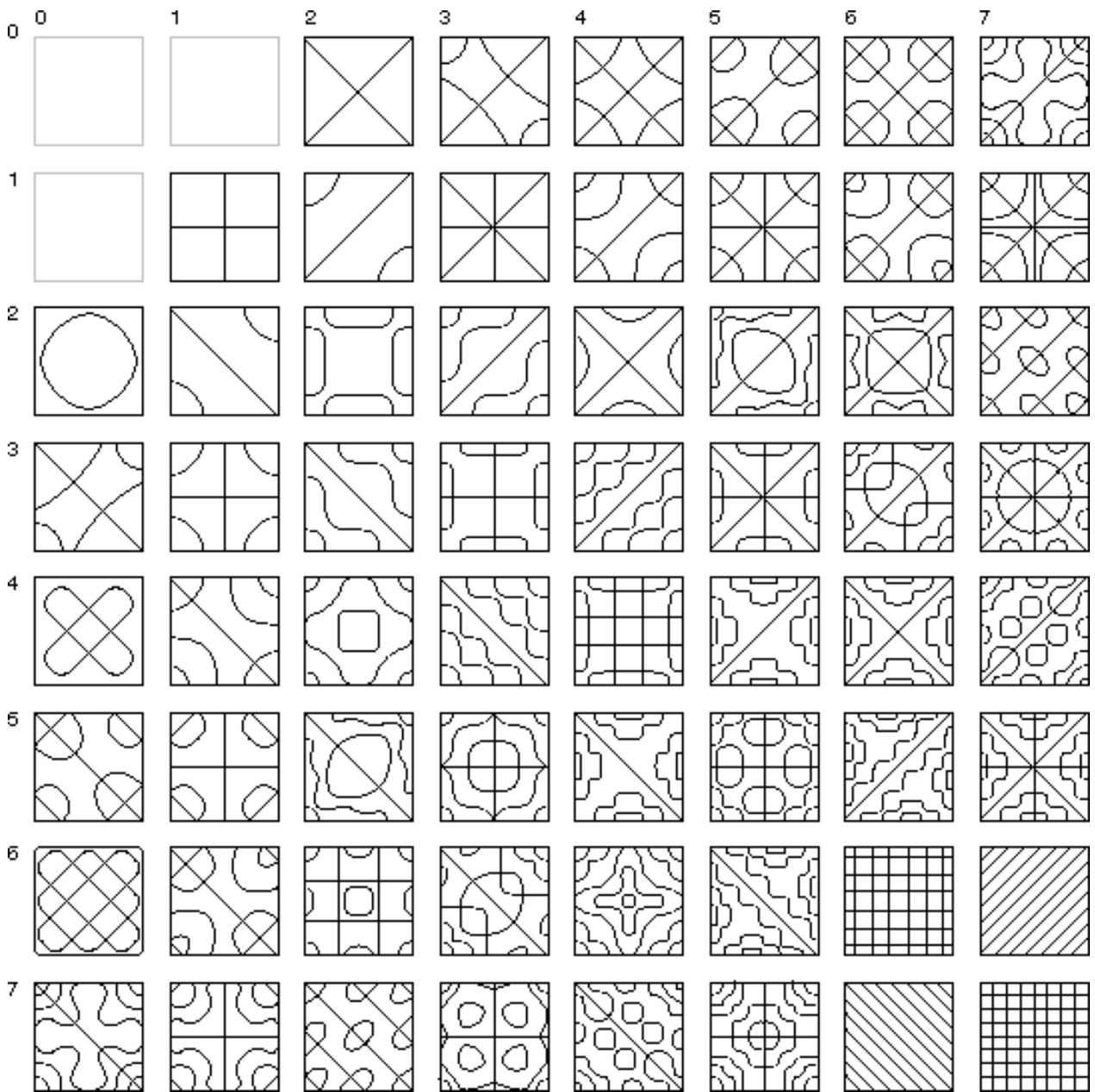
Whilst Jenny [...] didn’t apply any of his findings regarding the effects of sound and vibration upon physical matter [...] he laid a foundation for that work in respect of making visible the power of sound and its effects upon the world of form and matter <Perry2002>.

Wachsmuth (1932:143), in discussing the formative principles of living matter, says of the Chladni figures: “it is tone that causes the weaving together, the arranging and shaping of substances and substance forms. What audible tone affects [in the Chladni figures] in the sand is happening everywhere in space”. Wachsmuth goes on to explain the characteristics and activities of specific formative principles in all living substance, an issue that will be



considered in Chapter Four.

Plate 3.1 Chladni's sound figures <Chladni>



Shapes formed by the sand activated on the metal plate by a bow being drawn across the plate. Different pitches are achieved by stopping the plate at different places, resulting in different patterns.

Lehrs ([1951] 1985:397) suggests a way in which an understanding can be reached of the workings of invisible formative principles in all living substance. Using Chladni's sound plates and using the term "ether" (discussed in detail in Chapter Four) to describe that which affects formation in nature, Lehrs suggests that:

The significance [...] of Chladni's sound experiment will emerge still more clearly if we modify it in the following way. Instead of directly setting the plate with the powder into vibration by stroking it with the bow, we produce a corresponding movement on a second plate and let it be transmitted to the other by resonance. For this purpose the two plates must be acoustically tuned to each other and placed not too far apart. Let us imagine, further, that the whole experiment was arranged [...] in such a way that the second plate was hidden from a spectator, who also lacked the faculty of hearing. This gives us a picture of the situation in which we find ourselves whenever [...] ether, by way of tone-activity inaudible to our physical ear, cause[s] shapeless matter to assume regularly ordered form (Lehrs [1951] 1985:397).

In Chapter Four I suggest that one way of understanding the reported effects of audible sound on plant-growth is through the formative energetic phenomena at the basis of sound which are the same as the formative energetic phenomena at the basis of all growing life.

Regarding Chladni's figures, Wachsmuth (1932:144) made a startling comparison: Egyptologists record the two colossi of King Memnon (or Amenhotep III) in the Nile Valley near Thebes as having in past centuries given forth an audible, ringing tone every morning at sunrise (Pococke 1743:249ff; Breasted 1908:258; Nims 1965:153). Wachsmuth also emphasised the extent of the wisdom inherent in Ancient Egyptian manifestations, such as the pyramids which, he argued, represent "the macrocosmic numerical relationships of the most stellar worlds" – built without modern technology or the "accumulated information of our astro-physics" (Wachsmuth 1932:144). This wisdom, Wachsmuth indicated, extended to an understanding of the relationship between sound to substance: what Chladni's figures represent on a small scale was manifested, suggested Wachsmuth, on an enormous scale and in the reverse order in the two colossi of Memnon.

Since they [the priest scholars of the Egyptian mysteries] knew thoroughly the relationship between certain tones and certain forms of substance, they were able to give to these colossal figures, as high as a cathedral, such form and inner structure that the active force of the rising sun caused this form to send forth the tone to which it was adapted (Wachsmuth 1932:144-145).

After seeing the colossi early in the twentieth century, Wachsmuth speculated that the fact that they no longer produce this sound is in part because they have been so weather-beaten over the centuries that they have largely lost their original form.

The Chladni and Jenny figures make evident that sound exerts an organising tendency in matter, and therefore Chladni's and Jenny's discoveries form an apt background to Appelbaum's practical experiment, even if Appelbaum is still in the process of discovering precisely how to glean beneficial effects from the use of musical sound in his farming practice.

### **3.6 Conclusion**

This chapter has given an outline of some of the experiments of the past half-century looking into whether and how musical and other sound affects plant-growth. It has also briefly presented a case study of a modern farming practice in which some of these ideas are incorporated. Both the experimental enquiries and the case study contrast in character to the examples of agricultural music presented in Chapter Two. The main difference is that while Chapter Two's examples are based on intrinsic belief systems, this chapter's examples show a discursive investigation, based on uncertainty rather than belief (cf Giddens 1984:41ff).

Both chapters point to the fact that music affects plant-growth – a phenomenon to which no great deal of scholarly attention has been turned, but which, judging by the many pertinent examples, is nevertheless a topic worth investigating thoroughly.

The next two chapters examine sound as formative energy in an anthroposophical context, with a view to finding an explanation for why music affects plant-growth – which in turn may explain why music has been used so universally in agriculture prior to industrialisation.

## Chapter Four

### Etheric energies understood anthroposophically as the link between sound and plant-growth

*“To recognize the formative forces is no less important than to gain knowledge of the functions and functional relations of matter as such. It is the formative forces which in the living world organize matter.”<sup>1</sup>*

#### 4.1 Introduction

Historical and ethnographic literature provides a series of examples of music used in agriculture with the belief that it is beneficial to crop growing, as described in Chapter Two. There is also a contemporary interest, discussed in Chapter Three, in the potential of musical and/or other sound to affect plant-growth. The musical-agricultural traditions discussed in Chapter Two demonstrate knowledge systems based on what appears to be a more instinctual insight than is apparent in the proof-seeking modern-Western enquiries documented in Chapter Three. That old belief systems which grant music the power to affect crop-growth are common to all inhabited continents suggests that what lies behind these systems is more than unfounded pre-modern-scientific superstition. Modern experiments discussed in Chapter Three attempt to ascertain in a discursive way whether there is validity to the idea that musical or other sound can affect crop-growth, but there is little, if any, scientific enquiry into *why* musical or other sound should be linked to plant-growth in such a way as to be able to help or hinder it.

One possible explanation for why music has an effect on plant-growth derives from anthroposophical perceptions of etheric forces as energies that are believed to animate all biological growth-processes, and also to be at the basis of sound phenomena. This chapter introduces anthroposophy's ethers to be able to argue that these non-physical energies are the

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<sup>1</sup> Pfeiffer 1980:3.

common denominator linking sound energy and the life energy of the plant world.<sup>2</sup> Chapter Five continues to discuss this hypothesis, using Baumgartner's (2008) experimental work (showing effects of eurythmy<sup>3</sup> on plant-growth), which is based on this very tenet.

Anthroposophical study takes into account the living energies apparent in plant-life, and describes them in terms of etheric activity (Steiner [1924] 1958; Wachsmuth 1932; Poppelbaum [1952] 1985; Grohmann ([1959] 1974; [1968] 1989); Bockemühl 1985; Keats 1999; Proctor 1997). Wachsmuth (1932:145ff) describes, from an anthroposophical perspective, the energetic process of air being set into wave-like motion to create audible sound. He attributes this process to the interaction of contrasting etheric forces, as will be explained. Appelbaum (2009) and Stucki (2010) believe that sound fashioned into particular musical forms (e.g. Baroque music and Mozart's music) assimilates "universal laws of nature" (Stucki 2010), and for this reason possibly affects plant-growth, as described in Chapter Three. The anthroposophical notion of etheric forces as underlying both sound and plant-life, helps to elucidate what could be meant by "universal laws of nature", and why music may have an effect on plants.

Using anthroposophy's ethers as a basis for understanding the reported effects of musical and/or other sound on plant-growth relies on a mindset that gives credence to energies invisible to the naked eye (or for that matter, the microscope). This approach to understanding the link is comparable up to a point with the reasoning given by the Quechua-speaking rural Bolivians (whose practices are discussed in Chapter Two) to Stobart (2006) as to why their musical sounds are important for the growth of their crops. It is, however, a fundamentally different approach to understanding the music-plant link from the approach taken by Charnoe (1972) and Mi-Jeong Jeong *et al.* (2007) in their respective experiments.

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<sup>2</sup> According to Steiner, many intrinsic belief systems incorporated instinctual knowledge of ether activity, but a discursive understanding of these only began early in the twentieth century (Steiner [1923] 2007:119ff and 197ff; Wachsmuth 1932:144 footnote; cf Taussig 1980:155; cf Aristotle [ca.360 BC] 1995:59; cf Stobart 2000:28ff; cf Stobart 2006:27ff). If it is the case that sound and plant-growth are linked through their respective etheric origins, and if it is the case that many intrinsic knowledge systems contained an instinctual understanding of the workings of the ethers, then Chapter Two's examples of the widespread belief in music's agentive power make sense. Science based on physical laws does not take cognisance of the non-physical aspects of living growth, and therefore a modern scientific enquiry into why music affects plant-growth based only on a material understanding of sonic and botanical structure would not be comprehensive. Steiner's ethers provide a basis for this dissertation's enquiry into what is, after all, a phenomenon dealing with living energies and not static matter.

<sup>3</sup> Eurythmy is a movement art form founded along the tenets of anthroposophy. It is discussed in detail in Chapter Five.

#### 4.1.1 *Animu* as life substance in Kalankira

In Kalankiran belief, everything living contains *animu*, a Spanish loan word that has been adopted by the Kalankirans into their Quechua dialect to describe “the animating quality or essence of all living things” (Stobart 2006:27; cf Taussig 1980:155). At death, the Kalankirans believe that *animu* leaves the body that has been energised by it during life, and transforms into *alma*: also a Spanish loan word, “meaning ‘soul’ [but] exclusively associated [in Kalankira] with the dead” (Stobart 2006:27; cf Stobart 2000:32). Stobart (2006:27) mentions food crops specifically as containing *animu*. The presence of *animu* is perceivable by its activity in movement, light, scent, autoresonance (Stobart 2006:27) and, significantly, in sound. “Sound is equivalent to life and its shaping in music may, in certain respects, be seen as shaping life” (Stobart 2006:27). Stobart speaks of a “multiplicity of contexts” in which the link between musical sound and *animu* was made explicit in Kalankira (Stobart 2006:30), stemming from the understanding that sound “literally *is* the energy or animating quality (*animu*) of living things or their potential” (Stobart 2006:31).

In Chapter Two various seasonal instruments of Kalankira were discussed, such as the *jula-jula* panpipes, which are played to chase the rain away and call in the dry season (April–October) – a time period referred to in general terms by the Kalankirans as “harvest time” (Stobart 2006:133).

[...] *Jula-jula* panpipe construction and performance stresses the idea of a graduated sequence of receptacles – containing *animu* – where each represents a different stage or moment in the growth of a body. Indeed, [...] this music and its associated dance are intimately associated with inner bodily growth and the prolongation of life (Stobart 2006:30).

Contrasting with the closed *jula-jula* panpipes are the *pinkillu* flutes of the rainy season. These are “full of holes”, and it is understood that *animu* comes out from inside these instruments, transforming into *alma*. “Accordingly, the performance of these duct flutes is intimately associated with death, but also regeneration” (Stobart 2006:30).

*Animu* seems to describe an enlivening principle active in all animate entities, which is closely comparable (if less systematically defined) with the etheric energies discussed in this chapter.

#### **4.1.2 Principles underlying Charnoe's (1972) and Mi-Jeong Jeong *et al.*'s (2008) explanations for the music-plant link**

In contrast to perceptions of energetic life-force principles such as *animu* and etheric energies as being at the basis of music's link to plant-growth, are Charnoe (1972)'s and Mi-Jeong Jeong *et al.* (2008)'s approaches to understanding the link between music and plant-growth. Their approaches are based on a physical view of plants, where sound is seen to affect plants on a cellular level (in Charnoe's case) or a genetic level (in Mi-Jeong Jeong's case).

Charnoe's methods of bombarding seeds with sound at a range of frequencies and determining "favoured frequencies" by finding which frequency produces "optimum responses" from the seeds, is described in Chapter Three. While the method and results are clearly documented in Charnoe's report, the only clue he gives as to why he believes these results may arise is to be found in the following sentence: "the application of sound at the favoured frequencies may facilitate fluid and/or molecular transport within and between cells and across cell walls" (Charnoe 1972:5).

Mi-Jeong Jeong *et al.* (2008) investigated whether selected sounds could alter gene expression in rice plants. They used single frequencies, and also complex musical sound such as piano and instrumental music of Beethoven, Chopin, and Mendelssohn amongst others. Their results show that in some cases sound-responsive genes in plants can be identified, and that since these are also light-responsive genes, "the results suggest that sound could represent an alternative to light as a gene regulator" (Mi-Jeong Jeong 2008:221).

They do not discuss the question why sound affects genes, but the very fact that they investigate sound's effects on plant organisms on a genetic level suggests that they are approaching the topic from the viewpoint of the physical components of matter, as opposed to the life energies which the Kalankirans' (above) and Steiner's (below) viewpoints suggest as underlying the physical aspects of living matter.

#### **4.2 Definitions of ether**

There are various definitions of the word ether. The anthroposophical definition of ether, however, is not as widely accepted as some. The Oxford dictionary defines ether as:

n. 1 (also diethyl ether) a pleasant-smelling, volatile, highly flammable liquid used as an anaesthetic and as a solvent. 2 Chemistry any organic compound with an oxygen atom linking two alkyl groups. 3 (also aether) chiefly literary the clear sky; the upper regions of air beyond the clouds. 4 (also aether) Physics, historical a substance formerly postulated to permeate all space and to transmit light.

- ORIGIN ME: from O Fr., or via L. from Gk. *aithêr* 'upper air', from the base of *aithein* 'burn, shine'.

None of the above definitions concurs entirely with anthroposophy's meaning of the word "ether". Steiner emphasised that his use of the term was not to be confused with the "hypothetical ether of nineteenth century physics" (Steiner [1904] 1994:37; Lehrs [1951] 1985:390; Zajonc 1985:vi;). Barnett (1948:34) explains the latter as referring to a theoretical substance proposed by eighteenth and nineteenth century scientists as an explanation for light's ability to travel: "a medium to support [light waves], just as water propagates the waves of the sea and air transmits the vibrations we call sound". Later a second kind of ether, also dissimilar to Steiner's ether, was propounded by Faraday<sup>4</sup> as the carrier of electric and magnetic forces.<sup>5</sup> Einstein (1922:5) maintained that it is only reluctantly that "man's desire for knowledge endures a dualism of [the] kind" required by the acceptance of Newton's theory of gravitation, which "assigned a cause for gravity by interpreting it as action at a distance, proceeding from masses". This, Einstein said, "invoked a lively sense of discomfort among Newton's contemporaries, because it seemed to be in conflict with the principle springing from the rest of experience". It was, according to Einstein, "the endeavour toward a unified view of the nature of forces [that led] to the hypothesis of ether" (Einstein 1922:5). Einstein's understanding of ether bears similarities to anthroposophy's understanding thereof in that for Einstein, ether does not obey physical laws. Einstein (1922:23) says: "[T]his ether may not be thought of as endowed with the quality characteristic of ponderable media, as consisting of parts which may be tracked through time."

Steiner's meaning of ether comes close to Aristotle's explanation of "aithêr" (see Aristotle 53ff; Leggatt 1995:12). Marti (1966:1) comments on how Aristotle referred to aithêr as a

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<sup>4</sup> Michael Faraday (1791-1867) was an English chemist and physicist who contributed to the fields of electromagnetism and electrochemistry (Knight 2004:802).

<sup>5</sup> American physicists A.A. Michelson and E.W. Morley performed an experiment in 1881 with an instrument designed by them called an interferometer. They set out to prove the existence of ether by attempting to show that "a light ray projected in the direction of the earth's movement [would] be slightly retarded by the ether flow [arising from the earth's movement], just as a swimmer is retarded by a current when going upstream" (Barnett 1948:35ff). Their experiment resulted in clearly disproving the ether theory, facing the scientific world with a dilemma: either the ether theory had to be scrapped, leaving the activities of light and electromagnetism unexplainable, or the Copernican theory that the earth is in motion and not fixed had to be refuted – which hardly seemed a likely alternative. "To many physicists it seemed almost easier to believe that the earth stood still than that waves – light waves, electromagnetic waves – could exist without a medium to sustain them." (Barnett 1948:37).



single entity along the lines of the four elements that underlay the Ancient Greek conception of nature (solid, liquid, gaseous and heat): “somewhat as a fifth [element]” (Marti 1966:1; cf Aristotle 53ff; cf Leggatt 1995:12). Aristotle ([ca.360 BC]:1995:59), basing his discussion on the knowledge of “the ancients, who used to think of it in the way we ourselves are describing it” defined aithêr as a primary non-physical substance “beyond earth and fire and air and water”; a substance that is in movement “continually for time everlasting” (pg 59). Aristotle used the term aithêr to denote activity, or energy, rather than material or physical substance<sup>6</sup> such as earth, water, air or fire: the four elements of all physical life (Aristotle 53ff; Leggatt 1995:10ff).

Steiner described ether not as a single entity as Aristotle had done, but saw it as comprising defined energies with divergent properties and activities (Steiner [1920] 1988:160; Keats 1999: 78ff). Thus Steiner “created a totally new knowledge of the ethers” (Marti 1966:3). For Steiner the defined energies are not accessible to ordinary human perception: they are of an insubstantial nature, and are visible or perceptible to us only in as much as their effects in nature are visible or perceptible, unless we have developed the capacity for a subtle perception that enables us to recognize and observe living energies’ workings. As Keats (1999:80) says: “Differentiating their characteristics can be a first step [to understanding the ethers]. We then learn to “see” them by the footprints they leave in nature”. Anthroposophy’s ethers are comparable to the Hindu life force *prana* and to ancient Chinese wisdom’s *chi* (Sponheuer 2009:32; Jackson 2006:8), and to what Tompkins and Bird, ([1973] 2002:204ff) refer to as the “bioplasmic body” about which they say: “It is through his bioplasmic body that parapsychologists believe a man can be in direct contact with a living plant (Tompkins & Bird [1973] 2002:206).

The Chladni figures, discussed in Chapter Three, show a physical manifestation of the effect of sound’s discernable vibrations. Wachsmuth argues that indiscernible sound energies have similar formative effects: “What audible tone affects in the sand [in the case of the Chladni plates] is happening everywhere in space” (Wachsmuth 1932:143). By this argument, the “footprints” (Keats 1999:80) left by imperceptible etheric energies in nature are copiously evident in the myriad forms of the natural world (shells, leaves, flower shapes, fruits, etc.). Footprints of etheric energies in nature are thus said to be visible to any observant onlooker,

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<sup>6</sup> In 1922 Albert Einstein said: “the whole change in the conception of ether the theory of relativity brought about, consisted in taking away its last mechanical quality, namely its immobility.” (Einstein 1922:11)

although the ability to perceive etheric activity itself, requires what anthroposophy terms spiritual development. (Steiner [1909] 1972:367-370; Marti 1966:7; Lehrs [1951] 198:5412).

Four definable ethers are described as revealing themselves “in the space-and-time processes of our phenomenal world” (Wachsmuth 1932:39), and a further three ethers are active in the cosmos. Only the first four (warmth-ether, light-ether, tone-ether and life-ether) will be discussed because of their direct pertinence to the present subject. An extensive study of these ethers and their activities in the living world is, however, beyond the scope of this dissertation. The aim here is simply to give an overview, and to discuss how these immaterial forces are perceived to be present both in living plants and in unfolding sound (Steiner ([1906-1923] 1983:24,49; Wachsmuth 1932: 56ff, 145ff; Marti 1974; King 2006). Before giving an overview of the anthroposophical understanding of the different ethers, gleaned from anthroposophical literature, a brief account will be given of what can be perceived to be the immediately evident manifestation of etheric energies in nature.

#### **4.2.1 Anthroposophy’s ethers as observed in the natural world**

Steiner ([1904] 1994) says that one “speaks of an ether body at the point where an organism discloses something that a lifeless object cannot.” (Steiner [1904] 1994:36). A living plant, comprising, in anthroposophical terms, both a physical and an energetic body, can thus be clearly distinguished from an inorganic object such as a stone, which is inanimate: it has no energetic life-giving component. A plant, by contrast, is in a constant state of movement or development; aspects of it such as the leaves or petals are formed in a highly consistent manner, more so than the formations found in stone or rock.<sup>7</sup> A plant is either alive or dead, and once it has died or is in the process of dying, the living energies that have maintained its life can be seen quite clearly to be subsiding: colour diffuses, substance deteriorates, movement and growth discontinue. Forces of gravity gradually overcome the levitational workings of life at the death of a plant organism. Rhythmic life processes such as sap flow and transpiration also cease at the death of the organic, and the physical or mineral component disintegrates and loses its form. Adams and Whicher (1980) say: “In living processes,

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<sup>7</sup> Even the more formed minerals such as agate, tourmaline or quartz, do not present the same level of consistency in their formation as the leaves of most plants. Their formation, moreover, is built up from the outside as years of mineral deposits, unlike in plants, which develop out of their own seeds. I do not negate that the forms of certain stones and crystals are extraordinarily dynamic, geometrical and complex, but their manner of formation is other than the manner of formation of that which, like plant matter, can be said to be either alive or dead (Steiner [1904] 1994:50ff).

phenomena are to be seen which take place in an altogether different and usually quite opposite way from those which are familiar in the inorganic world.”

Earthly entities are perceived, anthroposophically, as a combination of the characteristics of the solid (earth), liquid (water), gaseous (air), and warmth (fire) elements, the workings of which are discernable in the physical makeup. Animate entities demonstrate, moreover, in their “aliveness”, the workings of the etheric formative forces. Being forces of life, the ethers are different from matter. Matter obeys gravitational laws, while etheric life forces are of a levitational<sup>8</sup> nature. Keats (1999:79) explains this:

Between the elements and ethers themselves there is a marked relationship of duality. The elements have forces acting on them that have a centric nature. Gravity acts radially on a solid, drawing it in straight lines of force, to a point at the centre of the earth. The ethers by polar contrast are drawn towards all the stars at the cosmic periphery. The flower reaches up and outwards; it does not grow towards a centre point (Keats 1999:79).

Anthroposophical spiritual science builds its understanding of living phenomena on the following observations: that the objects of the mineral world comprise only physical bodies; plant species, being animate, comprise physical bodies interpenetrated by etheric bodies; animals are seen to have physical, etheric and soul bodies; humans have physical, etheric, soul and intellect/consciousness “bodies” (Steiner 1906:24; Steiner [1908-1924] 1995:60; cf Steiner [1911] 1983:100).

A brief observation of the differences between an object of solely mineral composition (such as a rock), and a plant which grows and develops through different life stages, shows that certain activities, patterns and vibrancies exist in the latter that do not exist in the former. These patterns and vibrancies are evidence of etheric activity, according to anthroposophical understanding.

Wachsmuth (1932:19) acknowledged the difficulties presented by the study of imperceptible reality to those (and he referred particularly to scientists) who have been trained in a materialistic manner. He predicted that future scientists would choose either of two directions. The first would be to understand the workings of the etheric forces hypothetically, which, he says, would

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<sup>8</sup> Adams and Whicher prefer the use of the German noun “*Leichte*” to the word levitational for describing the movement of etheric energies. They say: “The ethereal [etheric] forces are not light and empty, in the sense simply of a lack of physical weight; they have their own kind of “*anti-weight*”, which the word “*Leichte*” comes nearest to expressing – better, perhaps, than the word “levity”.

offer much more far-reaching possibilities than the other hypotheses for an entirely consistent explanation of the phenomena of the physical sense-world – indeed, even for the understanding of phenomena whose comprehension in the basis of previous hypotheses was impossible: for example, the life-processes (Wachsmuth 1932:19).

Alternatively, people would choose to “rid [themselves] of the obstacles which prevent [their] perception of the supersensible<sup>9</sup> world [...] and will by this means attain the possibility of having the hypothesis of ether become the perception and knowledge of ether.”<sup>10</sup> (Wachsmuth 1932:19; cf Steiner [1908-1924] 1995). Contemporarily, various groups of professionals incorporate anthroposophical principles (including knowledge of the ethers) in their work: these include medical practitioners,<sup>11</sup> massage therapists<sup>12</sup>, biodynamic farmers, eurythmy artists and therapists (discussed in Chapter Five), amongst others. Due to the imperceptible nature of the etheric forces, a method of capturing their effects and making them visible was developed by Ehrenfried Pfeiffer under the guidance of Steiner during the 20th century (Joly [1999] 2005:162). This method, called “sensitive crystallisation” is used currently by organisations such as the Biodynamic Agricultural Association of South Africa to ascertain the efficacy of their farming methods in producing crops with healthy life forces. The method involves mixing a maceration or juice from a given plant with a copper chloride solution; the solution is then allowed to crystallise at a specific temperature.

If the substance analysed is dead on the level of living forces, the copper chloride dries leaving a sort of stain. In the opposite case, the living forces organise the copper chloride and form an image comparable to ice crystals on windshields after a hard freeze (Joly [1999] 2005:163).

The images are analysed for regularity, fineness, clarity and strength (Joly [1999] 2005:163). Sensitive crystallisation is one scientific way of making visible the activities of the etheric forces. Baumgartner (whose work based on these forces informs Chapter Five) presented her initial findings to a group of scientists using this and other methods towards a practical understanding and application of etheric energies (Baumgartner 2008:175).

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<sup>9</sup> Spiegel and Sponheuer (2008:15) explain anthroposophy’s preference of the term “supersensible” to “supernatural”. They say: “precisely because anthroposophists see the supernatural as part of the natural world of which humans are of course integrally part [...] they describe that world as super-sensible rather than supernatural. For them it is a world that exists in reality, yet in a realm of reality that is inaccessible to conventional human senses”

<sup>10</sup> Adams and Whicher (1980), with the help of projective geometry, give a lucid explanation as to how knowledge of etheric space could contribute to numerous modern scientific disciplines based as yet entirely on physical laws

<sup>11</sup> Anthroposophical medical doctors undergo a conventional seven year medical training before a further seven years of anthroposophical medical training.

<sup>12</sup> Hauschka or Rhythmical massage is the name given to a specific school of massage therapy stemming from anthroposophy, which works with the etheric forces of the human body (Hauschka [1979] 1990).

#### 4.2.2 Steiner's four ethers

Steiner's comprehensive perception of the four ethers (warmth-ether, light-ether, tone-ether and life-ether) and their specific characteristics and activities constituted a definitive uncovering of an ancient subject. He was the first to address this subject, historically evident in intrinsic knowledge systems, (Steiner [1923] 2007:119ff, 197ff; Wachsmuth 1932:144 footnote, 156), in a modern discursive way. However, because Steiner's overall writings and lectures extended anthroposophical insight to a multitude of different subjects and disciplines,<sup>13</sup> Steiner himself did not systematically present the ethers as a self-standing topic, but rather discussed them in the different contexts of "themes of a general anthroposophical, medical, educational, agricultural, [artistic], or scientific nature" (Marti 1974:x-xi). Several in-depth enquiries into the "wealth of detail pertaining to [the ethers] in [Steiner's] lectures and books" (Marti 1974:x) exist in print – notably those of Wachsmuth (1932), Marti (1974), Lehrs ([1951] 1985 and Bockemühl 1985). Because these scholars have penetrated and systematised Steiner's diverse references to the ethers, their works are relied on in this chapter.

The topic of the ethers is a large and complex one, with pertinence in many fields. In a paper summarising in detail Marti's work on the ethers – focusing on the characteristic definitions of the four ethers discussed in this chapter – King (2006) shows that, regarding a comprehensive knowledge of the ethers, as well as how and where this knowledge can be applied, the tip of the iceberg alone has been uncovered as yet. King says:

The aspect of the 'fallen ethers', of what Marti calls the sub-forces – electricity, magnetism and the nuclear force – has not even been touched on. [...] The connection between the formative forces and the gestures of eurhythm could be another, or the role of sound in morphic processes, or the relation of physical forces to the four states of matter... Marti's work has an open-ended quality. It is capable of much further development (King 2006:10).

What follows is only a crude overview of the anthroposophical view of the ethers: the aim is to show that the topic, while not widely known in mainstream scientific (and other) practices, is nevertheless valid, interesting, and pertinent. The aim is also to give basis to my argument that it is likely that: firstly, it is through the etheric aspects of plants and music that the two are linked; and secondly, that a developed understanding of the working of the ethers could

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<sup>13</sup> Anthroposophy applies to education (Steiner [1919] 1969; Blunt:1995), agriculture (Steiner [1924] 1958; Storl 1979; Proctor 1997; Joly [1999] 2005), medicine (Steiner & Wegman [1925] 1996; Goldberg 2009), the arts (Steiner [1906-1923] 1983; Usher), theosophy (Steiner [1904] 1994), botany (Grohmann [1959] 1974; Grohmann [1968] 1989; Adams & Whicher 1980), economics (Mees 1991) to name but some.

contribute to establishing a practice of music used as “an active agent in the world” (Dunn 2001), and particularly in agriculture.

As mentioned above, the four ethers believed to be present “in the space-and-time processes of our phenomenal world” (Wachsmuth 1932:39) are named: warmth-ether, light-ether, tone-ether<sup>14</sup>, and life-ether.

These four ethers are non-physical energies and therefore to define them in terms of themselves alone is nearly impossible. To describe them in terms of their activities in the natural world, however, gives a fascinating insight into the different qualities and processes of living nature. In Wachsmuth’s words: “We [can] conceive of ether, or the etheric formative forces, as formative forces void of any quality of substance, as *active principles* which come to living expression in the phenomenal world only through their active tendencies to definite motions, to shaping definite forms with definite qualities [...]” (Wachsmuth 1932:42 own italics).

### **4.3 Characterising the four etheric activities in relation to plant-growth**

Etheric activity is observable in all living organisms (Steiner [1904] 1994:32; Steiner [1919] 1981:60ff). For the purposes of this dissertation, the four ethers will be introduced in terms of their activities in plant-life, given that it is the connection between music and plants on which this dissertation aims to shed light. The four ethers are paired with the four elements: life-ether and earth element (the solid state of matter); sound-ether and water element (the liquid state of matter); light-ether and air element (the gaseous state of matter); warmth-ether and fire element (warmth). Each ether is introduced in terms of the element to which it has the closest affinity, and according to the component of plant-growth in which it can be said to be the most active. Plant species that show the tendency to be strongly influenced by one or other ether are given as examples of the characteristics of the ethers. After having given an outline of the four ethers, with reference to their activities in different aspects of plant development, an explanation is given as to how anthroposophical insight explains sound to result from etheric activity.

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<sup>14</sup> Tone-ether is also referred to as sound-ether, and as chemical-ether and number-ether according to which areas of its activities it is being viewed, as explained in 4.3.2 below.

Wachsmuth distinguishes a basic contrast between the activities of the ethers; warmth-ether and light-ether “have the tendency to expand, the impulse to radiate out from a given central point” (Wachsmuth 1932:40). Sound-ether and life-ether “have the tendency to draw in toward a centre, the impulse to concentrate all in a given central point; their action is suctional, centripetal”. The two tendencies constitute “an ultimate elemental principle lying at the [base] of all natural phenomena” (Wachsmuth 1932:40).

Each ether activity, when active in substance, “show[s] a tendency to shape the following basic forms: warmth-ether – spherical forms; light-ether – triangular forms; sound-ether – half-moon or curved forms; life-ether – square or cubic forms.” (Wachsmuth 1932:40ff 157;ff; cf Proctor 1997:20ff). These basic forms are to be found in countless modifications in plant-life, and will be discussed below in relation to the different etheric forces.

Common to a large percentage of all plant species are the stages of: (1) root growth; (2) stem and leaf growth; (3) the bud and flowering stage; and (4) the fruit or seed stage (Goethe [1790] 1993; Joly [1999] 2005; Proctor 1997). Merely a brief examination of these different components of the complete living organism shows us that life assumes distinct expressions and dynamics within the course of an organism’s development.

#### **4.3.1 Life-ether**

Roots exist beneath the earth’s surface, where conditions are dark, damp and cold. Their movement is downwards: “the root...responds to central forces and grows downwards in accordance with gravity” (King 2006:3). The substance of roots is generally harder than that of leaves and flowers, and their form is far less regular and harmonious than leaf, flower and fruit forms: “Though each species has its characteristic root system, the differences between plants are far greater in their upper parts [than in their roots]” (Grohmann [1959] 1974:18). Roots nonetheless have “great vitality and regenerative capacity and spread easily” and are “the most vital part of the plant” (Grohmann [1959] 1974:18-19). Of the four natural elements or states of physical matter (solid/earth, liquid/water, gaseous/air, warmth/fire), roots quite clearly have the closest affinity with the solid/earth element. Their density and substantiality, their downward, gravitational movement, and their “vital function of taking up [...] soluble mineral salts” (Grohmann [1959] 1974:18; cf Pelikan 1991:165) shows them to be the organ of the plant in which the earth element has most influence.

The energetic activity forming this contracted, hard, dense, and yet most vital and regenerative part of so many plant species is an expression of the life-ether, which “is a force which arises together with the earth-element – the solid state of matter” (King 2006:6). The fact that animate entities can be formed, dense, physical – and yet alive – can be attributed to the life-ether activity. The action of life-ether is behind the “multitudes of solid forms” apparent in the natural world (Lehrs [1951] 1985:410).

Life-ether, as already stated, is a suctional, gravitational force with the tendency to draw inwards (Wachsmuth 1932:43). This can be seen in the downward, earth-bound movement of roots, especially when compared to their polarity in the upward rising stem of the plant: “The plant is terrestrial as regards its root, cosmic as regards its stem” (Grohmann [1959] 1974:18).

The form to which the activity of life-ether tends when active in matter is the cubic or rhomboid form, such as that assumed by common salt in its crystalline state (Wachsmuth 1932:43; Proctor 1997:22; cf Lehrs [1951] 1985:420). Roots exist within the solid, mineral environment, and assimilate minerals into the plant organism. “Roots show a solid, earthy, mineral nature, which is associated with a high salt content. The cube form can be seen when the mineral nature extends up the stems, resulting in square stems such as in the *Labiatae* family (e.g. lavender and thyme)” (Proctor 1997:23; cf Grohmann [1968] 1989:93). Another example of a plant in which the influence of life-ether can be seen, is the grapevine. The grapevine is dense and woody; it is earthbound in that it does not grow upright without support, and therefore “does not fully use the forces of levity” (Joly [1999] 2005:23); its roots can penetrate even the hardest soils, and “can descend hundreds of feet beneath the surface of the soil” (Joly [1999] 2005:22), showing a strong alliance with gravity. The squarish leaves of spruce (*picea excelsa*) also “bear the form typical of life ether” (Wachsmuth 1932:163).

#### **4.3.2 Tone-ether**

In the same way as life-ether works through solid, mineral matter, tone-ether works principally through the liquid state of matter (Wachsmuth 1932:145; Marti 1966:19; Proctor 1997:22). In plants, the liquid state of matter is primarily observable in leaves and stems. “Leaves are essentially the watery part of the plant. A predominance of the watery nature results in the typical leaf form – the half-moon [...] or wavy form” (Proctor 1997:22). In the same way as life-ether, active in solid physical matter, tends towards cubic formations, tone-ether, active primarily in the water element, tends towards curves or half-moon shapes



(Wachsmuth 1932:43; Proctor 1997:22). These shapes can be observed in waves, and in the meandering of rivers when running their natural course. “Most New Zealand native plants, for example the *taupata*, show this watery form in their oval-shaped leaves” (Proctor 1997:24).

Tone-ether’s activities can be observed in several different but related areas, and for this reason the names “chemical-ether” and “number-ether” are also used to apply to this life energy. Its activities are evident in chemical processes, in numerical relationships, and in sound or tone vibrations, as discussed below.

The name “chemical-ether” is derived from the fact that “[this ether’s] forces [...] cause the chemical processes, differentiations, dissolutions, and unions of substances” (Wachsmuth 1932:42). Water facilitates chemical reactions (Keats 1999:78): this is one way in which tone-ether can be seen to work through the liquid element. The chemical processes evident in photosynthesis are attributed to tone-ether activity, “[the] water activity in the leaves and stems [...] bring[ing] about chemical changes” (Proctor 1997:24). Light-ether activity (see below) can also often be seen in leaf-formation, but it acts in a different way to tone-ether: “[tone-] ether is formative in an ordering way, rather than a sculpting way as the light-ether is” (Keats 1999:78). One of the primary characteristics of tone-ether activity is its tendency to harmonise and organise separated entities into measured relationships: “tone ether does this visibly for instance in the Chladni sound figures, or in the positioning of a plant’s leaves along its stem” (Marti 1974:22-23; cf Pelikan 1991:166).

Tone-ether orders chemical elements in “very definite number relationships” (Keats). Carbon chains show such numerical relationships of chemical elements. It is because of the numerical structure to the way in which order is created in natural chemical processes, that the name “number-ether” is often used instead of tone- or chemical-ether. “In broadest terms we can say that where numerical relationships occur in nature, number-ether is at work” (King 2006:4).

The ordering principles of sound can be shown in Chladni’s and Jenny’s sound figures, where audible sound-vibrations create definite and reproducible forms in physical substance. As has been discussed in Chapter Three, it is possible that the ancient Egyptian colossi of Memnos were constructed out of the knowledge of the ordering principles of sound. This can be reproduced on a small scale and in the reverse order in Chladni’s sound figures which show

the “adaptation of certain forms of matter to certain tones – [which] phenomenon the Egyptian priest-scholars knew how to [...] control on a huge scale and in ether direction” (Wachsmuth 1932:144). The number aspect of tone-ether is, according to King (2006:4) “inherent in the numerical relationships of sound”. Tone-ether’s activity creates order through differentiation, dissolution, and union of substances (King 2006:4-6; Keats 1999:78-79). The ordering principle can be seen in chemical reactions and processes, as well as in the harmonious, symmetrical manifestation of plant-growth. This ordering principle is evident in the effects of sound on matter in the Chladni figures. Wachsmuth says of the Chladni figures as regards tone-ether that what is evident in the sand of the Chladni figures is happening constantly throughout space. Space is interpenetrated by waves produced by the forces of chemical ether, which, as with the Chladni figures, dissolve and unite substances. Chemical ether “has in reality a tone-and-sound nature of which [...] tone heard by the physical ear, is only an outward expression: [...] an expression which has passed through air as a medium (Wachsmuth 1932:42)”.

Living physical substance (for example living plants) is an ordering of matter into living forms; if it were only matter, it would be inanimate, and likewise if it were only life-principles (or etheric activity), without physicality, it would be intangible. The same can be said for sound: its physicality is the air: but what force sets this physicality into motion, in order for it to vibrate? Tone-ether’s relationship to audible sound, and therefore the reason for its being referred to as tone-ether, will be discussed in some detail below.

### **4.3.3 Light-ether**

The flower component of many plant species is the most delicate, refined part of the plant. If it can be assumed that that which is at the basis of life acts in several different ways within a complete organism, then it is clear that a differentiation of such life energy can be made between the forces active in root development, and those active in flower development. The most notable difference is the tendency of roots to grow downwards, gravity-wise, into the dense and dark matter of the earth, while flowers exist in the air and light environment, very often opening upwards towards the sun. Grohmann ([1959] 1974:18) describes the stem growth from which both leaves and flowers extend as follows: “the stem can be seen as a living ray of sunlight reflected by the earth.”

Life-ether and sound-ether (like the earth and water elements through which they are, respectively, primarily active) exert a gravitational, centripetal force as has been discussed; light-ether and warmth-ether, on the other hand, working in the air and warmth elements, tend outwards and upwards. The refinement, levity and detail seen in many flower types, are expressions of the light-ether activity, which works mainly through the gaseous/air element. Grohmann ([1968] 1989:72) gives an account of the contrast between gravitational/terrestrial and levitational/cosmic forces as related to plant-growth:

In the root we find the tendency toward the salt state. It tends to harden and maintain form. Its life processes are centripetal, suctional, concentrating. Its task is to connect the plant with the mineral (salt) of the earth...It is the opposite with the *flower*. Here there is no densification nor hardening, but dispersal and scattering. The higher up the plant we go the more refined it becomes, it begins to disintegrate, for instance, in the dust-like pollen. The production of scent is another sign of dissolution. The substance of perfume is so fine that it lies on the border between the material and the non-material (Grohmann [1968] 1989:72; cf Joly [1999] 2005:16).

Light-ether activity “brings about an expansion and extension into space” (King 2006:3-4) and activates a “rarefaction of substance” (Wachsmuth 1932:145). This is observable in many flower types. Aspects of light-ether activity are also evident in the leaf-shapes of certain species: “In India, the harsh, brittle light has resulted in many leguminous plants with finely divided leaves like flower petals” Proctor (1997:24).

Life-ether and sound-ether have been mentioned above as tending to generate, respectively, cubic and half-moon shapes in physical matter. Light-ether, acting in physical substance, shows the tendency to generate triangular forms (Wachsmuth 1932:157). Proctor (1997:23) says: “light and air show a triangulation, which can be seen in forked lightning, or in light rays when you squint at a candle flame”. This triangulation can be seen in many flower petals – for example daisies – as well as in leaves: “All the leaves of the grass family are in the form of the isosceles triangle” (Proctor 1997:25). Fynbos, which grows in harsh light, also often tends towards a triangular formation of the leaves and flower petals.

Light-ether’s effects are prevalent in, but not limited to, the flowering component of plants (just as the other ethers’ activities are prevalent in but not limited to roots, leaves and fruits/seeds). Flowers’ tendency towards refinement, levity, and dissipation of matter illustrates some qualitative characteristics of life-ether activity. Life-ether’s characteristics can, however, extend to all areas: “Carrots have a triangular form in both the leaves and the roots... The light nature is so strongly connected to this plant that the colour, normally

associated with flowers, extends right down into the darkness of the earth” (Proctor 1997:24-26).

#### **4.3.4 Warmth-ether**

Like light-ether, warmth-ether is observed in anthroposophy to be an expanding, counter-gravitational energy (Wachsmuth 1932:40). Lehrs ([1951] 1985:391) points out this expanding quality of warmth-ether as being observable in the processes of melting of solids and evaporating of liquids – both of which are expanding, levitational processes.

The distinction between warmth-ether and warmth itself is not as distinct as between the other three ethers and their corresponding elements: warmth or fire is the finest state of physical matter, and warmth-ether is seen to be the densest of the ethers. Therefore, warmth is seen as a crossing point or “transition stage” between physical substance and etheric energy (Wachsmuth 1932:41; King 2006:7).

Steiner ([1920] 1982:169) understood that warmth’s most notable characteristic is intensive movement, the activity of which is present wherever material existence begins and ends. King uses the ripening process of fruit as an example of warmth’s tendency. The ripening process of fruit is double-sided: it is a culmination of the living process of the plant; the point at which the death (or dormancy) of the plant begins – the point at which it will “vanish from material being” (King 2006:7). At the same time, it prepares the conditions for the seeds, which will “bring material existence into being” in the future (King 2006:8). King also describes how freezing a process stops the activity of the warmth-ether, and this also shows up its dual nature: freezing stops the generative process on the one hand and the decay process on the other – “both embryonic and decay processes are suspended by freezing because the warmth-ether is prevented from acting” (King 2006:8). Muller (2006:139) understands fire to have “greater natural resonance towards higher states and greater resistance to the lower, requiring more effort to manifest its qualities”.

The form that has been attributed to warmth-ether is the sphere (Steiner ref; Wachsmuth 1932:41; Proctor 1997:20-21). “...The tendency to create spherical forms is inseparably linked with [warmth-ether’s] action, therefore it calls forth, wherever it enters into Nature and is not obstructed in its action, spherical forms” (Wachsmuth pg 41). This spherical tendency is seen in the ripening of various fruits (Pelikan 166). It is also observable in the sun’s sphere.

Joly ([1999] 2005:18) sees the upward, vertical growth of cypress trees as corresponding with warmth's counter-gravitational tendency: opposite to the earth-bound vine, the cypress grows upward in a flame-like form towards the sun.

#### **4.4 The etheric activity behind sound phenomena**

After introducing the ethers individually, Marti (1974:34ff) and King (2006:8-9) discuss the natural processes believed to result from the collaboration of the different ethers' action. For example, King (2006:9) describes the coupling of the expansive tendency of light-ether with the solidifying, contracting tendency of life-ether as being evident in processes of metamorphosis; he uses the example of the tadpole's growth and metamorphosis into a frog, or the change of shapes in human development, from "large-headed small-limbed infant to small-headed long-limbed adult" (King 2006:9).

Sound phenomena are also understood anthroposophically to arise from the coupling of two ether activities. Steiner ([1906-1923] 1983:40) emphasised that sound vibrations in the physical air are not the sounds themselves, but rather the support of the sounds – which, without air, could not manifest: "Air has no more significance for sound than the ground for the person who stands on it" (Steiner [1906-1923] 1983:40). According to anthroposophical insight, sound originates through the activity of tone-ether in the light-ether domain; and it is the element of air which enables sound – an etheric or spiritual phenomenon – to "stand" (Steiner [1906-1923] 1983:40; cf Steiner [1919] 1987:70ff).

Wachsmuth (1932:145-146) describes this process:

The gaseous state is produced by light ether, an expansive force. It represents a rarefaction of substance. Chemical ether, on the contrary, is a suctional force, drawing inward; it tends to produce a condensation of substance. What takes place when the chemical ether, or sound ether, becomes active in the light ether sphere of the air? A conflict! The light-ether strives for a rarefaction of substance; the chemical ether for a condensation. This constant back and forth swing of substance, of the air, between rarefaction and condensation, at a certain point passes over naturally to its environment and sets this into rhythmic wave motion which must also be shared by the tympanum of the human ear. At this point the action of the sound ether becomes manifest to human experience [...] The tone phenomenon arises as an entity at the moment and at the point at which the conflict begins between chemical ether and light ether.<sup>15</sup>

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<sup>15</sup> Wachsmuth (1932:146) goes on to suggest that the scientifically accepted statement that sound does not propagate in a vacuum is erroneous, and that it would be more accurate to state that physically audible sound cannot propagate in a space devoid of air.

Understanding sound phenomena as originating from etheric activity may have far-reaching implications for an agentive application of sound. The Chladni plates and Jenny's cymatics already show the ordering of substance through sound. Wachsmuth believed that music "created on the basis of a true knowledge of [...] ether" has the potential to influence the human physical body and the power to "exert healing or disease-producing effects" (Wachsmuth 1932:207). He also suggested that progressive investigators may develop their understanding of the etheric origin of sound and in so doing be able to access the potential of sound (Wachsmuth 1932:207).

#### **4.5 Conclusion**

This chapter has given a brief overview of the four ethers understood anthroposophically as permeating all life processes on the earth. It has given a brief summary of their characteristics, leading on to how sound is understood in anthroposophical terms to originate from etheric activity, activating movements in the physical substance of the air. Because plants are believed to consist of invisible etheric "bodies" active in and around their visible physical structures, and because sound is believed to stem from etheric activity, it makes sense that the ethers could help to explain the effects that music, as described in Chapters Two and Three, is or has been believed to have on plants. The following Chapter gives the example of a contemporary experimental study that claims to prove that certain plants respond notably to certain eurythmy sound-gestures – eurythmy being based on anthroposophy's understanding of the etheric nature of sound.

## Chapter Five

### Eurythmy as a means to understanding the etheric origin of sound

*Movement is the creative principle underlying all that assumes specific form and shape [...] The enlivening movements of eurythmy therapy have proven to be very beneficial, and can enable us to enter into resonance with the formative dynamic principles at work in plants and animals. In this way it is possible to develop a new connection with the forces that give rise to form, something so far denied to modern science.<sup>1</sup>*

#### 5.1 Introduction

This chapter introduces eurythmy (not to be confused with Dalcroze's eurythmics)<sup>2</sup> as an artistic movement-discipline, arising from anthroposophy, which aims to make visible that which is audible in spoken sound (speech-eurythmy) or musical sound (tone-eurythmy). It does so through an understanding of the etheric basis of sound (explained in Chapter Four), and the etheric forces that "are believed, by anthroposophists, to be responsible for all [...] growth, life energy, development and change" (Sponheuer 2009:32; cf Steiner in Usher 2006:22).

In May 2008 the Swiss eurythmy therapist Tanya Baumgartner (2008) presented her experimental work (conducted during the preceding three years) at a conference for eurythmy therapy in Dornach (Hurner 2008).<sup>3</sup> Baumgartner's in-depth studies show that certain speech-eurythmy gestures exert a significant influence on the growth of certain plants.

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<sup>1</sup> <Artenova>.

<sup>2</sup> Raffé et al. (1974:19-21) explain the difference between Steiner's eurythmy and Dalcroze's eurythmics: "Dalcroze was primarily concerned with a new approach to the teaching of music, and especially of rhythm in music. Interpretation of music in [e]urythmy differs widely from this aim. Naturally – like all arts of movement – it is deeply concerned with rhythm, though in a somewhat different way from Dalcroze, but it is equally concerned with such other elements as tone, interval, melody, colour and form" (Raffé et al 1974:19ff; cf Jaques-Dalcroze 1930).

<sup>3</sup> Hurner, a South African curative eurythmist, emphasised that in the last three decades eurythmy (and she referred to therapeutic eurythmy as well as artistic and pedagogical eurythmy) has grown exponentially, and is no longer a pioneering discipline (as it was when she began her career in the 1980s), but one which is firmly established and growing throughout the world. I was surprised at the large international audiences attending the eurythmy-symphony performances at the Goetheanum in Switzerland in 2009: while eurythmy remains obscure in South Africa and is not a mainstream art form in any country, it is certainly well-known, well attended and firmly established in Europe, and at the Goetheanum I witnessed well-attended performances by eurythmists (some of whom I spoke to) trained in Japan, Israel, Hungary, Slovakia, New York, Holland, Switzerland, Germany, South Africa, Norway, England and Austria.

Because eurythmy is intrinsically linked with sound, Baumgartner's experiments complement modern enquiries (see Chapter Three) into musical and other sound on plant-growth, although she used eurythmical *sound-gestures* rather than audible sound.

Baumgartner's study, unlike those mentioned in Chapter Three, did not set out to demonstrate any specific effect, but rather to prove, through the fact that there *is* an effect, the existence of what she believes facilitates this, namely, the etheric energies present in the plant world and intrinsic to eurythmy practice (Baumgartner 2008:183). Her work is relevant to my study as it suggests that the connection between sound and plants can be explained (and a modern practice developed) through an understanding of ether activity. As will be described, Baumgartner has shown that certain speech-consonants, as embodied in eurythmy gestures, exert consistent effects on plant-growth. She postulates that this occurs through the formative influence of these gestures on the plant through its etheric energies.

Eurythmy has two components, which will be discussed in terms of their numerous applications: speech-eurythmy, the gestures and movements of which endeavour to embody and make visible spoken sound (Steiner [1924] 1956; Steiner [1919-1924] 1984; Kirchner-Bockholt 1977); and tone-eurythmy, the gestures and movements of which endeavour to embody and make visible musical sound (Steiner [1924] 1932; Steiner [1919-1924] 1984). Baumgartner's work shows that certain speech-eurythmy gestures affect plant-growth.

This chapter gives a brief introduction to eurythmy, in which speech-eurythmy is defined as far as is necessary to explain the content of Baumgartner's experiment. Then it goes on to describe Baumgartner's methods and findings. In the previous chapter, Wachsmuth (1932:206-207) is quoted as having written that "the deep-reaching influence of music may extend even into the substance of the physical body. Music created on the basis of a true knowledge of [...] ether may exert healing or disease-producing effects upon human bodies." If it is the case that music created out of knowledge of etheric activity can influence human physicality, the question that arises is whether this follows for plant physicality. Judging by Baumgartner's work, which shows that eurythmy gestures built on knowledge of the etheric activity of sound do influence plants, it seems likely that Wachsmuth's idea would follow for plant as well as human bodies.



## 5.2 Introduction to eurythmy: origins and application

Eurythmy is an artistic movement discipline that “developed out of Rudolf Steiner’s creative insights” (Usher 2006:1) early in the 1900s, and that is “one of the most distinctive features in the practice of anthroposophy” (Spiegel & Sponheuer 2008:2). The initial conception of eurythmy (in 1912) took place in Switzerland, with a small group working under Steiner’s guidance. Since then it has become a world-wide practice, with training centres on six continents. The word “eurythmy” comes from the Greek *eu* meaning harmonious and beautiful, and “rhythm” from the Greek *ruthmos*, “to flow”. The overall purpose of eurythmy is to convey either spoken or musical sound through gestures and choreography (Sponheuer 2009:1). What are considered to be spiritual (meaning other than physical and sense-perceptible) aspects of the human being are activated in eurythmy movements, and the spoken and musical sounds expressed in eurythmy are understood from an anthroposophical perspective as originating from spiritual activity. Sponheuer (2009:2) says: “Steiner... explained [eurythmy] as integrating the spiritual into the sense-perceptible realm”.

Eurythmy has artistic, pedagogical, therapeutic and social interpersonal applications, which make use of both speech-eurythmy and tone-eurythmy.

Artistically, it is performed solo or in groups, with music (tone-eurythmy) or with spoken sound (speech-eurythmy). It aims to make visible the music or spoken sound performed simultaneously, this through specific choreographed movements of the human body (Steiner [1924] 1955; Steiner [1924] 1932; Spiegel & Sponheuer 2008:2; Sponheuer 2009:3). Tone-eurythmy performances vary in scope from solo to symphony, always performed with live music. While in some countries (South Africa being an example) eurythmy performances are generally fairly small-scale with smaller audiences, the Goetheanum in Dornach, Switzerland, stages performances of complete symphonies with full orchestra and thirty or more eurythmists, attracting audiences of up to a thousand people. Eurythmy has become an internationally accepted modern approach to art movement (Veit 1985:125).

Pedagogically, eurythmy forms part of the curriculum of Waldorf schools, of which, by a 2008 tally, there were already over 900 worldwide (Spiegel & Sponheuer 2008:2). It is used as a developmental discipline which addresses the specific stages of physical, soul and spiritual development of children at different school-going ages (Steiner [1924] 1955:37;

Steiner & Wegman in Usher 2006:204), and as a complement to purely physical exercise: “In ordinary gymnastics only the dynamics and statics of the physical body are developed. In eurythmy the full human being – body, soul and spirit – goes out into the movement” (Steiner & Wegman in Usher 2006:204).

Eurythmy also has a therapeutic application, where artistic eurythmy principles are transformed into curative or prophylactic exercises (Steiner [1921-1922] 1983; Kirchner-Bockholt 1977; Husemann 1989:199ff). Baumgartner’s motivation behind her experiments was based on her experiences working with therapeutic eurythmy, as discussed below.

Eurythmy has also been used in work and social situations as a teambuilding tool (Sponheuer 2009:1).

There is a small pioneer movement working with the possibilities of applying eurythmy to agricultural practices. Chapter One mentions Jacob’s use of eurythmy at the Borjrali initiative in Georgia. Comparitively, Karoline Rickett (2009), a eurythmy therapist based in Dornach, Switzerland, described a trial she had conducted treating young apple trees eurythmically at the request of a local biodynamic farmer. He had approached Rickett on two occasions, with two different problems: the one was a variety of apples that grew too densely, so that they became shapeless and small, with poor flavour and texture. The other concerned a variety of apples that had become susceptible to a disease manifesting as black spots on the skin and reduced flavour. The farmer wanted Rickett to use eurythmy therapy to transcend these deficiencies. She worked with seedlings grown from the seeds of the afflicted varieties, treating them daily for three months. She used the “O”, “B” and “L” gestures amongst others. Results were inconclusive at the time of the interview, and the trial was not intended as a rigorous scientific experiment, but merely as an initial enquiry into the possibilities of applying therapeutic eurythmy to plants. Rickett mentioned that a German farm, “Rigihof”, has used eurythmy in their practice for up to ten years. Baumgartner currently gives talks to farmers and organic growers’ associations, having found people in the field of agriculture to be open to her methods (discussed below), and their support and enquiries motivating for her team (Baumgartner 2008:185).

### 5.3. Speech-eurythmy: background to the gestures used by Baumgartner

Speech eurythmy aims to make visible the spoken sound of either poetry or prose (Steiner [1919-1924] 1984; Steiner [1924] 1956; Sponheuer 2009:2). More important than communicating the literal meaning of the text, are the specific gestures that aim to create visually the qualities of consonants and vowels: “It is not the abstract content of the poems that should be emphasised [in speech-eurythmy] but the structure of the language, the musical, sculptural, artistic elements” (Steiner [1919-1924] 1984:79). Spoken sounds are understood in anthroposophy as each having their own unique formative tendency (Steiner [1924] 1956:12). According to Steiner’s understanding, each word created through the human physiognomy (in speech) produces a definite form in the air. These forms are not visible unless one has the ability to perceive etheric activity; in the same way as a given form of the human physical body (a hand, for example) could be transcribed in a gesture in the air, the forms produced in the air by spoken sounds are understood to be the forms of the human etheric body (Steiner [1924] 1956:27). As mentioned in Chapter Four, anthroposophical insight views the human physical body as being interpenetrated and surrounded by etheric formative forces – referred to as the etheric body. The movement forms of spoken sound constitute the same moving energies of the etheric body. In Steiner’s words:

If we attempted to draw the etheric body something extraordinarily complicated would come to expression. For the etheric body can just as little be represented as something static as can lightning [...] The etheric body is in continual motion, continual activity [...] Now these movements [...] of which the etheric body does not indeed consist, but out of which it continually arises and again passes away [...] we have these movements in the sound formations which embody the content of speech (Steiner [1924] 1956:24-25).

The speech-eurythmy gestures are based on investigations into the sound formations of speech. They work in a specific way with etheric forces (Baumgartner 2009). Baumgartner, working with these gestures as a eurythmy therapist, found that, in contravention to mainstream medicine’s purely physical approach, remarkable curative results could be achieved in the physical body through the etheric principles of eurythmy gestures and movements, which act on the patient’s etheric constitution (Baumgartner 2008:173-174). Kirchner-Bockholt<sup>4</sup> (1977:14) synthesises eurythmists’ conception of spoken sound:

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<sup>4</sup> Margarete Kirchner-Bockholt was a medical doctor who was one of the first people to develop eurythmy’s therapeutic application, beginning in the early 1920s.

We have to imagine the whole world of movement active in the forces coming from the periphery, and which live, not in heaviness, but in buoyancy, as being far more diverse than all our physically visible movements put together [...] Rudolf Steiner makes this wealth of invisible movements, which come from the surrounding universe, visible to us in the gestures of sound eurythmy, especially those of the consonants.

The forms of movements which lie within all organically living nature are revealed to us when we occupy ourselves with each sound and practise it and get to know it. The enveloping gesture of ‘B’, the swelling, growth-furthering power of ‘L’, the rolling, vibrating ‘R’, [etc.] are the creative language of the ebbing and flowing etheric world which lies behind the frozen world of the senses.

Baumgartner’s experiments with plants were designed to demonstrate, to a scientific world dubious of the existence of the invisible ethers and of eurythmy’s ability to cure physical illnesses through etheric exercises, that the etheric forces are a practical and workable reality. Her methods are discussed below. She worked mainly with four consonant sounds and their gestures, later narrowing them down to two, in order to gain more accurate results and draw clearer conclusions in her experiments (Baumgartner 2008:176). These two consonants are discussed here, to give a cursory understanding of the way in which eurythmy gestures correlate to and originate from the content of speech, and to give an introduction to the anthroposophical understanding of the formative capacity of spoken sounds.

In anthroposophical understanding, the four consonants Baumgartner chose to work with correspond in their formative activity to the four elements discussed in Chapter Four. These are: “B” – solid/earth element; “L” – liquid/water element; “S” – gaseous/air element; “R” – warmth/fire element (Baumgartner 2008:175; cf Kirchner-Bockholt 101-102, 106, 114). The two consonants she worked with extensively were “L” and “B”.

### **5.3.1 The “L” sound**

The eurythmic expression of “L”, in my own experience of eurythmy, has been described as being similar to a spring or fountain: the arms describe a loop movement, moving downwards first and then in an accelerating upwards stream, breaking dynamically at the top point as a fountain does, and then falling downwards again like water. Kirchner-Bockholt (1977:101-102) describes the movement as follows:

When executing the ‘L’ movement one feels oneself in harmony with the forces working everywhere in nature, streaming in from the periphery.

Plate 5.1 Eurythmist executing the fluid gesture for the “L” sound<sup>5</sup>



Kirchner-Bockholt explains these peripheral forces as etheric energies that are not subject to physical laws of gravity; rather, they are understood as the forces of levity present in growth and living movement (Kirchner-Bockholt 1977:101; cf Adams & Whicher 1980). Referring to the gesture for the “L” sound, she continues:

With these forces of buoyancy permeating our arms we plunge them consciously into the forces of gravity, hold them in balance with the in-streaming [...] formative force, and raise them up in an opening movement. The movement is rounded all the time and remains in the watery element, striving to retain its drop-like form through all its metamorphoses.

In eurythmy, it is not the physical, muscular movement that is important as much as the quality of the sound that is experienced, lived into, and expressed in that movement, or “carried over into [its] actual form” (Steiner [1924] 1956:13). The gesture does not fully

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<sup>5</sup> Pictures for Plate 5.1 and 5.2 taken by the researcher.

express the sound: the experience of the sound during gesturing is as important as the gesture which copies the sound (Steiner [1924] 1956:65). Baumgartner describes her experience of each consonant sound as “a country to be travelled to,” in which new discoveries can continually be made (Baumgartner 2008:174). A wavelike quality is one which Steiner describes as being present in the “L” sound; evident in the sound itself as well as in the undulating tongue movement when forming the sound in speech (Steiner [1921-1922] 1983:31; Steiner [1924] 1956:117). Another quality of “L” is its form-giving element: according to Steiner, a creative, form-giving quality was understood by ancient knowledge systems as corresponding to the sound “L”. “L” was thought to be the “creative, form-giving element in all things and beings – the force which overcomes matter in the creation of form” (Steiner [1924] 1956:50). It is this which is translated into gesture in the eurythmy movement for “L”: “when you feel that something takes place in the arms which is similar to the movement of your tongue when you say *l* – then you will experience *l* in the right way, and you will discover that there is something truly fascinating in this movement” (Steiner [1924] 1956:70).

### 5.3.2 The “B” sound

“B” belongs to the group of consonants (d, t, b, p, g, k, m, n) that Steiner referred to as “sounds of force” (Steiner [1924] 1956:115ff), the activity in the creation of which differs greatly from that of the “breath sounds” (h, ch,<sup>6</sup> y, sh, s, f, w, v), as well as from the undulating activity in the creation of “L” as mentioned above (Steiner [1924] 1956:117). Steiner said that “when we make use of the consonants of force we do so in order to express what needs to be expressed in sharp outlines [...] the breath sounds, on the other hand, will never produce such outlines; they describe the reverse of everything clear-cut and definite” (Steiner [1924] 1956:116).<sup>7</sup>

The sound of the consonant “B” is described by Steiner as having an enveloping quality (Steiner [1924] 1956:34; Kirchner-Bockholt 1977:14). The form created in the air at the enunciation of “B” has in it “something of the nature of a *shelter*”, a protection from what is

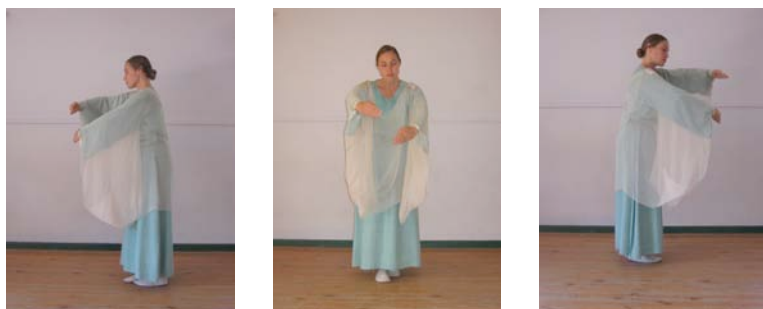
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<sup>6</sup> This refers to the soft German ‘ch’ sound in for example, ‘Bach’ as opposed to the hard English ‘ch’ in for example ‘church’.

<sup>7</sup> Steiner’s understanding of the formative tendency of consonants is based on the assertion that “all consonants contained in a given language are always actually variations of twelve primeval consonants” Steiner ([1906-1923] 1983:33). He goes on to explain that these twelve consonants are retained in a purer state in Finnish than in any other language, and that eleven of them are preserved completely clearly in this language, with only one having lost some of its original characteristics (ibid).

outside of ourselves (Steiner [1924] 1956:34). Its protecting, enveloping qualities are embodied eurythmically in a gesture something akin to an embrace, in which the feeling is of something “being held in the hollow space which is enclosed by the arms” (Kirchner-Bockholt 1977:130; cf Steiner [1924] 1956:66). The gesture is not fluid like the “L” gesture, but static, much as the sound itself is static opposed to the fluid “L” (see Fig. 5.2). Linguistically speaking, the “B” sound is referred to as a bilabial stop “with the air stopped at the mouth by a complete closure of the lips” (Fromkin *et al.* (2007:232), while the “L” sound is referred to as a liquid alveolar, in which “there is some obstruction of the airstream in the mouth, but not enough to cause any real constriction or friction” (Fromkin *et al.* 2007:233).

Plate 5.2 Eurythmist executing the static gesture for the “B” sound seen from three angles



Apart from consonant-sounds, speech-eurythmy encompasses, amongst other elements of speech, vowels, diphthongs, soul moods and meter, as well as connections between speech and the zodiacal and planetary movements (Steiner [1924] 1956:12-20). It is a complex discipline, requiring intensive training.

#### 5.4 Baumgartner’s experiments

In a website dedicated to research inspired by Baumgartner’s experiments, which documents the work of “Arte Nova” – a research group investigating the scientific basis of etheric forces and the effects of eurythmy – the following quote refers to the direction Baumgartner took in her empirical attempts to show the etheric activity of eurythmy consonant gestures:

Eurythmy draws on the movements and living energy of the human etheric body as impetus for the physical body’s gestures. Since the etheric body is larger and more diffuse than the physical body, any effects arising from etheric streams of energy, as invoked in the human etheric body through eurythmy speech gestures, should also be demonstrable outside the physical body <Artenova>.

In Baumgartner's curative eurythmy work, she treated a young hemiplegic: one side of her body had been paralyzed in an operation to remove a brain tumour. Baumgartner wondered whether it was possible to heal the paralysis of the patient's physical body by bringing her etheric body to her awareness and strengthening it, "just as one can make a puppet move by pulling on its strings" (Baumgartner 2008:173). Underlying this question was what was for Baumgartner an important statement by Rudolf Steiner, founder of eurythmy in the early 1900s. He said that "in eurythmy, every physical movement should become an etheric one" (Baumgartner 2008:173).

Achieving her aims with her patient, and thereby superceding the prognoses of the "mainstream physicians" (Baumgartner 2008:174), Baumgartner wanted to demonstrate incontestably the healing effects of eurythmy therapy, and particularly the use of consonant sounds. The means she chose was to experiment with different eurythmy sound gestures on plants. Thence followed an extensive research project showing the effect of eurythmy on plants. The premise was that curative eurythmy works on the etheric body, and that plants, having both physical and etheric bodies, register this.

Working though Arlesheim's HISCIA laboratory (cf <HISCIA>), she treated cress seed, dwarf peas, and calanchoe seeds which she divided into a B-sound group, an L-sound group, and a control group. She performed the "L" and "B" gestures to seeds counted out and sewn into gauze bags, and the treatment was administered before planting them. From the very first experiments it was clear that the "L" gesture had a growth enhancing effect, while the "B" gesture had a growth "inhibiting" effect (Baumgartner 2008:177).

Plate 5.3 Tanja Baumgartner executing a small "B" gesture over a pouch of seeds (Artenova 2)





Plate 5.4 Plants which have been exposed to the formative “L” and “B” eurythmy gestures: in both cases the “L” plants are on the left and the “B” plants on the right (Artenova 2)



Because the results were notable from the outset, Baumgartner and her team expanded their research to try to answer the many questions posed by this pioneering work. A first aim was to find out the optimum treatment period for the plants: was there any effect after a once-off ten-minute treatment, or alternatively after only two treatments? Was the effect more notable after one, two or three weeks of daily ten-minute eurythmy sessions? Results showed that the “L” gesture had a growth enhancing effect, while the “B” gesture had a growth inhibiting effect in all cases except when the seeds were only treated once: in this case, the “B” contributed to enhanced growth, and the “L” to inhibited growth. Baumgartner’s research partner, physicist Stephan Baumgartner (no relation), related this to homeopathic principles: a single dose of homeopathic medicine stimulates the organism, enhancing its own activity; when an ongoing dose is given, the organism plays a less active part and the medicine itself works more strongly.

The second question was: at what distance from the seeds should the eurythmy be performed? Baumgartner experimented with the pouches of seeds directly in her hand, on a table twenty centimetres away, two, five and seven metres away, and ten metres away in the next room with the adjoining door shut. Each group consisted of a pouch of 360 seeds. The results showed that the growth enhancing effect of the “L” gesture and the growth inhibiting effect of the “B” gesture were evident consistently in all groups, although the distances influenced the intensity of the effect. The group twenty centimetres away showed stronger effects than the one held in the hand, and two metres’ distance gave a weaker effect than five and seven metres away. Further experimentation is planned in order to find reasons for this result.

As a point of interest, Baumgartner later tried the experiment in the car while on a road trip, and found that even in these disturbed conditions effects were noticeable, “the movements of the speech sounds enduringly inform[ing] the seeds.” (Baumgartner 2008:182).

After working in the HISCEA laboratories, the research project relocated to KIKOM (complementary medicine research) at Switzerland’s Bern University (cf <KIKOM>). Three years of intensive experimental research followed, with 100 000 plants treated, measured (in terms of length, curvature and lateral spread) and the findings digitized in the first year alone. Albeit removed from mainstream scientific thinking in that it works with eurythmy and the notion of etheric formative forces, Baumgartner’s study is serious, and the results consistent and concrete. Speech-eurythmy noticeably influences the growth of plants. According to Baumgartner, this occurs through the etheric activity of sound working on the etheric constitution of the plants; this would suggest that it is through the etheric principles that sound and plant-growth are related. An insight is thereby gained into the question underlying this dissertation as to why music and plant-growth might be linked, although an explanation as to *how* music itself relates to etheric energies remains to be explored.

## **5.5 Towards an investigation into music’s etheric origin**

Through Baumgartner’s experiments, it has been established that certain consonant sounds used in a sculptural, formative way (and with an understanding of their etheric origins) by means of eurythmy gestures can have consistent growth-enhancing or growth-impeding effects on plants. Baumgartner’s suggestion is that this occurs because the sounds work on the etheric bodies of the plants.

That sound has been proven to exert influence on the growth of plants through the ethers working in both sound and plant-life, leads to a critical question. This question is based around Wachsmuth’s (1932:207) suggestion, quoted earlier, that music “created on the basis of a true knowledge of [...] ether” has the potential to influence the human physical body and the power to “exert healing or disease-producing effects” (Wachsmuth 1932:207). Based on Baumgartner’s conclusions that speech-eurythmy gestures – founded on an understanding of the etheric component of sounds – can work through the etheric body of a plant, resulting in effects on the physical plant body, this study suggests that music created around such a knowledge of the ethers would likewise have the ability to affect the physical bodies of

plants.

The living processes of vegetative life outlined in Chapter Four can, in accordance with anthroposophical thought, be divided into four general expressions: root, stem and leaf, flower and fruit. As described, the qualities of life-ether are perceived to be most prevalent in root expression, the qualities of tone-ether most prevalent in the rhythmic leaf growth, the qualities of light-ether in the flowering aspect, and the qualities of warmth-ether in the development of seed, or the fruiting aspect of plant processes.

The question that arises is *whether and how an understanding of the etheric origin of sound could be applied in the creation of music for the specific purpose of affecting living entities.*

What needs to be established is which components of musical structure correspond with which etheric forces. Steiner ([1906-1923] 1983:66-69), investigating three aspects of music namely rhythm, harmony and melody, described them in terms of how they correspond with the different aspects of the human entirety. Differentiating between the doing, feeling and thinking capacities of human beings, he described – and this is said here in the most basic terms, with the acknowledgement that this is a complex topic – how rhythm corresponds with the doing capacity, harmony with the feeling capacity, and melody with the thinking capacity. He concluded that the depiction of the entire musical experience is in fact a depiction of the human etheric body.

To enter into the complexities of a thorough anthroposophical understanding of the human etheric body is far beyond the scope of this dissertation. However, a suggestion will be made as to how music can be understood in terms of the ethers, based on the above thoughts.

In an interview with Sponheuer (2010), I asked whether in eurythmy there is an accepted understanding of the ways in which specific etheric forces work in the different elements of music. It is important to note that this followed a prior interview with Sponheuer (2009) in which we had discussed Baumgartner's (2008) work, when I asked Sponheuer whether she thought elements of tone-eurythmy could affect growing plants as the consonant gestures had done in Baumgartner's experiments. She had answered in the affirmative, although she had also suggested that tone-eurythmy might produce more subtle effects than the speech-eurythmy consonant gestures, the formative actions of which are very specific. This had

concurred precisely with Baumgartner's (2009) answer to the same question, despite Sponheuer and Baumgartner never having met.

Sponheuer's response to my question in 2010, as to whether in eurythmy there is an accepted understanding of the ways in which the specific etheric forces work in the different elements of music, was that this can be considered in two ways, depending on whether it refers specifically to music, or to the instrument (for example, the body) of the eurythmist depicting the music.

In the first case, rhythm, as mentioned above, correlates to human will/doing/limb activity; life-ether is the etheric force primarily active in the rhythm component of music. Harmony correlates to the human feeling capacity and the regulating activities of the human heart region; tone-ether is most prevalent in the harmony component of music. Melody correlates to the human thinking capacity, to head activity; warmth-ether is particularly prevalent in melody.

In the second case, beat is introduced as the musical component most strongly associated with a eurythmist's physical body and limb activity, and is understood to be the musical component in which life-ether is most prevalent, while rhythm, depending on whether it is harmonic or temporal rhythm, can, like harmony, be understood to be an expression of tone-ether activity.

The above explanation, which introduces suggestions as to how music can be understood in terms of its componential correspondence to the different etheric activities, provides basis for the suggestion that musical sound, like speech sounds, could act on the etheric body of plants, and enhance growth. This tentative conclusion aims to open up an arena rather than to reach a conclusive finality, and calls for further investigation.

## **5.6 Possible directions for further research**

By further experimentation and/or other enquiry, it could be established whether and how the different components of music could be used, like the eurythmy speech-consonant gestures, and with or without the corresponding tone-eurythmy gestures, for affecting plant-growth in specific ways. Root growth, an expression of life-ether activity, might just respond to rhythmical music in which life-ether activity is prevalent, while melody might have more

effect on the fruiting processes, both melody and the fruiting process being an expression of warmth ether activity. The scope is large and complex, and this dissertation, having shown that it is highly likely that there is validity underlying claims of music's ability to affect plant-growth, aims merely to point in a direction in which the ability of music to benefit agricultural practices is investigated.

A study that would scientifically investigate the influence of musical sound on plant-growth, testing the viability of the theory that music can enhance growth through the etheric bodies of plants, would call for a complex and lengthy research design.

## Chapter Six

### Conclusion

#### 6.1 Introduction

The foremost question posed at the outset of this dissertation was the following: *Can Steiner's conception of etheric life energies, present in both plant-life and sound phenomena, contribute to an explanation for music's reported influence on plants?* Through endeavouring to answer several subsidiary questions, a tentative answer to the overarching question has been reached; this is not a conclusive answer, but one which points in the direction of possibilities for further research towards a conclusive answer or answers. In order to have come to the point at which a clear onward direction has been gained, it has been necessary to specify how and where music has been reported to have an influence on plants; this has been done for two areas, one being pre-modern agricultural "traditions" with which music is intrinsically connected, and the other being modern scientific experiments aiming to ascertain music's effect on plant-growth. It has also been necessary to explain the study of etheric energies according to anthroposophy. Moreover, and unexpectedly, a suggestion that weaves itself throughout the study has been that a modern anthroposophical understanding of non-physical life forces (ethers) not only contributes to an explanation for music's reported influence on plants, but also forms a link between old knowledge systems in which music's relation to plant-growth was/is intrinsically understood, and modern scientific rationality which requires empirical proof.

#### 6.2 Summary of findings

In Chapter Two, this study reviewed various old belief structures and practices in which human sound creation (mainly of a musical nature) has been believed to play an important or even a crucial part in agriculture. From a modern Western perspective, given that comparable beliefs and practices do not exist in mainstream modern agricultural practices, the fact that examples of old beliefs and practices of a musical-agricultural nature are to be found so universally points to the pertinence of investigating whether and what validity underscores them.

Stepping into the technological 20<sup>th</sup> and 21<sup>st</sup> centuries, this dissertation went on, in Chapter Three, to show that while agricultural musical practices and their corresponding belief

systems are no longer maintained or renewed in any significant or far-reaching way in the modern agricultural arena, there does nevertheless exist a substantial body of modern scientific enquiry into the nature of musical and other sound's effects on plant-growth. There seems, moreover, to be a modest modern renewal of practical interest in the music-plant link, evident in such practices as those of Appelbaum (2009) and to a lesser degree that of Stucki (2010), as well as in the philosophical backgrounds to the work of Jacob (2008), Small (2008), Rickett (2009), and Hindmarch (2009). These facts give further substance to the question, already posed in relation to the examples given in Chapter Two, of the objective validity in beliefs that human-made – and particularly musical – sound has the ability to influence plant-growth.

While both the pre- and post-technological sets of examples assert *that* musical/other sounds affect growing plants and influence their growth, *why* this happens is not clarified in any of these examples. This dissertation has gone on, therefore, to glean from anthroposophical principles a possible way of understanding the link between sound and plants, through which it can be said that sound *does* influence plant-growth via etheric forces, introduced and explained in terms of their pertinence to both plant-growth and sound production in Chapter Four.

In order to substantiate as well as to validate the argument that an understanding of etheric principles could explain the links between sound and plants (and moreover lead to new ways of harnessing sound's potential to benefit plant-growth), Baumgartner's experiments, which are based on the assumption that etheric energies are a reality (as opposed to merely a theory) and can be worked with, have been explained in Chapter Five. Because Baumgartner works with speech-eurythmy gestures and not with music, Chapter Five has also given indications as to how music could possibly be harnessed – through a knowledge of the etheric energies present in it – to be beneficial to plant-growth.

### **6.3 Conclusions**

The overarching question of the dissertation can be answered in the affirmative: What Steiner describes as etheric life energies *can* contribute to an explanation for music's reported influence on plants.

It can likewise be affirmed that knowledge of the four ethers can forge a link between old and

new knowledge systems about the connection between sound and plant-growth. What remains to be answered is the question of how exactly music might be used – based on an understanding of the etheric principles inherent to it – to affect living growth and health. To answer this question in an appropriately modern investigative manner would call for extensive experimental study.

#### **6.4 Recommendations for further study**

At the end of Chapter Five, an explanation has been given as to the correlation between the etheric forces perceived to be active in elements of music and stages of plant-growth. By experimental enquiry, it could be established whether and how the different components of music could be used, like the eurythmy consonant gestures and with or without the corresponding tone-eurythmy gestures, for affecting plant-growth in specific ways. Root growth, an expression of life-ether activity, might just respond to rhythmical music in which life-ether activity is prevalent, while melody might have more effect on the fruiting processes, both melody and the fruiting process being an expression of warmth ether activity.

The scope is large and complex: the researcher would have to decide on whether to use isolated musical elements such as different intervals, harmonies, textures, meter and rhythms, or to use complex comprehensive musical environments that would deal with whole works. In reference to that latter, the researcher would have to consider issues such as style genres, instrumental use, and whether to use live or recorded music. A controlled experimental environment such as those used by Retallack (1973), Creath and Schwarz (2004), Baumgartner (2008) and others mentioned in Chapter Three would be necessary; also necessary would be an accurate measuring system (for example a microscopic botanical study, or Pfeiffer's "sensitive crystallization" method mentioned in Chapter Four) of both quantitative and qualitative effects exerted by music on plants.

This dissertation, having shown that it is highly likely that there is validity to claims of music's ability to affect plant-growth, aims merely to point in a direction in which the ability of music to benefit agricultural practices is investigated. A study that would scientifically investigate the influence of musical sound on plant-growth, testing the viability of the theory that music can enhance growth through the etheric bodies of plants, would call for a complex and lengthy research design.



## References

- Abouleish, Ibrahim (2004). *Sekem: a sustainable community in the Egyptian desert*. Edinburgh: Floris Books.
- Adams, David (1992). Rudolf Steiner's first Goetheanum as an illustration of organic functionalism. *Journal of the society of architectural historians* Vol. 51, No. 2, 182-204.
- Adams, George & Whicher, Olive (1980). *The plant between sun and earth - and the science of physical and ethereal spaces*. London: Rudolf Steiner Press.
- Agawu, K. (1995). *African rhythm: a northern Ewe perspective*. Cambridge: Cambridge University Press.
- Agawu, K. (2003). Defining and interpreting African music. Anri Herbst, Meki Nzewi & Kofi Agawu (eds), *Musical arts in Africa – theory, practice and education*. Pretoria: Unisa Press, 1-10.
- Appelbaum, Hylton & Wendy (2009). Interview, 14<sup>th</sup> June 2009, Stellenbosch.
- Appelbaum. <[www.demorgenzon.co.za](http://www.demorgenzon.co.za)> Accessed 15th March 2010.
- Aristotle ([ca 360BC] 1995). *On the heavens (De caelo)*. Edited and translated by Stuart Leggatt. Warminster: Aris & Phillips.
- Artenova. <<http://www.institut-artenova.ch/en/institut/development/>> Accessed 17<sup>th</sup> March 2010.
- Artenova 2 (2008). Brochure. Institut ArteNova: Institut für Eurythmie in Forschung und Kunst.
- Auerbach, Raymond (2009). Interview, 11<sup>th</sup> January 2009, Durban.
- Barfield, Owen (1957). *Saving the appearances: a study in idolatry*. London: Faber and Faber.
- Barfield, Owen (1963). *Worlds apart: a dialogue of the 60's*. London: Faber and Faber.
- Barnett, Lincoln (1949). *The universe and Dr. Einstein*. London: Victor Gollancz.
- Bartholomew, Alec (2003). *Hidden nature: the startling insights of Victor Schauberg*. Illinois: Adventures Unlimited Press.
- Baumgartner, Tanja (2008). *Eurythmy and its effects on substances*. Unpublished lecture notes. Dornach, 5<sup>th</sup> May 2008. <<http://www.institut-artenova.ch/en/publications/>> Accessed 12 August 2010.
- Baumgartner, Tanja (2009). Interview, 20<sup>th</sup> July 2009, Dornach.
- Best, Elsdon ([1925] 1972). Tuhoe the children of the mist. *Memoirs of the Polynesian Society*, Vol. 1, No. 6.

Blunt, Richard (1995). *Waldorf education – theory and practice: a background to the educational thought of Rudolf Steiner*. Cape Town: Novalis Press.

- Bochu, W., Jiping, S., Biao, L., Jie, L. & Chuanden, D. (2004). Soundwave stimulation triggers the content change of the endogenous hormone of the *Chrysanthemum* mature callus. *Science direct: colloids and surfaces B: Biointerfaces*, Vol. 37, 107-112.
- Bockemühl, Jochen ([1977] 1985). The formative movement of plants. In Bockemühl, J. (ed.), ([1977] 1985). *Toward a phenomenology of the etheric world*. Translated by Malcolm Gardner and John Davy. Spring Valley: Anthroposophic Press. 131-161.
- Breasted, James (1908): *A history of the ancient Egyptians*. London: John Murray.
- Campbell, Joseph (1975): Folkloristic commentary to: *The complete Grimm's fairy tales*. Part 4: "The question of meaning" pp 857-864. London: Routledge & Keagan Paul.
- Cancellotti, Claudia (2005). Music, culture and identity: pasts, presents and futures of San musical tradition. Andrew Tracey (ed.), *Symposium on Ethnomusicology* No. 18. Grahamstown, International Library of African Music, 21-27.
- Charnoe, Zeera Polyandre (1977). *Method and apparatus for treating plant organisms*. United States Patent 4055915, Nov. 1.
- Chatwin, Bruce (1987). *The songlines*. London: Penguin Books.
- Coats, Callum (1996). *Living energies: an exposition of concepts related to the theories of Victor Schauberg*. Dublin: Gateway.
- Concise Oxford English Dictionary* (2008). Eleventh edition. Edited by Catherine Soanes and Angus Stevenson. Oxford: Oxford University Press.
- Creath, Katherine & Schwartz, Gary E. (2004). Measuring effects of music, noise, and healing energy using a seed germination bioassay. *The journal of alternative and complementary medicine*, Vol. 10, No. 1, 113-122.
- Cymatics <[http://www.world-mysteries.com/sci\\_cymatics.htm](http://www.world-mysteries.com/sci_cymatics.htm)> Accessed 12 August 2010.
- Diallo, Yaya & Hall, Mitchell (1989). *The healing drum: African wisdom teachings*. Vermont: Destiny Books.
- Dunn, David (2001). Lecture given at Santa Fe Public Lecture Series, August 15<sup>th</sup> 2001. <<http://musicandnature.publicradio.org/assets/sfilecture.pdf>> Accessed 24th March 2008.
- Einstein, Albert (1922). *Sidelights on relativity*. Translated by G.B. Jeffery and W. Perrett. London: Methuen.
- Ekici, N., Dane, F., Mamedora, L., Metin, I. & Huseyinov, M. (2007). The effects of different musical elements on root growth and mitosis in onion (*allium cepa*) root apical meristem. *Asian journal of plants sciences*, Vol. 6, No. 2, 369-373.
- Frazer, James G (1890; 1981). *The golden bough: the roots of religion and folklore*. New York: Avenel Books.

- Fromkin, V., Rodman, R., & Hyams, N. (2007). *An introduction to language, eighth edition*. Australia: Thomson Wadsworth.
- Giddens, Anthony (1984). *The constitution of society: outline of the theory of structuration*. Cambridge: Polity Press.
- Gioia, Ted (2006). *Work songs*. Durham and London: Duke University Press.
- Goethe, Johann Wolfgang (von) [1790] 1993: *The metamorphosis of plants*. Kimberton: Biodynamic Farming and Gardening Association.
- Goldberg, Raoul (2009). *Awakening to child health Vol 1: wholistic child and adolescent development*. Stroud: Hawthorn Press.
- Gouk, Penelope (2000). *Musical healing in cultural contexts*. England: Ashgate.
- Grohmann, Gerbert ([1959] 1974). *The plant volume 1*. Translated by K. Castelliz. London: Rudolf Steiner Press.
- Grohmann, Gerbert ([1968] 1989). *The plant volume 2*. Translated by K. Castelliz and Barbara Saunders-Davies. Kimberton: Biodynamic Farming and Gardening Association.
- Haushka, Margarethe ([1979] 1990). *Rhythmical massage as indicated by Ita Wegman*. Translated by L.D. Monges. Spring Valley: Mercury Press.
- Heninger, S.K. (1977). *The cosmographical glass: renaissance diagrams of the universe*. California: The Huntington Library.
- Hindmarch, Avice. Interview 6<sup>th</sup> January 2009, Hermanus.
- HISCIA <<http://www.hiscea.ch>> Accessed 20 July 2010.
- Hou, T.Z. & Mooneyham, R.E. (1999). Applied studies of the plant meridian system: II. Agri-wave technology increases the yield and quality of spinach and lettuce and enhances the disease resistant properties of spinach. *American journal of Chinese medicine*. Vol. 27, No. 2, 131-141.
- Hurner, Caroline (2008). Personal communication, 25 June 2008, Cape Town.
- Husemann, Armin (1994). *The harmony of the human body: musical principles in human physiology*. Translated by Christian von Arnim and Alan Stott. Edinburgh: Floris Books.
- Jackson, Graham (2006). *The spiritual basis of musical harmony*. Ontario: George A Vanderburgh Publishers.
- Jacob, Jean-Jacques (2008). Personal communication and email correspondence.
- Janzen, John M. (2000). Theories of music in African ngoma healing. In Penelope Gouk (ed.), *Musical healing in cultural contexts*. England: Ashgate. 46-66.

- Jaques-Dalcroze, Emil (1930). *Eurythmics art and education*. Translated by Frederick Rothwell. London: Chatto and Windus.
- Jensen Krige, E. & Krige, J.D. (1943). *The realm of a rain-queen: a study of the pattern of Lovedu society*. London: Oxford University press.
- Jeong, Mi-Jeong, Shim, Chang-Ki, Lee, Jin-Ohk, Kwon, Hawk-Bin, Kim, Yang-Han, Lee, Seong-Kon, Byun, Myeong-Ok & Park, Soo-Chul (2008). Plant gene responses to frequency-specific sound signals. *Molecular breeding* Vol. 21, No. 2, 217-226.
- Joly, Nicolas ([1999] 2005). *Wine from sky to earth: growing and appreciating biodynamic wine*. Translated by G. Andrews. Austin, Texas: Acres U.S.A.
- Keats, Brian (1999). *Betwixt heaven and earth: a compendium of essays pertaining to the earth as part of a living cosmos*. Bowral, Australia: Brian Keats.
- KIKOM <[http://www.kikom.unibe.ch/content/index\\_ger.html](http://www.kikom.unibe.ch/content/index_ger.html)> Accessed 1st August 2010.
- King, Paul (2006). *The four ethers of life: a short introduction to aspects of the work of Dr Ernst Marti*. Unpublished text of a lecture given 16th May 2006, Cape Town.
- Kirchner-Bockholt, Margarete (1977). *Fundamental principles of curative eurythmy*. Translated by Janet Wood. London: Rudolf Steiner Press.
- Knight, Randall D. (2004). *Physics for scientists and engineers: a strategic approach*. San Francisco: Pearson.
- Kubik, Gerhard (1994). *Theory of African music*. Wilhelmshaven: Florian Noetzel Verlag.
- Kurath, Gertrude Prokosch (1956). Dance relatives of mid-Europe and middle America: a venture in comparative choreology. *The journal of American folklore*, Vol. 69, No. 27, 286-298.
- Leggatt, Stuart (1995). *Introduction to Aristotle: on the heavens I and II*. Warminster: Aris and Phillips.
- Lehrs, Ernst ([1951] 1985). *Man or matter: introduction to a spiritual understanding of nature on the basis of Goethe's method of training observation and thought*. London: Rudolf Steiner Press.
- Marti, Ernst (1974). *The four ethers: contributions to Rudolf Steiner's science of the ethers*. Translated by Eva Lautenbach and James Langbecker. Illinois: Schaumberg Publications.
- McLean, Mervyn (1996). *Maori music*. Auckland: Auckland University Press.
- Mees, Rudolf (1991). *Money for a better world*. Translated from Dutch by John Wood. Stroud: Hawthorn Press.
- Menuhin, Yehudi & Davis, Curtis (1979). *The music of man: exploring the miracle of music and its influence throughout the ages*. Canada: Methuen Publications.

- Modjadji <<http://www.prominentpeople.co.za/modjadji-queen.aspx>> Accessed 21st July 2010
- Muller, Linda (2006). *Music as metaphor and mediator: creating an integrative paradigm for education*. Unpublished doctoral thesis, University of Cape Town.
- Nims, Charles (1965). *Thebes of the Pharoahs*. London: Elek Books.
- Nzewi, Meki. Telephonic interview, 21<sup>st</sup> May 2010, Cape Town.
- Pelikan, Wilhelm (1991). *Healing plants part 1*. Translated by R.E.K. Meuss. London: Rudolf Steiner Press.
- Perry <<http://www.frankperry.co.uk/cymatics.htm>> Accessed 12 August 2010.
- Pewa, Elliot S. (2005). The contextual nature of the music of Africa. Andrew Tracey (ed.), *Symposium on ethnomusicology No. 18*. Grahamstown: International Library of African Music, 83-86.
- Pfeiffer, Ehrenfried (1958). Preface to Steiner, Rudolf ([1924] 1958). *Agriculture – a course of eight lectures given at Koberwitz, Austria, June 7<sup>th</sup> – 16<sup>th</sup> 1924*. Translated by Adams, George. Dornach: Rudolf Steiner-Nachlassverwaltung.
- Pfeiffer, Ehrenfried (1980). Preface to Adams, George & Whicher, Olive (1980). *The plant between sun and earth - and the science of physical and ethereal spaces*. London: Rudolf Steiner Press.
- Pococke, Richard (1743). *Travels in Egypt: book I – of the lower parts of Egypt*. John Pinkerton, (1814) *Voyages and travels volume xv*. London: Longman.
- Poppelbaum, Hermann ([1952]1985). The concept and action of the etheric body. In Bockemühl, J. (ed.), *Toward a phenomenology of the etheric world*. Translated by Malcolm Gardner and John Davy. Spring Valley: Anthroposophic Press. 217-238.
- Proctor, Peter (1996). DVD: *One man, one cow, one planet*. Collect and protect activist media
- Proctor, Peter (1997). *Grasp the nettle: making biodynamic farming and gardening work*. Auckland: Random House.
- Raffé, Marjorie, Harwood, Cecil & Lundgren, (1974). *Eurythmy and the impulse of dance*. London: Rudolf Steiner Press.
- Retallack, Dorothy (1973). *The sound of music and plants*. California: DeVorss.
- Rickett, Karoline (2009). Interview, 13<sup>th</sup> July 2009, Dornach.
- Schlosser, Katesa (2002). *Rain-queens and python dance: historical colour photographs of Lovedu and Venda life in Northern Transvaal*. Kiel: Museum für Völkerkunde der Universität Kiel.
- Schmidt, Gerhard. *The dynamics of nutrition: the impulse of Rudolf Steiner's spiritual science for a new nutritional hygiene*. Wyoming: Bio-Dynamic Literature.

- Seaman, Gerald (1967). *History of Russian music: from its origins to Dargomyzhsky*. Oxford, Basil Blackwell.
- Singh, T.C.N. (1963). On the effect of music and dance on plants. *Bihar Agricultural College Magazine*, Vol. 13, No. 1, 111-122.
- Slobin, Mark (1992). Peasant music-cultures of Eastern Europe. In Jeff Todd Titon, (ed.), *Worlds of Music: an introduction to the music of the world's peoples*. New York: Schirmer Books, 167-208.
- Small, Rob. Interview 22<sup>nd</sup> January 2008, Cape Town.
- Soper, John ([1996]). *Biodynamic gardening*. London: Souvenir Press.
- Spiegel, Andrew & Sponheuer, Silke (2008). *Transforming the soul of music into bodily practice: tone eurythmy's artistic principles and their relation to underlying structure*. Paper for presentation at a departmental seminar, University of Cape Town Social Anthropology 7<sup>th</sup> October 2008. Originally presented at the EASA biennial conference, Ljubljana, August 2008 in a panel WO11: "Body and soul: On corporeality in contemporary religiosity."
- Sponheuer, Silke (2009). *Music made visible in time and space: concepts of simultaneity in tone-eurythmy choreography*. Unpublished master's dissertation, University of Cape Town.
- Steffen, Albert (1961). *Meetings with Rudolf Steiner*. Translated by R.E. Raab, E. Mc Arthur and V. Brett. Dornach: Verlag für Schöne Wissenschaften.
- Steiner, Rudolf ([1904] 1994). *Theosophy*. Translated by C.E. Creeger. New York: Anthroposophic Press.
- Steiner, Rudolf ([1906-1923] 1983). *The inner nature of music and the experience of tone: seven lectures*. Translated by Maria St. Goar. USA: Anthroposophic Press.
- Steiner, Rudolf ([1908-1924] 1995). *Nature spirits: selected lectures*. Compiled and edited by Wolf-Ulrich Klünker. London: Rudolf Steiner Press.
- Steiner, Rudolf ([1909] 1972). *An outline of occult science*. Translated by M. and H. Monges. New York: Anthroposophic Press.
- Steiner, Rudolf ([1911] 1983). *An occult physiology: eight lectures*. London: Rudolf Steiner Press.
- Steiner, Rudolf ([1919-1920] 1987). *Light: first scientific lecture-course*. Translated by G. Adams, Forest Row: Steiner Schools Fellowship Publications.
- Steiner, Rudolf ([1919-1924] 1984). *An introduction to eurythmy: talks given before sixteen eurythmy performances*. Translated by G. Hahn. New York: Anthroposophic Press.
- Steiner, Rudolf ([1919] 1969). *Education as a social problem: six lectures*. New York: Anthroposophic Press.

- Steiner, Rudolf ([1920] 1982). *Geisteswissenschaftliche Impulse zur Entwicklung der Physik: zweiter Naturwissenschaftlicher Kurs*. Dornach, GA 321. Unpublished partial translation by P. King.
- Steiner, Rudolf ([1920]1988). *Warmth course: fourteen lectures*. Translated by G. Adams. Spring Valley: Mercury Press.
- Steiner, Rudolf ([1921-2] 1983). *Curative eurythmy: eight lectures*. Translated by K. Krohn and A. Degenaar. London: Rudolf Steiner Press.
- Steiner, Rudolf ([1923] 2007). *Harmony of the creative word: twelve lectures*. Translated by J. Compton-Burnett. First published in English as “Man as symphony of the creative word”. Forest Row: Rudolf Steiner Press.
- Steiner, Rudolf ([1924] 1932). *Eurythmy as visible song: eight lectures*. Translated by V. Compton-Burnett, and J. Compton-Burnett. London: Anthroposophical Publishing Company.
- Steiner, Rudolf ([1924] 1956). *Eurythmy as visible speech: fifteen lectures*. Translated by V. Compton-Burnett, J. Compton-Burnett, C. Dubrovic, & S. Dubrovic. London: Lawrence Bros.
- Steiner, Rudolf ([1924] 1958). *Agriculture – a course of eight lectures given at Koberwitz, Austria, June 7<sup>th</sup> – 16<sup>th</sup> 1924*. Translated by G. Adams. Dornach: Rudolf Steiner-Nachlassverwaltung.
- Steiner, Rudolf (1919). *Study of man*. Translated by D. Harwood and H. Fox. London: Rudolf Steiner Press.
- Steiner, Rudolf & Wegman, Ita ([1925] 1996). *Extending practical medicine: fundamental principles based on the science of the spirit*. Translated by A. Meuss. London: Rudolf Steiner Press.
- Stobart, Henry (1992). The sirens of the Andes. *The musical times*, Vol. 133, No. 1788:73.
- Stobart, Henry (1994). Flourishing horns and enchanted tubers: music and potatoes in highland Bolivia. *British journal of ethnomusicology*, Vol. 3, 35-48.
- Stobart, Henry (2000). Bodies of sound and landscapes of music: a view from the Bolivian Andes. In Penelope Gouk (ed.), *Musical healing in cultural contexts*. England: Ashgate. 26-45
- Stobart, Henry (2006). *Music and the poetics of production in the Bolivian Andes*. England: Ashgate.
- Storl, Wolf D. (1979). *Culture and horticulture: a philosophy of gardening*. San Francisco: Biodynamic Farming and Gardening Association.
- Stucki <[www.guardian.co.uk/world/2010/jun/02/sewage-mozart-germany](http://www.guardian.co.uk/world/2010/jun/02/sewage-mozart-germany)> Accessed 3rd August 2010.



- Taussig, Michael (1980). *The devil and commodity fetishism in South America*. Chapel Hill: University of North Carolina Press.
- Tompkins, Peter & Bird, Christopher ([1973] 2002). *The secret life of plants*, second edition. New York: Harper and Collins.
- Urieli, Baruch Luke & Müller-Wiedermann, Hans (1998). *Learning to experience the etheric world: empathy, the after-image and a new social ethic*. Translated by Simon Blaxland de Lange. London: Temple Lodge.
- Usher, Beth (2006). *Eurythmy – an introductory reader: original texts compiled with an introduction, commentary and notes by Beth Usher*. Forest Row: Sophia Books.
- Veit, Wolfgang (1985). *Eurythmie – Else Klink*. Stuttgart: Verlag Urachhaus.
- Wachsmuth, Guenther (1932). *The etheric formative forces in cosmos, earth and man: a path of investigation into the world of the living*. Translated by Olin D. Wannamaker. London: Anthroposophical Publishing Company.
- Watson, Lyall (1973). *Supernature: a natural history of the supernatural*. Kent: Hodder and Stoughton.
- Weinberger, Pearl & Burton, C. (1981). The effect of sonication on the growth of some tree seeds. *Canadian journal of forestry research*, Vol. 11, No. 4, 840-844.
- Weinberger, Pearl & Measures, Mary (1979). Effects of the intensity of audible sound on the growth and development of Rideau winter wheat. *Canadian journal of botany*, Vol. 57, No. 9, 1036-1039.
- Werner, Michael & Stöckli, Thomas (2007). *Life from light*. Translated by J. Collis. Forest Row: Clairview.
- Zajonc, Arthur G ([1977] 1985). Preface to the English edition. Bockemühl, J. (ed.), *Toward a phenomenology of the etheric world*. Translated by Malcolm Gardner and John Davy. Spring Valley: Anthroposophic Press.