

Reconceptualising the Philosophical Foundations of Health Education with Respect to the Impact of Food Technology on Human Health

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STATEMENT OF ORIGINALITY

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ABSTRACT

In recent years a considerable literature has accumulated to establish that western society is confronting a monumental crisis in health care. In the thesis that follows we shall see that the nature of the growing crisis is multifaceted and includes scientific, socio-cultural and philosophical dimensions, all of which figure prominently in the way in which we educate people of all ages for health. My aim in the first part of the thesis will be to explore and reflect upon a number of these facets, with an aim to showing that the epistemological framework they presuppose represents a valuable but incomplete understanding of newly emerging health problems which are themselves, partly the outcome of the highly technologised societies in which we live.

Once this preliminary objective of the thesis has been completed, I shall contend in Part II of the thesis that one area of crisis which remains insufficiently understood is the relationship between food and nutrition. I deliberately use the word relationship between food and nutrition, because the traditional emphasis of such concerns within the context of health has focused primarily on nutrition, largely in the quantitative sense of encouraging people to obtain enough vitamins, minerals, proteins, carbohydrates and fats required to keep them healthy. My contention is that without broadening the discussion to encompass the relationship between food and nutrition, the answers we give to the quantitative questions are inevitably myopic and limited.

My goal in the third and final part of this thesis will be to make clear that in light of the importance of the connection we have with our food and recent developments made in the philosophy of quantum mechanics, an exciting new discipline is emerging which Professor Ronald S. Laura has called the 'Metaphysics of Food'. As part of my elaboration of this area, I shall weave together strands of insight from the research of Professor Laura and Dr. Masaru Emoto, two major pioneers in advancing this field of knowledge.

Professor Laura's theory of 'participatory consciousness', drawn from his elaboration of quantum entanglement and his theory of 'empathetic epistemology' provides a fruitful conceptual framework, I shall argue, for the philosophical elucidation of Emoto's research on the metaphysics of

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water. Using the confluent theoretical interpretative heuristics of Laura and Emoto, my objective will be to argue that in principle, the foods we eat can themselves be impacted favourably or adversely in health terms by entanglements of consciousness which in turn affect our own health in subtle but important ways.

Although the articulation of the pedagogic implications of this insight would be beyond the remit of this Master Thesis, a conceptual foundation will have been laid here upon which a new edifice for further research at the doctoral level can be built.

Introduction

Towards A New Understanding of the Relationship between Food and Nutrition in Health Education

In recent years a considerable literature has accumulated to establish that western society is confronting a monumental crisis in health care (Day, 2001; Fillerup, 2007; Kling, 2006; Laura & Ashton, 2003). In the thesis that follows we shall see that the nature of the growing crisis is multifaceted and includes scientific, socio-cultural and philosophical dimensions, all of which figure prominently in the way in which we educate people of all ages for health. My aim in the first part of the thesis will be to explore and reflect upon a number of these facets, with an aim to showing that the epistemological framework they presuppose represents a valuable but incomplete understanding of newly emerging health problems which are themselves, partly the outcome of the highly technologised societies in which we live. The prohibitive cost of high tech medicine, for example, gives rise to problems of staggering complexity, including radical disparities in the access which people of different economic status have to it. Similarly, differences in the economic status of different countries are also an important indicator of the likelihood of certain health problems. For example, figures show that in 2004, 32 percent of children under the age of five, living in developing countries, were undernourished, as a result of inadequate diet (WHO, 2007a). The problem has arisen, despite, the technologically directed innovations that have allegedly increased world food production (Day, 2001). Similarly, the growing prevalence and pathological character of many chronic diseases such as diabetes, obesity, and respiratory dysfunction suggest strongly that their aetiology cannot be explained adequately without understanding the extent to which our technologically textured lifestyles impact on health

(Day, 2001; Horne, 1992). In essence, chronic diseases can aptly be described as ‘diseases of civilisation’ (Cousens, 2005; Horne, 1992; Laura & Chapman, 2009).

Within the category of diseases of civilisation, significant increases have also occurred in the number of people infected with HIV/AIDS (6.5 million new cases reported) (WHO, 2007a), along with increases in deaths attributed to longer standing major chronic diseases such as cancer (7.4 million) (WHO, 2008a) and heart disease (approximately 11.8 million) (WHO, 2008a). Moreover, the recent increase in tobacco consumption which has occurred among low to middle income citizens represents yet another lifestyle health risk of importance (WHO, 2007a). Given that tobacco consumption is a significant contributing factor in the development of heart disease and particular forms of cancer, it is clear that this rise in smoking is of serious concern and does not auger well as far as the reduction and control of these diseases are concerned (WHO, 2007a). Despite the major shifts that have occurred primarily in the area of health promotion and preventative health education, reflection on the state of global health in recent decades reveals that **the overall success in achieving the ostensible health goals set by the proponents of high-tech medicine has been alarmingly limited** (Laura & Chapman, 2009; Tang, Beaglehole & de Leeuw, 2007).

Another aspect of the crisis worth noting is that some diseases which medical science traditionally claims to have eradicated have paradoxically been superseded by new and more resilient strains or genre of the same disease (Day, 2001). Syphilis is an interesting case in point. Conventionally treated with **penicillin**, syphilis seemed to be readily controllable (Hopkins, 2002; Scheibner, 1993). However, the more penicillin was used to treat the disease, the more resistant it became to **penicillin** by transforming itself into another strain of the disease (Hopkins, 2002; Scheibner, 1993). A similar pattern of increased resistance to antibiotics of several kinds has made the treatment of certain infections previously effectively

controlled by them, now highly problematic at best (Day, 2001). We shall also see that adverse health problems have arisen in the context of ‘iatrogenic illness’, a term referring to sicknesses and disease caused by or associated with medical treatment, misdiagnosis, professional incompetence, negligence and exposure to highly infectious diseases such as staph infection, which, not infrequently, run rampant within the very hospitals and clinics where patients would otherwise be expecting to get well (Day, 2001). Moreover, reactions, for example, to some prescription drugs are sometimes more debilitating than the illnesses such drugs were intended to treat. Along with the increasing incidence of serious allergies to such drugs, misprescriptions have led to debilitating illness and in some cases have been life threatening (Day, 2001; Starfield, 2000).

In addition to the problem arising from the increased resistance of bacterial infections of various kinds to antibiotic treatment, (thereby augmenting their virulency), is the return of the same genre of infectious diseases which were previously thought to have been eliminated (Day, 2001; Horne, 1992). One example of this is the re-emergence of tuberculosis within the overcrowded contexts of prisons (WHO, 2009a). With regard to diseases once thought to have been controlled and essentially eliminated, it is now clear that ‘lifestyle’ and ‘nutrition’ are an essential if not more important factor in the control of diseases of all kinds than is vaccination, drug therapy and even surgical intervention (Underwood, 2004 p. 15). This is perhaps one major reason why it is somewhat misleading to suggest that modern medical science is primarily responsible for the eradication of major diseases. Indeed it will be argued in this thesis that the history of medicine shows that the primary casual aetiology for a number of major diseases can be traced to particular lifestyle environments. When the lifestyle environment changes sufficiently, the related diseases and illnesses diminish with it. Nonetheless, our socio-cultural commitment to covert increasingly high-tech lifestyle

environments has resulted historically in one set of diseases of ‘civilisation’ (and I use the term advisedly) being supplanted by other genres of diseases and illnesses peculiar to the new and different technologically textured lifestyle. In light of such subtleties involved in trying to understand the aetiology of disease, it will be the aim of the first part of the thesis to examine some of these and other facets of the crisis in health which connect and interface with each other in these subtle but important ways.

Another facet of the problem that becomes more obvious in the context of such reflection relates to the question of what the goal of ‘good health’ really means. The specific consideration I shall pursue in this regard concerns the implicit presumption that inasmuch as medical science can make us ‘live longer’, medical science has thereby made us healthier. The emphasis on the quantitative dimension of longevity in terms of life-span I shall argue, distracts us from deeper questions of the resultant quality of life associated with medical technologies capable of extending the years of those who would likely die without their life support. Given that one of the predominant goals of health education is to advance community health, I shall argue that we need to be philosophically mindful that the success medical science may have in extending life expectancy cannot in and of itself be equated with an advance in good health. We shall see that a number of subtle philosophical issues also arise from this discussion and that such subtleties make a significant difference to the judiciousness of the decisions made on how available medical funds should in fact be spent. Such subtleties make a difference also to our philosophical capacity to assess whether the current value presumptions of medical and health education underpinning such decisions are consistent with the outcomes of quantitative gains in years of extended life. The more discrepant the outcome, the more the need to reconceptualise and redefine the value presumptions which motivate our decisions.

Once this preliminary objective of the thesis has been completed, I shall contend in Part II of the thesis that one area of crisis which remains insufficiently understood is the relationship between food and nutrition. I deliberately use the word relationship between food and nutrition, because the traditional emphasis of such concerns within the context of health has focused primarily on nutrition, largely in the quantitative sense of encouraging people to obtain enough vitamins, minerals, proteins, carbohydrates and fats required to keep them healthy. My contention is that without broadening the discussion to encompass the relationship between food and nutrition, the answers we give to the quantitative questions are inevitably myopic and limited.

As a consequence, the potential role which nutrition can play in the maintenance of health is significantly diminished. With an aim to advancing our understanding of the importance of this interface, I shall in the second part of the thesis focus both accordingly and more determinately on the relationship between food and nutrition. My objective will be to show that what is required if we are to realise the deeper importance of the ‘nutritional aspect of health’ involves far more than the traditional task of educating people on the ‘right’ foods to eat. As important as this pedagogic goal is, we shall see that the technologisation of food, (e.g. how we grow food, store it, ship it, process it and even think or do not think about it), makes an enormous difference in comprehending the deeper implications for health of the actual connections we have with our food and in turn with nature. We shall see that by improving the depth and quality of our relationship to the foods we eat, we concomitantly improve our connection to the world around us in ways which inevitably serve to advance our health and wholeness in subtle ways which have been neglected. Similarly, once we can appreciate the ramifications which flow from a deeper understanding of the relationship between nutrition and food, we shall see that the way in which we educate people about their

relationship to the foods they eat requires us to develop an approach to ‘food education’ that is more ‘philosophically enlightened’ in its orientation than has traditionally been the case.

My goal in the third and final part of this thesis will be to make clear that in light of the importance of the connection we have with our food and recent developments made in the philosophy of quantum mechanics, an exciting new discipline is emerging which Professor Ronald S. Laura has called the ‘Metaphysics of Food’ (Laura & Munday, **In Press**). As part of my elaboration of this area, I shall weave together strands of insight from the research of Professor Ronald Laura and Dr. Masaru Emoto, two major pioneers in advancing this field of knowledge.

Professor Laura’s theory of ‘participatory consciousness’ (Laura, Marchant & Smith, 2008), drawn from his elaboration of quantum entanglement and his theory of ‘empathetic epistemology’ (Laura & Cotton, 1999) provides a fruitful conceptual framework, I shall argue, for the philosophical elucidation of Emoto’s research on the metaphysics of water. Using the confluent theoretical interpretative heuristics of Laura and Emoto, my objective will be to argue that in principle, the foods we eat can themselves be impacted favourably or adversely in health terms by entanglements of consciousness which in turn affect our own health in subtle but important ways. Being composed significantly of water, the metaphysics of food is as ‘real’ a phenomenon as is the metaphysics of water. Although the articulation of the pedagogic implications of this insight would be beyond the remit of this Master Thesis, a conceptual foundation will have been laid here upon which a new edifice for further research at the doctoral level can be built.

Given that the objectives of the thesis have been made clear in this introductory epigram, we can now turn to the task at hand to provide the substantive detail required to relieve any residual obscurity.

Chapter I

The Multidimensional Nature of the Current Crisis in Health

The Cost of Health Care

In 2007 the World Health Organisation (WHO), released a paper titled, Part 1 Ten Statistical Highlights in Global Public Health (WHO, 2007a). In their paper, the WHO (2007a) reported both significant and alarming figures on the prohibitive costs spent on the goal of advancing health around the globe. For example, the world spent a massive 4.1 trillion US dollars on health in 2004 (WHO, 2007a), approximately 11 times the figure for the cost of health care in 1970 (approximately 3.7 billion dollars) (Huber, 1999). This being so, health care expenditure per capita, increased to 3170 US dollars (WHO, 2007a), with expenditure in the United States rising from 600 dollars in 1970 to over 7000 dollars in 2007 (Brown, 2009). Although primarily a financial indicator, the exponential increase in cost has not been paralleled by any corresponding measure of success by way of controlling the health problems on which the money was spent.

The cost of health care has soared and is continuing to do so at a staggering rate (Herzlinger, 2007). According to Professor Regina Herzlinger (2007), total health care expenditure in the United States alone, stands at a record two trillion dollars per annum. Comparatively, this figure represented a 47 percent increase in the cost of health care per capita in the United States since the year 2000 (American Medical Association, 2008).

One dimension of this financial aspect of the crisis that appears to be playing a pivotal role in explaining the exorbitant cost of health care is the massive rise in the costs of government programs such as Medicare and Medicaid (Orszag & Ellis, 2007). According to Orszag and Ellis (2007), the current cost of Medicare and Medicaid per enrollee totals five percent of the gross domestic product of the United States. To put this figure in perspective, one of the United States' most lucrative export industries, Agriculture, totals only 1.0 percent of gross domestic product (Beta Phase Base, 2008). As alarming as the size of this existing figure is, Orszag and Ellis (2007 p. 1886) go on to write that:

If costs per enrollee in Medicare and Medicaid continue to grow at the same rate as they have over the past four decades, federal spending on those two programs alone would increase from about five percent of the gross domestic product today to about 20 percent by the year 2050.

The disconcerting increase in the cost of Medicare and Medicaid has been criticised at a more subtle level by Orszag and Ellis (2007), in their paper titled, "Addressing Rising Health Care Costs". They argue that, "Medicare has failed to consider data on what services warrant cover" (Orszag & Ellis, 2007 p. 1886). At present, they also suggest, Medicare and Medicaid cover the additional costs of significantly expensive therapies, despite the fact that it is becoming increasingly evident that the health benefits of more expensive therapies do not warrant this cost (Orszag & Ellis, 2007). Hence, Orszag and Ellis (2007 p. 1887) point out that evidence exists to show, "...that less than half of all medical care in the United States is based on or supported by firm evidence of effectiveness".

Nevertheless, financial incentives for both providers and patients tend to encourage the adoption of more expensive treatments and procedures (Orszag & Ellis, 2007 p 1887). For instance, doctors and hospitals can receive an incentive known as "fee for service reimbursement" (Orszag & Ellis, 2007 p. 1886). This government incentive encourages health care providers to deliver medical service efficiently, in return for additional medical

supplies and funding to cover expensive therapies (Orszag & Ellis, 2007 p. 1886). However, in providing such an incentive, there are “loopholes” that doctors and hospitals can use in an effort to continue receiving additional supplies and funding (Orszag & Ellis, 2007). For this reason, the definition of an “efficient service” can vary significantly in different hospitals across the United States. As a result, there is the opportunity for hospitals, in particular, to exploit this service (Orszag & Ellis, 2007). For example, a patient may wait in “Emergency” for a period of hours before being served by a medical practitioner or remain on a waiting list for a major surgical procedure for several months (Orszag & Ellis, 2007).

In light of these anomalies it is clear that Medicare and Medicaid’s approach to providing funding to medical services has serious ramifications for our health (Orszag & Ellis, 2007). If the United States system of Medicare and Medicaid continue to fund expensive and unnecessary health care procedures, for example, it is predicted that Americans will inevitably be restricted in their access to necessary health care service in the future (Orszag & Ellis, 2007).

Reinforcing the gravity of these concerns, John Robbins (2006) offers some interesting points. According to Robbins (2006), the escalating cost of chronic disease will be too much for the United States government to bear in the future. For example, the United States Centre for Disease Control and Prevention (CDC) estimates that people over the age of 65 years contribute to a staggering 67 percent of all health care expenditure in the United States (Robbins, 2006). As the ageing population of America continues to grow (CDC, 2007; Orszag & Ellis, 2007; Robbins, 2006), programs such as Medicare and Medicaid will not be in a position to adequately fund America’s health (Robbins, 2006).

Given the crisis at hand, Americans have now been persuaded of the need to purchase private health insurance (Fletcher, 2008). However, as we shall see, not all Americans will be in a position to afford private health care (Fletcher, 2008).

Private Health Insurance

While Americans do have the opportunity to pay for private health insurance, the fact that the price of their housing, fuel and food is at an all time high, makes it very difficult for some people to take up the private health insurance option (Fletcher, 2008). Vice President of the Employers International Union, Katherine Taylor, reports that “the way health care costs have soared is unbelievable; there are people out here making decisions about whether to keep their lights on or buy a prescription” (Fletcher, 2008). Moreover, the challenge of paying for private health insurance has been made increasingly difficult by virtue of its cost in recent years (Kaiser Family Foundation Report, 2007). Between 2001 and 2007, the cost of health care premiums for family health care coverage, increased by 78 percent in the United States alone (Kaiser Family Foundation Report, 2007). The significant rise in the cost of health care premiums has meant that low income workers (earning 15 dollars per hour) are less likely to purchase private health insurance (Fletcher, 2008). To receive private health care insurance, low income workers are required to pay one third of the total health care premium, with the remaining two thirds covered by the employer (Fletcher, 2008). Yet, when considering that the average cost of health care per family stands at 12, 106 US dollars per annum, families earning a low income wage can find paying a third of this figure unaffordable (Fletcher, 2008; Orszag & Ellis, 2007).

When comparing health care costs between low and high income families, we discover that a significant discrepancy exists (Fletcher, 2008). For example, nine out of ten

full-time workers earning greater than 15 dollars per hour have health care coverage available through their place of work (Fletcher, 2008), with 75 percent of fulltime workers and their families entirely covered by their job (Fletcher, 2008; Baker, 2004).

Given these statistics, it is easier to see that higher income families have greater access to health services than do low income families, by virtue of being privately insured. Bearing this in mind, we shall in what follows, address the relationship between societal status and a person's state of health.

Social Status and Health

Despite the advances we as a society have made to improve the health of the wider community, it is becoming increasingly evident that a person's state of health can be influenced by their social status (Gaston, 2003; Turrell & Mathers, 2000). Although it may appear that as a nation Australians are relatively healthy (Gaston, 2003), reflecting on the state of Australian health, betrays that the matter is not as simple or straightforward as this.

When considering the subject of "health equality", we find that Australia is ranked as number 17 in the world, despite being second on account of life expectancy (Gaston, 2003 p.33). For example, in 2001, the life expectancy of an Australian boy living in an area of "most disadvantage" was 3.6 years less than a boy living in an area of "least disadvantage" (Saunders & Davidson, 2007 p. 530). Similarly, the life expectancy of an Australian girl living in a disadvantaged area was 2.4 years less than a girl living in an area of "least disadvantage" (Saunders & Davidson, 2007 p. 530). These figures support the notion that "socioeconomically disadvantaged groups experience significantly higher increases in mortality rates" than do higher socioeconomic groups (Turrell & Mathers, 2000 p. 434). Elaborating these ideas further, Professor Carol Gaston (2003) addresses the issue of health inequalities at a state level within South Australia (Gaston, 2003).

According to Gaston (2003 p. 36), lower income may no doubt have some bearing on the state of our health; however, there are “clear indications that the specific characteristics of a neighbourhood can significantly influence a person’s health quite independently from their socioeconomic status”. For example, in remote and rural parts of South Australia, the rate of premature death is 17 percent higher than in the capital city, Adelaide (Gaston, 2003). Moreover, in urban areas of disadvantage, the rate of premature death is significantly higher than in areas of least disadvantage (Gaston, 2003). For instance, in the disadvantaged township of Port Adelaide premature death was reported by Gaston to be 93 percent higher than in a township of least disadvantage such as Mitcham or Happy Valley (Gaston, 2003). This being so, if the total population of South Australian reflected the state of health reported in Mitcham and Happy Valley, there would be 1200 fewer deaths per annum in South Australia (Gaston, 2003). In light of these differences, it is easier to see that inequalities in community health can be attributed to factors more complex and subtle than simply income.

Contributing to this discussion is Professor of Epidemiology and Public Health at the University of London, Michael Marmont (2004). According to Marmont (2004 p. 4), a person’s state of health is largely a reflection of “social standing”. On Marmont’s (2004 p. 15) view, social standing is “intimately related to your chances of getting ill and the length of your life.... with small differences in your social standing having a significant effect on your health”. For example, Marmont holds that a person with a doctoral degree has a higher life expectancy than a person who completes a master degree (Marmont, 2004). Hence, on account of this concept, your position within the social hierarchy of an institution can influence your state of health (Marmont, 2004).

Moreover, Marmont suggests that despite your income, the way you interpret the systems within a hierarchy can have a profound effect on your health (Marmont, 2004).

According to Marmont, the Gross Domestic Product (GDP) for every person living in the United States is 34, 000 US dollars (Marmont, 2004). In comparison the GDP for each person living in Cuba is 5200 US dollars (Marmont, 2004). Yet, when we consider the average life expectancy between these two nations, we discover that the United States records a life expectancy of only 0.4 years greater than that of Cuba (Marmont, 2004). Given these figures, it is clear that a person's health is determined in part by their interpretation of their environment inasmuch as it is by their income. In short, despite the fact that income and social status play a critical role in the state of our health, there are clearly other factors, within this context, contributing to our health.

Life Expectancy as a Measure of Health

According to Guy Brown (2007), life expectancy in the Industrialised West has doubled in the last hundred years. It is reported, that over the course of the last century, life expectancy has increased at a rate of 2.2 years per decade (Brown, 2007). Given this increase, life expectancy for people living in the Industrialised West, has been extended during the last century, by approximately twenty years (Brown, 2007). This being so, we are told that we are now living significantly longer lives than we did a century ago (Brown, 2007). Yet, despite a significant increase in life expectancy being reported (Brown, 2007), several scholars contest, that in the last hundred years, increases in life expectancy have in fact been minimal (Day, 2001; Eckersley, 2008; Stuart-Hamilton, 2006). Moreover, it is a commonly held belief that by virtue of extending our lives, we have in turn improved our health (Brown, 2007; Stuart-Hamilton, 2006). For this reason, we equate a longer life with a healthier one (Laura & Chapman, 2009). Nonetheless, I shall in what follows, suggest that the foregoing figures reporting a significant rise in life expectancy are misleading as is the notion that a longer life necessarily equates to a healthier one.

Are We Living Longer Lives?

According to Professor Ian Stuart-Hamilton (2006), only a minimal increase in life expectancy has been observed over the last century. For example, Stuart-Hamilton 2006 p. 15) reports that the difference in life expectancy between a young adult living in the twentieth century and a young adult living in the twenty first century is “only about seven years”. Moreover, Stuart-Hamilton (2006 p. 15) asserts that, “the older the age group one considers the smaller this difference progressively becomes, until centenarians in 1900 had as much future life ahead of them as centenarians today”.

On this account, it is clear that we are now living longer lives than we did a century earlier. However, in contrast to Brown’s (2007) findings, Stuart-Hamilton (2006) reports only a seven year increase in life expectancy in the last hundred years. Hence, in light of this discrepancy, which figure provides an accurate account of the number of years we have gained?

Fellow of the Nation Centre for Epidemiology and Population Health, Dr Richard Eckersley (2008 p. 91), states, “life expectancy figures are deceptive and often misunderstood”. On account of Eckersley’s (2008) view, how we interpret life expectancy figures is a major factor in determining increases in life expectancy. To reliably determine an increase in life expectancy figures, life expectancy should “represent the number of years people can on average expect to live at prevailing mortality rates” (Eckersley, 2008 p. 91). For example, upon birth, a child living one thousand years ago had an approximate life expectancy of 24 years (Eckersley, 2008). However, if the child was to live beyond their first year of life, he or she had an approximate life expectancy of 36 years (Eckersley, 2008). Hence, for every year of life lived, life expectancy is also increased (Eckersley, 2008).

Nevertheless, Eckersley (2008 p. 91) points out, that very rarely do we report increases in life expectancy by way of “prevailing mortality rates”. Instead, we have come to report increases in life expectancy as they relate to the years of life remaining from birth (Eckersley, 2008).

Illustrating this point is Director of Credence Publishing, Philip Day (Day, 2001). According to Day (2001), if life expectancy is estimated from birth, it will appear that we are living longer than we actually are. For example, if we were to compare life expectancy figures between an Australian male born in 1998 and an Australian male born in 1900, we would discover that from birth a male in 1998 is expected to live 20.7 years longer than a male born in 1900 (Day, 2001). However, if we are to compare at age fifty, the life expectancy of an Australian male living in 1998, to a fifty year old Australian male living in 1900, we discover that a man living in 1998 could expect to live only 7.6 year longer than a man living in 1900 (Day, 2001). Hence, although it is true that from birth we are living twenty years longer than we did in 1900, we observe only a slight increase as we age. This being so, to say that we are living ‘twenty years longer’, is a palpable misinterpretation of the data, when the data is understood in this more comprehensive context.

Although, it is clear that life expectancy figures have slightly increased in the last century, let us consider whether an increase in life expectancy equates to a healthier life?

Are We Living Healthier Lives?

According to Stuart-Hamilton (2006 p. 15), to determine if we are healthier today than we were a century ago, an assessment of “active life expectancy” is necessary. On Stuart-Hamilton’s (2006 p. 15) account, “active life expectancy” is defined as “the average number of years remaining in which people can expect to live a reasonable life”. This means having the capacity to complete basic day to day activities without support (Stuart-Hamilton,

2006). Hence, in light of the slight increase in life expectancy reported, can we expect to live a “reasonable life” during these years?

The WHO report that “from birth the average citizen of an industrialised country can expect to spend at least the final 10 percent of their life suffering an inappreciable disability” (World Health Organisation, cited in Ian Stuart-Hamilton, 2006). Moreover, several years prior to the development of a life suffering disability, a person will more than likely acquire a serious chronic illness that will impinge significantly upon their quality of life (Stuart-Hamilton, 2006). For example, according to Nick Triggle (2008), a woman living in the United Kingdom in 2001 could expect to live with “poor health” for the remaining 11.6 years of her life, while a man could expect to live with “poor health” for 8.7 years. Hence, when we consider the foregoing figures reported by Ian Stuart-Hamilton (2006) and Philip Day (2001), we come to realise that despite an increase in the number of years gained, these additional years of life are likely to be spent managing our poor state of health. For this reason, Stuart-Hamilton (2006 p. 15) asserts that “it must not be supposed that the added life many modern people experience is necessarily blissful”. Thus, in light of this discussion it is easier to appreciate why a longer life is not necessarily synonymous with a healthier life.

Men’s Health

In 2003, President of the International Society for Men’s Health, Meryn Siegfried (2003 p. 4) remarked that the state of men’s health was “appalling”. Speaking at the 2nd World Congress on Men’s Health in 2003, Siegfried (2003 p. 6) reported that “male life expectancy is unnecessarily low and too many men die too young from preventable causes”. Moreover, it is now clear that “men are at particular risk of suicide” (Siegfried, 2003 p. 7), with male depression remaining largely “under-diagnosed and untreated” (Siegfried, 2003 p. 7).

Are Mortality Rates Gender Biased?

In 2004 Professor Randolph Nesse and Research Fellow Daniel Kruger, released a paper titled “Sexual Selection and the Male: Female Mortality Ratio” (2004). In this paper, Nesse and Kruger (2004) evaluated male and female mortality rates across 20 countries, including the United States, United Kingdom, Sweden, France and Australia. In their evaluation, Nesse and Kruger (2004), report several alarming statistics, with respect to male mortality rates. For example, of the 11 leading causes of death in the United States, male mortality rates, on average, were three times higher than that of women in the year 2000. According to Nesse and Kruger (2004), if male mortality rates in the United States were to reflect female mortality rates, approximately 375, 000 fewer deaths would occur per year. Moreover, the risk of premature death, for men living in the United States, United Kingdom and Australia, was reported to be three times higher than that of women living in these nations (Nesse & Kruger, 2004). In light of their findings, Nesse and Kruger (2004 p. 5) state that “being male is now the single largest demographic risk factor for early mortality in developed countries”.

Suicide and Depression

In their study titled, “Suicidality in men-practical issues, challenges and solutions” (2007), Wolfgang Rutz and Zoltan Rihmer, examined Eastern European male and female suicide rates, as an expression of mental illness. According to Rutz and Rihmer (2007), the loss of employment, saw men three times more vulnerable to suicidal thoughts than women. Rutz and Rihmer (2007), suspect that the foregoing figure reflects the view that a man’s identity and self-worth are derived from his job. This being so, stress in the work place, the stress of being a family provider and the stress of maintaining job status, were contributing

factors in the development of suicidal thoughts and tendencies (Rutz & Rihmer, 2007).

Moreover, suicidal tendencies in men correlate with cortisol induced stress related conditions as well as cardiovascular and cerebrovascular disease (Rutz & Rihmer, 2007). For this reason, Rutz and Rihmer (2007) note that men, on average, were five times more likely to develop heart disease, as a consequence of job loss.

Further, Jules Angst et al. (cited in Rutz & Rihmer, 2007), examined the coping behaviours of men and women diagnosed with depression. According to Angst et al. (cited in Rutz & Rihmer, 2007), when males became depressed or mentally ill, they engaged in unhealthy behaviours such as increasing their consumption of alcohol and/or drug use. As a consequence of engaging in unhealthy coping behaviours, the likelihood of developing hypertension and respiratory illness increased two fold (Angst et al. cited in Rutz & Rihmer, 2007). For this reason, Angst et al. (cited in Rutz & Rihmer, 2007), suggest a relationship between depression and chronic disease. In light of these findings, it is clear that ‘male depression’ is a significant concern. This being so, if left undiagnosed and untreated, male depression shall continue to be a major health burden in years to come (Siegfried, 2003).

Heart Disease

It is reported by J. George Fodor and Rayka Tzerovska (2004 p. 32), that “....coronary heart disease (CHD) develops in men 10 to 15 years earlier than in women”. The prevalence of CHD among men living in the United States increases with every age bracket (Fodor & Tzerovska, 2004). This being so, at age 65, men living in the United States develop CHD at six times the rate of women (Fodor & Tzerovska, 2004). Moreover, CHD was responsible for approximately “one in every five deaths in the United States in 2005” (American Heart Association, 2009 p. 8). This being so, in 2005, CHD resulted in the deaths of 232,115 males

living in the United States (America Heart Association, 2009). For this reason, CHD is considered the largest single killer of males in the United States (American Heart Association, 2009).

Young Men and Health

In his book titled, The M Factor-men and their health, Dr Andrew Pattison (2001) provides some illustrations of the factors contributing to high mortality rates in young men. For example, in 1998, 1,782 Australians died as a result of a road accident (Pattison, 2001). Of this figure, 1,271 deaths were attributed to men; with 85 percent of these fatalities occurring in men aged between 20 and 24 years (Pattison, 2001). Moreover, in working as a visiting medical officer at a Melbourne Hospital from 1985 to 1994, Pattison (2001 p. 44) reports that of the “213 men admitted to emergency, under his care....75 percent of these cases were men aged 15 to 35 years”. According to Pattison (2001), excessive alcohol consumption, motor vehicle induced injury and violence were the main contributing factors leading to the high percentage of young males treated under his care.

Furthermore, higher than average suicide mortality rates, are reported among young males (King & Apter, 2003; New Zealand Official Statistics Agency, 2009; White, 2009). For example, in 1996 “there were 144 deaths of young people aged 15 to 24 years that were attributed to suicide” (New Zealand Official Statistics Agency, 2009). According to the New Zealand Government, “this represented 26.6 percent of total suicide deaths”, despite this age bracket making up “only 15.6 percent of the total population” (New Zealand Statistics Agency, 2009). In light of the foregoing figures, it can be deduced that “the male suicide rate was three times higher than that of females”, in New Zealand (White, 2009 p. 97).

In light of the statistics which highlight factors contributing to the state of men's health, it is clear that the crisis in health cannot adequately be understood without recognising that men of all ages are at great risk of developing serious health problems.

Iatrogenic Illness

Senior Physician for the American Medical Association, Professor Ralph Nader, was the first to shed light on the number of deaths attributed to medically induced injury or death in the United States (Day, 2001). According to Nader, a variety of medical errors arising from medical treatment itself, termed iatrogenic illness, and representing yet another challenge to health, can be attributed to the death of 300,000 Americans per annum (Day, 2001). Given the foregoing figure, it is now reported that iatrogenic illness is the third leading cause of death in the United States and United Kingdom, behind heart disease and cancer (Day, 2001). In what follows I shall endeavour to establish the extent to which iatrogenic illness, contributes significantly to the monumental health crisis we face.

According to Vincent, Neale and Woloshynowych (2001 p. 519), 10.8 percent of patients that are admitted to hospital, experience an "adverse event". Of this figure, Vincent, Neale and Woloshynowych (2001 p. 519) report that, "about half of these events were judged as preventable". Moreover, one third of preventable adverse events, led to either moderate disability or death (Vincent, Neale & Woloshynowych, 2001). On account of their findings, Vincent, Neale & Woloshynowych (2001 p. 519) estimate that "around 5 percent of the 8.5 million patients admitted to hospitals in England and Wales each year experience preventable adverse events, leading to an additional three million bed days". This being so, approximately 425,000 people each year, in England and Wales experience a preventable iatrogenic event (Vincent, Neale & Woloshynowych, 2001).

Reinforcing this view is Professor Barbara Starfield (2000), who reports that the administration of approved pharmaceutical treatment results in 106,000 adverse events in the United States per annum. According to Starfield (2000), the likelihood of experiencing an adverse event from the administration of an approved pharmaceutical is 14 times higher than if administered a mistaken medical treatment. In their book titled, Is The Medicine Making You Ill? (1999 p. 34), Jackson and Soothill note that, “people continue to become ill and even die as a result of taking prescribed drugs”. For example, the use of isoprenaline aerosols to treat asthma more than doubled the number of asthma related deaths in Australia and the United Kingdom between 1959 and 1966 (Jackson & Soothill, 1999 p. 36). Hence, in light of the previous example, it is clear that the administration of a sanctioned pharmaceutical can cause severe and life threatening adverse events.

Can Mortality Rates be reduced by Reductions in Medical Intervention?

According to Ross Horne (1992), reductions in medical intervention have been shown to minimise the number of iatrogenic adverse events. In his book titled, Health and Survival in the 21st Century (1992 p. 156), Horne provides two clear examples reinforcing this view.

In 1973 doctors in Israel went on a strike and reduced their total daily patient services from 65,000 to only 7,000. The strike lasted a month and during that time the death rate, according to the Jerusalem Burial Society, dropped fifty percent. In 1976 in Bogata, Columbia, doctors refused to treat all except emergency cases for a period of 52 days, and in that time the death rate fell by thirty five percent.

Hence, in light of the aforementioned figures, it is clear that a reduction in medical intervention has a significant influence on patient mortality rates. Moreover, when we consider the extent to which medical intervention can influence patient morbidity and mortality, it is easier to see why iatrogenic illness is so significant a contributing factor to the monumental health crisis.

Now that we have considered various aspects of the general crisis I shall in what follows, examine a specific dimension of the crisis as it relates to the exponential or massive rise in chronic disease.

Chronic Disease

It has been argued that due to the advances of medicine, improvements in hygiene, sanitation and nutrition, the vast range of infectious diseases that threatened to wipe out whole civilisations during the twentieth century have been contained, and to a large extent eradicated from many regions across the globe (Semba, Bloem & Piot, 2008). Given apparent success, it was easy for some to believe that medicine had triumphed over disease and that the continuing advancements made by medicine would stifle the advent of further disease throughout the globe (Porter, 2006). However, despite the advancements made by medicine to alleviate infectious disease, history has shown that medicine has not been extremely successful in developing the technology either to treat or to prevent effectively the chronic diseases now rampant (Siegel & Lotenberg, 2007).

In their report titled, Chronic diseases and associated risk factors (2005), the Australian Institute of Health & Welfare (2005) state:

By their very definition, chronic diseases are those involving a long course in their development or their symptoms. They are a major health problem in all developed countries, accounting for a high proportion of deaths, disability and illnesses...Most chronic diseases do not resolve spontaneously and are generally not cured completely. Some can be immediately life threatening, such as heart attack and stroke; others are often serious, including various cancers, depression and diabetes.

As indicated in the foregoing statement “chronic disease is by far the leading cause of morality in the world, representing 60 percent of all deaths” (Abegunde et al., 2007 p. 1929). Moreover, in 2005, for example, the World Health Organisation projections indicated that of the 58 million deaths worldwide, 35 million were attributed to chronic disease (Abegunde et

al., 2007). Given these statistics, it is clear that “chronic disease”, represents a critical aspect of the general crisis in health.

Amongst the chronic diseases given significant coverage in the scholarly literature, cardiovascular disease, cancer and obesity are reported frequently. This being so, I shall in what follows, consider each of these disease types.

Cardiovascular Disease

Cardiovascular disease is the number one cause of death globally, projected to remain the major cause of death until 2030 (WHO, 2008b). According to the WHO (2008b), in 2004, 17.5 million people died as a result of cardiovascular disease, accounting for 30 percent of all global deaths. By 2015 the foregoing figure is expected to increase to 20 million, with one in every two males and one in every three females diagnosed with a form of cardiovascular disease (WHO, 2008b). Despite the best efforts of medical science, cardiovascular disease remains out of control.

Cancer

In 2004 ‘cancer’ was reported as one of the leading causes of global deaths (WHO, 2008b). Of the 35 million deaths attributed to chronic disease in 2005, cancer accounted for 7.6 million, or 13 percent of all deaths (WHO, 2008b). Yet, despite the size of the foregoing statistics, it is estimated that by 2030, 11.4 million people will die from cancer per annum (WHO, 2008b). Once again, notwithstanding the best efforts of medical science, the incidence of cancer is still on the rise.

Obesity

In 2005 the global figure for overweight people, aged 15 and over, was approximately 1.6 billion, with 400 million people reported as obese (WHO, 2006). By 2015, overweight and obesity is predicted to increase to 2.3 billion and 700 million respectively (WHO, 2006). Specifically, at least 20 million children under the age of five were overweight in 2005 (WHO, 2006). According to Australian figures, 20 percent of Australian children are either overweight or obese; double the percentage rate of ten years ago (Goyen, 2003). It is thus estimated that 55 percent of obese Australian children aged 6 years and over will go on to become obese adults by 2030 (Goyen, 2003). An approximation of this magnitude represents an extremely serious concern, given that premature death and disability in adulthood is associated with childhood obesity (WHO, 2006).

In short “obesity and overweight lead to serious health consequences” (WHO, 2006). According to the WHO (2006), a rise in Body Mass Index (BMI), “is a major risk factor for chronic diseases such as cardiovascular disease, diabetes, osteoarthritis and some forms of cancer”. For example, the risk of developing diabetes is increased by 20 times, for both males and females, when BMI is 35 (obese) or more (Field et al., 2001 p. 1583). Furthermore, the risk of developing heart disease increases 1.4 times, for both men and women, even with a slight increase above “healthy” BMI (Field et al., 2001 p. 1583). Again, despite the best effort of medical science the growing incidence of obesity is out of control.

Economic Impact of Chronic Disease

According to the economic research group, Milken Institute, the total cost of chronic disease in the United States alone is 1.3 trillion US dollars per annum (Devol & Bedroussian, 2007). It is estimated that by 2013, the total cost of chronic disease in America per annum

will total 2.1 trillion US dollars, increasing to an estimated 3 trillion US dollars by 2023 (Devol & Bedroussian, 2007). This being so, chronic disease now represents the single largest gross domestic product of any group of diseases in the history of the United States (Devol & Bedroussian, 2007). Moreover, the economic impact of chronic disease is a serious concern for other nations (Abegunde & Stanciole, 2006).

According to Abegunde and Stanciole (2006), the national loss of income for heart disease, stroke and diabetes in China in 2005 was 18 million, with the Russian Federation and the United Kingdom reporting losses of 11 million and 1.6 billion dollars respectively (Abegunde & Stanciole, 2006). In the Russian Federation, for example, heart disease alone is predicted to represent 1 percent of GDP by 2015 (Abegunde & Stanciole, 2006). According to Abegunde and Stanciole, the aforementioned figure corresponds with the 30 percent increase in coronary heart disease between 1990 and the year 2000 (Abegunde & Stanciole, 2006).

In light of the aforementioned findings, it should be clear that the escalating cost and the significant rise in the prevalence of chronic disease figures are important facets of the current crisis in health. Moreover, that the cost and prevalence of chronic diseases are expected to continue to increase is a clear indication that the present direction of orthodox medicine, along with the medical innovations that stem from it, represent a valuable but incomplete approach to health care. The question arises whether the growing interest in nutrition will be enough to reverse the trends we have observed.

Chapter II

The Cumulative Effects of Food Technologicalisation and its Impact on Human Health

In recent years there has been increasing concern about the massive rise in the incidence of chronic disease, some of which was identified in the previous chapter (See Chapter I pp. 23-26). A range of epidemiological, human and animal studies on the causes associated with chronic disease has attributed the exponential growth of these diseases to inadequate levels of nutrition. For instance, Paul Goyen (2003 p. 130) M.D writes “environmental factors, a large percentage of which are dietary related, account for about 50 to 80 percent of all cancers”. This being so, Goyen (2003 p. 130) points out that “it is thought a reduction in cancer deaths of 30 to 40 percent can be achieved in Australia (about 30 000 people each year) by dietary change alone”. It is thus of little surprise that a number of health organisations encourage the consumption of foods deemed necessary to prevent the onset of chronic disease (WHO, 2003). Nonetheless, despite a growing awareness of the importance of incorporating dietary change, the fact remains that the chronic ills we bear continue to rise at a rapid rate (Saunders, 2003). Although the chronic ills explored in Chapter I can be attributed to a range of factors, it will be the objective of this second chapter to focus on a sizeable body of evidence that supports the idea that the technological and commercial processes that produce the food we eat may by virtue of their cumulative and adverse impact on health, constitute one of the most serious, yet only dimly recognised threats to health confronting modern society. Specifically, I shall in this chapter make explicit the ways in which the technologicalisation of food can on the one hand diminish rather than enhance its nutritional integrity, while on the other, introduce toxins and other chemical compounds into our foods that make them carcinogenic. To achieve this goal I shall examine a number of the

technological interventions associated with how we grow our food, protect it from pests, fertilise the soil in which our food is grown, as well as store, process and transport it.

Given that the objective of this chapter has been made clear, let us begin with an examination of the dominant farming method utilised to produce the food we eat.

Monoculture

The conventional system of farming practiced across the globe is monoculture farming (Kimbrell, 2002; Leahy, 2008; Townsend, Begon & Harper, 2003). According to Terry Leahy, monoculture is a method of farming that services large pieces of land with the use of machinery to produce a single crop (Leahy, 2008). In short, it is a preferable method of farming due to its relatively low cost and efficiency (Leahy, 2008; Fridell, 2006), taking “less time and energy to plant, tend, harvest, and market” (Fridell, 2006 p. 43). Moreover, it is held that monocultures produce more yield per acre, “which means more food for the growing of populations of city dwellers consuming it and more money for the farmers who produce it” (Fridell, 2006 p. 43).

Challenging the foregoing view is Professor Vandana Shiva (2006 p. 105), who argues that contrary to popular belief, monoculture farming practices are not necessary to produce more food:

Comparing traditional polycultures with industrial monocultures shows that a polyculture system can produce 100 units of food from 5 units of inputs, whereas an industrial system requires 300 units of input to produce the same 100 units. The 295 units of wasted inputs could have provided 5,900 units of food. This is a recipe for starving people not for feeding them.

Moreover, Shiva (2006 p. 105) demonstrates that monocultures do not necessarily provide greater income for farmers, for example, “Small farms in West Bengal growing 55 different crops gave incomes of 227,312 rupees per acre; a farm with 14 crops gave 94,596 rupees while a monoculture brought in only 32,098 rupees per acre”.

Reinforcing the foregoing view is Andrew Kimbrell (2002 p. 22), who clearly states that “relatively smaller farm sizes are 2 to 10 times more productive per unit acre than larger ones”. For example, Kimbrell (2002 p. 22) remarks that small farms measuring 27 acres or less and cultivating several crops “recorded ten times the productivity” of that which was recorded by larger farms, nurturing a single crop.

In light of the foregoing figures, it is clear that in comparison to diversified farming methods, the growing evidence and more careful analysis shows that monocultured farms provide fewer yields and slighter profits.

Of significant concern also are the “environmental and human health impacts for which industrial scale monocultured farms allow society to pay” (Kimbrell, 2002 p. 22). Expressing his consternation about the deleterious impact on the environment resulting from industrial agriculture, Andrew Kimbrell (2002 p. 31), who asserts:

No myth can hide the fact that decades of industrial agriculture have been a disaster for the environment. Its chemical poisoning has caused eco-cide among countless species. And it has resulted in irreversible soil loss, reduction in soil and water quality, and the proliferation of non-native species that choke out indigenous varieties. Without question, the tilling, mowing and harvesting operations of industrial agriculture have affected, and continue to catastrophically destroy, wildlife and soil and water quality.

Given, the effects monocultures can have on our soil, water and wildlife, I shall now explore one example of the extent to which such environmental degradation can significantly compromise human health.

Selenium and Human Health

Despite, the role of several nutrients contributing to the overall maintenance of human health, the essential trace mineral selenium is one nutrient we now know to be of fundamental importance to the body (De Lorgeril, Salen & Accominotti, 2001; Rayman, 2000). According to Professor Margaret Rayman (2000 p. 233), selenium has the ability to support “proper

functioning of the immune system...counteracting the development of virulence and inhibiting HIV progression to AIDS”. Moreover, the capacity of selenium to minimise oxidative stress and inflammation in the human body is becoming increasingly appreciated (Rayman, 2000). Neve (cited in Rayman, 2000 p. 240), for example, has shown that oxidative modification of lipids and reductions in platelet aggregation can be achieved through recommended daily levels of selenium (Neve cited in Rayman, 2000 p. 240). Given the foregoing findings, it is clear that a decline in selenium intake over a prolonged period can lead to a serious compromise of our health.

According to Troeh and Thompson (2005), selenium occurs naturally within the soil, with the developing crop absorbing selenium from the soils in which it is grown. However, plant absorption of selenium can be compromised by the routine application of chemical agents employed in the farming of monocultures (Troeh & Thompson, 2005). For example, it has been shown that the use of sulphur fertilisation on sulphur deficient soil can reduce the selenium content of vegetable sprouts such as alfalfa from low to deficient (Troeh & Thompson, 2005). Hence, in light of the protective role selenium plays in the maintenance of the human body, we can appreciate the deleterious impact monoculture practices are having on the land that produces the food we eat, and thus in turn upon the people who eat it.

Consistent with the foregoing discussion, I intend now to examine one specific dimension of monoculture that I believe is contributing to a specific genre of health risk factors that have not yet been fully appreciated.

Agrochemicals

According to Emeritus Professor Colin Archibald Russell (2000), agrochemicals are chemical substances designed with the intention to protect and assist in the production of the food we eat. However, Russell (2000 p. 29) clearly states that these intentions are not yet

being met urging that “despite all the efforts made to reduce losses, billions of pounds worth of growing crops are destroyed annually by pests...”. Although the foregoing intentions remain unfulfilled, Russell (2000 p. 29) encourages us to continue with the application of agrochemicals, “despite the fact that they are all highly toxic” to our health. On Russell’s (2000) view, even though the application of agrochemicals is highly toxic to human health, they nonetheless provide an element of protection from pests to the developing crop and should be maintained. In proposing this view, Russell (2000) is in essence suggesting inadvertently that we place our personal health aside for the greater good of the foods that sustain us as a community. Let me now try to show in what follows that if we accept Russell’s (2000) view, we will inadvertently compromise health interests both at the personal and the community contexts.

The Pesticides Catastrophe

I calculate that in the United States alone the use of toxic genetic chemicals (herbicides, insecticides, hormones, steroids etc) cause damage equal to the atomic fallout from 145 H bombs of 14 megatons each, or in terms of atomic bombs-from 72,500 atomic bombs of the Hiroshima type. For this reason, disease of all kinds and the birth of mentally retarded babies have increased dramatically in the last 10 years. The damage to plants, crops, soil fertility and water pollution is practically incalculable. [This being so], if the use of these toxic genetic chemicals persists in agriculture and on food, this will cause the destruction of the American people (Mosca cited in Muller 2005 pp. 30-31).

It is clear from the above quote that the scale by which the harmful effects of agriculture can be measured is staggering. To consider that 38 years ago the impact of chemical agents on the human body were already “incalculable” is a serious indictment of Russell’s (2000) view especially in light of the exponential rise in the application of pesticides within the United States (Levine, 2007). With the foregoing statistical scenario in mind, let us now examine the human health implications that can arise through the application of pesticide to the foods we eat.

Pesticide Exposure and the Risk to Human Health

According to Consultant of Risk Communication, David Ropeik and Regulatory Toxicologist, George M. Gray, direct contact with pesticide can lead to symptoms of low level exposure including fatigue, diarrhoea and vomiting, with severe poisoning resulting in coma, convulsions and even death (Ropeik & Gray, 2002). However, given that many of us will not be in direct contact with the application of pesticides, the question is, will people indirectly exposed to pesticide present with symptoms of ill health?

Jack Holland and Phil Sinclair inform us that people who consume food sprayed with pesticide may in fact be indirectly and in some cases directly exposed to pesticides (Holland & Sinclair, 2004). Holland and Sinclair (2004 p. 28) write:

Pesticides may reach food and drinking water in a variety of ways, with the most obvious being through direct contamination of produce as a result of deliberate application to control pests on the growing crop. Contamination of food may also occur through uptake by the roots of plants of pesticide residues in the soil within the field in which the crop is grown.

Reinforcing this view are Landrigan and Claudio (2009 p. 942), who assert, “surveys of foods commonly consumed by infants have shown that a high proportion of them contain pesticide residues and that these foods also frequently contain residues of multiple pesticides”. According to Landrigan and Claudio (2009), the presence of pesticide residue in our food is a serious concern, given the extent to which it can compromise human health. For this reason, Landrigan and Claudio (2009 p. 942) alert us to the following example:

Observations of children’s exposures to pesticides in food were complemented by a 1995 study that found 16 different pesticides present in some of the baby foods most commonly sold in the U.S. These pesticide residues included eight that have been shown to be toxic to the nervous system, five that affect the endocrine system, and eight that are potential carcinogens.

Of the eight potential carcinogenic pesticide residues identified in the foregoing study, Iprodione was given particular attention (Wiley & Davies, 1995). Iprodione, an imidazole fungicide that has been shown to produce testicular adenomas in male rats (LaDou, 2006)

was found “more often and at higher levels than any other pesticide detected” in the study (Wiley & Davies, 1995). In light of the foregoing data, infant exposure to Iprodione is undoubtedly a serious concern.

Moreover, there is a concern that the pesticide residues that can currently be identified in food frequently exceed regulatory standards (Hill, 2004; Rose, 1998). Professor Marquita Kaya Hill (2004 p. 383) writes that, “only a small percentage of all fresh produce can be checked by the US FDA for pesticide residues that may exceed tolerable levels”. Hill (2004 p. 383) points out that “most of the more than 40 fruits and vegetables on the market go unexamined”. Hence, given the apathetic regulation of pesticide residue in the United States, the likelihood that Americans will be exposed to intolerable levels is alarmingly high.

Reinforcing the foregoing view is John Rose (1998 p. 123) who reports, that “about 35 percent of the foods purchased by American consumers have detectable levels of pesticides, with between 1-3% of these foods containing residue levels that are above the legal tolerance level”. Rose (1998 p. 123) attributes the foregoing statistic to “the analytical methods now employed in the U.S. that detect only one-third of the more than 600 pesticides in use”. According to Rose’s (1998) research, we are exposed to approximately 325 undetected pesticides in our food supply alone. This being so, it is clear that the actual rates of exposure to pesticide toxins is considerably higher than the more commonly quoted statistics of one to three percent reported earlier. Far higher percentages, for example, have been reported in Pakistan where “out of 250 samples screened, 93 contained residues, including 45 samples which contained residues above the maximum limits proposed by the FAO [Food and Agriculture Organisation]/WHO” (Richardson, 1995 p. 269). Hence, in light of the foregoing discussion, it now seems incontestable that we can be exposed to pesticides residues that exceed regulatory standards.

In addition, it is reported that “some pesticide residues remain in fruits and vegetables even after they have been washed and peeled” (Rose, 1998 p. 123). For example, Dr DT Wigle (2003 p. 269) writes:

Aldicarb, a carbamate insecticide used on fruits, nuts, potatoes and other vegetables...is not removable by peeling or washing because it is a systemic agent, that is, it is taken up by roots into the plant itself.

According to Wigle (2003), individual bananas grown in the United States contained ten times the legal level of aldicarb imposed by the FDA. This is a serious concern, given that the ingestion of aldicarb even at low doses has been shown to seriously compromise human health (Rall & Pope, 1995). For example, watermelon contaminated with aldicarb led to 690 individual human poisonings in the state of California with seizure, loss of consciousness, dysrhythmias, hypotension, dehydration and anaphylaxis being reported (Rall & Pope, 1995).

Chemical Fertiliser

It is well established that the extensive application of pesticides to arable land has also led to widespread soil infertility in the West (Montgomery, 2007; Sumner, 1999). The application of pesticides has been shown to render sterile, otherwise organic materials that revitalise soil (Hosner & Frazee, 2004); in turn making soil devoid of the nutrient base required to sustain plant cultivability (Sumner, 1999). In an effort to supply nutrients to the soil, chemical fertiliser is thereby applied (United Nations Industrial Development Organisation and International Fertilisers Development Centre, 1998) with the aim of sustaining future crop yields (Sumner, 1999). Thus, with a sharp rise in the sterility of the earth's soil there has been an exponential increase in the application of chemical fertiliser (Blatt, 2008; Stauffer, 2004). As the earth's soil continues to deteriorate, we have become highly dependent on the application of chemical fertiliser to sustain the plants which produce the food we eat, without appreciating the adverse health implications that doses of chemical

fertiliser actually have on our health (Blatt, 2008; Stauffer, 2004). Let us now consider in what follows the range of serious health implications which can follow from the excess application of chemical fertiliser.

Is our Drinking Water Laced with Chemical Fertiliser?

According to Norberge, Goering and Page (2001), soil is often incapable of absorbing the high amounts of chemical fertiliser applied to it, with a significant amount of chemical fertiliser runoff being leached into our water supply. Of the chief chemical fertilisers which leech into our water supply nitrogen fertiliser is most prevalent (Norberge, Goering & Page, 2001). It is estimated that in the United States, for example, 50 percent of nitrogen fertiliser ends up in either surface or ground water, as nitrate (Blatt, 2008; Norberge, Goering & Page, 2001). When nitrogen is applied to the soil, bacteria convert nitrogen to nitrate, as nitric oxide (Norberge, Goering & Page, 2001). This conversion is crucial as the “nitrogen used by plants is absorbed in the nitrate form” (Oram, 2008). Given that nitrate is, as mentioned above, highly leachable it can eventually end up in ground water even with the presence of excessive rainfall or over irrigation watering (Norberge, Goering & Page, 2001; Oram, 2008). Despite alleged claims that nitrates have no toxicity, (Du, Zhang & Lin, 2007), recent research has shown that its metabolites such as nitrite or N-nitroso compounds can lead to the development of methaemoglobinemia and some forms of cancer (Norberge, Goering & Page, 2001; Stauffer, 2004; Stone, 2007). The problem of nitrogen residue from chemical fertilisers is thus a far more serious health risk than earlier recognised.

Methaemoglobinemia

Du, Zhang and Lin (2007 p. 1248) state that once a glass of water is consumed “the dorsal surface of the tongue symbiotically harbours a specialised flora of anaerobic bacteria

which can rapidly reduce nitrate to nitrite”. However, if the conversion of nitrate to nitrite occurs too quickly, the body can be exposed to high concentrations of nitrite which can compromise human health (Stone, 2007). According to Public Health Toxicologist, Professor Dave Stone (2007), nitrite can oxidize iron in the haemoglobin of the red blood cells to form methaemoglobin, which lacks the oxygen carrying capacity of haemoglobin. When a significant percentage of haemoglobin is converted to methaemoglobin, a condition known as methaemoglobinemia develops, where the red blood cells do not have the capacity to carry sufficient oxygen to the body (Stauffer 2004; Stone, 2007).

It is claimed that most humans have the ability to metabolise methemoglobin back to its oxygen carrying form oxyhaemoglobin (Stone, 2007). However, in infants and individuals with genetically impaired enzymes systems there is difficulty with metabolising methaemoglobin (Stone, 2007). In new born babies the gastric acid barrier remains under development in the early weeks of life (Stone, 2007). When nitrate is introduced into the digestive system of a new-born child “bacteria can colonise in the gut allowing for more conversion of nitrate to nitrite” (Stone, 2007 p. 3). In most adult humans nitrite can be buffered by stomach acid, which is still being developed in human infancy (Stone, 2007). Given, that the gastric pH in infants is less acidic than adult gastric pH, it is highly likely that infants exposed to high concentrations of nitrite will develop methaemoglobinemia (Stauffer, 2004; Stone, 2007).

According to the WHO (2009b), “....others at risk of developing methaemoglobinemia include, adults with hereditary predisposition, people with peptic ulcers or chronic gastritis, as well as dialysis patients”. Of the foregoing conditions it is estimated that 14.5 million Americans are diagnosed with a peptic ulcer (Lethbridge-Cejku & Vickerie, 2003). A common cause of peptic ulcer is the microaerophilic bacterium known as *helicobacter pylori*

(Underwood, 2004). It is estimated that 25 to 30 percent of Australians and 30 percent of Americans are infected with *Helicobacter Pylori*, with the incidence in developing nations estimated at 70% or higher (Edlin & Golanty, 2007; Stenstrom, Mendis & Marshall, 2008). It is well established that individuals diagnosed with *helicobacter pylori* have low stomach acid and thus find it difficult to buffer the presence of nitric oxide in the digestive system (Edlin & Golanty, 2007). This being so, a significant number of people infected with *helicobacter pylori* are at serious risk of developing methaemoglobinemia (Edlin & Golanty, 2007).

Cancer

Once nitrate is converted to nitrite, it is then broken down into N-nitroso compounds (NOC's) within the stomach (Du, Zhang & Lin, 2007). According to Du, Zhang and Lin (2007), impaired stomach acid stimulates the production of unstable NOC compounds which are associated with stomach cancer. Individuals diagnosed with *helicobacter pylori* often present with impaired stomach acid (Underwood, 2004). It is well established that "lymphomas of the stomach...are closely related to preceding *helicobacter* infection" (Dixon cited in Underwood, 2004 p. 376). Hence, given the foregoing *helicobacter pylori* statistics, exorbitant numbers of people could develop lymphomas of the stomach.

Moreover, Gulis, Czompolyova and Cerhan (2002), demonstrated that long term consumption of ground water containing nitrate increases a person's risk of developing non-Hodgkin's lymphoma and colorectal cancer. According to Gulis, Czompolyova and Cerhan (2002), epidemiological evidence confirmed positive associations between the levels of nitrate in municipal drinking water and the increased risk of males developing colorectal cancer, while the risk for both men and women of developing non-Hodgkin's lymphoma is also significantly increased. For example, the risk of a male developing colorectal cancer

increased by 5.1 percent when the nitrate level in ground water exceeded the maximum permitted level of contamination advised (Gulis, Czompolyova & Cerhan, 2002). According to Stauffer (2004), exceeding maximum contamination levels is common, with 15 percent of domestic wells in agricultural and urban areas of the United States found to have nitrate levels above the maximum contamination levels permitted. This being so, it is clear that when exposed to levels of nitrate which exceed maximum contaminate levels, the risk of developing some forms of cancer is significantly increased.

Antibiotics

Having provided an account of some of the health issues arising from pesticides and fertilisers used to grow our foods, we are now in a better position to appreciate that the problems arising from a number of other technological interventions and processes associated with food production represent in their **cumulative** effect, a monumental threat to our health. To date, discussions of the important role played by nutrition in health have not reflected adequately, if at all, the way in which the technologisation of the foods we eat radically change the philosophical meaning we can attach to the concept of nutrition (Laura & Chapman, 2009). I shall now explore the subtlety of this relationship further, with the explicit aim of showing that attempts to resolve the crisis in health are inevitably bound to fail without understanding it.

There is little point in talking about the nutritional value of meat without also talking about the health issues arising from the technological interventions utilised to ensure its nutritional integrity. In this section we shall see that these dimensions of food production do not necessarily connect harmoniously.

There is growing concern over the health implications which follow from the transmission of resistant strains of bacteria from live stock to humans (Barton & Wilkins,

2001; Philips et al., 2004; Van den Bogarrd et al., 2002). It is held that the overuse of antibiotics to treat bacterial infections in livestock is resulting in resistant strains of bacteria which cannot be treated by antibiotics (Barton & Wilkins, 2001; Philips et al., 2004; Van den Bogarrd et al., 2002). Hence, there are now cases where life threatening strains of bacteria cannot be treated effectively with high strength antibiotics (Barton & Wilkins, 2001). This being so, the health of livestock is seriously compromised, with many animals dying as a result of continuous bouts of bacterial infection (Barton & Wilkins, 2001). If resistant strains of bacteria are transmitted to humans through the food chain, it is held that similar outcomes could occur (Barton & Wilkins, 2001; Philips et al., 2004; Van den Bogarrd et al., 2002).

Van den Bogarrd et al. (2002 p. 497) states that “acquired resistance against commonly used antibiotics has been observed ever since these agents were introduced in human and veterinary medicine”. However, the rate of resistant bacteria has increased considerably in recent years with multiple resistant bacteria now constituting a global problem (Van den Bogarrd et al., 2002). According to Van den Bogarrd et al. (2002), unnecessary, long term use of antibiotics is a significant factor contributing to the accelerated rise in resistant bacteria among livestock (Van den Bogarrd et al, 2002). In the Netherlands, for example, of the 380,000 kilograms of antibiotics prescribed in 1990, “80,000 kg were used in humans and 300,000 kg on veterinary prescription in animals” (Van den Bogarrd et al., 2002 p. 497). Of the foregoing figure, it is estimated that approximately 85 percent of the antibiotics administered were utilised to ensure the survival of livestock (Four Corners, 2001). Given, the overcrowded and unhygienic environment in which livestock live, it is easier for bacterial infections to spread, with livestock frequently exposed to bacterial infection (Four Corners, 2001). This being so, the routine application of antibiotics is carried out with the aim of minimising disease (Four Corners, 2001). However, the overuse of

antibiotic treatment has led to bacteria which are resistant to the most potent of antibiotics (Four Corners, 2001).

According to Van den Bogarrd et al. (2002), the deadly bacteria, enterococci, has been shown to be resistant in both animals and humans to the antibiotic Vancomycin and its analogues including erythromycin (Van den Bogarrd et al, 2002). Vancomycin, a parenteral therapy for resistant gram positive cocci, is considered a last resort antimicrobial agent recommended strictly for use when all other antimicrobial agents are likely to be ineffective (Hayward, Levin & Sondheimer, 2002). In their study, Van den Bogarrd et al. (2002 p. 502), reported that:

The overall prevalence of antibiotic resistance between broiler and broiler farmers and poultry slaughters indicates that contact with broilers is a risk factor for colonisation of humans with resistant bacteria. In laying hens and laying hen farmers this was only the case for tetracycline and erythromycin resistance, which correlated with increased risk for humans from animals with a higher degree of resistance.

Reinforcing the foregoing finding is Professor of Microbiology Mary Barton and Jodi Wilkins, who report that “Vancomycin was shown to be ineffective **in** the treatment of resistant **enterococci** in humans” (Barton & Wilkins, 2001 No. 1/105). According to Barton and Wilkins (2001), the liberal use of the antibiotic avoparcin is a significant contributing factor **in** the prevalence of resistant enterococci in animals and medical problems of resistance in human pathogens. Avoparcin is a vancomycin analogue, known to produce similar effects to the antibiotic vancomycin, with vancomycin resistant enterococci (VRE) offset by the long term application of avoparcin (Barton & Wilkins, 2001). For this reason, several countries have placed a ban on the routine application of avoparcin with significant reductions in VRE among poultry meat, and within the gut flora of healthy humans (Barton & Wilkins, 2001). Hence, in light of the foregoing scenario it is clear that the routine application of antibiotics in the treatment of veterinary animals can significantly influence the development and transmission of resistant bacteria in humans, which can compromise human

health. Let us now consider the impact on health associated with other aspects of food technologisation.

The Problem of Ripening Food Artificially

According to Professor Adel Kader (2002), several fruits are picked prematurely with the aim of reducing postharvest handling damage. Harvesting fruit ahead of time means that fruit is not given the opportunity to naturally ripen, inhibiting the development of its texture, flavour and colour (Kader, 2002). Once shipped, ripening is re-stimulated through the application of artificial ripening agents (Kader, 2002). However, recent research is now revealing that the application of these agents can compromise human health (Janick & Paull, 2008; Prakash, 2005; Rahman, Chowdhury & Alam, 2008). This being so, let us consider in what follows the ramifications for human health which follow from the application of artificial ripening agents.

In parts of the developing world, the ripening agent commonly used to stimulate the ripening process is calcium carbide (Rahman, Chowdhury & Alam, 2008; Janick & Paull, 2008; Prakash, 2005). According to Rahman, Chowdhury and Alam (2008) calcium carbide is a strong reactive chemical, known to have carcinogenic properties. This being so, its use in the developed world is often restricted or prohibited (Rahman, Chowdhury & Alam, 2008). Nonetheless, calcium carbide is still applied to bananas and tomatoes in Australia and the United States (Rahman, Chowdhury & Alam, 2008). Thus to focus on the nutritional value of bananas and tomatoes without recognising the serious health risks associated with the technological processes that prepare these foods for the market is highly problematic and educationally dangerous.

The application of calcium carbide produces the chemical agent acetylene gas, responsible for aberrant ripening (Rahman, Chowdhury & Alam, 2008; Per et al, 2007). To stimulate ripening, “high concentrations of acetylene are required to stimulate the ripening process” (Rahman, Chowdhury & Alam, 2008 p. 43). According to Rahman, Chowdhury and Alam (2008), acetylene is considered an extremely hazardous chemical that when applied at high concentrations **“contain traces”** of arsenic and phosphorus hydride. It is reported by Rahman, Chowdhury and Alam (2008 p. 43) that:

Early symptoms of arsenic and phosphorous poisoning include vomiting, diarrhoea [with or without blood], burning sensation of the chest and abdomen, thirst, weakness and difficulty in swallowing and speech. Other effects include numbness in the legs and hands, cold and damp hands and low blood pressure and in cases it can be fatal if not treated in time.

Moreover, the application of calcium carbide can significantly compromise the neurological system (Rahman, Chowdhury & Alam, 2008; Per et al., 2007). For example, ingestion of calcium carbide has been demonstrated to induce headaches, dizziness, mood disturbances, sleepiness, mental confusion, and seizures, with memory loss and cerebral oedema reported in the long term (Rahman, Chowdhury & Alam, 2008; Per et al., 2007). The development of cerebral oedema is a serious concern given that there is evidence which shows that even early treatment of cerebral oedema did not “prevent severe or fatal nervous system damage in almost one-half of subjects in one study” (Crocetti, Barone & Oski, 2004 p. 242).

Reinforcing the foregoing concerns, Professor Huseyin Per et al. (2007), provide a clinical account of the effect calcium carbide can have on a child. Per et al. (2007 p. 179) state that a healthy 5 year old girl “with no chronic disease history was transferred to our emergency department with an 8 hour history of coma and delirium”. According to Per et al. (2007), after acquiring a careful case history it was found that the child had consumed an unripe date treated with calcium carbide. Given the foregoing clinical symptoms, Per et al.

(2007 p. 180) “warn that the use of artificial ripening agents can be fatal”, and that “traces of calcium carbide are unfit for human consumption”.

In light of the foregoing evidence **it is clear that the application of artificial ripening agents can seriously compromise human health**, and that health education can no longer confine itself to approaching the value of food in terms of the nutritional value of specific food items such as dates.

Food Transportation

It is reported that ‘in transit vibration’ of foodstuffs is leading to physiological changes within the food we eat which can compromise human health (Fischer, Craig & Ashby, 1990; Vursavus & Ozguven, 2004; Wills et al, 1998; Zhou et al, 2007). This being so, we shall observe in what follows, the ramifications which arise from ‘in transit vibration’ of foodstuffs.

According to Fischer, Craig and Ashby, ‘in transit vibration’ can induce bruising, discoloration and reduce shelf life of a fruit (Fischer, Craig & Ashby, 1990). In their paper titled, Reducing Transportation Damage To Grapes and Strawberries (1990), it was reported that vibrations which are common to modern transportation led to the deterioration of aesthetic qualities in grapes and strawberries (Fischer, Craig & Ashby, 1990). For example, grapes vibrated between 5 to 10 Hertz resulted in 16 percent of grapes shattering and the colour of grapes developing a significantly darker outer coat due to sub surface bruising (Fischer, Craig & Ashby, 1990).

Reinforcing the physiological degradation of food through ‘in transit vibration’, is Kubilay Vursavus and Faruk Ozguven (2004). Vursavus and Ozguven (2004 p. 311) state that “mechanical injuries are responsible for considerable decay of fresh fruits and

vegetables”. According to Vursavus and Ozguven (2004), apples packaged tightly together, and vibrated at frequencies consistent with non-simulated vibrational frequencies, led to damage of the cuticle and epidermis of Golden Delicious apples. For example, tightly packed apples vibrated for 20 minutes at 5 to 10 hertz, increased the onset of bruising to the cuticle and epidermis of apples by 31 percent (Vursavus & Ozguven, 2004). Moreover, “surface discolouration” and “cell wall fatigue” was observed at this frequency (Vursavus & Ozguven, 2004 p. 317).

Contributing to this discussion is Professor Ran Zhou et al. (2007), addressing the mechanical damage to Huanghua pears during in transit vibration (Zhou et al, 2007). Zhou et al. (2007 p. 20) state that:

Mechanical damage caused by different vibration levels to pears affected plasma membrane integrity of skin cells and contents of polysaccharide components in the cell walls of pear tissue, which contributed to colour change and softening of pears during subsequent commercialisation after transportation.

It was reported by Zhou et al. (2007 p. 26) that heavier visible damage was observed in mature fruit, with a “loss of firmness in all samples”. Hence, in light of the foregoing reports it is clear that fruit, in particular, can undergo **serious** physiological damage during transportation.

Implications for Human Health

According to Professor Neason Eskin and Professor David S. Robinson (2000), mechanical damage to a food item can increase the likelihood of pathogens entering our food. It is reported by Eskin and Robinson (2000 p. 52) that “...even for pathogens that can penetrate the skin of the produce, the presence of wounds or cuts accelerates their penetration and infection”.

The WHO (2009c p. 33) reports that food borne illness is likely “if the food handler is suffering from a gut infection”. According to the WHO (2009c) if a food handler becomes a chronic carrier of the infection multiple cases of food borne illness can occur. It is estimated that approximately 1300 people can be infected by one handler alone (WHO, 2009c). In the developed world, food borne illness leads to the hospitalisation of 325,000 people and death of 5000 people per year (WHO, 2007b). This being so, it is clear that so subtle a problem as the vibrations at which our food is transported can lead to serious health problems. Moreover, when we consider the risk of developing resistant strains of bacteria through the overuse of antibiotics, food borne pathogens may not be treatable with current medications.

The Effect of Cold Storage on Fruits and Vegetables

It was reported in 2008 that fruit and vegetables sold in major supermarkets across Australia were placed in cold storage facilities for periods of ten months before being sold (The Sydney Morning Herald, 20th January 2008). According to Dr Stephen Morris fruit is often stored for extensive periods of time within cold storage facilities, which have been shown to compromise the nutritional integrity of the food we eat (The Sydney Morning Herald, 20th January 2008). This being so, we shall in what follows examine the implications which arise from the holding of fruit and vegetables for long periods in cold storage.

Assistant Professor of Pharmacology, Andrea Tarozzi et al. (2004 p. 1105), state, that “cold storage can **affect** the bioactivity of fruit”. According to Tarozzi et al. (2004), ‘Golden Delicious’ apples exposed to cold storage for a period of six months led to reductions in the total phenolic concentration and antioxidant activity of organically grown apples. A reduction in the foregoing phytochemical assemblage is a serious concern given that apples “provide a major source of phytochemicals in the human diet” (Tarozzi et al, 2004 p. 1105). Tarozzi et

al. (2004 p. 1105), state, that phytochemicals play “a critical role in the prevention of oxidative damage to biomolecules and associated pathologies in humans, including heart disease and cancer”. It has been reported that there is a correlation between the consumption of apples and a reduction in the risk of stroke (Knekt et al., 2000), heart disease (Knekt et al., 1996) and lung cancer (Le Marchand et al., 2000). Hence, Tarozzi et al. (2004 p. 1109) note that in order to maintain ‘adequate’ phytochemical intake we would need to consume two apples daily, stored for 6 months, too match the health benefits provided by one freshly picked apple.

Reinforcing the foregoing concerns are Dr Beatriz Rosana Cordenunsi et al. (2005) from the University of De Sao Paulo. According to Cordenunsi et al. (2005), reductions in the concentration of anthocyanin and ellagic acid compounds, total phenolics and antioxidant activity of strawberries can fluctuate when stored at temperatures of 6, 16 and 25 degrees Celsius for up to 6 days. For example, at six Degrees Celsius, the level of anthocyanin content reported for strawberries was significantly lower than storage at 16 Degrees Celsius (Cordenunsi et al., 2005). Wills and his co-workers report that a constant of +1 Degree Celsius is to be kept for all fresh produce “in order to maximise storage life, avoid freezing, minimise desiccation and avoid gas injury” (Wills et al., 1998 p. 66), though it is admitted that significant fluctuations can transpire (Wills et al, 1998). The problem is that a reduction in anthocyanin content, for example, is a serious concern given its importance in supporting visual acuity, urinary tract health, and anticancer activity (Prior, cited in Meskin et al., 2003).

Moreover, Miebach-Mayer and Spieb (2003) acknowledge the adverse impact that cold storage can have on the nutritional integrity of vegetables. For example, Miebach-Mayer and Spieb (2003 p. 212) report that:

Within 8 weeks of cold storage at 1 degree Celsius and 97 percent humidity, the raw carrots lost about 30 percent of their initial total carotenoid content. Lycopene content was reduced to about 60 percent, while only 20 percent of B carotene content was lost.

According to Miebach-Mayer and Spieb (2003), the consumption of the carotenoid, lycopene, has been shown to be associated with a decreased risk of cardiovascular disease and cancer, Kintoki carrots, serving as an “additional source of lycopene in the diet” (Miebach-Mayer & Spieb, 2003, p. 211). Hence, in light of the foregoing findings it is clear that the employment of cold storage for long periods of time can compromise the nutritional integrity of the foods we require to maintain optimal health. Similarly, this research shows that the conventional listings for the nutritional value of specific fruits and vegetables is extremely misleading.

Food Additives and the Aspartame (APM) Problem

According to Professor Gordon Edlin and Professor Eric Golanty, fabricated foods contain a diverse range of additives that are reported to modify flavour, texture, stability and colour (Edlin & Golanty 2006). However, it has been observed that despite the compositional changes food additives can produce, consumption of food additives can compromise human health (Allen & Albala, 2007; Edlin & Golanty, 2006; Yaffe & Aranda, 2004). Let us now then consider some of the implications which follow from the consumption of food additives. To keep this master thesis within manageable bounds, I shall continue my analysis to the effect the food sweetener, aspartame, can have on human health.

Aspartame is a methyl ester consisting of two amino acids, phenylalanine and aspartic acid and the wood alcohol, methanol (Mercola & Pearsall, 2006). According to Mercola and Pearsall (2006 p. 46), the amino acids, phenylalanine and aspartic acid, are found naturally within our food supply, yet, “never occur isolated together” or “attached as a single entity”. The combination of phenylalanine and aspartic acid to form the artificial sweetener

aspartame, thus, is a 'unique amino acid sequence', which "does not occur anywhere in nature" (Mercola & Pearsall, 2006 p. 46). Due to its 'unique amino acid sequencing', the human body is unable to recognise this newly formed combination instead identifying it as a foreign chemical (Mercola & Pearsall, 2006). The body then attempts to metabolise and excrete this foreign material, which cannot be processed by the body (Mercola & Pearsall, 2006). According to Mercola and Pearsall (2006), the accumulation of this foreign chemical within vital organs and in the blood stream has the potential to cause "havoc" within the human body (Mercola & Pearsall, 2006 p. 51).

Aspartame and Neurological Disorders

When you consume a food in its 'natural state', the properties of that food "exist in an ideal relationship to each other" which facilitate the safe and efficient absorption of food within the human body (Mercola & Pearsall, 2006 p. 46). While phenylalanine and aspartic acid do naturally occur in nature, their consumption outside of their 'natural state' has been shown to compromise the central nervous system:

When phenylalanine and aspartic acid are consumed as free form amino acids, rather than with the full balance of amino acids found in foods, they enter your central nervous system in unusual and abnormally high concentrations, causing excessive firing of brain neurons and potential cell death (Mercola & Pearsall, 2006 p. 46).

According to Professor of Neurosurgery Dr. Russell Blaylock (1996), Aspartate (aspartic acid) acts as a neurotransmitter in the brain, assisting in the transmission of information from neuron to neuron. However, excessive amounts of Aspartate in the brain have been shown to kill particular neurons by way of allowing an influx of too much calcium to enter the cells (Blaylock, 1996). This process then allows an overproduction of free radicals to accumulate in the cells, resulting in cell death (Blaylock, 1996). This being so, Aspartate is referred to as an 'exotoxin' because it excites or stimulates the neural cells in the brain to death (Blaylock, 1996). Urologist Dr R.A.S Hemat (2003 p. 351) states that:

excitotoxins play a critical role in the development of several neurological disorders including migraines, seizures, infections, abnormal neural development, certain endocrine disorders, neuropsychiatric disorders, learning disorders in children, AIDS dementia, episodic violence, Lyme borreliosis, hepatic encephalopathy, specific types of obesity and especially neurodegenerative diseases such as ALS, Parkinson's disease, Alzheimer's disease, Huntington's disease and olivopuncocerebellar degeneration.

According to Hemat (2003), when aspartame is consumed with a carbohydrate rich meal, phenylalanine concentrations are increased. As a result of these chemical changes, amino acid neurotransmitter precursors have the potential to alter the indoleamine or catecholamine balance within the brain, and “thus have a profound effect on mood and cognition resulting in depressed mood, anxiety, dizziness, panic attacks, nausea, irritability, impairment of memory and concentration” (Hemat, 2003 p. 351). Hemat (2003) points out, that Aspartame is made up of 50% phenylalanine, “which as an isolate is neurotoxic and goes directly into the brain” (Hemat, 2003 p. 351). Further, Hemat (2003) informs us that Phenylalanine reduces serotonin which can trigger manic depression, anxiety, hallucinations, panic attacks, insomnia, paranoia, mood swings and even suicidal tendencies.

Can Aspartame Increase the Risk of Cancer?

The poison methanol represents 10 percent of aspartame, “which is created when aspartame is heated above 30 degrees Celsius in, for example, the preparation of processed foods” (Day, 2001 pp. 129-130). According to Day, methanol breaks down in the body to produce formic acid and the ‘neurotoxin’ formaldehyde (Day, 2001). The United States Environmental Protection Agency (EPA) considers methanol to be a “culminative poison due to the low rate of excretion once it is absorbed” (Monte, 1994 p. 42). It is reported that “a one litre carbonated beverage, sweetened with aspartame, contains around 56mg of methanol” (Day, 2001 p. 130), which for high consumers of soft drinks, sweetened with aspartame, can result in the consumption of “250mg of methanol daily... amounting to 32 times the EPA warning limit” (Day, 2001 p. 130). According to the EPA, symptoms of methanol poisoning

include dizziness, nausea, vertigo, memory lapses, shooting pains in the extremities and behavioural disturbances (Monte, 1994).

The methanol by-product, formaldehyde, has been shown to induce cancer in laboratory animals and is likely to cause cancer in humans (Mercola & Pearsall, 2006). Hence, in several studies it has been demonstrated that the production of formaldehyde is likely to be the contributing agent, leading to the development of some forms of cancer in animals to which aspartame has been given (Mercola & Pearsall, 2006).

In their paper titled, Aspartame induces lymphomas and leukaemias in rats (2005), Soffritti et al. set out to examine the carcinogenicity potential of aspartame, following protocol supported by Good Laboratory Practices. In their assessment Soffritti et al. (2005; 2007) reported on the incidence of lymphomas, leukaemia and brain tumours in Sprague-Dawley rats fed aspartame at concentrations very close to human levels of exposure. In their discussion, Soffritti et al. (2005 p. 8) noted that:

In our experimental conditions, it has been demonstrated, for the first time, that AMP causes dose related statistically significant increases in lymphomas and leukaemia's in females at dose levels very near those to which humans can be exposed. Moreover, it can hardly be overlooked that the lowest exposure of 80 ppm, there was a 62% increase in lymphomas and leukaemia's compared to controls.

Reinforcing these concerns is neurologist, Dr. John Olney, who noted that one of the by-product's of aspartame metabolism, Diketopiperazine (DKP), when nitrosated in the stomach, produced a compound that was similar to N-nitrosourea, "a powerful brain tumour causing chemical" (Mercola & Pearsall, 2006 p. 59). According to Mercola and Pearsall (2006), Olney hypothesised in 1989 that the increasing incidence of reported brain cancer in the United States, could be attributed to the introduction of aspartame (Mercola & Pearsall, 2006). Two years later the United States Food and Drug Administration supported this hypothesis, when it was found that 12 of 320 rats, fed aspartame containing feed, for a period

of two years, developed malignant brain tumours (Mercola & Pearsall, 2006). In light of the foregoing evidence it is easier to see why the use of aspartame is a serious concern, particularly with respect to the deleterious effect it can have on the integrity of the human brain.

We have seen in this chapter that the technologisation of food has, despite its **putative benefits**, dramatically transformed the natural food products we once grew and harvested from the earth. This being so, I have endeavoured to show that we have not only compromised much of the nutritional integrity of our foods, but so chemicalised and processed them that they have in many ways become toxic and carcinogenic to us, especially over the course of long term consumption. The point of these deliberations has been to show that understanding the relationship between what we eat and our health cannot be reduced to quantative recommendations about nutritional requirements that somehow almost magically ensure good health. What we have seen here is that the crisis in health is far more subtle and much more complicated.

Chapter III

Reductio-Mechanism and the Paradigm Shift to Quantum Holism in Nature

Within the contemporary literature a number of researchers take for granted the extent to which the technologies we have created to cultivate and produce the food we eat provide a highly technologised society with an extremely convenient system to access food of all kinds, virtually at will (Casper, 2003). In the previous chapter, for instance, we observed that the employment of cold storage affords the opportunity for food shoppers to consume fruits and vegetables at any time of the day and stage of the year, despite their seasonal availability (See Chapter II p. 45). Given high-tech food production, we now rely little on the labour of our hands or animals to cultivate the food we eat, relying instead upon chemical agents and various forms of machinery and equipment to produce the foods we consume (Casper, 2003; Laura & Chapman, 2009). Despite the expedience of food production, the question remains whether the problems created by industrial agriculture outweigh the benefits of its technologically contrived convenience. The deeper question, that is to say, is whether the technological things we do to make our food available in these convenient ways compromise its nutritional integrity on the hand and thus our health on the other.

Speaking on this matter is Associate Professor Monica J Casper (2003 p. 113), who laments:

One of the advantages of human development and technology is a certain quality of life that Americans have come to cherish. We like the convenience of new products, procedures and processes offer us. We are happy that life is no longer brutish and shortish, that we have cars to drive, plentiful food, medicines, cheap electricity and so on. We are pleased with these developments even though we recognise that some of these technologies and subsequent way of life may actually harm our health. The pollution from cars is deemed worth the convenience in travel. The pesticides lingering on our food and collecting in our bodies is the trade off for an abundant harvest...What is implicit is that we are exchanging short term benefits for long term consequences. It is this “gamble now and pay the devil later” nature of the exchange that also informs the kind of solutions we implement for the problems created by new technologies.

Casper (2003) informs us that there are two salient points to bear in mind. The first relates to the need to recognise the health and environmental implications arising from the technological approach to food production. With respect to this point, we are prompted by Casper (2003 p. 113) to inquire as to what value we see in our efforts to “gamble now and pay the devil later”. Following on from this issue, Casper’s (2003) second point is a salutary reminder that the types of solutions we generate derive from our obsession to gamble a life no matter what the cost. Is our belief that technology is the only way forward blinding us to the fact that it may not be the best path forwards.

Extending and elaborating this perspective is Professor Ronald S. Laura and his colleague Amy Chapman. In their book titled, The Paradigm Shift in Health, (2009 p. 77) Laura and Chapman contend that the application of technology ensures “a covert measure of control over every aspect of our lives”. They **argue** that given our preoccupation to take control of every aspect our life, we generate particular forms of technology designed to provide us with a degree of power over every feature of our lives we endeavour to control (Laura & Chapman, 2009). Given the chronic ills we bear, it is indeed fitting, that Laura and Chapman (2009 p. 78) go on to explain the various ways in which we have failed to realise the “price we pay for this measure of control”. We thus turn to technology as if it were the ultimate panacea for all of our ills and use technology to control nature by making it adapt to us, rather than confront the wages of our sins by living in ways that connect us to it, not disconnect us from it. We thus forego confronting the implications that arise **from** our actions, be it related to our health or the degradation of our environment.

With the foregoing points in mind it will be the objective of this chapter to show that the crisis in health can be traced to its philosophical foundations in the epistemology of power and what Laura calls the methodology of ‘Transformative subjugation’ (See for

example, Laura & Cotton, *Empathetic Education*, 1999). We shall see that transformative subjugation refers to the way in which the technologies defined by the epistemology of power are used to transform, convert, or reconstruct living things into other things which by way of being rendered chemicalised, increasingly inert, and lifeless become more predictable and thus more readily controllable (Laura & Cotton, 1999). I shall argue, that the technological processes used to cultivate and produce our food, are of no exception, and the transformations of the food we eat have radically reconceptualised what we are now calling ‘foods’, just as the technologisation of food has dramatically altered our relationship to food and to nature. We shall see later in the thesis why both these changes constitute threats to health that are not yet fully appreciated. Hence, let us begin our exploration with the ambition to unearth the genesis of this concept.

Mastery over Nature

Between the fifteenth and seventeenth centuries, a new paradigm emerged, producing a method of scientific inquiry that would serve as a vehicle in achieving mastery over all aspects of nature (Kramarae & Spender, 2000). This mode of inquiry, sought to reduce and mechanise the natural world, providing fundamental insight into understanding the functionality of all living systems (Cousens, 2005; Kramarae & Spender, 2000; Merchant, 1992). Hence, if successful in acquiring knowledge about the function of a particular thing, science would be in a position to predict, restore and manipulate all forms of life adhering to this method (Knight, 2004). This being so, Professor of History and Philosophy, David M. Knight (2004) contends that in fulfilling this promise, science believed it could alleviate the burden that nature had placed upon us.

In his book titled, Science and Spirituality (2004 p. 168), Knight points out that in developing tools to master nature, a more convenient standard of living could be attained, he writes:

Mastering nature, with the promise of prosperity and labour saving devices, was quite as attractive as living in harmony with nature, going back to the land and respecting Gods creation.

For this reason, it is of little surprise that the application of 2.2 billion tonnes of pesticide per annum (Levine, 2007) and storage of fruit and vegetables for periods of 10 months (Chapter II p. 45) have been excused as the technological means to materialist goals of convenience and a prosperous life. Environmental Writer, Kirkpatrick Sale, brusquely contends:

It makes technology nothing less for us than a life force, a source of existence. And it makes the development and perfection of technology an inherent part of our desire to improve, enhance, and secure that existence. No wonder we have gone at the business of creating and refining technology with such persistence...More technology would mean more power-power over (not merely within) nature.

Motivated by the epistemology of power, the mastery we seek over nature extends to our transformative subjugation of food. As Laura (2009, pers. Comm., 7th August) puts it, the technological search for our own immortality, through the science of unlimited life extension, is extended to our food as we seek to increase its shelf-life indefinitely. The paradox is that we do so, at the cost of making the foods we put on the shelf increasingly chemicalised, lifeless and dead (Laura, 2009, pers. Comm., 7th August).

The Reductionist Mode of Inquiry

According to Associate Professor at UNC Chapel-Hill, Randall Styers (2004 p. 44), a central figure in “advocating a rigorous mode of inductive observation and scientific knowledge” was Sir Francis Bacon. On Styers (2004 p. 44) account, Bacon contends for “...an empirical focus on the marvels of nature in order to uncover their complex underlying

natural processes”. This being so, Bacon (cited in Soule & Piper, 1991 p. 74) believed that if one could master nature, we would be in a position to “manipulate and improve upon nature for [our] own ends”.

In setting out to achieve this task, Bacon asserts in his volume titled, Novum Organum (1620), that the new mode of inquiry and the technological interventions that stem from it, will not “merely exert a gentle guidance over nature’s course; they have the power to conquer and subdue her, to shake her to her foundations” (Bacon cited in Soule & Piper, 1991 p. 74). For this reason, Bacon contends that we can reign supreme over nature, binding her to ‘subservience’ (Soule & Piper, 1991). Hence, “nature placed in bondage through technology would serve human beings” (Merchant, 1992 p. 46)

In their book titled, Farming in Nature’s Image (1991 p. 75), Judith D. Soule and Jon K. Piper point out that in adhering to Bacon’s reasoning, “people could manipulate nature as they desired, without paying consequences”. Hence, on the account provided by Bacon, humans were considered to be separate from nature, and in charge of its resources (Soule & Piper, 1991 p. 75). The implications of Bacon’s philosophy of science have greatly influenced the way in which we define our relationship to nature. Commenting on this point, Soule and Piper (1991 p. 75) write that, “it allows agriculture to embrace inorganic fertilisers and hybrid crops with little thought of the consequences to their ultimate sources-fossil fuels, the soil, and wild species and their habitats”.

A noted architect who expounded Bacon’s new method of inquiry was the French philosopher Rene Descartes (Suzuki & Dressel, 2004). According to David Suzuki and Holly Dressel (2004 p. 45), “Descartes postulated that by stepping outside the world and becoming observers of nature, rather than being part of it, we would be able to see how it really worked”. We thus become detached observers, and Bacon believed that this disconnection

from nature would make our judgements more objective and place us in a position to manipulate her and expropriate her resources without moral restraint (Merchant, 1992). Soule and Piper (1991 p. 75) write that, when “free of nature’s restraints scientists could gain a so-called objective viewpoint”, so we can at last investigate the secrets of nature without any self involvement or prejudiced value. Because, we can look upon nature without feeling connected to it, we need no longer feel responsible for it (Soule & Piper, 1991).

Having separated ourselves from nature, we have for at least two centuries done little to nurture its longevity (Soule & Piper, 1991; Suzuki & Dressel, 2004). For example, the fertilisers and chemical agents we apply to the land “render sterile...organic matter that revitalise the soil” (Hosner & Frazee, 2004 p. 60). Yet, in adhering to this perspective we expose ourselves to the ills of our land (Hosner & Frazee, 2004). It is thus of little surprise to discover that “whenever soil erosion has destroyed the fertility base on which civilisations have been built, these civilisations have perished” (Hosner & Frazee, 2004 p. 60). Thus, there continues to exist, a divide between man and nature, which on account of our previous exploration, is a contributing factor to the ills we bear.

Perhaps the most significant contribution to this new mode of inquiry was the form in which it was articulated by Sir Isaac Newton. For it was Newton who employed this new method of inquiry to determine laws of nature that could be consider universal and timeless (Suzuki & Dressel, 2004 p. 45). Suzuki and Dressel (2004 p. 45), inform us that Newton saw the world as “an immense clockwork mechanism that could be taken apart and its components studied”. Newton also formulated the concept of “Scientific Reductionism”, which gave rise to the methodological procedures for the dismantling of nature, and the reduction of wholes into each of their finite aspects, so that each part could in turn be

“analysed under controlled conditions” (Suzuki & Dressel, 2004 p. 45). Suzuki and Dressel (2004 p. 45) explain this as follows:

By measuring input, output and changes within isolated fragments, scientists assume that they can determine how each part functions and, by extension, how the whole of nature works... Newton hypothesised that once we knew these secrets, we would be able to use our intellect to harness those functions for our own benefits.

In fostering this new reductionist science, Newton, not unlike some of his predecessors such as Galileo, Bacon and Descartes, marginalised the importance of subjective properties (LaFreniere, 2008). Thus, according to LaFreniere, the Newtonian system encouraged the perception that knowledge of the world could itself be reduced to the sum of its quantifiable or measurable properties (LaFreniere, 2008). LaFreniere (2008 p. 125) points out that the reductio-mechanist philosophy expounded here, “...reduced our conception of nature to that of bodies possessing the properties of weight, size and shape in space, and dependent upon the arrangement and motion of small particles”.

For this reason, Cousens (2005) advises that the food we eat is not exempt from this philosophy. Cousens (2005) suggests that the reductio-mechanist paradigm has limited our understanding of the importance of our connection with food because it disconnects us from it. Cousens (2005 p. 200) contends that in embracing this paradigm, we disassociate “our basic instinctual connection with the quality of our food and Mother Earth”. This being so, he points out that:

The result of this conceptual approach is an excessive and unbalanced focus on individual nutrients and their interactions. This nutrient-super nutrient focus has served to lock us into materialistic conceptions about food, the human system, and the relationship between the two.

Having lost the desire to engage with the food we eat, beyond its material forms and functions, deeper metaphysical significance remains recondite.

According to Director of the School of Advanced Study at University College London, Time Crane (2003), the advent of Newton’s mechanical philosophy, led to the

demise of the Aristotelian world view. This view saw all aspects of the universe as having a final end or purpose, “wholly in harmony with a conception of a universe whose ultimate driving force is God” (Crane, 2003 p. 3). For this reason, Crane contends that this “organic” world view had nature working in synergy to achieve its own natural condition (Crane, 2003). Hence, the “dance of nature” was a harmonious union and one to be applied to our own lives by virtue of study and interpretation (Crane, 2003). However, the Aristotelian world view was in time replaced by the materialistic and mechanical perspective (Crane, 2003), alluded to above.

Crane (2003 p. 3) points out that “the mechanistic method of explanation” created a world that was decided upon, in which mathematical laws would quantify the secret knowledge of nature. This being so, the behaviour of all aspects of nature were considered to be calculable by this new mode of inquiry (Crane, 2003). On this point, Crane (2003 p. 3) writes that:

To put it very roughly, we can say that, according to the mechanical world picture, things do what they do not because they are trying to reach their natural place or final end or because they are obeying the will of God, but, rather, because they are caused to move in certain ways in accordance with the laws of nature.

Reinforcing this point is Lecturer of History of Science at Harvard University, Steven Shapin (1996 p. 30), who points out that the:

Very idea of construing nature as a machine, and using understandings derived from machines to interpret the physical structure of nature, counted as a violation of one of the most basic distinctions of Aristotelian philosophy.

According to Shapin (1996), the difficulty here is that according to Aristotelian view, there exists a clear distinction between what is natural on the one hand and that which is considered contrived and artificial on the other. This being so, the view that nature could be engineered, was as foreign to the Aristotelian perspective, as is perhaps the Aristotelian view to us today (Shapin, 1996). Nevertheless, the mechanical model eventually replaced the

organic integrity of the Aristotelian view, legitimising the “use of artificial devices either to interrogate or model the natural order” (Shapin, 1996 p. 31). On this point, Assistant Professor of Philosophy and Religious Studies at Iowa State University, Carla Fehr, highlights that the interrogative and inert model of mechanism, “made possible an ideology of control and domination over nature” (Merchant cited in Fehr, 2004 p. 145). Hence, we could objectify nature in a manner that would make it increasingly easier for us to control it (Fehr, 2004).

Knowledge as Power

According to Sir Francis Bacon, Knowledge is Power (Knight, 2004), and it is our obsession with power and control that is grounded in the mode of inquiry we discussed above. On the account provided by Emeritus Professor of Philosophy, Elie Maynard Adams (1991 p. 5), “Science as we know the term today, seeks knowledge of the factual and **causal** structures of its subject matter in a way that will give us manipulatory control over it”. This being so, we observed earlier how this mode of inquiry “gave way to a dominant concern for control over and exploitation of, the material conditions of our existence” (Adams, 1991 p. 6). For this reason, Adams (1991 p. 8) makes the point that Western culture is now defined by our “commitment to material progress and the modern scientific way of thinking”. From this it follows that our conviction in the advancement of knowledge and power is driven by science and technology (Adams, 1991).

Reinforcing the work of Adams is Victor Ferkiss et al. (1994 p. 43), who point out that “power is knowledge” (Ferkiss et al, 1994 p. 43). In their book titled, Nature, Technology and Society (1994), Ferkiss et al. (1994 p. 43) note that the Newtonian ethic worked to alleviate the problem of a world to be discovered “out there”, instead devising a

world of human ideas. Within this framework, the scientific mode of discovery embraced a world that could be shaped by human ideals (Ferkiss, 1994). This being so, Ferkiss et al. (1994 p. 43) write that, “....in such a universe, nature can have no rights against technological manipulation because it does not exist except as we know it through technological control”.

For this reason, to “Know”, became synonymous with what could be observed, replicated and agreed upon under the experimental setting of this mode of inquiry (Lacey, 2004). Within the materialist framework of reductionism, “there is no more to seeing than what meets the eye” (Bem & Jong, 2006 p. 70). This being so, this mode of inquiry confirmed “the divorce from the world of value from the world of facts” (Lacey, 2004 p. 2).

Is Technology Value Free?

Reflecting on the value question, Kincaid, Dupre and Wylie (2007 p. 4), note that the “value free ideal sees science as neutral...independent of anyone’s moral or political views”. Hence, according to this ideal, the technologies we employ to cultivate and produce the food we eat, are free of any value concepts. However, when we consider that the content and the application of these technologies are imbued with a desire to control and conquer nature, should we be mislead into believing that they are value free?

In their book titled, Value Free Science (2007 p. 4), Kincaid, Dupre and Wylie assert that opponents to the value free ideal discussed here contend that if the content of science and its application, “can and must involve values, then **presenting** scientific results as entirely neutral are deceptive”. This being so, Kincaid et al. (2007 p. 4) note that in debating issues of importance (Race, IQ, free markets and environmental pollution), if value is assumed, “treating them as entirely neutral is at best misleading”. For this reason, Kincaid, Dupre and Wylie (2007) advocate that science be used in a responsible manner, hence, we are

accountable to question what should be promoted, advanced or realised within the context of scientific inquiry. With this idea in mind, are we acting in a responsible manner when we promote, advance or come to realise technologies that afford us ill health?

Speaking on this point is Emeritus Professor Hugh Lacey (2004 p. 3), contending that the value concepts we acquire are irrelevant to the “laws that make up the underlying order of the world”. On this assumption, Lacey (2004) urges that whatever value we derive by way of human experience, social organisation or practice, it is obtained through causal powers. This being so, science “does not follow from a theory that explains this “fact” that human agents themselves are objects of value” (Lacey, 2004 p. 3). For this reason, science is “simply there to discover-the world of pure fact stripped of any link with value” (Lacey, 2004 p. 3). However, can science simply discover the world of ‘pure fact’, without regard for man?

Laura and Chapman (2009), argue strongly that scientific knowledge is far from being value neutral. Elaborating upon Laura’s Theory of ‘Transformative Subjugation’ and its ramifications for integrated wellbeing, they establish convincingly that the empiricist and quantitative mode of reductionist science we have come to favour not only shapes how we come to perceive the world, but it defines what it is we come to know in value terms (Laura & Chapman, 2009). For this reason, Laura and Chapman (2009 p. 77) argue that:

Far from being ‘neutral’, every piece of information that is accepted as knowledge is what we shall call here “structurally encoded’ to ensure a covert measure of control over every aspect of our lives. And if the primary form of knowledge we transit is conditioned and shaped by our obsession with power, both its form and application will reflect the value we place on power and dominance.

In a similar vein, Assistant Professor Michael Doherty (1993), dispels the popular myth that knowledge is neither ‘good’ nor ‘bad’. In rejecting the view that knowledge is value free, Doherty (1993 p. 6) writes that:

Knowledge is reduced to technology, a technology that enables the illusion of power and of domination over nature. It is important to stress that it is an illusion. This kind of power does

not give actual power over nature...What it does give in the way of power is, of course, a power over the consciousness of others who may be less fluent in the language of reason...Knowledge thus becomes a dialectic of mastery and slavery.

Given the experimental mode of scientific inquiry, with its methodological prescriptions for observing and describing the world's knowledge is "not just a systemised exposure to the world; it is a way of thinking about the world, a forming of conceptions" (Bem & Jong, 2006 p. 70). Bem and Jong (2006) thus contend that the epistemic concepts science puts forth derive from hypotheses, and not just a value free set of exact laws. For this reason, the data assessed is intelligible only within the value hypotheses presupposed by the reductio-mechanist mode of inquiry (Bem & Jong, 2006). As Laura puts it, neither scientific knowledge nor the technologies which derive from it, are value free, anymore than they are synthesised reconstructions of nature science bequeaths to future generations (Laura, 2009)

Transforming Nature

Our disconnection from nature has provided humanity with an increasingly inert and synthesised environment (Adams, 1991; Gore, 2007; Laura & Chapman, 2009). Hence, in our efforts to manipulate nature, we have alienated and disenfranchised ourselves from it (Adams, 1991; Gore, 2007; Laura & Chapman, 2009). Mindlessly, we thus continue to live out a life which symbolises our commitment to subjugate and subdue the natural world (Laura & Chapman, 2009). Laura and Chapman explore the idea that our preoccupation with the epistemology of power relates strongly to our misguided view that the more we can dominate the world of nature, the more secure we become in it (Laura & Chapman, 2009).

According to Laura and Chapman (2009 p. 78), to attain this sense of security, we develop technologies of power designed to make the world around us "as predictable as possible". We mistakenly think that the more predictable a thing, process, or event is the more control we have over it and thus the more secure we can somehow become (Laura &

Chapman, 2009). I submit that it is of little surprise that in the context of our relationship with food, we recast nature in a manner that makes it increasingly inert and artificial, so that our food security is protected without having to rely upon the caprice and vicissitudes of nature (Laura & Chapman, 2009).

Laura's theory of 'Transformative Subjugation' provides a helpful heuristic to develop these ideas further. Laura and Chapman (2009) assert that science endeavours to achieve this task by "making the world around us as predictable as possible". Elsewhere, Laura and Cotton (1999 p. 38) contend that by transforming "the world of nature into increasingly synthesised and artificial environments, virtually every application of technology as power results in the systematic conversion of living things into dead things which admit of greater control and predictability than the living things from which they came". For this reason, the epistemology of power shapes our dependence upon technology to fabricate every aspect of our lives (Laura, Marchant & Smith, 2008). Thus, imbued with the value modality we have come to favour, the crops we cultivate and the foods we produce reflect our commitment to the chemicalised, inert and lifeless fabrications of the technologies of power used to transform and control them.

In coming to recognise this point, it is easier to appreciate the sense in which we come to be disconnected from the food we eat. This being so, our obsession with a form of knowledge which enshrines the value of power, control and dominion over nature leads inevitably to "our systematic desacralisation of nature" (Laura & Chapman, 2009 p. 80). This is why, Laura and Chapman (2009) contend that "the ramifications of transformative subjugation are far more pernicious and relate to the philosophy of a value which the technology of transformative subjugation presupposes".

Disconnection

So far, we have come to realise that our lust for power and our obsession to control every living thing within the world is grounded in a methodological construct that has sought predictability through the synthesised and inert configurations of every aspect of nature. By virtue of our quest to dominate every dimension of our world, we have taken to nature with an emotionless axe, reducing every living organism to its smallest unit as a way to make predictable the functionality of the organisms we seek to control. I have tried to show that the reductio-mechanist paradigm and the epistemology of power that underpins our commitment to dominate the world in which we live, has transformed the whole of nature and the living things within it into inert and lifeless technological reconstructions. We have now seen that this has significant implications for the whole of nature, including the food that we eat and our relationship to it.

We can now recognise that the technologies that are born out of our desire to control and manipulate the world of nature, have transformed the natural world in ways that despite supporting the lifestyle and working life we desire on the one hand, have significant consequences for the health of every living thing on the planet. In light of our deliberations on transformative subjugation, it is increasingly clear that the chronic ills we bear, shall to some degree, remain “chronic”, by virtue of what I shall describe as the technological desecration of the foods we eat and our relationship to it. Moreover, our lust for power has meant that the technologies we have created to secure it have themselves now become a threat to our health and the health of the planet.

Challenging the Reductio-Mechanist Mode of Inquiry

Given the far reaching implications that we see emerge from the epistemology of power, it is increasingly clear that we need to rethink our commitment to the reductio-mechanist and materialist world that has emerged from it. Our disconnection, and fear of nature continues however to encroach upon our need to dominate the environment that we are a fundamental part of. Yet, despite this mode of inquiry serving us for some time, the mechanist world view represents but one perspective on how we can interact with nature. This being so, we shall in what follows, explore an alternative model, drawn from the philosophy of quantum mechanics. I shall argue that a new model for construing our relationship to nature and each other is afforded within this framework, and I shall now turn to the task of elaborating it.

Before turning our attention directly to the development of quantum mechanics as the basis for a new paradigm of reality and epistemological perspective, we need to reflect more critically than we yet have on the limitations of reductio-mechanism, as it relates to the transition to the quantum philosophical view of reality. Let me turn directly to this task.

Reductionism

One aspect of Newtonian Mechanics is the concept of reductionism (Rosenbaum & Kuttner, 2006). According to Rosenbaum & Kuttner (2006), reductionism asserts that we may come to know a complex system by way of reducing it to its simpler parts. For example, the inner function of a motor vehicle may perhaps be explained in terms of “the pressure of the burning gasoline pushing on the pistons” (Rosenbaum & Kuttner, 2006 p. 35). Further, “a chemist might explain a chemical reaction in terms of the physical properties of the involved atoms” (Rosenbaum & Kuttner, 2006 p. 35), hence, Rosenbaum and Kuttner (2006 p. 35)

indicate the reduction here of a “chemical phenomena to physics”. Given, these two common examples, it is explicit that in our day to day lives we operate from a reductionist hypothesis, however, in doing so, do we lose a sense of the “whole” of a system by virtue of attending to its isolated parts?

In ascribing to a reductionist philosophy, the whole of an object is reduced to its simpler parts so that we may come to understand the functionality of various elements within the hierarchical texturing of the whole system (Louise, 2007). In this context hierarchy refers to specific levels within the whole of a system, each serving to function in a manner that by way of their intricate connectivity assists in the production of the whole system (Cousens, 2005; Emoto, 2004; Louise, 2007). However, in her paper titled, The systems principles that underlie naturopathic medicine: the human being as a complex system (2007), Doctor of Medical Science, Christa Louise, refutes the assumption that we may acquire knowledge about a system by way of assessing its isolated parts. Louise (2007 p. 116) writes that complex living systems “behave in ways that cannot be predicted by analyzing [their] individual parts”, and that a living system such as the human body or indeed the cosmos, “cannot be understood through analysis alone”. In favour of this view, Louise (2007 p. 112) asserts, that the intricate web of connectivity between the whole of a system and its parts “cannot be accounted for using classical Newtonian Laws of physics”.

According to Louise (2007), complex systems are best understood by way of a systems theory approach. This approach, explores the “interrelatedness and interdependence of a phenomena” (Louise, 2007 p. 115), and in doing so offers a “framework for viewing the integrated whole whose properties cannot be reduced to its isolated parts” (Louise, 2007 p. 115). Louise (2007) acknowledges that fundamental to ‘systems thinking’ is the concept of moving away from a focus on isolated parts to ‘consideration of the whole’. Reinforcing this

point, Louise (2007 p. 119) writes that: “the state of a whole system is affected by a number of interacting factors that cannot be exclusively evaluated independently”. This being so, Capra (1996 p. 36) informs us that “systemic properties are destroyed when a system is dissected into isolated elements”.

The reductionist paradigm asserts that “regulation processes are independent of each other, which is a fundamental error when considering the regulation of complex biological systems” (Louise, 2007 p. 119). Hankey (2005 p. 386), points out that “complex organisms exhibit holistic functioning because regulation processes must themselves be regulated”. Thus, Louise (2007 p. 119) avers the result to be an “integrated hierarchy of regulation processes”. The hierarchy of the living system is comprised of a system that in addition is made up of subsystems that function within a suprasystem (Louise, 2007; Skyttner, 2005). In using the example of a biological system Louise (2007) suggests that there is a hierarchical structure of subsystems within an organism, with diverse laws functioning within each level. This being so, Louise (2007 p. 119) makes clear by example, that in examining the appearance of symptoms, present in a patient at a single level, a symptom at one level “may not necessarily provide information about the way the system is operating at the next level”.

Given that every system comprises of subsystems and a suprasystem it is vital from the outset to make clear the “boundaries of the system being considered”, so that we may distinguish between the functions that work exclusively within a system from those that couple systems or cross various levels (Louise, 2007; Skyttner, 2005). Hence, from a system’s theory perspective, for every system, definition is derived by way of the boundaries defined by the observer (Louise, 2007). For example, a holistic therapist may develop wider boundaries in assessing a patient’s condition than that of a conventional therapist (Louise, 2007). This being so, the more extensive the boundaries defined by the observer, the more

complex the system is, and the more holistic an approach we must take in our assessment of the system (Louise, 2007). Therefore, to reduce the whole of a system, for example, nature, into individualised parts, distorts our perception of the natural world, by way of directing our focus upon isolated elements that according to system's theory requires the "whole to explain the parts and vice versa" (Mindell, 2000 p. 246).

In addition to our discussion about complex living systems, is that by virtue of their complex nature, they present as organized and open systems (requiring input in and producing output), with a capacity for self renewal that "allows for a living system to be autonomous (Skyttner, 2005 p. 60). Swedish Systemicist Lars Skyttner notes in his book titled General Systems Theory: Problems, Perspectives, Practice (2005 p. 60), that "activities of autonomous systems are mainly directed inward, with the sole aim of preserving autonomy". This being so, Skyttner (2005 p. 60) points out that "maintaining internal order or own identity under new conditions demands frequent internal reorganization" by the system.

Disturbance of the internal organisation of a system is said to result in entropy, which according to Louise (2007 p. 123) refers to the "tendency of a system to move towards a disorganized state". Extending this point is Joanna Macy (1991 p. 71), who writes that the concept of entropy, relates to the second law of thermodynamics in physics, which states "that in every transformation of energy part of that energy is lost". Elaborating on this point, Macy (1991 p. 71) writes that differences in heat, as a result of this process, gradually equalize and the universe "is seen as tending ultimately towards sameness, randomness and disorganization". This being so, despite this law never having been contradicted or disproven, it is "inadequate to explain the evidence that in parts of the universe, such as living organisms, forms differentiate and evolve in complexity....instead of running down they build up" (Macy, 1991 p. 71).

Reinforcing Macy's point is Cousens (2005 p. 208), who writes that "entropy applied to the human system, implies that it is the natural order of things for the body to break down or age", hence, "because of the degenerative lifestyle many people on this planet live, this is indeed the case". However, on this point Cousens (2005) contends that this should not be viewed as the natural order of living things. Thus, what appears more accurate to Cousens (2005 p. 208) is that "what seems natural is unnatural, and what seems miraculous is natural". He goes on to write that the fundamental fallacy in applying the second law of thermodynamics to a living system is that it "only holds in a closed system (a system in which energy and matter are neither moving in nor moving out), or in a system formed of elements independent of each other", and that in 'quantum mechanics': "we can say that there is nothing in the universe that does not affect everything else...everything can be viewed then as an open system" (Cousens, 2005 p. 209).

According to the designer of systems theory, Ludwig Von Bertalanffy, the reductionist model, is an "analytic, mechanist one way casual paradigm of classical science" (Bertalanffy cited in Macy, 1991 p. 60), that by virtue of its deconstructed thinking assumes that reality can made clear by reducing it to its parts. Upholding this view, Macy (1991 p. 70) points out that "by way of approaching life in this way", despite making some remarkable scientific gains, the cost of these gains surmounts the gains we have made by virtue of the reductionist approach we have employed to the living systems of our world. Hence, systems are not things that can be reduced to isolated parts but rather should be observed as patterns of events that are by their very nature non-summative or irreducible (Macy, 1991). This being so, Macy (1991 p. 72) concludes her point by stating that the:

Character of a system as a pattern of organisation is altered with addition, subtraction and modification of any piece. Hence it is more than the sum of its parts. **This "more" is not**

something extra, like a vitalist principle or an *élan vital*, but a new level of operation which the interdependence of its parts permits.

Quantum Mechanics

Up until the earlier half of the twentieth century, the classist physics made famous by Sir Isaac Newton, forming the basic principles upheld by empiricist science today, remained the dogmatic interpretation for our explanation of the world (Aczel 2003; Mindell 2000; Rosenbaum & Kuttner, 2006). Hence, for every facet of science, from chemistry to cosmology, our understanding of the complex nature of the world became understood by way of the principles laid down under the auspices of Isaac Newton's "Newtonian Mechanics" (Cousens 2006; Mindell 2000; Rosenbaum & Kuttner, 2006). This interpretation, discussed in the previous chapter, assumed that the inner workings of the whole of nature operated in a similar capacity to that of the mechanical workings of a clock (Vithoulkas, 2005). Thus, in doing so, mechanist thought put forward the assumption, that in the same manner by which we come to "know" the function and behaviour of our clocks, the "secret's of nature", believed to be hidden from science, would be revealed by virtue of "knowing" the function and behaviour of nature's blueprint (Mindell 2000; Vithoulkas, 2005). This being so, it has been the intention of science, since Newtonian consensus, to adopt practices that will acquire relevant knowledge in order to ascertain the function and behaviour of the world in which we live, largely despite the implications that may occur, by virtue of the reductionist methodological practices forced upon nature. However, with a series of new developments that would emerge over the course of the twentieth century, our classical interpretations of the world, would be reinterpreted by the emergence of an enigmatic branch of science known as quantum mechanics (Rosenbaum & Kuttner, 2006).

According to Professor of Physics Bruce Rosenblum and Lecturer of Physics Fred Kuttner, at the University of California Santa Cruz, quantum mechanics “is not just one of the many theories in physics it is the framework upon which all of today’s physics is ultimately based” (Rosenblum & Kuttner, 2006 p. 9). In their book titled, Quantum Enigma (2006 p. 11), Rosenblum and Kuttner define quantum mechanics as a term which encapsulates both the “actual experimental observations [of an object] and the quantum theory explaining them”. To this, Rosenblum and Kuttner (2006 p. 51) add that quantum theory informs us that “the reality of the physical world [that being what we can see, taste, touch and hear] depends upon our [conscious?] observation of it”. Thus, according to quantum theory, the observer, you or I, has the capacity to influence the reality in which a physical object exists (Goswami, 1993; Mindell, 2000; Rosenblum & Kuttner, 2006). Going further, the quantum enigma says that the “observation of one object can instantaneously influence the behaviour of another greatly distant object”, despite their distance from one another (Rosenbaum & Kuttner, 2006 p. 52). Therefore, it is not only our influence on the observation of an isolated object, that is important here, but rather all objects that come into contact with the object we have observed (Mindell, 2000). Second, the act of consciously observing an object to be in a particular place at a particular time actually causes it to be there (Rosenblum & Kuttner, 2006). This being so, objects, from the perspective of quantum mechanics, can exist in multiple places at the same time, until our actual observation of the object places it in the location we find it to be (Rosenblum & Kuttner, 2006). Hence, given the uncanny nature of quantum theory, is it any wonder that Nobel Prize Winner, Albert Einstein, termed the quantum enigma “spooky” (Rosenbaum & Kuttner, 2006 p. 9). My intention in what follows is to provide as clear an interpretation as possible of the nature of quantum mechanics, as it relates to reconceptualising the Newtonian world view.

To appreciate the significance of quantum mechanics, we shall begin by addressing the historical architects that have contributed to the development of quantum mechanics.

A Biography of Quantum Mechanics

According to Rosenblum and Kuttner (2006), there have been a number of physicists who have contributed to the development of quantum theory over the last eighty years. Given his long and complex history, it would be extraneous to our present consideration to elaborate in detail the ongoing evolution of ideas within this field. Nevertheless, we shall in what follows, discuss the contributions of those within the field of quantum mechanics who have provided the greatest insight to the development of quantum theory.

In accordance with the historical foundations of quantum mechanics, consensus states that the physicist Max Planck was the first architect to engineer the beginnings of quantum theory (Chopra, 1989; Davies, 1988; Goswami, 1993; Mindell, 2000; Morris, 1999; Rosenbaum & Kuttner, 2006). Planck, seeking a mathematical formula to elucidate accurately the behaviour of blackbody radiation (Morris, 1999), required that the traditional view used to describe light, be replaced by the assumption that light “was emitted in tiny packets or “quanta”, of energy” (Morris, 1999 p. 44) rather than in continuous waves (Davies & Brown, 1986). According to Planck, the traditional view could not explain the creation of waves (Morris, 1999) regarding “radiant heat energy from a hot body, among various wavelengths” (Davies & Brown, 1986 p. 32). Yet, despite Planck’s finding, the new assumption was difficult for him to accept given the reputable theory firmly established half a century earlier (Goswami, 1993; Davies & Brown, 1986). This being so, Planck continued in his search for an accurate formula to explain his research (Mindell, 2000; Rosenbaum & Kuttner, 2006). However,

despite his labour, Planck had “no way of knowing that in later years he would be considered the originator of the twentieth century revolution in physics” (Morris, 1999 p. 44).

Planck’s work, challenged the idea known as determinism, demonstrating that atoms displayed randomised movements that could not be predicted under the deterministic rule of a Newtonian World View (Rosenbaum & Kuttner, 2006). Planck confirmed that “without cause and impressed force, a vibrating electron would suddenly radiate a ‘quanta’ of energy as a pulse of light” (Rosenbaum & Kuttner, 2006 p. 56). His supposition, given the research findings, was if miniscule objects (e.g. atoms), behave in a randomised manner without cause, can we assume that all things, big or small, act in a similar manner, by virtue of their atomic makeup? (Rosenbaum & Kuttner, 2006). This being so, Planck questioned why it is that living things, including human beings, behave in a manner that is not reflective of the randomised behaviour of an atom (Rosenbaum & Kuttner, 2006). However, these questions would be answered in later years by some of quantum physics elite.

Following the work of Planck, was Nobel Prize Winner Albert Einstein, who in 1905 strengthened the quantum supposition put forward by Planck (Rosenbaum & Kuttner, 2006). Believing in Planck’s quanta, Einstein “speculated that light is a stream of compact lumps” (Rosenbaum & Kuttner, 2006 p. 59), later termed photons (Morris, 1999), “acting as though it was made up of particles” (Morris, 1999 p. 45). According to Richard Morris (1999 p. 46), in putting forward this submission, Einstein journeyed further than Planck who mentioned nothing of the “character of light as it travelled through space”. Thus, Einstein extended and revised Planck’s findings, demonstrating that light displays characteristics of both particle and wave phenomena, unlike that of Planck’s proposition which put forward that once light was emitted it travelled exclusively in electromagnetic waves (Morris, 1999). Hence, the outcome of Einstein’s ‘light-quanta’ made apparent, “that not only electrons but all

subatomic particles are subject to similar wavelike behaviour, [making clear] that the traditional laws of mechanics... fail completely in the microworld of atoms and subatomic particles” (Davies & Brown, 1986 p. 33). This being so, Einstein’s “light-quanta” presented a challenge to the traditional laws of physics (Rosenbaum & Kuttner, 2006 p. 59).

Revolutionising further the theory of quantum, was our third architect, physicist Niels Bohr, who in 1913 “applied the idea of light quanta to suggest that the whole world of the atom is full of quantum jumps” (Goswami, 1993 p. 67). Planck, who earlier put forward the theory that light travelling across a hot body, presented as tiny jiggling charges (electrons), suggested that the motion of these tiny jiggling charges acted in discontinuous steps (quantum jumps) (Goswami, 1993; Rosenbaum & Kuttner, 2006). This being so, Bohr disputed the previously held assumption that electrons rotate around a nucleus in the same manner by which planets rotate around the sun (Goswami, 1993), suggesting that the rotational motion of an object could only exist in quantum units (Rosenbaum & Kuttner, 2006). According to Rosenbaum and Kuttner (2006), Bohr’s principle suggests, that the planetary atom originally thought to be unstable was in fact stable by virtue of its forbidden nature to crash into the nucleus of an atom. Yet, despite Bohr’s model having provided physics with a solution to the stability dilemma, it also created further questions which came to be known as the quantum enigma (Goswami, 1993; Morris, 1999; Rosenbaum & Kuttner, 2006).

Coinciding with the work of Bohr was Arthur Compton, who revealed that when ‘light bounced off electrons its frequency changed” (Rosenbaum & Kuttner, 2006 p. 65). This being so, Compton was puzzled by his findings, as his discovery did not demonstrate wave behaviour as described by the traditional laws of physics (Rosenblum & Kuttner, 2006). For this reason, Compton concluded that what he had discovered was not “wave behaviour” and

that contrary to previous thought the frequency of the wave does not change in reflection (Rosenbaum & Kuttner, 2006 p. 73). This being so, Compton's findings strengthened Einstein's light-quanta, demonstrating that light could be both spread out wave properties and compact particle properties (Rosenbaum & Kuttner, 2006).

In addition to the work of Compton, physicist Louis De Broglie speculated that if light was either wave or particle, then perhaps matter was wave or particle also (Rosenbaum & Kuttner, 2006). Working on this hypothesis, De Broglie eventually saw that his hypothesis was able to explain the ad hoc quantum rule suggested by Bohr that the planetary atom thought to be unstable was in fact stable by virtue of its forbidden nature to crash into the nucleus of an atom (Rosenbaum & Kuttner, 2006). Despite, De Broglie theoretical work, it was by accident that an experiment on the scattering of electrons on metal surfaces carried out by Clinton Davisson, demonstrated that the theory put forward by De Broglie was indeed true, "confirming De Broglie's speculation that material objects could also be waves" (Rosenbaum & Kuttner, 2006 p. 67).

Given that physics believed that matter and light could be displayed as either compact lumps or as widely spread out waves (wave particle duality), our next architect, sought to refine the theory "that material objects could display a wave nature" (Rosenbaum & Kuttner, 2006 p. 71). Attempting this task was German physicist, Erwin Schrödinger (Rosenbaum & Kuttner, 2006), who in 1926 "produced a new theoretical description of the behaviour of matter on the subatomic level" (Morris, 1999 p. 48). Schrödinger, believing that Niels Bohr's quantum jump hypothesis was nothing but nonsense, wanted to do away with the notion of a world in which atoms and electrons acted in a randomised manner (Goswami, 1993; Mindell, 2000; Rosenbaum & Kuttner 2008). This being so, Schrödinger "wanted a description of the world that had electrons and atoms behaving reasonably" (Rosenbaum & Kuttner, 2006 p.

71). Hence, utilising De Broglie's assumption (Chapter III p. 75), Schrödinger thought "he might get rid of Bohr's damn quantum jumps" (Rosenbaum & Kuttner, 2006 p. 71).

In advocating his supposition, Schrödinger required an amendment to Newton's laws of motion, in order to "account for the quantum behaviour of small objects" (Rosenbaum & Kuttner, 2006 p. 71). This being so, Schrödinger developed a new universal equation of motion that would not only work for larger objects, but also smaller objects (Rosenbaum & Kuttner, 2006). This was imperative, as Newton's laws were shown to only provide assumptions about larger objects, providing a flawed assessment of the behaviour an object (Rosenbaum & Kuttner, 2006).

According to Rosenbaum & Kuttner (2006 p. 73), the fundamentals behind quantum mechanics can be observed by way of the wavefunction of a "simple object moving along in a straight line". Wavefunction refers to the "mathematical representation of a wave" (Rosenbaum & Kuttner, 2006 p. 72), with the wavefunction symbolising the actual object. Schrödinger believed that the wavefunction of an atom in motion may look similar to ripples in a pond, a sequence of wave crests or as Schrödinger suggested a packet of waves (Rosenbaum & Kuttner, 2006). Aware that matter could be expressed as either spread out waves or compact clumps, Schrödinger believed that a wave equation would be able to describe either a "spread out packet of waves with many crests" (Rosenbaum & Kuttner, 2006 p. 72), a "compact packet with only a few crests or even a single crest moving along" (Rosenbaum & Kuttner, 2006 p. 72).

Schrödinger's equation, says "a moving object is a moving packet of waves" (Rosenbaum & Kuttner, 2006 p. 72). However, Schrödinger was perplexed by what it was that was waving (Rosenbaum & Kuttner, 2006). Schrödinger's initial assumption was that an "objects waviness was the smeared out object itself" (Rosenbaum & Kuttner, 2006 p. 73), yet, his

original assumption was incorrect despite his equations success at predicting what was actually observed (Rosenbaum & Kuttner, 2006). Given his initial assumption, Schrödinger was led to articulate a proven theory behind what was waving, though the conclusion was so bizarre Schrödinger himself found it difficult to believe (Rosenbaum & Kuttner, 2006).

According to Rosenbaum and Kuttner (2006), what is waving is the actual object itself (Rosenbaum & Kuttner, 2006). What is even more perplexing is that it is the observation of the object that ensures that the object is in the place where you found it (Rosenbaum & Kuttner, 2006). Hence, “your happening to find it caused it to be there” (Rosenbaum & Kuttner, 2006 p. 75). In coming back to quantum mechanics the wavefunction of an atom or an electron in reality represents the atom itself (Rosenbaum & Kuttner, 2006). Further, by way of making an observation, quantum mechanics says that we actually collapse the size of the wave packet, thus making the nature of an object discontinuous (Morris, 1999; Rosenbaum & Kuttner, 2006). According to Rosenbaum & Kuttner (2006 p. 151), the nature of wave particle discontinuity is “tricky and the essence of the quantum enigma” (Rosenbaum & Kuttner, 2006). This being so, in reverting to Schrödinger’s attempt to remove Bohr’s quantum jump hypothesis, the fact that the collapse of a wave packet is discontinuous (randomised) means that quantum mechanics cannot exist without quantum jumps (Rosenbaum & Kuttner, 2006).

Despite the uncanny nature of the quantum enigma, and the varying interpretations one may draw from it, the wave equation developed by Schrödinger, remains the dominant theory utilised by physicists the world over to explain the “structure of atoms, radioactivity, chemical bonding and the details of atomic spectra” (Davies & Brown, 1986 p. 32).

Almost identical in his formulation of quantum mechanics was Werner Heisenberg, who along with Schrödinger is ascribed the accolade of developing the “new system of

mechanics” (Davies & Brown, 1986 p. 33). Heisenberg approached his new system of mechanics by way of an “abstract mathematical method for obtaining numerical results” (Rosenbaum & Kuttner, 2006 p. 72) that denied the “pictorial description of what was going on” (Rosenbaum & Kuttner, 2006 p. 72), as embraced by Schrödinger’s theory (Rosenbaum & Kuttner, 2006).

For Heisenberg quantum mechanics proved that unlike Newton’s theory of determinism, the world in which we live is not predictable after all (Davies & Brown, 1986). This being so, Heisenberg believed that an element of uncertainty existed within the “microworld of photons, electrons, atoms and other particles”, that could not be explained by way of Newtonian mechanics (Davies & Brown, 1986 p. 34). Hence, after much consideration and testing, Heisenberg put forward the supposition known as the “Heisenberg Uncertainty Principle” to suggest that the “more accurately you measure an object’s position, the more uncertain you become about its speed” (Rosenbaum & Kuttner, 2006 p. 72), and vice versa. Hence, according to physicists, Amir Aczel (2003 p. 241), “it is impossible to know both the momentum of a particle and its location-if one is known with some precision, the other of necessity, can only be known with uncertainty”. This being so, Goswami (1993) asserts that “we really cannot say that the electron is such and such distance away from the nucleus when it is at this or that energy level” (Goswami, 1993 p. 69).

According to Rosenbaum & Kuttner (2006), Heisenberg’s uncertainty principle can derive from Schrödinger’s equation also. This assumption rests on the fact that despite one’s observation of ‘any property, one aspect of that property, complementing another, makes the quantity of property uncertain by virtue of its complementarity to the other’ (Rosenbaum & Kuttner, 2006). This being so, Rosenbaum & Kuttner (2006 p. 72) write that “the bottom line is that any observation disturbs things enough to prevent disproof of quantum theory’s

assertions that observation creates the property observed”, thus preserving the intent of Heisenberg’s uncertainty principle.

Given the uncanny nature of quantum mechanics, Bohr sought to dissipate the conceptual anxiety of the physicist community with the heuristic of an “observer created reality” an integral foundation by what is called the Copenhagen interpretation (Rosenbaum & Kuttner, 2006). The Copenhagen interpretation states, that the “observation produces the property observed” (Rosenbaum & Kuttner, 2006 p. 100), though, we are not to infer that the property observed exists by virtue of a conscious observation on the part of the observer”. Hence, in order to remove the idea of a conscious observer, Bohr’s Copenhagen, softens the assertion that the “observation produces the properties observed by defining an observation as taking place whenever a microscopic, atomic scale, object interacts with a microscopic large-scale object” (Rosenbaum & Kuttner, 2006 p. 100) and not by virtue of an observer’s conscious thought (Mindell, 2000).

Within this interpretation exists two realms, the first is a “macroscopic classical realm of our measuring instruments governed by Newton’s laws” (Rosenbaum & Kuttner, 2006 p. 101) and the second a “microscopic, quantum realm of atoms and other small things governed by the Schrodinger equation” (Rosenbaum & Kuttner, 2006 p. 101). Thus, the Copenhagen interpretation argues that given that we never deal directly with quantum objects of a microscopic realm we therefore need not worry about their physical reality or lack of it (Rosenbaum & Kuttner, 2006). However, despite Bohr’s attempt to smooth the unease resulting from the quantum enigma, physicists John Von Neumann believed that “Bohr’s separation of the microscopic and macroscopic is only a very good approximation and that an ultimate encounter with consciousness is inevitable” (Rosenbaum & Kuttner, 2008 p. 100). Given Neumann’s point, are we thus to consider that atoms may indeed have a kind of

receptor consciousness at the level of informed exchange, and if so what does this imply for all things made of atoms, such as baseball bats, motor vehicles and the universe? With Neumann's words we are again challenged not to decompartmentalise the wholeness of an object in order for the reduced parts to be made sense of by virtue of its reduction. Although the microscopic realm may not appear to interact with our day to day tasks, we cannot refute the evidence that the microscopic realm continues to play a significant part in the function of the whole. This we shall see with our final architect physicists John Bell.

In 1935, Einstein along with two other physicists, Boris Podolsky and Nathan Rosen, produced the paper now known as EPR (each letter represents the three authors contributing to the paper) (Aczel, 2003). In this paper, Einstein, Podolsky and Rosen wished to "prove the incompleteness of quantum mechanics" (Goswami, 1993 p. 125) and to bolster support for a physically real universe that is void of an "observer created reality" (Aczel, 2003 p. 261; Goswami, 1993 p. 125). On Aczel's (2003 p. 261) account:

Einstein's conviction was that we must abandon one of the following two assertions, [that] the statistical description of the wave function is complete, [or that] the real states of two partially separated objects are independent from one another.

In demystifying the "spooky actions" of quantum mechanics, it was imperative for either one of the above assertions to be rejected as Einstein sought to cement his belief in a deterministic world, despite the "spooky actions" of quantum mechanics, as Einstein was certain that "God does not play dice" (Rosenbaum & Kuttner, 2006 p. 10). However, despite the intent of the EPR paper in confirming Einstein's theory of a world devoid of "quantum jumps" and "observer created reality" the disjunction query put to the physics community was soon answered by the final architect physicist we shall consider here, John Bell (Aczel, 2003 p. 261).

Aczel (2003 p. 262) informs us that Bell “offered an actual framework for testing the hypothesis that the quantum theory was incomplete [against] the assertion that it was, indeed, complete but included distinctly non-local elements”. Bell’s theorem proposes, that if “objects in our world do have physically real properties that are not created by observation”, then, we must also accept that “two objects can be separated from each other so that what happens to one cannot affect the other” (Rosenbaum & Kuttner, 2006 p. 142). Thus, on Davies’ and Brown’s (1986 p. 38) account, Bell’s theorem “opens the way for a direct test of the foundations of quantum mechanics, and the decisive discrimination between Einstein’s idea of a locally real world and Bohr’s conception of a somewhat ghostly world full of subatomic conspiracy”.

The “experimentally tested prediction” of Bell’s theorem was given the name “Bell’s inequality” (Rosenbaum & Kuttner 2006, p. 148). His idea was that in coming to know the inner workings of the world, we must decide whether the world is exemplified either as a physical state of reality, or as a world within which consciousness is itself a dimension of reality (Rosenbaum & Kuttner, 2006). The outcome of Bell’s experiment found that “two quantum entities which were originally part of the same system, remain interconnected in the most inexplicable manner” (Mindell, 2000 p. 238). Mindell (2000 p. 238) explains, that they are considered to be ‘entangled’, in the sense that if a particular photon in the system is spinning in one direction, the other must spin in the opposite direction so that their total ‘spin’ is balanced, no matter what distance exists between them. According to Chopra (1989 p. 91), Bell’s theorem “holds that the reality of the universe must be nonlocal; in other words, all objects and events in the cosmos are interconnected with one another and respond to one another’s change of state”, independently of physical location.

Despite Bell's theory going relatively unnoticed when first published in the 1960's (Mindell, 2000), it was the work of physicist Alan Aspect who made clear the importance works of John Bell's research, by demonstrating that "entangled protons give the impression of coming from a background of unbroken wholeness" (Mindell, 2000 p. 545). Hence, Aspect's experiment resulted in a whole new understanding and general agreement among physicists about non-locality (Mindell, 2000). This being so, what implications do we surmise from this general consensus, given a belief in a world that is whole, interconnected and entangled? Let us now see.

Contrasting Quantum Mechanics and Newtonian Mechanics

It will be the aim of this next section to continue our assessment of the quantum enigma by making explicit the key differences between quantum mechanics and classical physics. In doing so, we shall attempt to extend upon some of the aforementioned points as a way to develop further the information discussed in our previous section.

According to Rosenbaum and Kuttner (2006), and others (Aczel, 2003; Goswami, 1993; Mindell, 2000), there exist four critical principles by which we can differentiate between the theoretical assumptions of quantum mechanics and the scientific assumptions that gave birth to the classical physics known as Newtonian Mechanics. The three critical principles examined by Rosenbaum & Kuttner (2006), to which will examine, are determinism, physical reality, and separability. Let us begin by addressing the topic of determinism.

Determinism

According to Rosenbaum and Kuttner (2006), Newton's classicist physics believed that the inner workings of the world were determined in advance of the world itself. Accepting

this notion, Newton proposed an “all seeing eye” that was said to know the exact “position and velocity of each atom in the universe at a given moment” (Rosenbaum & Kuttner, 2008 p. 32), [making if you like], the entire future of the universe known prior to its existence. This being so, we discussed in the previous chapter how by way of accepting this model, we have come to see the whole of nature operating in a similar manner, so that by way of knowing the “exact” behaviour of an object we too can predict the future of those objects we seek to control.

Yet, despite this assumption, we have come to realise through the work of physicist Max Planck and others that the randomised nature of objects at the atomic level, cannot be predicted under the deterministic rule of a Newtonian World View (Rosenbaum & Kuttner, 2008). According to Rosenbaum and Kuttner (2006), Planck confirmed, as we noted earlier, that without cause and impressed force, a vibrating electron can suddenly ‘radiate a quanta’ (quantity) of energy as a pulse of light (Rosenbaum & Kuttner, 2006), conjuring the notion of atomic particles behaving not under the influence of an all seeing eye but by virtue of their own “free will”. This being so, here lies our paradox, “free will conflicts with the determinism of Newton’s physics” (Rosenbaum & Kuttner, 2006 p. 33). In doing so, we must thus assume either that our free will when exercised has no influence upon the finality of the determined future, or that in exercising our free will we create from a metaphysical perspective, the experiences we will experience in our future (Rosenbaum & Kuttner, 2006).

According to quantum theory, the later point rings true, for it has been shown that “the reality of the physical world [that being what we can see, taste, touch and hear] depends upon our [conscious?], observation of it” (Rosenbaum & Kuttner, 2006 pp. 51-52). This being so, we are led to believe that the experiences we will live in this world exist not as a result of a

predetermined existence but rather from the liberty we have been bestowed as conscious observers creating or at least co-creating our existence.

The idea of exercising free will as a way to create the reality of our physical world remains dismissed by neuropsychologists, who continue to accept the Cartesian view, that the decisions of the mind are separate from the physical actions displayed by the body, hence, to those who study the finite aspects of the brain, the concept of free will is nothing but an illusion (Rosenbaum & Kuttner, 2006). The question whether this assumption is correct remains an important one. According to Benjamin Libet (2002), a pioneering scientist in the field of human consciousness and former researcher in the physiology department of the University of California, this is a question we are forced to answer, as a way of discovering what influence, if any, conscious thought exerts upon our physical reality.

In a chapter titled, “Do We Have Free Will” (2002), Libet discusses some of the implications arising from his 1983 experiment, considered the most famous free will experiment to date. In his experiment, Libet (2002 p. 551) wished to answer the following question “are freely voluntary acts subject to macro deterministic laws or can they appear without such constraints, non-determined by natural laws and truly free?”. In order to answer his question Libet (2002) developed an experiment where subjects were instructed to flex their wrists at the time that they made their free choice, yet without prior thought in doing so. On Rosenbaum & Kuttner’s (2006 p. 174) account, Libet “determined the order of three critical times: the time of the “readiness potential”, (a voltage that can be detected with electrodes on the scalp almost a second before any voluntary action actually occurs); the time of the wrist flexing; and the time the subjects reported that they had made their decision to flex (by watching a fast moving clock)”. It was Libet’s initial thought that “one would expect conscious ‘will’ to appear before, or at the onset, of the readiness potential and thus

command the brain to perform the intended act” (Libet, 2002 p. 553). However, it was shown that the readiness potential actually occurred prior to the indicated decision time (Rosenbaum & Kuttner, 2006). This being so, Rosenbaum and Kuttner (2006 p. 174), raise the question “does this show some deterministic function in the brain brought about the supposedly free decision”?.

In responding to this question, Libet (2002 p. 561) infers that despite these findings:

It may be pointed out that free choices or acts are unpredictable, even if they should be completely determined. The “Uncertainty Principle” of Heisenberg precludes our having a complete knowledge of the underlying molecular activities. Quantum mechanics forces us to deal with probabilities rather than with certainties of events.

Further, Libet (2002 pp. 561-562) puts forward that in the case of chaos theory, which endeavours to elucidate the fact that complex and unpredictable results can and will occur in systems that are sensitive to their initial conditions, “a random event may shift the behaviour of a whole system in a way that was not predictable”. Yet, despite Libet’s reply he strongly concludes that the decision about whether a theory of determinism exists or one of non-determinism, remains unproven as we “do not have a scientific answer to the question of which theory may describe the nature of free will” (Libet, 2002 p. 563).

Even if it is conceded, however, that the nature of free will remains unanswered from a scientific perspective, it must be considered that in the possible presence of a deterministic framework by which certain physical laws exist, we are still in a position to dictate the events that may unfold around those physical laws by virtue of the free choices we make. This being so, it would be naive to think that the free choices we make have little if no significance, given that the unpredictability of our choices, from a quantum mechanics perspective, will create a range of probable outcomes that under Newtonian mechanics cannot be explained.

Physical Reality

According to MD and psychotherapist Edward C Whitmont (1993), we have come to believe that reality is shaped by what we can see, taste, touch, hear and smell, yet quantum physics tells us otherwise. In his book titled, The Alchemy of Healing (1993 p. 38), Whitmont writes that “whatever is not accessible to our five senses, either directly or by amplification through instruments, whatever cannot be mathematically and statistically (that is mechanically) reproduced, this viewpoint excludes from credible reality”. Extending his point, Whitmont (1993 p. 38) informs us that “this assumption persists in the very face of the evidence we possess of the perceptual limitations of our sensory equipment and of the “indeterminacy” principle of modern physics that has established that the stance of the observer, at least in part, determines the behaviour of what is being observed”. For example, the “observer created reality” put forward by physicist, Niels Bohr, suggests that by virtue of observing an object, we “cause”, if you like, the object to appear in the place we have observed, influencing the very nature of the object itself (Rosenbaum & Kuttner, 2008 p. 75). This being so, we can appreciate that the manifestation of an object appearing as a result of our observance is difficult to explain by way of the conventional Newtonian account of the reality.

In his book titled, Ordaining Reality: The Science Behind the Power of Positive Thinking (2008 p. 186), Joseph E Donlan points out that, “our five physical senses have consistently presented us with a highly restricted view of reality...In truth, our five physical senses serve little purpose in understanding” quantum physics. In arguing this point Donlan (2008 p. 186) suggests that Newtonian physics, has sought to challenge the “character of the physical reality which is at odds with our everyday sense of what’s out there”. For example, Donlan (2008) points out that several aspects of what we have called classical physics assume non-

intuitive notions including the rate upon which time slows down and how lengths contract. However, these measures of assessing our sense of reality, is challenged by way of Bell's discovery of non-locality (Donlan, 2008). Donlan (2008 p. 187) informs us that, "non-locality is upsetting because it contravenes and undermines the prevailing and intuitive notion that there is actually a world out there". Instead Donlan (2008 p. 187) points out, "it exposes us to the eastern notion that a world comprised of individual objects existing independently of an observer is merely an illusion". Thus, unlike Einstein, who according to Bud McClure, "placed the human observer outside his objective universe" (McClure, 2005 p. 225), physicists including John Bell and David Bohm "sought to eliminate the subject-object dichotomy by visualising the universe as a single, unbroken whole" (McClure, 2005 p. 225). They saw it as an interconnected universe whereby our observation of past and present objects can have an influence on the behaviour of those objects we observe (Mindell, 2000).

According to Rosenbaum and Kuttner (2006 pp. 33-34), quantum physics "challenges the classical view" of reality, that under a Newtonian worldview observes nature as a "machine whose workings, though incompletely understood, need be no more mysterious than the clock whose gears are not seen" (Rosenbaum & Kuttner, 2006 pp. 33-34). How it challenges Newtonian physics, relates to what we have addressed above, with quantum physics moving from an ordered, predictable world that can be measured and thus physically assessable on measurable assumption, to a world that creates a range of probabilities that despite being measurable to some degree, displays a random nature unexplainable from the perspective of a five physical sense reality.

Mindell speaks of a dichotomy between a "classical reality" and that of a "realm of direct personal experience, dreaming and deep feelings" (Mindell, 2000 p. 238). According to Mindell (2000), for millennia, ancient mystics have sought to merge these two worlds

together, which current scientific thinking has split apart. In the first world we consent to a reality that is indicative of objective objects that by virtue of their objectivity can be measured and validated under scientific law (Mindell, 2000). However, the second world consists of what Mindell refers to as subjective experiences, emotions and telepathy (Mindell, 2000) that despite being acknowledged by empiricist science, remains incalculable by way of the mechanical instruments designed for scientific testing.

At the beginning of chapter three we considered the Newtonian argument that knowledge that can be tested, that is measured and validated under scientific law, is awarded a higher value than other forms of knowledge including subjective experience. This being so, we are led to believe, for example, that the emotions we feel towards a particular object are, by virtue of its immeasurability, given a lesser value than that of a mathematical equation. Yet, are we correct in taking this position? According to Professor of Theoretical Physics at the University of Newcastle upon Tyne, Paul Davies (1988), we are not. In his highly acclaimed book titled, Other Worlds (1998 p. 108), Davies points out, in accordance with the points we have made above, that “the purpose of physical science has been to disengage from this personalised and semi-subjective view of the world and to build a model of reality which is independent of the observer”. Davies (1988 p. 108) continues by writing that “traditional procedures to attain this goal are repeatable experiments, measurement by machine, mathematical formulations etc”. This being so, Davies (1988 p. 108) points out that in adopting an objective world view we must ascertain the success of the objective model provided by science and on further inquiry examine whether this model can “actually describe a world which exists independently of the people who perceive it”. In providing an answer to his question Davies (1988 p. 108), on account of his research into the nature of reality, writes that:

Clearly the world that a person actually experiences cannot be totally objective, because we experience the world by interacting with it. The act of experience requires two components: the observer and the observed. It is the mutual interaction between them that supplies our sensations of a surrounding 'reality'. It is equally obvious that our version of 'reality' will be coloured by our model of the world as constructed by previous experience, emotional predisposition, expectation and so on. Clearly, then, in daily life we do not experience an objective reality at all but a sort of cocktail of internal and external perspectives.

Reverting to the work of Mindell (2000), we recognise a need to acknowledge both worlds with equal importance. However, the realisation is, that one world is awarded more value than that of the other. This being so, Mindell (2000) develops the analogy of a Consensus reality and a Non Consensus reality, to distinguish the value we ascribe to either world.

In physics, reality is given the meaning "perceptions that people consent to as being common" (Mindell, 2000 p. 25). This being the case, Mindell (2000 p. 25) puts forward the view that a Consensual Reality (CR), the first world, "implies not only a general collective agreement of modern international culture, but also scientific authorisation", whilst a Non-Consensual Reality (NCR) is indicative of "perceptions that do not collectively correspond". For example, Mindell (2000 p. 25) writes that "most people will agree that a given river is about five feet deep, but most will not agree on the idea that there are demons and monsters, or mermaids in the water". Yet, despite our lack of belief in the above creatures, we must recognise that from a CR perspective, experiences, including our dreams and emotions such as love and pain, are perceived as "less fundamental or at least, less real" (Mindell, 2000 p. 25). This being so, is the love we feel for our family less authentic than the measure of an athlete's performance? In answering this question, the majority of us would answer no, yet, the measures we conform to under scientific authority indicate alliance to a CR reality which denies the objective reality of this powerful emotion.

With the foregoing point in mind, Einstein (cited in Mindell p. 25) reminds us that:

We are accustomed to regard as real those sense perceptions which are common to different individuals, and which therefore are, in measure, impersonal. The natural sciences, and in particular, the most fundamental of them, physics, deal with such perceptions.

Einstein's presentation of this point sows the seed of a CR reality that according to Mindell (2000) is fundamental to the discipline of physics. However, Mindell (2000 p. 25) challenges such a view, commenting that "how a person or group defines the term "real" is not an objective fact, but a matter of opinion". He suggests then that "problems begin to arise when we use the term "real" as though it was the absolute truth" (Mindell, 2000 p. 25) and in doing so we make one "experience real and the other "not real" because they have little "correspondence" with the perceptions of others, [hence], making them insignificant" (Mindell, 2000 p. 25). This being so, Mindell (2000 p. 25) states that given this belief we resign ourselves to the fact that "some perceptions are considered the important ones while other perceptions are marginalised, set aside and given second class status, so to speak".

However, Whitmont (1993 p. 41) reminds us that in light of our search for facts as validation of the truth "out there" "we may well remember that the word "fact", derived from the Latin "factum", actually means something that is "made up". This being so, are the facts derived under a Newtonian science, at best simply empiricist assumptions for the workings of the world in which we live, rather than the factual reality by which we have heralded these views?

According to Rosenbaum and Kuttner (2006), the principles, of Newtonian "classical" physics themselves afford only an approximation of the nature of an atom, and are not in any way an indicator at all for the "workings" of the atoms that make up every living thing. Elaborating this argument Davies (1988 p. 109) writes that "a central feature of this Newtonian view of a real world is the existence of identifiable 'things' that can consistently be ascribed intrinsic values;....we have no difficulty in accepting for example, a football as a

football- a definite entity with fixed properties (round, leathery, hollow etc)...it is not a house or a cloud". Hence, according to Davies (1988) this world is identified as a collection of distinct objects interconnected with one another, however, the idea is only an approximation. For example, despite having fixed properties does the ball not change on account of it being kicked, collecting dirt and becoming remodelled on account of it being trod on? Is the ball still a ball when it is in the air? On this point Mindell (2000 p. 159) writes, that the point here "is that today's physicists are far less certain than ever about what a ball really is, [stating that] our old CR view-Newtonian View- on the nature of an objects mass, its weight and size, has changed...as nothing is totally certain any longer".

According to quantum physics Mindell's (2000) point rings true, by virtue of applying Heisenberg's "Uncertainty Principle". This principle suggests that in knowing one aspect of an object we indeed surrender to not being able to define the other. This being so, our interpretation of an object, for example, becomes skewed, as only one aspect of the object can be known at a time (Mindell, 2000). Hence, in becoming uncertain of the determined world by which Newtonian physics postulates as "fact", what we consider to be real in theory may by its very nature be a mere theoretical assumption to which masks a much deeper perspective on the world in which we live. This being so, it is of no surprise writes Bohr (cited in Rosenbaum & Kuttner, 2006 p. 100) that:

the discovery of the quantum action shows us, in fact, not only the natural limitation of classical physics, but by throwing a new light upon the old philosophical problem of the *objective existence of phenomena independently of our observations, confronts us with a situation hitherto unknown in natural science* (emphasis added by authors).

In revisiting the concept of an "observer created reality", NCR reality suggests that consciousness plays a dramatic role in what we as the observer shall observe, that is what then becomes our physical reality (Mindell, 2000). According to some physicists, it is our "conscious" observation of an object that "causes" or influences the object to appear where

we shall find it (Rosenbaum & Kuttner, 2006 p. 10). By conscious observation, we imply that our actual conscious act, prior to our physical decision to act upon a stimulus, will be reflected in the result we ascertain (Mindell, 2000). Yet, in accepting this theory, one must acknowledge the influence of the individual over the object observed, though this line of thinking is difficult for physics to support, given the mysticism invoked by such a thought (Rosenbaum & Kuttner, 2006). However, despite varied support, quantum theory has engendered a whole new understanding of our encounter with consciousness. In fact physicists such as John Von Neumann and John Wheeler suggest that “quantum theory makes physic’s encounter with consciousness inevitable” (Rosenbaum & Kuttner, 2006 p. 184). This being so, is there any evidence to suggest that our conscious observation of an object “causes” the object to be in the place where we have found it? According to John Von Neumann, evidence supporting the above question does exist (Rosenbaum & Kuttner, 2006 p. 184).

By way of his meticulous research, Neumann (cited in Rosenbaum & Kuttner, 2006 p. 184) demonstrated in his book titled, The Mathematical Foundations of Quantum Mechanics (1932), that by using a measuring device such a Geiger counter, that could be “isolated from the rest of the world” you can also make “contact with a quantum system”. The idea is that the counter itself would enter a superposition state, that is, it exists in all possible states, until we make a conscious observation of it (Rosenbaum & Kuttner, 2006). This means, to some degree, that the counter exists as our mother, friend or favourite meal until we observe what we are “expecting to see”, that being an atom. Hence, in doing so, Neumann points out that when we look at the counter we will “see a particular result, not a superposition” (Rosenbaum & Kuttner, 2006 p. 184). Upon conclusion of his work Neumann (cited in Rosenbaum & Kuttner, 2006 p. 184) concluded that “only a conscious observer can actually make an

observation”. This being so, my question is will our conscious thought influence our day to day activities including the food we eat? Suffice to say, enough has now been said in the foregoing pages to answer the question in the affirmative. This being so, I suggest that the decisions we make in technologising the foods we eat, cannot be divorced from the actions we take to ensure the inert and artificial nature of the foods we ingest?

Separability

Discussing the Newtonian Worldview, Mindell (2000 p. 25) points out that our implicit value judgments regarding NCR experiences have resulted in physics detaching itself from “parts of nature and from parts of human perception”. For example, from a Newtonian perspective, the notion of a chemist influencing the purity of his chemical reaction is considered farcical, yet in the wake of Aristotelian science, alchemists “believed that their personal purity (conscious influence?), influenced the chemical reactions in their flasks” (Rosenbaum & Kuttner, 2006 p. 35). In dividing consensual claims from those of non-consensual, we have disengaged not only from the cocktail of solutions lining the pharmacy cabinet, but we have disconnected ourselves from the natural world, so that the rocks that lie beneath our feet or the people we pass on the side of the road are given minor acknowledgement if any by virtue of our separation or isolation from them.

According to Mindell (2000), Newtonian physics, displays a strict separation between the facts (chemicals creating the solution) and the experiences (the passion and soul we apply to the creation of the solution) we acquire. This being so, in making this split, we contribute to the destruction of the “NCR sense of feeling connectedness to the world as a whole” (Mindell, 2000 p. 25).

From a Newtonian perspective, “a hunk of matter, a planet or a person, interacts with the rest of the world only through the “physically real forces” impressed upon it by other objects” (Rosenbaum & Kuttner, 2006 p. 35). This being so, the Newtonian Worldview, considers objects, humans and the universe as separate from the rest of the world, unless a physical force is impressed upon it, such that due to physical interconnectivity it becomes connected through entanglement (Rosenbaum & Kuttner, 2006). However, experiments within the field of quantum physics have disproven the Newtonian conclusion of a separation between objects (Rosenbaum & Kuttner, 2006). For example, we saw earlier that the mathematical formula, Bell’s Theorem “holds that the reality of the universe must be non-local; in other words, all objects and events in the cosmos are interconnected with one another and respond to one another’s changes of state” (Chopra, 1989). According to Aczel (2003 p. 252), the world in which we live can be at best describe as “entangled”, meaning that two, three or four entities “are really parts of one system”, a universal interconnected system, whereby all entities are “unaffected by physical distance between its components...the system acts as a single entity”. Extending his point Aczel (2003 p. 250) notes, that given this connectivity or entanglement “two particles that can be miles or light years, apart may behave in a concerted way: what happens to one of them happens to the other one instantaneously, regardless of the distance between them”. This implies that communication between two distance entities happens faster than the speed of light, which according to ‘Einstein’s Theory of Relativity’ is impossible (Chopra, 1989 p. 109). Thus, it is not surprising that Einstein was bewildered by the claim that “what happens in one place could be directly and instantaneously linked with what happens at a distance location” (Aczel, 2003 p. 249).

According to Physicists David Bohm, we require a theory of the world that assumes a field of unbroken wholeness (Mindell, 2000 p. 240). Bohm believed that in this theory,

“quantum events-like the relationship of twin photons- are interconnected from the beginning”, with an unbroken world unfolding from what Mindell calls a “great soup” into the individual noodles, peas, electrons and people (Mindell, 2000 p. 240).

Mindell writes that Bohm put forward the concept of unbroken wholeness as a way to “explain non-locality and the mysterious connections between entangled quantum objects” (Mindell, 2000 p. 546). On Mindell’s account (2000 p. 546), Bohm stated that:

The essential new quality implied by the quantum theory is non-locality; i.e. that a system cannot be analysed into parts whose basic properties do not depend on the...whole system...This leads to the radically new notion of unbroken wholeness of the entire universe (Bohm & Hiley, 1975 p. 94).

This being so, Bohm endeavoured to develop a theory of unification that put the world in which we live, broken apart under Newtonian Physics, back together again (Mindell, 2000 p. 546).

It appears that “without separability what happens at one place can instantaneously affect what happens far away without any physical force connecting the two events” (Rosenbaum & Kuttner, 2006 p. 151). Interestingly, experiments conducted have shown such influences to “extend over more than one hundred kilometres” (Rosenbaum & Kuttner, 2006 p. 151), with quantum theory asserting that this “connectedness extends over the entire universe” (Rosenbaum & Kuttner, 2006 p. 151). This being so, we may infer that by virtue of “quantum entanglement”, larger objects including the food we eat, are expected to make use of this connectedness also.

In accepting this point, the question to ponder regarding our discussion in previous chapters is: Are we connected to the foods we eat? Or in our attempt to dominate the whole of nature, has the wholesomeness of our food become broken partly by our disconnection from it? This is a question I will address in the following chapter.

Chapter IV

The Metaphysics of Food: Reconceptualising our Relationship to the Foods we Eat

In the previous chapter we came to realise that the reductio-mechanist mode of inquiry serves on the one hand to detach us, as it were, from the subject matter of our investigations. On the other hand the paradigmatic epistemology it presupposes covertly drives us to develop technologies of power designed for the most part to transform and reconstruct the living world of nature into a world of increasingly chemicalised, inert and deadened things, over which, by virtue of their lifelessness, we gain a greater measure of control. Detached from the world, we live out a life that is highly regimented and artificial, fuelled by our obsession with power and dominance to control everything around us by transformations to modalities of subjugation and inertness that serve to make them as predictable and thus as controllable as possible. This epistemology of power is a new hierarchy of value that perpetuates itself by reproducing and recasting the world technologically. In essence our primary interactions with the world around us are technologically textured (Laura, Marchant & Smith, 2008). Within the commercial context of food technologisation, the mechanist processes and emotionally detached agents that produce our food systematically transform the living world of nature into marketable chemicalised nutritional packages of synthesised inertness.

In undertaking the task of reconceptualising our relationship to the foods we eat, we shall draw upon the epistemological model proposed by Laura, and first published in his book titled, Empathetic Education (1999), where he develops his theory of ‘Participatory Consciousness’, based on the quantum concept of entanglement interconnectivity. Extending these ideas, I shall endeavour to show that an epistemology grounded in the consciousness of

connectivity, offers a far more enriching life, a life which honours and fosters our relationship with nature and the foods we eat. Consistent with Laura's epistemological framework, I shall then introduce the work of Masaru Emoto, as a plausible example of the theory of participatory consciousness in practice. My objective will be to show how by expanding the domain of consciousness to encompass empathetic connectivity, we can reconnect ourselves to the foods we eat in beneficial ways far beyond the increasingly narrow focus on food nutrition. Let me now turn to the analysis at hand.

Restoring our Connection with Nature

According to the reductio-mechanist paradigm we discussed in chapter three, man is accorded a privileged position within nature but somehow above it. The world of nature is construed as man's own private laboratory in which he carries out his experiments objectively by detaching himself from the objects of investigation. We observed in the previous chapter that this paradigmatic separation of man from the world is in essence a modality of epistemological disconnection, resulting in the desanctification of the earth and its degradation, along with our alienation from it. The degradation our disconnection has allowed us to take an emotionless approach in our destruction of the world in which we live. This degradation of nature, fostered in some respects by our reductionist deconstructions of it on the one hand and our technological reconstructions of it on the other have meant that in the context of our foods, we appreciate neither the food itself nor the hands that cultivated and cooked it. Instead, we desire foods that conform to the technological human palate we have designed by virtue of texturing foods in their original form to be transformed into artificial and inert products, reported as being nutritious to the human body. On this point Laura, Marchant and Smith, write in their book titled, The New Social Disease (2008 p. 149) that: "Given the commitment to a theory of knowledge driven by our cultures obsession with

power and control, the technologisation of nature has led to the reconstruction of a world in which we are alienated, dehumanised and depersonalised”.

Reinforcing their concern, Laura, Marchant and Smith (2008 p. 158) make us aware, that by way of our commitment to this approach, when “surrounded by things, ideas and even relationships which are conformist, fossilised, inert and even dead, should we really be surprised that we sometimes find it so hard to feel alive and vital, imaginative and responsive, to feel love and act lovingly?”. To appreciate the profundity of this point, reflect upon the following pattern of disconnectivity that follows from the epistemology of power. Laura has endeavoured to make explicit the covert value equation enshrined in this epistemic model in the following way (Laura & Chapman, 2009). Knowledge equals power; power equals dominance/subjugation; dominance equals control and control equals security. On Laura’s view, knowledge is not value free, as the concept of knowledge is driven and defined by the preoccupation with power in such a way that what we count as knowledge will reflect the ultimate goal of control (Laura & Chapman, 2009). Similarly, in so far as technology represents the application of knowledge, technology will itself be invested to achieve the implicit epistemic goals of power, dominance and control, and this is where Laura’s theory of ‘transformative subjugation’ comes into play (Laura & Chapman, 2009). To gain control via the epistemology of power model, the application of technology will be directed towards the transformation of the world into modalities of increasing mechanistic or biological inertness (Laura & Chapman, 2009). The conceptual connection of praxis here is that the more inert something is, the more predictable and thus quantifiable it is, under the aegis of scientific law, the ultimate measure of scientific control (Laura & Cotton, 1999).

The methodology of reductionism by way of which this process of transformative subjugation is carried out often involves deconstruction first and then reconstruction (Laura

& Cotton, 1999). In either case the outcome is the production of a secondary ontology or world made up of artificial, synthesised and lifeless things. According to Laura (2008) and his colleagues, the city represents the ultimate culmination of our technologisation of nature, one outcome of the transformation being the production of predictive conformity. Given this panoply of conceptual connections, it will now be easier to appreciate the extent to which we have so technologised our food that much of what remains is little more than a lifeless chemical cocktail that projects the pretence of being a food (Cousens, 2005). It is a commentary on how disconnected we have become from nature that as a culture, we accept the transformative degradations of food with so little protest or understanding of the monumental impact the technological production of food has for our health.

On this point, revolutionary Japanese agriculturist, Masanobu Fukuoka, in his book titled The One-Straw Revolution (1978 p. 27), calls for an intersectoral approach in the maintenance of an ecosystem that shall exist in oneness writing that “methods of insect control which ignore the relationships among the insects themselves are truly useless”. Fukuoka (1987 p. 27) continues by noting that “it is impossible for specialised research to grasp the role of a single predator at a certain time within the intricacy of insect-inter-relationships”. For example, in the case of spiders and leaf hopper’s Fukuoka (1978 p. 27) points out that we cannot merely research the spider and the frog, but are required to consider in more detail the relation between frogs and spiders within their environment. Hence, in reconnecting with our environment from a quantum perspective we must acknowledge the relationship between the parts of a living system, rather than its parts in isolation. This being so, Laura, Marchant and Smith (2008 p. 158) remind us that in failing to adopt an epistemic framework of empathetic connectivity with nature, the resultant to disconnection from it

leads ineluctably to the “technological world we have created... that by its very nature depersonalises and dehumanises”.

Reconceptualising the world as connected and whole, Laura, Marchant & Smith (2008 p. 149) write that “despite the dominance of the epistemology of power as a technological paradigm, there exists the conceptual material to reconstruct an epistemic framework which eschews needless technological texturing in the name of progress”. However, to achieve this goal Laura, Marchant and Smith (2008 p. 149) are quick to point out that to supersede the epistemology of power, we must begin by acknowledging that “the precious gift of human consciousness is not best deployed in the service of gaining knowledge to dominate, subjugate, suppress and subdue the world around us, including other living things”. This being so the authors call for a conscious and concerted effort to reconceptualise knowledge as a form of connectivity, such that the connections are expressed empathetically (Laura, Marchant & Smith, 2008).

In beginning a journey of reconnection to and with nature, Laura, Marchant and Smith (2008) proffer a paradigm shift that shifts us from the epistemology of power to an epistemology of connectivity and participatory consciousness. In their elucidation of the later model, Laura, Marchant and Smith (2008 p. 152) assert that “when the concept of educational knowledge is motivated by our faith in the virtue of connectivity as the ultimate form of security within nature, our interaction with each other will reflect a participatory mode of personal interchange which cannot be reduced to mechanistic substitutions for it”. By virtue of this form of participatory engagement with nature “the measure of security is shifted in epistemic terms from how well we know how to dominate and control each other to how well we know how to connect with each other” (Laura, Marchant & Smith, 2008 p. 152). Endeavouring to extend the epistemology of participatory consciousness to our foods,

Cousens (2005 p. 499) contends that our inert and deadened approach to food will be replaced by an “authentic” view, whereby the growers will focus their attention on what they are doing to improve the biological quality of our food “instead of what they are not doing”. Further, Cousens (2005 p. 499) informs us that in living out such an approach we shall seek to “add energy to food and soil, by love and devotion in its production”.

Laura, Marchant and Smith (2008 p. 151), point out, that the epistemology of empathetic education “encourages moral reflection not just on the use of technology, but on whether certain types of technology should ever be invented”. The idea here is that the more we think empathetically about the world around us, the less likely it is that we would be willing to degrade our foods in the way we have, as in the case of its technologised chemicalisation (Laura & Ashton, 1998). Given the denigration such processes are having on the quality of the earth’s soil and the bioavailability of the nutrients we require for sustained health I submit that our whole approach to food production would be different. According to Laura, Marchant and Smith (2008 p. 153), quantum entanglement shows that the systemic web-like connectivity of nature is so seamlessly undivided that: “for every increase in power brought to us by technology, there will be a diminution of power and consequent disruption somewhere in nature which results”.

Reinforcing the basic idea of an epistemology of participatory consciousness is environmentalist, Caroline Merchant (2003 p. 229), who states that in reconnecting ourselves with nature, we require “a new ethic, [entailing] a new consciousness and a new discourse about nature”. Evolving her point, Merchant writes in her book titled, Reinventing Eden: The Fate of Nature in Western Culture (2003 p. 229), that: “living with nature opens the possibility of nondominating, non-hierarchical modes of interaction between humanity and nature”. Merchant (2003 p. 229) points out that we will speak of nature in high regard, rather

than as a “machine to be manipulated, a resource to be exploited, or an object to be studied and transformed”. However, in order to establish what Merchant (2003 p. 230) calls an “ecological partnership”, whereby those who work with the land uphold a concerted effort to work in partnership with it, we must reconnect with it first. This being so, in approaching the natural world as a “dynamic force with which to connect” (Seaward, 2004 p. 160), we shift from a detached, power-driven perspective to a participatory consciousness defined by a profound sense of empathetic connectivity to the world around us.

Connecting with Nature and Honouring our Food

Our disconnection from nature, I have been urging, is also reflected in our disconnection to and treatment of the foods we consume. We observed that the technologies we employ to cultivate the foods we eat result in the denigration of a number of vital nutrients being lost, most of which are required for the maintenance of human life. What the theory of empathetic epistemology helps us recognise is that the values we place on food reflect the fragmented value judgements we place in general on the mechanistic character of the technological utopia in which we reside. For example, because we are not connected empathetically with nature, we believe we can remove a fruit from a tree in a manner similar to the way in which we move a brick from a wall of bricks, with no effect on the brick, given its inert modality which allows it to hold its structure. This being so, that we are unable to observe any structural change to a fruit or vegetable, when picking it, is irrelevant to the fact that such changes take place. The complex botanical complexity of the fruit in its dynamic connectivity to the tree, not unlike in some ways, the placental attachment of a foetus in the womb, can be disrupted dramatically by premature separation. It is now well established that the premature harvesting of fruits or vegetables may significantly deplete their nutritive

content, texture and flavour, not to mention longevity past their picking (Gutiérrez-López & Barbosa-Cánovas, 2003).

In light of the foregoing discussions it should now be easier to appreciate, that our relationship to nature, and thus to the foods which nature brings forth have been compromised by our reductionist technologisations of it. Driven by the epistemology of power, the transformative subjugations of technological intervention recast the face of the earth and virtually everything on it into synthesised and inert fabrications. To define new goals for health in nutritional terms, or the view I advance here, without recognising the extent to which the food we eat have themselves become lifeless and in some cases chemically toxic fabrications, is tantamount to an idle ritual. Laura, Marchant and Smith (2008) propose that we are in the midst of a paradigmatic dilemma such that many of the very technological interventions designed to improve both food quality and production, serve inevitably, to undermine these goals. The way forward is not necessarily more and better technologies, but the reconceptualisation of the epistemology of power that underpins them, so that we can redefine our relationship to the tools of technology, concomitantly with the redefining of our relationship to nature.

Specifically, Laura enunciates an alternative theory of knowledge which he calls, 'Empathetic Epistemology', the basis of which affords a new vision of quantum connectivity by way of a radical revision of the equation defining the epistemology of power (Laura & Cotton, 1999). On this new theory knowledge equals empathetic connectivity; equals participatory consciousness, equals affective resonance with nature; equals authentic security (Laura & Chapman, 2009). Extending this new approach to the task of redefining our relationship to food, I submit that the first stage of re-educating people to connect empathetically with nature entails enhancing quantum sensibilities of entanglement such that

the transformative subjugation of food (e.g. its synthetic reconstruction) is regarded as a violation of its nutritive resonance and integrity. The second stage leads to an ethic of participatory consciousness which invites an empathetic approach to the stewardship of the earth and thus of the soil upon which so much of food production relies. This means that we should endeavour in every possible way ensure that our fertilisation techniques will make our soils more rather than less alive, and that our ways of protecting crops from insect infestation reflects our commitment of nutritive resonance to ensuring that the crops we grow are less rather than more toxic for the chemicals we spray on them. Stage three involves reconceptualizing the ways in which we harvest and store food to preserve it for transport and protracted economically viable shelf-life. Stage four encourages a whole new perspective on how we ourselves value and honour our food in the context of its preparation and its eating.

Consistent with the empathetic approach to our food, Cousens (2005 p. 500) encourages the development of what he calls authentic foods that “support the health of the ecosystem, our bodies and the local economy”. In defining authentic foods, Cousens (2005 p. 500) stresses foods that are “local, seller grown, fresh and organic”. To reconnect with our food in this way we are required to introduce new principles of praxis to bring about these goals. These principles include such practices as consuming foods produced within a 50 to 100 mile radius of the location in which they are to be sold (Cousens, 2005). Epistemic holism will seek to find a balance between the need to create plentiful and healthy crops on the one hand, while educating people for deeper understanding of the importance of what I shall call ‘earth/food honouring’ as an integral component of good health. However, Cousens (2005) points out that to adopt these changes we must first create and embrace an alternative mindset that supersedes the conventional nutritional paradigm we discussed in Chapter III. This being so, Cousens (2005) stresses that the production of local, fresh and organic food is

meaningless, if we fail to honour the food we cultivate under such principles. Hence, honouring our food means cultivating a more comprehensive consciousness with which our expressed feelings of connective empathy towards its production become increasingly natural (Cousens, 2005).

The Role of Consciousness in Fostering Improved Health

As we have made clear in the previous chapter, there is evidence to support the notion that the reality of our physical world depends upon our conscious observation of it (Rosenbaum & Kuttner, 2008). This being so, we have the responsibility of making a conscious effort to reconnect with nature as part of a seamless, indivisible and harmonious unity. What empathetic epistemology requires of us is that we value the land, those who work with it and the foods that come directly or indirectly from it in ways which foster an ethic or spirit of participatory consciousness and connectivity (Laura, Marchant and Smith, 2008). According to empiricist science, the contribution of consciousness remains, an enigmatic feature that for some is best left to the sciences of psychology (Rosenbaum & Kuttner, 2008). We have observed, however, that the quantum enigma surrounding the role of consciousness in the unfolding of reality cannot be reduced to our sensory system of five cognitive faculties, and thus as physicists John Von Neumann and John Wheeler suggest “quantum theory makes physics encounter with consciousness inevitable” (Rosenbaum & Kuttner, 2008 p. 184). This being so, if we are consciously to commit to connecting with nature through expressions of affective resonances of interaction, is it possible that the virtues of an empathetic heart become the ontic grounding for the emergence of a whole new metaphysics of entanglement?

In beginning to answer this question, we turn first to Biological Scientist, Dianne Trussell, who in her article titled 'Healing Energy Connections' (2008) provides some evidence to support the view that our thoughts can have a profound effect on our physical body. Trussell writes that the relatively new "biological science of psycho-neuro immunology (PNI), is uncovering the incredible world of direct, measurable effects that thoughts, emotions and situations have on the human nervous, immune and endocrine systems" (Trussell, 2008 p. 31). For example, according to Trussell (2008 p. 33), it has been shown in controlled studies, under the supervision of well known psychiatrist Dr Elizabeth Targ, that "individuals have attained the vibrational level necessary to re-establish, even at remote distances, the coherence in a sick person who has a lower, more chaotic vibration". This effect represents, from a quantum perspective, a collective conscious connection between one individual and another such that despite their locality from each other, their effect upon one another is neither limited nor marginalised. On this point Targ (2002) suggests that her research establishes that the use of prayer, energy and spiritual healing that derive from a conscious desire for the healing and rejuvenation of those who are sick will actually result in improvements in the health of those individuals who receive these blessings.

In a study conducted by Medical scientists Sicher et al. (1998) at the California Pacific Medical Centres Complementary Medicine Research Institute, data reported in the study indicated the "possibility of a distant healing effect in patients diagnosed with advanced AIDS" (autoimmune deficiency syndrome) (Sicher, Targ, Moore & Smith 1998, p. 356). In this study, 40 volunteers diagnosed as having advanced AIDS were solicited via local advertisement and matched in pairs according to the criteria of age, CD4 white blood cell count (depleted and/or defective in autoimmune conditions) and AIDS associated illnesses (Sicher, Targ, Moore and Smith, 1998 p. 358). Volunteers were "randomly selected to either

10 weeks of DH (distant healing) treatment or a control group”, with all volunteers receiving medical support and care from their own doctor (Sicher Targ, Moore and Smith 1998, p. 358). During the course of the study, 40 healers, from a range of religious backgrounds, acknowledged as having experience in the treatment of AIDS and accustomed to sending distant healing, sent various forms of distant healing (e.g. ‘psychic healing’ and ‘prayer’) to the individuals participating in the study (Sicher, Targ, Moore and Smith, 1998). In sending their “healing”, healers were limited in their knowledge of their client knowing only their first name and receiving one photograph of the individual (Sicher, Targ, Moore & Smith, 1998 p. 359). Rotating healers randomly so that each volunteer received distant healing from ten different healers, healers spent one hour per day, six days per week for the entirety of the study sending what might be called distant healing energy (Sicher, Targ, Moore & Smith, 1998).

According to Sicher et al. (1998), volunteers were followed for six months, with tests conducted on their blood. At this point, “a blind medical chart review found that treatment subjects (those sent distant healing) acquired significantly fewer new AIDS defining illnesses, had lower illness severity and required significantly fewer doctors’ visits, fewer hospitalisations and fewer days of hospitalisation” compared to the control groups (Sicher, Targ, Moore & Smith, 1998 pp. 361-362). Further, those individuals in the treatment group reported significantly improved mood compared to those individuals assigned to the control group (Sicher, Targ, Moore & Smith, 1998).

Despite CD4 levels showing no significant difference between the treatment group and control group, Sicher and his colleagues suggest that measures of viral load and activity of natural killer cells may be a more useful measure of healing effects given their role in the proliferation of the AIDS virus (Sicher, Targ, Moore & Smith, 1998). Although no

comparisons were made in the study in relation to the care received by each volunteer, suggesting significant differences in treatment and care, it would appear that those in the treatment or “prayer group” have some advantage over those individuals in the control group (Sicher, Targ, Moore & Smith, 1998; Benor, 2001).

Supporting the theory that distant healing can invoke healing effects is the work of William S. Harris et al. (cited in Benor, 2001 p. 2) “who studied the effect of intercessory prayer in consecutively admitted patients on a cardiac intensive care unit (CCU) at the Mid American Health Institute, Kansas City”. In this study, Harris et al. (cited in Benor, 2001 p. 2) replicated a study conducted earlier by medical researcher Randolph Byrd (cited in Benor, 2001 p. 2), but with a greater number of patients (Benor, 2001). Harris et al. (cited in Benor, 2001 p. 2) placed 466 patients on a CCU in a treatment group (prayer group) and 524 patients in a control group, with no significant initial differences reported regarding morbid conditions, sex or age between the treatment and control group (Benor, 2001). Interestingly, neither staff nor patient at the CCU was aware of the study, thus “no informed consent was obtained” (Benor, 2001 p. 2).

Intercessors recruited for the foregoing study, came from various “Christian” backgrounds, including non-denominational, Episcopalian, Protestant or Roman Catholic (Benor, 2001). In agreeing to commence the study intercessors had to be in accordance with the following statement: “I believe in God. I believe that he is personal and is concerned with individual lives. I further believe that he [God] is responsive to the prayers [I make] for healing made on behalf of the sick” (Benor, 2001 p. 3).

In carrying out this study, intercessors prayed daily over a 28 day period for a “speedy recovery with no complications”, with intercessors commencing prayer by “at least the second day after admission to the CCU” (Benor, 2001 p. 3). Further, the CCU study,

“covered the patients’ entire hospitalisation in 95 percent of the cases” (Benor, 2001 p. 3). In assessing cardiac progress, Harris et al. (cited in Benor, 2001 p. 4) “assessed all assessments and data blindly”. They used: “weighted and unweighted values for various events, procedures and new diagnoses” (Benor, 2001 p. 4) with the treatment group reporting significant improvement in cardiac status for both scales (both at $p < 0.04$) (Benor, 2001 p. 4).

Given the foregoing studies and further studies which support the theory of conscious action in the healing of animals (Hol, 1983; Snel & Vander Sijde, 1995), there is reason to believe that entanglements of conscious interconnectivity play a role in improving the health states of a range of living systems state of health. This being so, will our conscious actions support renewed vitality in the life of the food we eat, so that it supports our bodies in a manner conducive to good health?

In addressing this question, I shall now turn my attention to the work of Japanese scientist and Doctor of Complementary Medicine, Masaru Emoto. Emoto presupposes but does not himself philosophically articulate the empathetic epistemology of connectivity and participatory consciousness elaborated by Laura and Cotton (1999). In a series of experiments he endeavours to show that the attitudes of consciousness we express to water in particular and food in general can bring forth significant changes in water and food such that those who drink or ingest these well-honoured foods can be significantly benefitted in their health (Emoto, 2004).

Emoto’s Theory of Water Entanglement and Consciousness

It is Emoto’s (2003 p. 12) view that: “the quality of water [and food] changes based on the information it receives....in other words, the information we give to water changes its quality. According to Emoto (2003; 2004), our thoughts and feelings towards water and food

can generate changes to the physiological structure and in doing so, develop restructured molecular properties unsuitable for our consumption. This being so, the consequences of consuming such foods, suggests Emoto (2003; 2004), is impaired health. Similarly, thoughts which express our value and honouring of the water and foods we eat can improve health (Emoto, 2004). On this assumption, Emoto (2004 p. 22) states that:

The healing power of water and its ability to carry information has been known for centuries, and many therapies have been based on this knowledge. What's new is that these 'hidden' properties can now be made visible. The information carried by the water can be seen as a picture, and this changes our view of it from a mere chemical molecule into a living creature. In former times there was nothing unusual in holding conversations with nature and nature spirits, even in the Western world. Nowadays, our increasingly mechanistic view of things prevents us from acknowledging these organic perceptions, even if they come into our consciousness.

In his book titled, The True Power of Water (2003), Emoto argues on the basis of his research that by way of expressing our intention towards water 'positively' it is possible to generate qualities in the water we drink that will ultimately be beneficial for human life (Emoto, 2003; Emoto, 2004). On this point Emoto (2004 p. 107) writes:

We can use water in many ways to maintain our health and fight disease...water does this in two interconnected ways: through its well-known physical properties, and through its more hidden spiritual qualities. The human body is composed of around 85 percent water, which performs many life-sustaining tasks. For example, it supports complex biochemical reactions, provides structural support for our cells, and is the major component in blood and all other body fluids. Also very important, it eliminates dangerous waste products from every part of the organism. These processes all rely on water's physical properties. From my own and other scientists' work with water and water crystals, I'm convinced that there's a profound interaction between our thoughts (and perhaps those of people around us) and the water in our bodies. Positive thoughts affect the molecular structure of bodily water, and thus the health and well-being of the entire organism.

Numerous experiments, based on the hypothesis of Masaru Emoto have been carried out by Emoto's Chief Scientist Dr. Kazuya Ishibashi, who completed his doctoral program in applied science at the University of Kumamoto, Japan (Emoto, 2003). Hence, at this point let us explore the nature of these experiments. Emoto (2003 p. 2) writes that the first step in conducting our experiment was to "put a water sample into a glass bottle and expose it to information, such as a word, picture, or music" for a selected amount of time. Emoto (2003 p.

11) reports that this first step is carried out because of previous observations which have shown “water to form different shapes of ice crystals depending on the information it has received”. For example, Emoto (2003 p. 13) asserts that:

When we showed water the word “happiness”; it formed crystals with well-balanced shapes like beautifully cut diamonds...On the other hand, water exposed to the word “unhappiness” resulted in broken and unbalanced crystals.... We continued to show a pair of opposite words to the same water: “well done” versus “no good”, “like” versus “dislike”, “power” versus “powerless”...water formed crystals only when it was shown positive words.

Drops of water from the glass bottle are then placed onto fifty petri dishes (5cm or 2.5 inches in diameter) with each dish then frozen in a freezer at -25 degree Celsius” for a period of three hours (Emoto, 2003). At three hours, the frozen drops of water are taken out of the freezer and observed under a microscope (Emoto, 2003). According to Emoto, the frozen drops of water begin to form crystals as the temperature rises and the ice begins to melt (Emoto, 2003). As each formation is observed, it is then classified into groups of “beautiful crystals, those that tend to have many collapsed crystals, or those that have no crystals” at all (Emoto, 2003 p. 4).

Based on his findings, Emoto (2003 pp. 13-14) points out that:

Water seems to correctly understand the essence of what it was shown....Water didn’t recognise the word it saw as a simple design; rather it understood the meaning of it. When water realised that the word carried good information it formed crystals. Perhaps water is also capable of sensing the heart of the person who wrote the word.

Scientific Perspectives on the Effect Human Intention can have on

Water

According to Professor Emeritus, Stanford University Department of Material Science and Engineering and Fellow to the American Academy for the Advancement of Science, William Tiller (2004 p. 33), “experience shows that human consciousness readily manipulates information of all kinds to produce order out of disorder e.g. numbers to sums,

jig saw puzzle pieces to make maps and pictures”. In his Chapter titled, “Psychoenergetic Science: Expanding today’s Science to Include Human Consciousness” (2004), Tiller discusses his discovery of a second unique level of physical reality that reinforces the hypothesis put forward by Emoto. Tiller (2004 p. 33) writes that the “discovery of a “second unique level of physical reality [differs] from our normal electric atom/molecule level”, and that: “this new level [of physical reality functioning] in a physical vacuum within the “empty” space between the fundamental particles that make up atoms and molecules”. On this point Tiller (2004 p. 34) makes the comment that “in accessing these two unique levels of physical reality [allowed us] to tune this large space so that a specific intention could be manifested in that space via the physics of this vacuum level of physical reality”. Further, Tiller (2004 p. 33) points out that “the stuff of this physical vacuum consists of magnetic information waves; and we’ve observed that the physics of this new level is modulatable by the human mind, intentions and consciousness in general”. This being so, Tiller, reinforces the influence of the human mind over that of the physical world in which we live.

In his experiments Tiller (2004 p. 60) developed an “IIED (intention imprinted electrical device), which acts as “an effective surrogate to robustly influence a unique target experiment in physical reality”. For example, Tiller (2004 p. 34) has, by virtue of this device increased by 25 percent “the in vitro thermodynamic activity of a specific human liver enzyme alkaline phosphatase”, and “substantially changed the PH of the same type of water in equilibrium with air either up or down by one full PH unit”. In carrying out his research Tiller (2004 p. 60) found that in utilising an IIED conditioned space, coupled with a “magnetioelectrochemical potential contribution” to the thermodynamic free energy driving force for “the water to ice phase transition”, the form of the dominant ice crystal morphology observed during this phase transition” was altered. This being so, Tiller (2004 p. 60) makes clear that the “standard science of crystallisation theory for our normal electric

atom/molecule level of physical reality shows that all ice-crystal morphologies displayed in the Emoto research have been reproduced”. Extending his point, Tiller (2004 p. 57) writes that “there is little doubt that crystal morphology plays a significant role in the resultant crystal perfection, and that this morphology is largely determined by the subtle interplay of the factors discussed”. Thus, in reflecting critically upon the Emoto experiments, Tiller (2004) points out that in following a strict protocol, the results reported by Emoto gain credibility in light of IIED research. For example, Tiller (2004 pp. 58-59) writes:

In the Emoto experimental protocol one starts with a cold chamber at 0 degrees, where temperature coefficient is presumed to be sufficiently large that most if not all of his water samples are well below their liquidous temperature and thus should eventually freeze...Let us suppose that he uses a tray with 25 water sample holders at room temperature well above 0 degrees Celsius and places them in a cold chamber. The water samples will begin to lose heat to the chamber so they cool at a [cooling] rate which slows down with time. At a melt undercooling...they begin to nucleate ice crystals, probably on the top of the surface of the water (because the heat transfer rate is greater there). These small crystals will float, because water expands upon freezing and the value of [nucleation] becomes important here in determining the ultimate crystal size and perfection. [Thus] to determine if there is a significant correlation between ice crystals morphology and a written intention message pasted on the tray, one would need to see more than 20 of the 25 cups providing the same crystal morphology, and in a repeatable way.

This being so, in following such protocol procedures and by obtaining results that reinforce the protocol followed, Tiller (2004 p. 60) claims that “results of significance” are available from these experiments. Hence, by way of carrying out numerous scientific experiments which have shown repeatable results, illustrated by Emoto and his team of scientists in a number of his books (Hidden Messages in Water, 2005; The Healing Power of Water, 2004; The Secret Life of Water, 2005; True Power of Water, 2003), such findings in light of IIED research demonstrate “results of significance”. Given Tiller’s comprehensive research in which he examines the entire range of crystal morphologies shown by Emoto, it is not surprising that under the controls of temperature constant, concentration and type of solute, “one can conclude that...one is dealing with the normal crystallisation process perturbed perhaps somewhat by the human consciousness invoked” (Tiller cited in Emoto, 2004 p. 58).

Memory: Scientific Perspectives on the Capacity of Water to

Store Information

According to Emoto (2004), when water is presented with a positive or negative intention, be it in word, picture or music, water will store this information, and in turn will react in a manner that is indicative of the water crystal morphology observed. This perspective, at first glance, may be difficult to embrace, but if we open our minds to a universe that is interconnected and whole, why should the information we store and project cosmically not be considered at least in principle accessible to other conscious minds, even in different places? On this point, biologist and architect of the theory “Morphogenetic Fields”, Rupert Sheldrake (1995 p. 151) suggests this could:

When crystals of a newly synthesised chemical substance, for example a new kind of drug, arise for the first time they have no exact precedent, but as the same compound is crystallised again and again, the crystals should tend to form more readily all over the world, just because they have already formed somewhere else.

Burred within the realms of science, there lay many interpretations regarding the inner workings of the world in which we live, yet, there remains uncertainty as to which interpretations reign supreme (Davies, 2004 p. 164; Gallo, 2004 p. 38). Amongst these interpretations exists factual evidence to support that many of the structures by which we maintain our “positioning” on earth are in part due to the existence of invisible fields that hold such positioning at bay e.g. gravitational fields (Broomfield, 1997 p. 71). Hence, Sheldrake (1995) has attempted to theorise and extend upon the concept of what has been described as “field theory” (the idea that physical phenomena exist by virtue of the interaction between matter (person, place or thing) and a highly structured invisible field encapsulating all matter). In developing his argument of the inner workings of the world in which we live, we shall now assess whether Sheldrake’s (1995) view of the world can be utilised as support for Emoto’s hypothesis and findings.

According to Caro and Murphy (2002 p. 6) a morphogenetic field represents: “modalities of structure, rules, behaviours, ideas and tendencies, each one informing particular aspects of reality”. In their book titled, The World of Quantum Culture (2002 p. 6), Assistant Professor of Sociology at Barry University, Manuel J Caro, and Professor of Sociology at the University of Miami, John W Murphy, comment on the nature of morphogenetic fields stating that “Fields consist of the accumulated experiences of humankind” and that “as a result, any changes or novel actions initially collide with strong sources of resistance”. However, Caro and Murphy (2002 p. 7), point out that “as these changes become adopted by an increasing number of people, learning them becomes easier”. Hence, “for this reason, morphogenetic fields, at least as they relate to humanity, are ever changing and in a process of continuous transformation” (Caro & Murphy, 2002 p. 7). This being so, “each action exists within the context of a morphogenetic field”, [that] incorporates “itself into the whole of a system while simultaneously changing this composite” (Caro & Murphy, 2002 p. 7). Put simply, a morphogenetic field, “posits that the entire universe is evolving a conscious system that is simultaneously learning from itself and co-creating itself” (Neal, 2006 p. 36). This being so, Sheldrake argues in his book titled, The Presence of the Past (1995 p. 82), that the very nature of the morphogenetic field is to transmit information in a way so that “all kinds of atoms, molecules, living organisms, societies, customs, and habits of the mind” can be shaped, while containing within themselves “a memory of their previous physical existence”.

Clinical psychologist for 35 years and author of the book titled, Energy Psychology (2004 p. 38), Fred Gallo makes the comment that the purpose of morphogenetic fields is to replicate systems “in the same way a blueprint serves the purpose of guiding construction”. In replicating systems and guiding construction of a system, Gallo (2004) informs us that the

capacity of the field to achieve such a feat comes by virtue of its morphic resonance. On Sheldrake's (1981 p. 96) account, morphic resonance:

Takes place through morphogenetic fields and....gives rise to their characteristic structures.
Not only does a specific morphogenetic field influence the form of a system....but also the form of this system influences the morphogenetic field and through it becomes present to similar system.

Put another way, morphic resonance implies that once a “new type of form has come into existence, it sets up its own morphogenetic field which then encourages the appearance of the same form elsewhere” (Davies, 2004 p. 164). Extending his point, Davies writes in his book titled, The Cosmic Blueprint (2004 p. 164), that according to Sheldrake's theory “once nature has learned to grow a particular organism, it can guide by resonance, the development of other organisms along the same pathway”. On this assumption, fields associated with memory, provide new generations the capacity in finding it easier to learn tasks (2004 p 164).

Elaborating on this point Sheldrake (1995 p. 82), asserts that:

When any particular organised system ceases to exist, as when an atom splits, a snow flake melts, an animal dies, and its organising field disappears from that place. But in another sense, morphic fields do not disappear; they are potential organising patterns of influence, and can appear again physically in other times and places, wherever and whenever the physical conditions are appropriate. When fields do so, they contain within themselves a memory of their previous physical existence.

Given this insight, Sheldrake (1995 p. 85) suggests that “Memory is inherent in nature”, and thus that our formed habits “explain the close similarity of form and behaviour through time across generations”. Sheldrake (1995 p. 85), thus, speculates that inasmuch as the morphic field, encapsulates “an entire species or inorganic system, the resonances of an innovation potentially affect every individual in the field, and all humans, for instance, draw upon a collective memory, to which all in turn contribute”. Given this wholistic perspective, the contribution of all individuals will in turn have an effect on all other individuals by way of their interconnectivity within the unified whole. This is perhaps why Sheldrake (1995)

speculates that we, along with all other life forms (e.g. water), can resonate in a manner that will cause an effect on the organisms within that field. For example, Sheldrake (1987 p. 10) writes that his theory can attempt to “explain how termites building columns which are adjacent yet separate know how to build arches so that the two sides meet exactly in the right place at the middle”. On this point, Sheldrake (1987) explains that termites are blind, working in dark nests with no vision. Moreover, according to Harvard biologist, Edward O. Wilson, it is not at all likely that ants construct their bridges via hearing or acoustic methods, because of constant background sound within the nest (Sheldrake, 1987 p. 10). Adding to this point Wilson (considered a strong reductionist proponent) “considers the possibility of smell, yet believes this to be farfetched” (Sheldrake, 1987 p. 10).

In putting forward his theory, Sheldrake draws upon a number of findings to support (See for example, Sheldrake, 1987 p. 9; Gallo, 2004 p. 38). In his paper titled “Society, Spirit & Ritual: Morphic Resonance and the Collective Conscious” (1987 p. 11), Sheldrake writes:

In the 1920s, South African biologist Eugene Marais wrote, *The Soul of The White Ant*, in which he described experiments investigating the effect of damaging South African termite mounds. Marais took a large steel plate several feet across and several feet deep and hammered it into the center of a termite mound. The termites repaired the mound on both sides of the steel plate, building columns and arches. Their movements were coordinated even though they approached the wall from different sides. Amazingly, the termites on opposite sides of the steel plate built arches that met at the steel plate at exactly the right position to join if the plate had not blocked their way. This seemed to demonstrate that there was some kind of coordinating influence which was not blocked by a steel plate. Obviously, this would be impossible to do by smell, as Wilson suggests, since even termites can't smell subtle odors through a steel plate.

According to Sheldrake (1987), no one has ever repeated the foregoing experiments, despite the ease in which an individual could repeat them in a country where termites are common. Hence, Sheldrake (1987) suggests that if Marais' results were replicated, it would strengthen the notion that there was a field coordinating the actions of the individual ants.

In further support of his work, Sheldrake turned his attention to the works of Professor of Psychology William McDougall, who in the 1920's assessed the learning capacity of rats over multiple generations (Sheldrake, 1995).

The rationale behind McDougall's (cited in Sheldrake, 1995 p. 190) research was to test inherited learning among laboratory Wistar strain white rats that had been inbred for generations (Sheldrake, 1995). In conducting his research McDougall developed the task of training rats to escape from a water maze via one of two gangways (brightly lit vs. dimly lit), yet with the aim of training the rats to escape through dim lit gangway only (Sheldrake, 1995). In training the rats to achieve this aim, rats would receive an electric shock, if they attempted to exit the water maize via the brightly lit gangway (Sheldrake, 1995). On Sheldrake's (1995) account, McDougall's (cited in Sheldrake, 1995 p. 190), results are as follows:

Some rats required as many as 330 immersions, involving approximately half the number of shocks, before they learnt to avoid the bright gangway. The process of learning was in all cases one which suddenly reached a critical point. For a long time the animal would show clear evidence of aversion for the bright gangway, or taking it with a desperate rush, but not having grasped the simple relation between light and shock, he would continue to take the bright route as often or nearly as often as the other. Then at last would come the point in his training which he would, if he found himself facing the bright light, definitively and decisively turn about, seek another passage, and quietly climb out of the dim gangway. After attaining this point, no animal made the error of again taking the bright gangway or only in very rare instances. In each generation, the rats from which the next generation [was] to be bred were selected at random before their rate of learning was measured, although mating took place only after they were tested. This procedure was adopted to avoid any possible conscious or unconscious selection of favour of quicker-learning rats. After 15 years and 32 generations it was evident with each successive generation the rats learned the task more rapidly and the number of errors steadily decreased with each generation and even the qualitative responses of later generations were noticeably different, as they approached the maze more cautiously.

Further, we must note also that upon conclusion of this phase of the study, McDougall sought to repeat its results, this time however selecting subjects on the basis of learning scores (Sheldrake, 1995). McDougall thus categorised sample rats into quick and slow learners (Sheldrake, 1995). Again, as predicted by McDougall "the progeny of quickest learners learned relatively quickly", while the "slow learners relatively slowly" (McDougall

cited in Sheldrake, 1981 p. 187). In addition to McDougall's work, Crew (cited in Sheldrake, 1989 p. 187), reported similar findings noting that "the average learning score of Crew's rats was approximately that of McDougall's rats at the completion of nearly 30 generations of training". However, not all studies support these findings. For example, a duplicate experiment conducted by Agar and Colleagues in 1942 and again in 1954 in Australia showed a different result (Sheldrake, 1989). In their experiments Agar and his colleagues found in alignment with the work of McDougall that trained rats had a marked tendency to learn quickly over subsequent generations, yet they also found the same results apparent for untrained rats (Sheldrake, 1989 pp. 187-188).

Sheldrake (1995 p. 188) suggests that the changes observed in the trained and untrained lines of the same species offer some support for the hypothesis of formative causation (the proposition that every system is synchronized not only by "known energy and material factors but also by invisible organizing matrices termed morphogenetic fields)", which is consistent with the notions of morphogenetic fields and morphic resonance (Gallo, 2004). This being so, Gallo (2004 p. 39) remarks that:

In essence, morphic resonance is akin to a television wave that serves to inform the receiver, thus producing specific visual and auditory effects. The picture and sound are replicated by millions of television receivers, which is analogous to a broad spectrum morphogenetic field. [Hence], it is suggested that behaviour, as well as physical form, entails as field based heritability component, possibly distinctive from our DNA (genetic code).

It could be argued that the changes observed in McDougall's (cited in Sheldrake, 1995 p. 190) study could only take affect after a number of generations, (given that the life of a rat over 32 generations equates to approximately 32 years of human life) (Sheldrake, 1995). However, Sheldrake (1995) points out that the stronger the resonance amongst organisms, the easier it is for organisms to tune into the frequency of the field. Moreover, by virtue of becoming tuned in or resonant, it allows for a decrease in the time required in acquiring the memory held by the field for the organism (Caro & Murphy, 2002 p. 6). It is therefore a

misinterpretation according to Sheldrake's theory, to suggest that non-local memory between past and present organisms cannot be achieved instantaneously (Caro & Murphy, 2002 p. 6).

On the assumption that Sheldrake's theory is at all possible, it continues to "highlight our difficulty in explaining a world from a mechanistic perspective" (Davies, 2004 p. 164). Hence, in light of the foregoing research, it is possible, that in using positive words, positive emotions and positive thoughts our collective conscious shall begin to function in a way that is more empathetic in nature. Using the example of a water crystal, Emoto (2004 pp. 13-17) reinforces the foregoing assumption:

The morphogenetic field for "thank you" is increased if somebody says the words or even just thinks them, the stronger the morphogenetic field the easier it becomes for everybody else to say those particular words and the more likely this will happen.... [Moreover], when we're thinking a thought and give it energy by imaging it as real or speaking it, we're storing the pattern of vibration in the water of our bodies, and it shows as the corresponding vibration all around us and further out, beyond our physical selves. In this way, we influence our surroundings and others react to it, so we receive the appropriate feedback that again reinforces both our vibrations and the morphogenetic field. This shows how important it is to think and speak with purity of intent.

Quantum Perspectives

According to quantum theory, the world in which we live, can be viewed as an interconnected whole, with the whole and the parts of the whole working together in synchronization (Rosenbaum & Kuttner, 2006). It is theorised that each part contributes to the whole, as does the whole to each of its parts (Rosenbaum & Kuttner, 2006). Hence, the analogy is not one of the whole controlling its parts or the parts allowing the functionality of the whole, but rather a non-separatist existence of interconnectedness functioning in unison. This being so, it is certainly viable that in a world shown to be seamlessly intertwined that interactions between human forms and other organisms (e.g. water or food), can change their structures by way of the informational exchange of resonance we provide. With this thought in mind, we shall now again turn our attention to the work of the physicist David Bohm.

David Bohm is reported to be a major architect in the development of the theory known as the “Holographic Model” of the Universe, which suggests that the universe itself is a giant holographic image (Medina, 2006 p. 34). This theory implies that our tangible reality, that being our day to day physical reality, is merely an illusion in respect of the deeper workings of the world in which we live (Medina, 2006 p. 35). In his book titled, The Holographic Universe (1991 pp.46-47), Michael Talbot reports in his interview with David Bohm and comments:

One of Bohm’s most startling assertions is that the tangible reality of our everyday lives is really a kind of illusion, like a holographic image. Underlying it is a deeper order of existence, a vast and more primary level of reality that gives birth to all the objects and appearances of our physical world in much the same way that a piece of holographic film gives birth to a hologram. Bohm calls this deeper level the implicate (meaning enfolded) order, and he refers to our own level of order as explicate, or unfolded order....He uses these two terms because he sees the manifestation of all forms in the universe as the result of countless enfolding and unfolding between these two orders.

In deepening our understanding of this model, let us reflect upon the nature of a hologram. According to Bohm (2002 p. 43) a holograph is unique; in that “every piece of holographic film contains the whole within it”. In making this assertion Bohm (2002 p. 43) points out, if a “holographic plate is cut into pieces, each constituent piece still contains all the information of the whole”. This being so, “every fragment can still be used to project the whole image” (Bohm, 2002 p. 43).

This theory provides an interesting heuristic within the context of this chapter. For if we recount the theory of Morphogenetic fields expressed by Sheldrake (1987; 1995), the whole of the information continues to be expressed in future generations, despite the origins of that generation remaining in the past. This being so, Bohm (Talbot, 1991 p. 48) asserts that given our entangled state, “at some deeper level of reality such particles are not individual entities, but are actually extensions of the same fundamental something”.

This fundamental something, signifies a central aspect of Bohm's holographic theory of the universe, known as "Unbroken Wholeness" (Bohm, 2002 p. 28). Bohm's (2002 p. 28) theory of 'Unbroken Wholeness' informs us:

That everything in the universe including human consciousness is considered to be a seamless extension of everything else, not one huge undifferentiated mass but rather part of an unbroken whole and at the same time able to maintain its unique attributes.

Reinforcing this point is Talbot (1991 pp. 49-50), who responds by saying that in essence every "entity carries within it every form of energy, matter, consciousness and life that ever proceeded out of a deeper reality....so that every cell in our body enfolds the entire cosmos, so does every raindrop, every leaf and every dust mote". This being so, Bohm's theory can be used to suggest that every thing in the universe stands in a relation of entanglement, including water and food. One way of heuristically interpreting this quantum phenomenon is to characterise consciousness as the substrate within which the seamless interconnectivity of quantum entanglement unfolds. In relation to the Emoto (2003) experiments, the crystalline patterns captured in the photographed water reflect the subtlety of the 'participatory levels of consciousness available, which provide the medium of informational and energetic exchange expressed holographically. For example, if our consciousness sustains an epistemology which views the world as an opposing force to suppress and dominate, should we be surprised to find that the dispositional fragment of dominance becomes holographically enfolded in all entities that unfold within the unified whole? On Talbot's account (1991 p. 48) the foregoing assumption is reflected in Bohm's work, when he states that:

Everything in the universe is made out of the seamless holographic fabric of the implicate order....it is as meaningless to view the universe composed of "parts", as it is to view the different geysers in a fountain as separate from the water out of which they flow. An electron is not an "elementary particle" it is just a name given to a certain holomovement (idea that wholeness is not static, but in dynamic motion)....Despite the apparent separateness of things at the explicate level, everything is a seamless extension of everything else, and ultimately even the implicate and the explicate orders blend into each other.

In accordance with a part/whole relationship, Mark Woodhouse (1996) draws on examples within the field of neuroscience to support Bohm's theory of a holographic universe. According Woodhouse (1996), Neuroscientists, Karl Pribram and John Lorber, have boldly expressed support for the idea that each part contains the whole. Lorber has shown, for example, that when the entire visual cortex of a patient has been destroyed (hydrocephilia), patients continued to exhibit normal vision, despite this condition (Woodhouse, 1996). In another case, it was found that when only 1/45 of the cortex remained intact, patients were shown to be normal in every other way, save intelligence, which was shown to be unusually high (Woodhouse, 1996). Although it is somewhat presumptuous to use neurological interconnectivity of the brain as a model for the projected holographic interconnectivity of the entire universe, the parity of reasoning may well provide another interpretative dimension of Laura's theory of participatory consciousness. In this case Laura's ascription of entanglement as a holographic form of interconnectedness between the whole and its parts, can be elaborated and grounded heuristically in brain neuroscience. If not unlike our brains the entire universe is saturated by different levels of interconnectedness, might it not be reasonable to assume that in the holomovement of the unfolding parts, participatory consciousness may be the medium of informational exchange whereby individual consciousness can, at least in principle, mirror all aspects of the whole.

A not so dissimilar account is advanced by Bohm (2002). There is within the field of physics a dominant presumption that the universe can be construed as a compilation or field force of vibratory interconnectivity. This interpretive heuristic is reinforced by Einstein's unified field theory which states that "all matter is organised energy" (Wayne, 2005 p. 87). On this point Michael Wayne M.D (2005 p. 87) writes that:

Energy is the electromagnetic expression of vibration. Quantum physics researchers have revealed that atoms, the building blocks of all form, consist of a vibrating neutron surrounded by particles that vibrate and spin wildly around it... quantum waves are invisible they are

constructs of human thought necessary for us to understand atomic and subatomic matter, the building blocks of our world.

Putting the same idea with a nuance of difference, Jones (2006 p. 182), asserts that there is nothing in our universe that does not vibrate, hence, “there is no such thing as zero, dead or still...Everything that exists gives off some vibration of a certain frequency, be it planet, person or particle” (2006 p. 182). To this quantum vignette, Talbot (1991 p. 49) adds that, “It is current understanding in physics that every part of space is flooded with different types of fields, made up of waves, with all waves possessing energy”. Thus, on account of this, Talbot (1991 p. 50) surmounts that “every cubic centimetre of empty space contains more energy than the total energy of all matter in the known universe” with the energy of a trillion atomic bombs in every cubic centimetre. Similarly, Bohm (2002 p. 33) asserts that “Implicate order with an infinite sea of energy is the source of manifestation for everything that will be in our physical universe”. Laura’s theory of participatory consciousness suggests that we can educate people for ‘empathetic sensibility’ (Laura, Marchant & Smith, 2008). On this view we can almost literally tune into consciousness receptivity to ensure that our connections with the world around us are based specifically on empathetic dispositions of ‘affective resonance’ (Laura, Marchant & Smith, 2008). Laura, Marchant and Smith (2008) remind us that the momentum of scientific materialism is still so strong that it can create infrastructures within which even connectivity can be commodified, thus losing its purity. Given Bohm’s (2002) idea that holographic manifestations can affect everything that could be incorporated into our physical universe, it is indeed possible that the words, thoughts and music utilised in the Emoto experiments, represent affective resonations enfolded in the energy field in such a way that brings about a structural change in the water under experimentation (Knight & Stromberg, 2004; Roy, 2004). Demonstrating the probability of this assumption, Knight and Stromberg (2004 p. 92), point out:

In 1997 we developed an implosion machine. In this machine, water is made to form very powerful vortices. We found that water undergoing this process of implosion (suctional process that causes matter to move inward) was developing a rhythmically pulsating field of energy, which comprised the full spectrum of etheric colour. During this process, it was brought back to its natural vibrant energetic state and regained its life force. This energetic change turned out to be permanent and didn't diminish after the implosion process was complete. We further discovered that when filled into particular shapes this imploded water transferred its energy to samples of ordinary non-energised water until they reached the same level of charge as the imploded water. The imploded water was resonating ordinary water in a similar way one tuning fork picks up the vibrations of another.

Despite conceding that the work of the above scholars requires further exploration, they nonetheless offer a measure of explanatory support for Emoto's hypothesis that as **co-creator custodians** of the world in which we live, we can remain individualised in one sense, while at the same time holographically reflective of and integrated with the whole. We thus have the capacity, in principle, to influence, by way of our thoughts, "the molecular structure of bodily water and thus the health and well being of the entire organism" (Emoto, 2004 p. 107).

Disparities in the Quality of Water

During the course of Emoto's (2003) experiments, testing of tap water and natural water demonstrated interesting results. In the case of tap water Emoto (2003) carried out tests on the tap water throughout the city of Tokyo, Japan, with no formation of crystals reported in any of the samples taken. Further, Emoto (2003 p. 6) sourced and photographed tap water from other cities including Hokkaido, Kyushu, Okinawa, Sapporo, Sendai, Nagoya, Kanazawa, south of Osaka, Hiroshima, Fukuoka and Nahn, that according to their findings, were unable to "form a shape worthy to be called a crystal". However, when sourced from the

north of Osaka near the borders of prefectures of Kyoto and Nara, known for its rich source of ground water (60 percent groundwater) beautiful crystals formations were produced (Emoto, 2003).

Extending their work, water was sourced from various regions of **Asia** including Hong Kong, Macao and Bangkok, all cities producing poor quality water (Emoto, 2003). In addition European cities including London, Paris and Rome also produced low quality water, with water in Venice reported to form shapes that were considered far from crystallised (Emoto, 2003). However, cities located near natural water sources such as Vancouver, Canada, and Buenos Aires, Argentina, formed beautiful crystals (Emoto, 2003).

According to Emoto (2004), the difference between tap water and natural water is indicative of the approach we utilise to manipulate all forms of the natural world. For example, tap water is laden with an array of chemicals, many of which have been reported as known carcinogens (Laura & Ashton, 1998; Wanjek, 2002). However, the addition of these chemical substances to our tap water is believed to rid the water of deadly bacteria that may in some instances result in illness or death (Laura & Ashton, 1998; Wanjek, 2002).

Yet, despite this alleged benefit, it is clear that water once pristinely pure in nature is now laden with chemicals that may evoke potential health qualms in the name of controlling the earth's water supply from the "alien" invasion of bacterial agents said to cause us harm. For example, in 1996 the United States Army Corps of Engineering found "high bacteria counts throughout the entire Washington D.C water system", to which their response was to significantly increase the chlorine level to kill the bacteria (Wanjek, 2002 p. 154). In this case we observe the introduction of technology to our water as a way to eliminate the deeper issue of bacteria in the water supply, often the result of our inability to care for our natural environment in the way we should (Laura & Ashton, 1998; Oram, 2008). Further, in the case

of the chemicals with which we lace our municipal water supplies, chlorine which remains as a principle cleaning agent reacts with organic molecules in water to **form** a by-product known as trihalomethanes (Wanjek, 2002). Discussing this point is Anahad O'Connor (2007 p. 80), who states that: "the effects of trihalomethanes have been examined and debated since 1974", with a range of studies expressing concern over chlorine by products. In his book titled, Never Shower in a Thunderstorm (2007 p. 80), O'Connor writes that although a number of studies have been written on this issue, "the most reliable findings have come from meta-analyses, large studies that pool the results of many smaller, previous ones to produce greater statistical power". This being so, O'Connor (2007 p. 81) goes on to point out that "three such meta-analyses since the late 1980's have found that the consumption of chlorinated drinking water over a period of decades can increase the risk of bladder cancer, particularly in men". Moreover, the relative risk of bladder cancer is between 1.2 and 1.27, meaning that people drinking chlorinated water have a 20 to 27 percent greater risk of getting the disease than those who drink non-chlorinated water (O'Connor, 2007). Regarding the by-product trihalomethanes a meta-analyses carried in 2004 and headed by Senior lecturer of Epidemiology, and Public and Primary Care at Imperial College London, Mireille B Toledano, found that "the risk [the risk of developing bladder cancer] was greatest for frequent long term exposure to water with levels of trihalomethanes that exceed 50 micrograms per litre" (O'Connor, 2007 p. 82). However, this value is of great concern given that in the United States for example, "the Environmental Protection Agency has set the maximum level for trihalomethanes in tap water at 80 micrograms per litre" (O'Connor, 2007 p. 82). In pointing out this value we must remain mindful of the fact, that this is the water we are also using on our crops.

Given the chemical agents, present in our water supply, it is not surprising that people have turned to bottled water as a source of nourishment, **however**, according to Health director for the Astrophysics Science Division, NASA, and author of the book Bad Medicine: Misconceptions and Misuses Revealed (2002), Christopher Wanjek, the consumption of bottled water may be problematic also. For example, Wanjek (2002) points out that 25 to 40 percent of the bottled water consumed in the United States is sourced from municipal water supplies drawn from the same supply reservoirs by way of which we access tap water (Wanjek, 2002). This being so, Wanjek (2002 p. 154) writes that a “1999 report from the National Resources Defence Council, which tested 103 brands of bottled water, found that....one third contained levels of contamination, synthetic organic chemicals, bacteria and arsenic that exceeded allowable limits under either state standards or bottled water industry guidelines”. In addition, Wanjek (2002 p. 154) goes on to report that in “a survey conducted in 2000 by School of Dentistry at Western Reserve University, Cleveland, Ohio, found that 15 out of 57 bottles tested had 10 to 1000 times the bacterial levels of Cleveland water plants”. These putative levels warrant further investigation beyond the parameters of this paper, since many producers of bottled water add chlorine to their water during the filtration process, possibly at considerable risk to human health (Emoto, 2003; O’Connor, 2007; Wanjek, 2002).

In addition to the pollutants being found in bottled water, it is further disconcerting to note that even the most pristine of waters are at risk of being polluted. According to Professional Engineer, James R Pfafflin and Associate Professor of Chemical and Biological Engineering at Polytech University, Edward N Ziegler (2006 p. 959), “it is clear that pesticide residues are constantly being transported and redistributed to and from their sites of

application through the atmosphere and are present in some degree in the air everywhere”.

Thus, Pfafflin and Ziegler (2006 p. 959) are quick to point out that:

The water environment provides the ultimate sink for pesticide residues which enter it by direct contamination from rain precipitation aerosols, or atmosphere codistillates, by direct application to surface waters, by runoff from treated plants and soils, by industrial and household sewerage effluents and by residues in human and animal excreta.

This being so, it is not surprising that ground water, often thought of as a rich water source, was shown throughout 24 counties in the state of California (water sampled from 8000 wells) to contain 50 different types of pesticides (Pfafflin & Ziegler, 2006).

Health, Water and Food

As previously mentioned, the same water we pour into our glasses during our daily ritual of water consumption is the same water we apply to the foods we eat. This being so, we shall now go on to point out, the implications that can follow on from the use of the water we have described.

In regard to the human body, water is believed to play a pivotal role in an array of life sustaining tasks, given that water constitutes between 60 to 80 percent of our total body weight (Rolfes, Pinna & Whitney, 2006 p. 396). It is reported by Nutrition Scientists, Sharon Rolfe, Kathryn Pinna and Ellie Whitney (2006 p. 396), that: “in the body water becomes the fluid in which all life processes occur”. For example, Rolfe, Pinna & Ellie (2006 p. 396) point out that water within body fluids assists in carrying:

Nutrients and waste products throughout the body, maintaining the structure of large molecules such as proteins and glycogen, participates in metabolic reactions, serves as the solvent for minerals, vitamins, amino acids, glucose and many other small molecules so that they can participate in metabolic activities, acts a lubricant and cushion around joints, inside the eyes and spinal cord and aids in the regulation of normal body temperature.

This being so, there is strong evidence to suggest that water plays a major role in the production of homeostasis (balance) within the human body (Rolfes, Pinna & Ellie, 2006).

In maintaining the water supply required by our bodies, it is obvious that a majority of that water is replaced by the water we consume daily by way of the beverages we ingest (Duyff, 2006). However, a second major source of water for humans is derived from the foods we eat, estimated at 20 percent of our daily water consumption (Duyff, 2006). For example, Fellow of the American Dietetic Association, Roberta Larson Duyff (2006 p. 156), states that: “juicy fruits and vegetables such as celery, lettuce, tomatoes and watermelon contain more than 90 percent water”, with dry ingredients providing sources of water also (Duyff, 2006). According to Physician and Lecturer in Health Education, Petra Bracht (2004), the most effective way for the body to obtain water is out of fruits and vegetables. Bracht (2004 pp. 118-119) informs us that:

In this way, all minerals, trace elements, and vitamins are easily available, as well as all the other plant substances that have benefited humankind for millions of years. Water that’s consumed in this manner reaches the blood more slowly and evenly and at the same time that the minerals are offered in the biological bond. Therefore, the body is able to use both water and minerals much more effectively. Thus, the best way to provide your body with water is to eat it.

In consuming these foods for healthy living, one would expect that the quality of water within them meets a high standard. As we have seen, however, the chemical pollutants which are present in our water supply make it increasingly clear that the water contained to the food we eat is very likely to be compromising our health. This being so, Emoto (2003 p. 134) asserts that:

In our modern culture, we have lost our attitude of respect for water and have been heading in the direction that technology could clean up as necessary. We sometimes say ‘purified water is not pure’. Water processed in treatment plants is not the water that forms beautiful crystals. What water requires is not purification but respect.

Reconceptualising the way we think about our Food

In light of the foregoing information, it is easier to see why it is necessary to reconceptualise the way we think about food. We must recognise the enormous potential in

educating people to honour their food in accord with the empathetic epistemology proposed by Laura, Marchant and Smith (2008). This being so, we shall in what follows offer an alternative view in developing empathy towards the food we are indeed interconnected too.

Honouring our Food

To honour something means to treat it with dignity and respect, yet unfortunately, in what we have discussed in previous chapters, the foods we eat are very rarely paid homage too in the way they should. This being so, we have moved away from the premise of being thankful for our food, appreciating the work of nature in providing nutritious foods that are life sustaining. However, with particular reference to the developed and developing worlds, the rise of man-made processed foods inundating our supermarket aisles, has in effect distorted our view of all foods, given the ease by which our food is now available in any season and in quantities designed simply to invoke profit, with little or no intrinsic value or personal meaning. This being so, is it clear that we dishonour our food, when we cavalierly purchase packets of processed foods laced with lifeless chemical ingredients that in many cases themselves dishonour the foods they are designed to imitate and nutritionally mimic?

According to Bonita Ford (2006 p. 8), the challenge of beginning to honour our food means we must “open our eyes to the intricate web of life (food, water, soil) that supports our health and well being”. With the foregoing statement in mind, Ford (2006 p. 8) writes:

Food is in fact medicine for personal and ecological healing. The type of food we eat, the way we eat, and the way we cultivate our food all contribute to our physical, emotional, and spiritual health, as well as to the ecological health of the Earth. The way food grows from the living Earth offers a unique lens for examining the workings of the natural world. The processes involved demonstrate the relationships among plants, animals, and other elements within living ecological systems. When we grow our own food or observe a vegetable garden, it becomes apparent that the quality of the food depends on the health of the plants and animals, which in turn depend on the vitality of the soil and the purity of the water and air. Furthermore, eating vital foods or growing our own food reconnects us to the natural world and fosters an appreciation of the healing properties of nature. In nature, we can experience the fragility and resilience of life, the miraculous and life-giving quality of a simple element like water, the mystery of food “waste” being transformed into soil-enriching compost, and the miracle of a plant

growing from a tiny seed. When we cultivate and eat food consciously, we learn about ecological principles and the healing potential of nature.

In light of the foregoing statement, it is easier to see why honouring our food means a great deal more than simply knowing our food as a source of nourishment. Of far greater importance is the need to see ourselves as genuine extensions of our food, shaping our food in a manner which reflects our conscious ecological principles. This being so, it is vital that we develop an empathetic appreciation for the food we engage with. Speaking on this point is Broomfield (1997 p. 76), who remarks that:

An empathetic science is a better science for it allows the scales of scepticism to fall from our eyes. As Saint Augustine told us, a thing is recognised only by the extent that it is loved... If we open our hearts to the beings and processes we desire to understand, they open their hearts us and reveal themselves.

In accepting Broomfield's (1997) point, we are encouraged to engage with our food in ways that engender gratitude, so that in its cultivation, harvest, storage and consumption, we make a concerted effort to nurture the food we consume, in some ways reflective of the care we give to our children. On this point Emoto (2003 p. 96, See figure p. 79) provides an elegant example:

A family that subscribed to our magazine conducted an interesting experiment. They put rice in two glass jars, and every day for a month said "Thank you" to one jar and "You fool" to the other, and then tracked how the rice changed over the period. Even the children, when they got home from school, would speak these words to the jars of rice. After a month, the rice that was told "Thank you" started to ferment, with a mellow smell like that of malt, while the rice that was exposed to "You fool" rotted and turned black. I wrote about this experiment in the book, messages from water, that I published, and as a result hundreds of families throughout Japan conducted this same experiment for themselves. Everyone reported the same results. One family tried a variation of the experiment: like the others, they said, "Thank you" to the first bottle of rice and "You fool" to the second bottle, and then they prepared a third bottle of rice that they simply ignored....The rice that was ignored actually rotted before the rice that was exposed to "You fool". When others tried this same experiment, the results were the again the same. It seems that being ridiculed is actually not as damaging as being ignored.

Reinforcing this point is psychologist, Melanie Joy (cited in Kheel, 2007 p. 228), who asserts "in an inclusive humanistic paradigm empathy and unconditional nonviolence will be considered central to psychological wellness". To this Kheel (2007) writes that, "for Joy this expansive empathy extends to all "sentient beings" (Kheel, 2007 p. 228). If this were

so, it could be considered that both living and non living entities are connected with morphogenic fields which are themselves holographically entangled.

According to research, conducted by polygraph analyst Cleve Backster, in 1966, the foregoing point was confirmed. In his book titled, The Vibrational Universe (2005), political scientist, Kenneth Maclean (2005 p. 51), comments on the “Backster Experiments” stating that:

Using a polygraph detector hooked up to the leaf of a dracaena plant and standing at a distance of five feet or so from it, Mr. Backster formed a picture in his mind and thought “I am going to burn that leaf,” immediately noticing a wild agitation on the polygraph equipment.

This study according to Maclean (2005) has been confirmed multiple times over the years, not only by Backster but others (George Lawrence American Electronics engineer, Jagdish Bose); with, similar effects reported for lettuce, onions, oranges and banana’s (Tompkins & Bird, 1973). One of the most interesting findings in Backster’s research was the confirmation that positive emotion had no effect on the testing equipment, but in the “presence of negative emotion the equipment shows immediate bursts of electrical activity” (Maclean, 2005 p. 52). Maclean comments on these findings by adding that such a finding invokes much interest and confirms that well being is indeed the norm, suggesting that positive thoughts reflect the natural balance of all things (Maclean, 2005).

However, despite the work of Backster and other, their claims have been refuted by scientific scholars, yet with the confirmation of an interconnected universe, the Backster effect has become of interest (Thakur, 2004). This being so, in light of the evidence supporting Emoto’s studies, the contest made against Backster may be over turned. Nevertheless, it reinforces an important aspect of bringing honour to our food, and despite scientific grounds confirming the findings of these studies; it is common sense to appreciate

that in the conscious act of harming a living organism it will not reflect a negative response in return.

In honouring our food, we must remain mindful that “what we eat is important to our health” (Ford, 2006 p. 8). However, what “we often forget is how we grow our food shapes how we relate to the earth that sustains us” (Ford, 2006 p. 8). This being so, Ford (2006 p. 9) asserts, that “holistic approaches to food production allow us to cultivate healthy food as well as a healthier relationship to the natural world”. One such approach, writes Ford (2006 p. 9), is ‘Masanobu Fukuoka’s natural farming’ method:

Masanobu Fukuoka, a pioneer of natural farming, describes the process as “the very embodiment of life in accordance with nature. Through careful observation and experimentation, Fukuoka developed simple, effective techniques that produced abundant and healthy crops without the use of pesticides, chemical fertilizers, prepared compost, weeding, or tilling. The study of living systems reveals that ecology is about relationships. In a healthy system, each element is in dynamic, harmonious relationship to the other elements. The healthiest food system fosters sustainable relationships among plants, animals, farmers, food workers, and food consumers. Because many of us no longer grow our own food, it is easy to lose sight of the multiple layers of relationship that are involved in producing the food we eat. Living systems theory tells us that all life is interconnected in an intricate web of relationship. Each part of the system is connected to other parts by strands on the web; the whole web is greater than the sum of its parts. We cannot sever any strand on the web or rid ourselves of any part without affecting the whole.

This being so, we must remind ourselves that under the auspices of a reductio-mechanist perspective, separation of each part has provided us with an imprecise picture of the interrelationship within, between and amongst morphogenic field systems. Therefore, that we employ technologies designed to manipulate our food in a manner by which it becomes increasingly inert and lifeless, ensures that such foods in the long term fail to sustain our health and instead lead to our degeneration and chronic disease. Regarding this point, Ford (2006 p. 10) eloquently states that:

Respecting food, people, and the Earth are all part of a holistic way of living healthfully. In many indigenous traditions, food, creative expression, spiritual practice, healing, and community celebration are neither separate from one another nor from everyday life. What do these cultures have to teach us? We can learn from such cultures that, far from being separate, every aspect of our lives is intricately interconnected and interdependent. When we cultivate our relationships with food in all of these dimensions, we move closer to an ecological way of living. Food is nourishment, celebration, and healing. If we are willing to learn from the ecological processes associated with food, we can enjoy a sustainable way of

life that is rooted in our relationship to the Earth and all living beings. We can open ourselves again to an age-old medicine that speaks to us from the very heart of the Earth.

The Sacredness of Food and Subtleties of Integrated Well-Being

According to Miriam Therese MacGillis (2008 p. 10), sacred agriculture reinforces a return to the contemplatives of the land, with a focus on the “exploration of the earth as a self nourishing organism”. Hence, MacGillis urges each one of us to take responsibility for the land and the foods which we consume from it:

The determination to redeem the earth and transcend its natural limitations has played itself out in the industrialisation and total mechanism of farming. The soils have been exhausted and drugged, their inner life forces depleted and poisoned, not because we are necessarily an evil species so much that we are driven by our abstract ideas about a perfect world. We have been encultured to toward an inability to experience the universe as it actually is. We end up tearing apart the “garden planet” in an effort to redesign it. If we were to accept the earth on the terms and under the exquisite conditions in which it continues to evolve, the role of the farmer would be raised to a most honourable and sacred human profession. Relieved of the illusions that they are manufacturing food, or that they are worthy of success to the degree that they are also economists, cosmeticists and managers, farmers might understand themselves as acting in something akin to a prophetic and priestly role.

In approaching our food in such a manner, MacGillis (2008 p. 11), points out that we may “begin to regain the elementary prosperity of pure air, water, diversity and the possibility for health and vitality”. From this simplified perspective, we can appreciate that in reconceptualising the way in which we view the land and those who work with it, that an ethic of participatory consciousness invokes empathy and fosters new possibilities for reconnection with nature and our food.

Reinforcing the foregoing ethic is Adrian Butash (2007 p. 3), who encourages us to bless the food we eat, he writes:

Sharing food is the most universal cultural experience. Expressing thanks for food was humankind’s first act of worship, for food is the gift of life from above. In every culture there are sacred beliefs or divine commandments that require honouring the giver of life-God or the divine principle-through acknowledging the sacred gift of food.

This being so, it is of little surprise, writes Butash (2007 p. 5), that the “first interhuman act is to experience satisfaction through food”. For example, Butash (2007)

suggests that the new born child has imprinted upon his/her mind a thanks giving experience in which the infant's gratitude or voice of prayer is confirmed on suckling of the mother's nipple. The act of blessing offers virtues of gratitude and appreciation, signifying the intention to honour the food itself and to connect not only with those who share in a meal, but also with those whose hands that cultivated or prepare the food we eat. Such blessings connect us empathetically with the environment in which our food is grown (Cousens, 2005).

In light of this point, Emoto (2003 p. 137) states that:

We must pay respect to water [food], and feel love and gratitude, and receive vibrations with a positive attitude. Then water changes, you change, and I change. Because both you and I are water.

Thus in light of the foregoing assumption, we can appreciate that in reconceptualising our relationship to the foods we eat the act of blessing our food is indeed vital.

Reinforcing this point, Cousens (2005 p. 488) writes, that “live food contains structured water, which can hold the vibration of prayer”. This being so, Cousens (2005) suggests improvements in the quality of the water can be generated by virtue of the blessing we impart to it. Supporting the foregoing assumption, Raleigh (1996) invites us to see the act of blessing our food as not a chore, or something we complete unconsciously with little meaning, but rather to observe the process of blessing as a sacred act that greatly influences our connection with the food we are to consume. Elaborating on this point, Raleigh (1996 p. 76) contends that the exercise of blessing our food can result in “revitalising the food, spiritualising it and giving it a nutritive quality which does not naturally exist”. Therefore, with respect to the Emoto experiments, the act of blessing our food in a conscious and concerted way could enrich the quality of the food we eat. On this point, Emoto (2004 p. 23) writes that:

Water is a very honest mirror. The pictures of the water crystals show clearly the effect that different environmental factors have on living systems. But what these images show as well is

that we're not helplessly exposed to negative influences. Through love and gratitude, we have the ability to improve our world. By thinking and feeling "love and gratitude", we can actively put a healing process in motion.

With the foregoing remark in mind, it is not surprising that when water was shown the words 'love' and 'gratitude', the ice crystals in the Emoto experiments, "opened up strongly as if a blossoming flower....stretching its hands fully, expressing its joy" (Emoto, 2003 p. 14). Hence, Emoto (2003 p. 14) reports that "since beginning our research we have never again been able to take water crystal pictures as beautiful as the one that resulted from showing water the words love and gratitude". In recognising the potential behind such a finding, the benefit of applying Laura, Marchant and Smith's (2008) theory of participatory consciousness, would hope to capture and replicate the effect shown in the Emoto experiments on a larger scale. In establishing a concerted effort to be mindful in our conviction of expressing gratitude towards our food, the act of increasing participation in numbers could bring forth a global change to the production of the foods we eat. **This being so, we may become enlightened to the technological interventions which express empathy towards the food we eat and those which express forms of power and control.**

Education

In reshaping our educational framework, to include an increasingly holistic perspective, we must realise the importance of viewing nature as a whole. In recognition of this point, the process of educating in isolation, or with an emphasis on particular parts, limits an **individual's** ability to capture the essence of the whole. Thus, in losing sight of the whole, we begin to foster principles that simply provide meaning to isolated fragments of the whole picture, without ever capturing the origins of the existing whole. This is incredibly vital, for in reducing ourselves to such learning, the worth of the whole is compromised, to such an extent that it becomes worthless. For example, in educating students about the individual

properties of a food, it is not at all surprising that we find students in our institutions consuming foods inadequate to good health. No longer are foods given the respect they deserve, which is of little surprise when we consider our mindless commercial and almost unlimited technological manipulation, of the food we eat.

In educating individuals to better health, the development of empathy within and outside the bounds of human nutrition is required, with no one area seeking dominance over the other. This point is imperative, given the importance of all things working together in unison for improvements in health. That is to say, it is not simply a matter, for example, of visiting your health care practitioner for a regular check-up, when the implications of technology, and human intention play out a major role in the capacity for generating greater health gains.

In developing a holistic framework, we must begin to educate for empathy, so that we can heighten the sensibilities of compassion, awe and stewardship. In the end education should help people to become custodians of better health and wellbeing. By taking this approach, the food we will consume will reflect an empathetic understanding of the foods we eat. Reinforcing and concluding this point is Emoto (2004 p. 23) who states:

When we look at the water crystal pictures of negative ideas, the numinous fear that most of us feel disappears. Instead we empathize with the malformed water. It didn't choose to suffer in such a manner. In this way a new state of mind comes into being inside us. We want to do something good for the water and, consequently, for ourselves. We're not at war anymore with the pollution of negativity. Conflict just produces more harmful energy, which in turn gives rise to more adversity. We don't want to close our eyes to negativity-on the contrary, we're visually and intellectually aware of it-but we use love and gratitude to transform it in a positive way. From this it follows that we have the ability to take an active part in the creation

of our world. This realization gives us not only power but also responsibility....We are no longer helpless “playthings”.

When all is said, it is clear that wholistic health entails educating people not just to see the world through their eyes but to feel and connect with the world through their hearts. Perhaps the deeper truth is, that the most effective way in which to achieve wellness is through participatory consciousness, which encourages us to live purposively, passionately and empathetically in affective resonance with the world around us.

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