To the Heart of the Matter

- examining the conceptual context of the understanding of cardiac illness

By

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Abstract

This paper is an examination of the hypothesis, that the context of the empirical therapeutic philosophy of Western Herbal Medicine (WHM) demonstrates a conceptual understanding that is concurrent with the biomedical theories being developed within the field of Psychoneuroendocrinology (PNE). The origin of this commonality is examined within the context of the historical development of medicine, establishing the nature of *holistic* and *vitalistic* understanding, and its influence upon medicine.

A discussion of the conceptual understanding of the mechanisms of cardiovascular (CV) illness is presented as a debate forum for testing the hypothesis. Recent advancements in the development of biomedical theories describing the aetiology of CV illness in a PNE context, provide a comprehensive understanding, which facilitates a comparison based upon broad therapeutic principles.

An analysis of the current PNE concepts of CV illness is presented in order to demonstrate the *multi-system* approach and to provide a theoretical basis for conceptual comparison.

Examination of the empirical basis of WHM reveals the importance of the *vitalistic* understanding, and establishes its origin in Humoral Medicine and Phyiomedicalist practice. Explicating the main therapeutic concepts inherent with these systems, an examination of the WHM understanding of cardiovascular illness aetiology is presented as a theme for comparative discussion.

In testing the hypothesis, the comparative discussion demonstrates the aspects of conceptual understanding that reveal a commonality of understanding. These aspects are shown to relate to the *vitalistic* context dictated by a *multi-system* approach to understanding the human condition.

The paper concludes by discussing the consequences of this conceptual commonality in relation to the understanding of disease processes, and to the conceptual philosophy of WHM practice.

Contents

1. Introduction

Throughout history, mankind has been continually striving to develop and refine an understanding of the mechanisms of the life processes ultimately defined by disease and death. Disease symbolises the portal between these two apparently irreconcilable aspects of human existence and its enigma has been the challenge of physicians since the dawn of time. In meeting this challenge, each cultural epoch has developed its own specific concepts with which to understand disease processes and apply treatment. These concepts have had their foundations in the contemporary cultural awareness, and they represent the cognitive perception of the culture in which they developed.

Historical research often presents the development of medical concepts as being a linear cumulative progression of knowledge (Gotfredsen 1973), where the subsequent evolution of medical theory is based upon extending the understanding of the theories of the previous epoch. However, as described by Kuhn (1996) and Køppe (1993) this is rarely the case. The establishment of a new conceptual model is often concurrent with a renunciation of the assumptions and methodologies of the model it replaces. Whitelegg (1995, p. 36) writes: "The transition… from which a new tradition of normal science can emerge is far from a cumulative process, one achieved by an articulation or extension of the paradigm. Rather it is a reconstruction of the field from new fundamentals, a reconstruction that changes some of the field's most elementary theoretical generalisations…"

This process of ideological developmental renounces those theories, which cannot be immediately facilitated within the *new* theoretical framework, as being superstition, which results in them being lost to any subsequent conceptual development. Barker (1991, p. 40) states that "…superstition is an index of rigidity of thought and occurs whenever the preservation of a theoretical model is seen to be more important than the phenomena it purports to describe". Expansion of any conceptual theory therefore, relies entirely upon its own precepts, often necessitating the re-definition of ideas and concepts, which have been an integrated part of historical cultural understanding.

1.1. The Veil of Context

Conceptual models for defining disease and its subsequent treatment have their foundations in the context of the contemporary understanding, and are derived from observation of the life processes. Disparities that arise between differing theories can be understood as being products of incompatibilities in the context within which they are described, and are not necessarily reflective of theoretical misinterpretation or misunderstanding. Discussing the critique the of classification of conceptual theories, Gould states that: "If systems of classification were neutral hat racks for

hanging the facts of the world, such disdain [towards classification] might be justified. But classifications both reflect and direct our thinking. The way we order represents the way we think. Historical changes in classification are the fossilised indicators of conceptual revolution". (Gould cited by; Barker1991, p. 42).

It could be possible therefore, that each epoch has in some way, discovered fundamental *truths* in developing the concepts used to describe the life processes. It is also possible that these *truths* transcend the boundaries of the historical cultural understanding from which they evolved, but remain veiled in the critical evaluation of subsequent theoretical perspectives. The inability in comprehending the *conceptual context* of these *truths* is therefore what is at core of the theoretical incompatibility between differing ideologies.

If the above statement is true, then it could be assumed that there are *facts of observation,* which have been veiled in the context of historical cultural understanding. Furthermore, that it should be possible to objectively examine the differing medical concepts and find some correlation in the information they present. This approach would effectively transcend the exclusive character of the paradigms that exist in conceptual understanding.

This approach has already been supported by research work examining the scientific basis of traditional herbal texts. Evaluating the modern biomedical basis of the therapeutic information presented in the Herbals of Culpeper[1] and Gerard[2], McFaddon (1994, p. 33) concludes: "…it would appear that they were very often correct, their therapeutic indications correlating closely with modern scientific research into plant remedies… regardless of how they visualised the aetiology of disease and therapeutic action of a remedy, they knew by experience how to cure people".

1.1.1. ***Science in Traditional Therapy***

In discussing the role of biomedical science in traditionally based therapies, the problem of context often becomes a major subject of discussion. Proposals for re-evaluating the relationship between biomedical science and traditionally based therapies, often present a polarised view when defining contextual compatibility, as can be seen in the works of: Barker (1991), Caldock (1990), St. George (1994), Whitelegg (1995) and Valussi (2001). Descriptions of traditionally based therapies clearly define the conceptual differences between the *holistic* contra the biomedical approach, and call for the development of *new* research strategies, with which to validate the practice of traditional

[1] Nicholas Culpeper, English Apothecary & Physician (1616-1654 C.E.).

medicine. In contrast, biomedical science, has stated that: "from the point of view of the scientific medical establishment most unconventional medical procedures…are defined as speculative, subjective and non-measurable by current scientific methods" (Monckton *et al*. 1998, p. 13). The almost mutually exclusive nature of the two conceptual approaches often places them in diametric opposition and effectively prevents the possibility of any academic exchange.

However, an alternative way to address this problem, could be to examine the conceptual differences from a non-polarised position. Analysis of the *facts of observation* that are inherent in traditional and biomedically based therapeutic understanding could constitute a neutral focus for developing a comparative dialog. Recent advances in biomedical science are beginning to facilitate this process by establishing theories of *mind-body* system interaction, which can encompass the *holistic* model. By transcending the differing conceptual boundaries, there could arise a potential for unifying what currently appear as irreconcilable approaches to medicine. The result could be a common forum for a broad discussion aimed at developing the understanding of disease processes and their subsequent treatment.

1.2. ***Western Herbal Medicine as an Empirical Repository ~ a hypothesis***

This dissertation examines the hypothesis, that within the differing historical conceptual models that have been used to describe disease processes and the subsequent application of treatment, there can be found common elements of understanding. Furthermore, that this can be clearly demonstrated by examining the empirical therapeutic philosophy of Western Herbal Medicine (WHM).

The practice of WHM is based upon a synthesis of empirical understanding and biomedical explanations, which are integrated to serve as models with which to understand the application of remedies in a therapeutic context (Mills 1991). Within this *unique* framework, it should be possible to illustrate that in its application of an eclectic approach to treatment, WHM demonstrates aspects of therapeutic understanding which transcend the differing conceptual approaches that characterise its practice. As hinted by Whitelegg (1994), WHM is in an excellent position where research can be a catalyst: "eroding boundaries between conventionally-defined knowledge generation and application" (Whitelegg 1994, p. 22)

[2] John Gerard, English physician (1545-1607).

A discussion of the mechanisms of cardiovascular (CV) illness has been chosen as a debate forum for comparing the empirical and eclectic understanding, reflected in contemporary WHM, with a biomedical scientific explanation of these conditions and their treatment. The choice of CV illness as the subject of comparison has been made in the light of recent advancements in the development of biomedical theories relating to these conditions within psychoneuroendocrinological (PNE) research. The comprehensive nature of PNE research into CV illness facilitates a comparison of understanding based upon broad therapeutic principles.

In approaching this proposal, the development of conceptual changes in understanding disease processes and their treatment are discussed in a historical perspective. This is done to define the current positions of WHM and of modern biomedical science, and to establish the contextual boundary between the empirical and biomedical basis of the WHM practice.

In this dissertation, a description of the *holistic* perspectives in PNE and WHM relating to the activities of the heart is followed by a presentation of the current biomedical understanding of CV system control and CV aetiology. The therapeutic understanding of the CV system in WHM is then presented along with a discussion of the relevant *materia medica* applied in CV illness. This is then followed by a comparison of the two approaches, discussing the concepts of understanding that are common to both modalities.

After summarising and discussing the findings of the dissertation, the conclusion evaluates the hypothesis and relates aspects of the empirical understanding in WHM to developments in WHM practice.

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2. The Context of Medicine in an Historical Perspective

Some of the earliest known inscriptions, the clay tablets recovered from Kuyunchik Mountain, dating from 3000 – 2000 B.C.E.[3], describe the practice of Assyrian medicine/healing. They present an understanding of disease and treatment, based upon incantation, ritual and religion (Gotfredsen 1973). The context of the Assyrian approach to medical conditions is a reflection of their theocratic culture, and is a typical example of how mankind related to disease throughout the pre-cartesian period (Capra 1989). During this period, life was understood as being teleologically formed and governed (Køppe 1993), and for the ancient healer/physicians, the *monistic* world-view was an integral part of their system of medicine.

Historical literature is rich with references, which present models of disease processes and their appropriate treatment in the context of environmental, social and spiritual relationships. However, in the modern era, the epistemological context in which these texts are written is often considered as being philologically archaic and naive, having little relevance to the practice of contemporary medicine. In a discussion of the 12th century C.E. medicinal texts written by Hildegard of Bingen[4], Ladefoged (1997, p. IX) writes: "Behind all of [ancient] science, also that of medicine, their lies a series of observations of nature upon which are based theories. Whilst the observations themselves maintain there insight throughout the centuries, the explanations stand like a *house of cards* and in the light of history, appear as barren intellectualities"[5]. However, the attempts of our forefathers to describe disease processes were genuine and incorporate *facts of observation* that arose out of careful and comprehensive cognitive perception. Discussing the *Epidemics*, a collection of medical treatises thought to have been written in the first or 2nd century C.E. and attributed to Hippocrates[6], Smith (1994, p. 5) writes: "…however fumbling the expression is, the *Epidemics* give the impression of sincere, intense, and productive intellection. The rare methodological formulations confirm our impression that the particulars are being pursued in the hope of successful generalities".

It could be argued that the fundamental basis for the practice of medicine has remained unchanged throughout the history of mankind. Contemporary clinical medicine is still based upon the being able to identify and recognise *general* aetiological factors, in an attempt to develop an understanding of a *particular* condition. However, the epistemological framework, which is used to

[3] Clay tablets thought to originate from the Assyrian King Assurbanipal. Discovered in 1849 by Sir Austin Layard.
[4] Hildagard of Bingen, Abbess and scribe (1098-1179 C.E.).
[5] The citation is this authors translation.

describe and define the practice of medicine has changed, the monistic context, in which the ancient physicians comprehended illness, dictated a multi-factorial understanding including physical, environmental, social and spiritual aspects.

2.1. The Imposed Limitations of Reductionism

The last 150 years has seen the development and subsequent dominance of the biomedical approach to disease processes and treatment. This framework, which is based upon a *reductionist* epistemology (Køppe 1993), has its roots in the Cartesian *dualistic* concept of division between *psyche* and *soma*. It is from the *dualistic* position that the critique of the *monistic* approach to the life processes described by the traditional physicians arises. Zachariae (1991, p. 18) writes: "It can be assumed that the division of soul and body along with the formulation of a mechanical world view has been the prerequisite for establishing modern science"[7]. This simultaneous denial of he *old* and movement towards the *new* is characteristic of the revolutions in understanding that mark a destructive-constructive change of paradigm (Kuhn 1996). Kuhn specifically states that "The depreciation of historical fact is deeply, and probably functionally, ingrained in the ideology of the [contemporary] scientific profession…" (Kuhn 1996, p. 138).

Moving away from a *monistic* explanation, the *reductionist* method defines "…the complex and compound in terms of its fundamentals"[8] (Hansen, Thomson & Varming. 1993. p.324). This is the central tenet of the biomedical approach which, when applied to the study of health and disease, has necessitated a shift away from *holistic* and *vitalistic* understanding. Zacharie (1991, p. 18) writes that: "The central dogma of the biomedical model has been the concept of the specific aetiology of disease"[4]. The result has been a system of medicine, which has been engaged in pursuing understanding on an organic level, by examination of discrete morphological phenomena.

The *facts of observation* that have emerged from this application of *reductionist* research can be said to be valid within their own epistemological framework or paradigm. However, as shown previously, the characteristic of a paradigm, by defining the nature of which *facts* can be considered as being valid, consequently dictates its inability to integrate concepts, falling outside its own remit (Kuhn 1996); (Whitelegg 1995). For biomedical science, this has resulted in the inability to integrate the *holistic* understanding of disease processes within its framework. In a discussion of

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6 Hippocrates, Greek physician (460-377 B.C.E.).
7 The citation is this authors translation.
8 The citation is this authors translation.

biomedical science, Dethlefsen (1990, p. 4) writes: "Its high specialisation and reliance on analysis as the basic principle of research has inevitably resulted not only in an ever greater and more exact knowledge of detail but also, at one and the same time, in its losing sight of the picture as a whole".

Biomedical science has advanced medical understanding, in terms of the specific cause/effect relationship arising from organic observation, which has facilitated the development of incredibly technical and precise medical intervention. However, there is a growing opinion that the contemporary medical pre-occupation with *reductionist* science has reached its limits in being able to improve patient health (Capra 1988). Parallel to this opinion, there has been an expressed need to expand the realms of medical science by examining models of disease that look further than the biomedical realm (Pert 1997).

2.2. Psychoneuroendocrinology ~ the return of vitalism ?

During the last 25 years, there has been a steadily growing awareness within the biomedical world that the reductionist approach to medicine is not providing the answers to the clinical problems facing medical practice. Watkins (1997, p. XI.) states that: "The current biological approach is limited in its perception and in its ability to explain the human condition. It has had its day and we now need to embrace a new approach". There is some recognition that the arena within which the precepts of biomedical science are defined and applied needs to be expanded to include a more humanistic understanding of the relationships between health, disease and the individual. Consequently, the boundaries that delineate the many fields of biomedical science have become less well defined and a multi-system/aspect approach to understanding the human state is beginning to develop.

Mind-body Medicine has been described as a being an approach that: "… attempts to reconcile the reductionist and *vitalistic* approaches to health and illness. [And that] It draws on *reductionist* research while seeking to demonstrate the importance of the whole" (Watkins 1997, p. 2). Central to this approach is a *new* branch of biomedicine that has developed over the last 15 to 20 years, which has been termed psychoneuroendocrinology, or psychoneuroimmunology (Maier, Watkins & Fleshner 1994). PNE/PNI had its first official debut in 1981, when Dr. Robert Ader *et al.* presented their work proposing the hypothesis that the immune system was modulated by the brain and is therefore influenced by emotion (Ader. 1991). This event marked the beginning of a departure from the classical biomedical understanding, towards a *new* way of perceiving the human condition, where interaction is perceived as occurring on all levels of being. Pert (1997, p. 185) writes: " …we

might refer to the whole system as a psychosomatic information network, linking *psyche*, which comprises all that is of an ostensibly nonmaterial nature, such as mind, emotion and soul, to *soma*, which is the material world of molecules, cells and organs".

The PNI/PNE approach to the aetiological aspects of disease processes prescribes the inclusion of non-physical states in understanding the nature of illness. In a conceptual sense, the brain, internal organs the immune and endocrine systems are seen as being an integrated whole, that reflect, respond and communicate the state of the individual at all levels. "Simply studying immunology at the level of the immune cells, neuroscience at the level of neurones and psychology at the level of behaviour cannot capture the complex interactions between levels. Living organisms are not composed of disconnected systems or processes" (Maier, Watkins & Fleshner, 1994, p. 1015).

PNI/PNE is still in its infancy, it represents a forum where many areas of specialist research are being combined to form a model for understanding the relationships between all aspects of the human condition. The challenge of this *new* approach demands that biomedicine moves away from Cartesian *dualism*, and once again embraces a *monistic* position, where: "…the soul and the body are indivisible, and the psychological and the physiological are two descriptions of one and the same phenomena"[9] (Mirdal 1995, p.17-18).

The wheel has turned, the world view that is being dictated by following the biomedical scientific pathway is in many ways similar to that of the healer/physicians of antiquity. Health and disease are once again being related to as aspects of life, which reflect the human condition in its entirety. Watkins (1997, XI.) states that: "Understanding the human system as an integrated whole… also provide[s] evidence to support the view that the health of any individual not only depends upon physical health but also on the unique mental, emotional and spiritual aspects of that individual".

The emergence of this *new* view marks the possible *re-emergence* of some of the theoretical observations made by the pre-cartesian physician/healers. Whilst it would be a naive step for biomedical science to acknowledge and apply ancient beliefs, it may be possible that the *vitalistic* content of pre-cartesian understanding might hold the key to unravelling some of the problems faced by science.

Provided with a comprehensive understanding of the elements upon which life is dependent, the *microcosmic understanding*, it could be that mankind is now duly prepared to expand this understanding and relate it to the *macrocosmic* aspects of human existence.

2.3. The Conceptual Context of Western Herbal Medicine ~ empiricism, eclecticism and biomedicine

The mid-1800's C.E. saw *reductionism* become the dominant influence in the study of science bringing with it the emergence of a strict adherence to biomedical principles. With the development of the biomedical approach, arose a crisis in the practice of medicine that divided the medical profession in the western world (Griggs 1997). Orthodox medicine was being born and the new attitudes towards the medical sciences re-defined the therapeutic arena in which the physician was considered the expert. The focus was now being placed upon the biochemical activity of the remedies and their affect upon an individual's physiology.

Within this arena were a few physicians that could not divorce their practice of medicine from its more *holistic* and *vitalistic* foundations. These physicians prescribed from the then contemporary *materia medica,* which consisted primarily of botanical medicines (Gotfredsen 1973). Their practice was of the *old school*, developed throughout many centuries of observation, which form the foundation of any empirical system of understanding. It was from within their ranks that the system, which was later to be termed Medical Herbalism has its roots (Griggs 1997). The fundamental tenet of Medical Herbalism, was clearly expressed by one of the professions forefathers, Samuel Thomson[10], who once wrote: "…The conduct of Hippocrates is a bright example… Experience must be enlightened by reason and theory built upon close and accurate observations" (Thomson cited by; Griggs 1997, p. 179).

The clinical approach of the early herbalist/physicians, based upon the ancient Hippocratic philosophy of *vis medicatrix naturae* (the healing power of nature) (Eldin & Dunford 1999) was, for these *vitalistic* physicians, incompatible with the emerging biomedical approach to treatment. This brought about a schism in medical practice that defined the orthodox and traditional medical schools of thought throughout the 19th and 20th centuries C.E. The fundamental philosophies of these two schools were relatively judged as being incongruous, and each school continued upon its own developmental pathway.

Discussing WHM's attitude to the biomedical approach, Mills writes: "Herbalists have rarely viewed the human being through the eyes of the modern scientist. They have rarely gone out to attack fragmented diseases or even been particularly interested in them" (Mills 1991, p. 17).

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9 The citation is this authors translation.

10 Samuel Thomson, American Physician (1769-1843 C.E.).

However, despite this declaration, a retrospective evaluation of the development of WHM during the last 150 years, reveals that biomedical science has played a major role in its evolution. Since its self-recognition as a system of practice in the mid-1800's C.E., WHM has continued to incorporate biomedical concepts as a therapeutic tool for *extending* traditional empirical understanding, whilst maintaining its fundamental therapeutic philosophy. Eloquently arguing for this approach, the herbalist E. Miller[11], writing in 1910 C.E. states: "the… liberty of being a panpathist should be granted to every physician whose heart and soul are wrapped up in his desire to cure the sick" (Miller 1910, p. 13).

The development of modern WHM can be therefore considered as being somewhat of an anomaly in the discussion of a conceptual basis of treatment. Having its origin in traditional empirically based practice, modern WHM is *optimally* a combination of an empirical therapeutic approach and biomedical science, where biomedical principles are used as an adjunct to understanding health and disease processes. This dual aspect of WHM could reveal a unique comprehension of illness, where biomedical descriptions are understood in a *holistic* and *vitalistic* context.

2.3.1. ***Biomedical Understanding in Western Herbal Medicine ~ the phytotherapeutic dilemma***

It has been argued that the more recent role of *reductionist* science in WHM has created a distorted picture of contemporary herbal therapeutic practice (Chenery 2001); (St. George 1994); (Whitelegg 1995). Within the last 15 years, WHM has once again experienced a schism in the interpretation of the therapeutic principles it employs. Under the aegis of the term *Phytotherapy*, some practitioners of WHM have raised criticism regards the empirical and traditional basis for the application of herbal remedies in a therapeutic context. The editor of the British Journal of Phytotherapy writes: "This return to the past which we thought was long since overcome makes it very difficult for Phytotherapy to make progress in its fight for recognition as a scientific discipline" (Ed. BJHM 1990, p. 9). It is therefore no longer self-evident that WHM is practised or described using empirical and *vitalistic* understanding.

In the light of this argument, it is paramount to the context of this dissertation, to demarcate the WHM therapeutic principles, which are used as examples of the empirical approach. It is also important to define the context in which explanations of a given remedy's therapeutic effects are applied.

[11] E. Miller, American eclectic medical doctor practising during the turn of the 20th century.

2.3.2. Defining the Empirical Understanding in Contemporary Western Herbal Medicine

Analysing the historical information regards the empirical WHM approach to disease and treatment, it becomes apparent that there exists two main descriptive styles, which are historically defined by the emergence of *reductionism*.

WHM originally developed out of *pre-reductionist vitalistic* medicine, which had its origin in the time of the Romeo-Grecian Empire, and was fundamentally an empirically based system (Holmes 1997). Western medical texts from the *pre-reductionist* era were written in the language of Humoral Medicine, originally expounded by Hippocrates and Galen[12], and later by the English Physician; Nicholas Culpeper. Within Humoral Medicine disease is understood in terms of imbalances, and treatment is aimed at addressing the expressions of the *vital energy*, by correcting imbalances at the physical, constitutional and temperamental levels (Chishti 1988) .

Humoral teaching could be described as forming the foundations upon which WHM was built. Following the influence of the lineage of Humoral Medicine from 300 B.C.E. Holmes (1997, p. 38) writes: "The analytic tradition is rooted in the rationalistic Hippocratic medicine that sprang from Kos. It was enriched and consolidated by Galen of Pergamon in Rome in a form that lasted to the threshold of the nineteenth century".

In the modern era, the most influential of the *post-reductionist vitalistic* styles of WHM has been the practice of Physiomedicalism (Brown 1991). Developed in North America during the 19th century C.E. and instituted by the teachings of Samuel Thomson, Physiomedicalism exerted its influence on herbalism in the United Kingdom under the inspiration of Albert Coffin[13], an estranged student of Samuel Thomson (Griggs 1997). The therapeutic tenet of Physiomedicalism is based on the understanding that health and disease are expressions of the *vital force,* and that physical health, being archetypal, is expressed in the individual, as a function of temperament and organ inferiority (Priest & Priest 1983).

The Physiomedicalist approach reflects strongly some of the concepts found in Humoral Medicine, suggesting that humoral understanding either has survived, or has been re-discovered by Physiomedicalist practice.

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[12] Claudius Galen. Greek physician (129-200 C.E.).
[13] Albert Isiah Coffin, Anglo-American Physician (1790-1866 C.E.).

Since its establishment in 1864, the name of the National Institute of Medical Herbalists has been synonymous with the lineage of contemporary WHM. Having its origins in Physiomedicalism, the National Institute has, since its inception, influenced WHM practice by presenting an eclectic approach to herbal therapy, incorporating Physiomedicalist philosophies with contemporary physiological understanding (Mills 1991). This adaptation of physiological information, has been moderated by a phenomenological interpretation (Mills 1991), which has maintained the criteria of a *vitalistic* application.

The academic influence of Physiomedicalist based herbal practice is evident in contemporary herbal texts and in the practice and teachings of Medical Herbalists. However, the emergence of the *Phytotherapeutic* approach in the 1980's C.E. has begun to shift the focus of WHM practice towards a more biomedically-based approach (Griggs 1997).

The therapeutic information presented in this dissertation is based upon the empirical traditions found within WHM. The therapeutic references used in the following discussion, have been chosen with the criteria that they are representative of the lineage of empirically based humoral or Physiomedicalist practice. Modern texts utilising purely biomedical arguments to support a herbal therapeutic approach have not been included as reference material in this dissertation. Similarly, use of the term 'contemporary WHM' within this work, refers to the lineage of empirical herbal practice, and excludes the more recent biomedically based approaches in Herbal Medicine.

The discussion of specific herbal therapeutic actions/indications, which is the foundation of WHM, can be described as being the *one* area of WHM where the context of history becomes transparent. The herbal monographs employed in WHM, present pharmacological explanations of herb activities in juxtaposition with ancient traditional applications (for example the British Herbal Pharmacopoeia 1983 (BHMA 1983)) and the popular Modern Herbal of Hilda Leyel[14] first published in 1931 (Leyel 1994). The language used in traditional and pharmacological descriptions of herbal activities can often differ, reflecting differences in the epistemological framework within which the information is presented *(ibid.)*. However, within WHM texts, the biomedical definition of traditional herbal activities is rarely questioned and similarly the biomedical information is not used to rationalise traditional descriptions. Perhaps this is the epitome of good WHM practice, where data is presented as a basis for study and understanding and not as dogma. This approach is

[14] Hilda Leyel. Herbal healer and co-founder of the Society of Herbalists in 1927.

accordant with the aims of this work, and in discussing specific herbal remedies, the origin and context of the information presented is clearly indicated.

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3. The Heart
~ holistic perspectives in biomedical science and western herbal medicine

The heart has played a central role in many systems of traditional medicine, where its function is often described in terms, which transcend the activities ascribed to it by biomedical physiology. Culpeper, writing in the *English Physition*, published in 1652, said that: "The *vital spirits* proceed from the heart and cause in *man mirth, joy, hope, trust, humanity, mildness, courage*… and their opposite: *viz. sadness, fear, care, sorrow, despair, envy, hatred, stubbornness, revenge*…" (Culpeper 1995, p. 305). Similarly, the teachings of Avicenna[15] say that the heart is a repository of divine potentialities, which is greatly effected by the emotions (Chishti 1988).

Modern language still reflects this traditional understanding of the concept of the *heart*. Tobyn (1997, p. 83) writes: "The English language is full of examples of how we locate emotions in the heart. There are 'heartaches', 'heart warming' moments and 'heart rendering' events. It has been said of some people that 'they die of a broken heart' and the expression 'a heaviness of the heart' denotes a depression of spirits".

Physiomedicalism has more recently, described disturbances of the heart and vascular system in a *vitalistic* context utilising physiological understanding. The state of the CV system is seen to be a reflection of autonomic nervous system (ANS) balance, mediated by the vasomotor system. This is in turn understood as a reflection of how the *vital energy* expresses itself within the constitutional limitations of the individual (Ellingwood 1911); (Priest & Priest 1983).

Modern neurophysiology describes how the ANS is in part, mediated by emotion via the limbic/hypothalamus pathways (Nixon & King 1997). This approach correlates with the eclectic description found WHM, and infers a *holistic* understanding relating emotion to physiological activity.

Contemporary biomedical research, under the aegis of PNE, is beginning to except that the *reductionist* 'organ specific' approach to the CV system is an inappropriate model for defining treatment strategies. Nixon & King (1997) argue this point by presenting the following postulates:

- That there is no close relationship between the anatomy of the coronary arteries and CV illness

[15] Avicenna (Hakim Ibn Sina), Arab Physician & teacher (980-1037 C.E.).

- That the factors, which damage the heart, are the physical, psychological and social challenges that accompany the demand for effort.

In their conclusion they reason that the treatment of CV illness should include: "…[psychological] strategies for anticipation and prevention …[of CV illness] … integrated with the reactive tactics of conventional cardiovascular medicine and surgery" (Nixon & King 1997, p. 63).

Similarly, in the field of psycho-physiological research, many studies have been carried out examining the relationship between emotion and cardiovascular illness. This work generally concludes that negative emotional states disturb the CV system control mechanisms and predispose to CV illness (Scheier & Bridges 1995); (Hemingway & Marmot 1999).

The general understanding of the approaches that are presented here can be described as being *holistic*, in that they argue for a non-specific aetiological approach, which encompasses psycho-social aspects in the description of CV activity and disease processes.

A philosophical discussion of the cultural influence of the *reductionist* biomedical approach to CV illness adds another perspective to the *holistic* argument. In removing the *holistic* understanding from the discussion of heart disease, modern biomedical science has effectively reversed the image of the heart as a socio-symbolic icon. Hillman (1979) writes: "The heart is still king, still the pace-maker, but now a tyrant, for heart and circulatory diseases are 'the number one killers', usually striking in the night. It cannot be trusted; we cannot have faith in the very organ which once was the source of faith".

The *holistic* attitude to CV illness is at the centre of the proposed hypothesis, as it offers a multi-aetiological approach which can facilitate the comparison and discussion of the concepts of understanding employed within traditional WHM and PNE.

It could be debated that this evaluation of the comparative understanding of traditional WHM and the modern biomedical approach to treatment could be interpreted as a *non-holistic* process, in that the subjects under discussion are placed in a juxtaposed objective perspective. However, it is not the aim of this work to argue for a *holistic* approach, but to demonstrate a basic commonality in understanding, which transcends the context of the concepts, which are employed in the discussion.

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4. The Cardiovascular System ~ the modern biomedical context

Classical physiology has developed descriptions of the primary extrinsic CV control mechanisms mediated by the ANS and its regulation by the catecholamines (see appendicies; I: table 1., II: fig. 1., III: table 2. & IV: fig. 2.). Within these descriptions, the CV system dynamics are presented in relation to discrete disassociated processes that involve system specific regulatory mechanisms. The application of this understanding has dictated the mechanistic approach to CV illness aetiology throughout the nineteenth and most of the twentieth centuries (Sterling & Eyer 1981).

Extending this model, PNE has integrated emotional states into the description of the CV regulatory processes. This development has been concurrent with the progress in the aetiological understanding of CV illness. It has been shown that psychological factors can dysregulate the CV system control mechanisms, mediated by the interaction of the ANS, the hypothalamic-pituitary-adrenocortical axis (HPA) (see appendix V: table 3 & fig. 3.) (Appels 1997) and neurotransmitter activity (Thase & Howland, 1995). This can result in disturbances of CV system function, resulting in the development of CV illness.

The model of the CV system that has developed within PNE, is one where the CV system is understood as been intimately related to the emotional state of the individual. Nixon & King (1997, p. 49) write: “The role of the emotional arousal in the genesis of heart diseases and sudden coronary death is commonly dismissed as anecdotal, but the development of appropriate technology is bringing it into the realm of probability and scientific approbation”.

The following discussion presents the mechanisms, which form the basis for a biomedical understanding of the CV system in relation to emotional responses. Presented are some of the more intricate interrelationships, which are propose a *mind-body* approach to understanding the integrated role of CV system regulation and activity.

4.1. The Role of the Hypothalamic-Pituitary-Adrenocortical Axis

The role of the HPA axis in CV regulation is primarily mediated by the glucocorticoids. These are produced in response to adrenocorticotropic hormone (ACTH) production, which is stimulated by the release of corticotropin releasing factor (CRF) from the hypothalamus (see appendix V: table 3 & fig. 3.).

The activity of the HPA mechanism in the 'fight or flight' response was first recognised in 1911 by Walter Cannon[16] (Gotfredsen 1973). Research has since shown that the HPA system is intimately associated with the CV autonomic regulatory mechanisms. In addition, recent developments have established that CRF plays a major role in the physiological response pathways that constitute the HPA/autonomic responses in aroused states (Thase & Howland. 1995); (Koob 2001).

Dysregulation of both the HPA regulatory mechanisms and of HPA/autonomic interaction, is often seen in prolonged emotional and psychological disturbance (Plotsky, Owens & Nemeroff 1998).

In 1956 C.E. Hans Selye[17] published a work describing how the body has a limited capacity to deal with stress. Seyle described two aspects of the stress response: A normal short-term response characterised by primary physiological adaptation, which he termed 'General Adaptation Syndrome'. The second stage was seen in prolonged stress, where the bodies physiology adapts to prolonged stressors. However, prolonged second stage conditions lead to a third stage of physiological exhaustion, with diminishing adaptive resource associated with disturbed adrenal activity (Seyle 1978).

Nielsen (1989), has also categorised the stress response and associated stress activity to disturbances of the HPA and the ANS regulatory mechanisms:

- The *active stress response* is characterised primarily by sympathetic autonomic activity.
- The *passive stress response* is characterised by high activity of the HPA system.

The *active stress response* occurs as a reaction to immediate stress stimulus, whilst the *passive stress response* occurs when the individual is presented for uncontrollable stressors, which cannot be compensated for by the 'fight or flight' response (e.g. long-term anxiety and depression) (Nielsen 1989)

A proposed aetiology of CV illness pathogenesis, which implicates these mechanisms, has related disturbances in HPA/CRF activity and ANS regulation with a potentiating effect of the inherent pathogenic action of prolonged, stress-induced glucocorticoid activity (Musselman, Dwight & Nemeroff 1998) (see appendix V: table 3).

[16] Walter Bradford Cannon, Professor of physiology Harvard (1871-1945)
[17] Hans Selye, Canadian research Physiologist

4.1.1. ***Corticotropin Releasing Factor***

Negative feedback between glucocorticoid production and the hypothalamic release of CRF, constitutes the major *coarse* feedback regulatory mechanism for glucocorticoid production (see appendix V: table 3. & fig. 3.). However, Thase & Howland (1995, p. 246) write that: "The overall integrity of the HPA axis is controlled by an intricate feedback inhibition system, which receives input from both the limbic system and the cerebral cortex". This proposal suggests a link between emotional and cognitive behaviour and HPA response.

It has been found that many of the major neurotransmitters influence CRF activity; acetylcholine, serotonin, noradrenaline and dopamine stimulate CRF secretion, whilst opioide derived peptides and GABA have an inhibitory effect upon CRF secretion (Mitchell 1998). In addition, CRF appears to have an inhibitory effect upon peptide activity (Pert 1997). These feedback mechanisms could constitute the link between HPA activity and emotional states, as many of the neurotransmitters named, along with the peptides, are implicated in higher centre emotional responses (Pert *et al.* 1985); (Constantine, Stratakis & Chrousus 1995). Pert (1997, p. 270) writes: "We could say that CRF is the peptide of negative expectations, since it may be stimulated by negative experiences…".

In addition to the extrinsic effects of CRF as a HPA endocrine mediating agent, CRF has also a direct intrinsic action upon central nervous system activity. Specialised CRF responsive cells have been found throughout the cerebral cortex (Nemeroff 1992), and are thought to be implicated in responses relating to emotion. Examining the interaction between emotion and extrinsic/intrinsic CRF activity, Mitchell states that: "…physical and psychosocial stressors, for example prolonged immobilisation or social conflict, down regulate CRF receptors in the anterior pituitary and hypothalamus. But may up regulate receptors in sites outside the HPA axis" (Mitchell 1998, p. 644).

4.1.1.1. ***Intrinsic Neurological Activities of Corticotropin Releasing Factor***

It has been established that the intrinsic neurological activity of CRF is strongly associated with emotional conditioning (Goleman 1995). Lehnert *et al.* (1998) describe CRF activity as being: "a major regulator of the hypothalamo-pituitary-adrenal (HPA) axis and [of] the activity of the autonomic nervous system […], it exerts numerous effects on other physiological functions such as appetite control, motor and cognitive behaviour and immune function" (Lehnert, Schulz & Dieterich 1998, p. 1039). More specifically, CRF has been firmly identified as having an

anxiogenic-like effect (Krysiak 2000), mediating stress/anxiety responses. In a summary of the neurological activities of CRF, Plotsky *et al.* (1998) lists two major areas of CRF influence:

- An important participant in the neurological mediation of fear and anxiety
- A major regulator of autonomic nervous system activity

In examining the possible pathways by which CRF could be implicated in these activities, it is necessary to be able to topographically associate behavioural responses with CRF influence. (Koob 2001) discusses the relationship of CRF activity with the Locus Coeruleus (LC) and the Amagdyloid Nucleus (AN). Similarly, Lehnert *et al.* (1998, p.1039) write: "the basis for these [(CRF)] effects is constituted by its distribution in hypothalamic and extra-hypothalamic brain areas, the latter being represented by limbic structures such as the central nucleus of the amygdala or by brain stem neurones such as the locus coeruleus …".

4.1.1.2. ***The role of the Locus Coeruleus***

Weiss *et al.* (1994) has linked anxiety with increased levels of CRF in the Locus Coeruleus (LC), which is an area of noradrenergic (norepinephrine stimulated) neurones, situated in the superioanterior aspect of the Pons, lateral to the mesencephalic aqueduct. The LC has extensive projections to the forebrain, characterised by the fact that they do not synapse in the thalamus (Moose & Møller 2000). It also has fibres, which innervate the dorsal vagal nucleus, and influence the preganglionic sympathetic neurones in the intermediolateral cell columns of the spinal cord (Wilkinson 1988. p. 230).

The effect of CRF upon the LC is to enhance electrical activity (Plotsky *et al.* 1998), potentiating the activity of local norepinephrine influence, resulting in heightened LC activity.

It is known that projecting fibres from the vasomotor regions in the brain descend in the intermediolateral columns of the spinal cord. These intermediolateral columns are influenced by LC activity, prior to emerging via the ventral roots to synapse in the para-vertebral sympathetic chains (Moose & Møller 2000). The dominant effect of fibres from the LC is inhibitory; therefore, heightened LC activity would result in inhibition of sympathetic innervation of the vascular system (see appendicies II: fig. 1. & VI: fig. 4.). Vascular innervation is primarily sympathetic, and extrinsic vascular control is influenced by sympathetic innervation, catecholamine activity and intrinsic vasoactive substances. Impedance of this extrinsic sympathetic vascular control therefore, will accentuate the effect of both the circulating catecholamines and intrinsic vasoactive substances upon the vascular bed (Berne & Levy 1998). The net effect is to move the focus of control of

vascular tone from the swift responsive nervous system activity, to the slow responsive/prolonged endocrine and intrinsic control mechanisms. This response corresponds to the characteristics of the *passive stress response* to prolonged psychological stressors described by Nielsen (1989).

The LC also has efferent projections, which innervate the dorsal motor vagus nucleus, situated in the medulla oblongata. This nucleus constitutes the origin of the vagus nerve (Cranial nerve X) efferent fibres (Moos and Møller 2000). Research carried out by Ter Horst, Toes & Van Willigen (1991), has shown that the LC activity inhibits the CV parasympathetic vagal preganglionic neurones (see appendix VI fig. 4.). This response would result in an increase in Cardiac Sionoatrial-node firing, and an increase in atrio-ventriculoar conduction (see appendix II: fig. 1.), characteristic of the 'fight and flight' response. This CV activity is also concurrent with the previous findings, that LC activity could be a modulator of the *stress response*.

It has also been established that sensory afferent fibres from within the tractus solitarius (TS) are modulated by LC activity, which effects pre-synaptic excitability at the TS nucleus (Lucier & Sessle 1981); (Chen & Huang 1997). The TS nucleus is the site of the central projections of the baro- and chemoreceptors, which are an integral part of the CV control feedback mechanisms. An increase in LC activity inhibits the effect of TS nucleus activity, thus abating the influence of baro- and chemoreceptor afferent signals (see appendix VI fig. 4.). This effectively impedes the *normal* parasympathetic feedback mechanisms, which regulate the CV system *status quo*, thus enhancing sympathetic and catecholamine influence (Berne & Levy 1998). Here again we see that the activities of the LC, mediated by CRF are implicated in CV disturbance related to the *stress response*.

4.1.1.3: ***The role of the Amygdaloid Nucleus***

The amygdaloid nucleus (AN) is considered as being part of the limbic system, it receives afferent fibres from the thalamus, hypothalamus and cortex, and has efferent projections to the hypothalamus via the stria terminalis. The activities of the AN are associated with aggression and anxiety, and it is thought that its function is the emotionalising of sensory information (Moos & Møller 2000).

The AN releases endogenous CRF in response to anxiety and stress, and research has shown that the presence of CRF in the amygdala induces the behavioural patterns associated with anxiety (Mitchell 1998). The regulation of CRF response in the AN is mediated by norepinephrine, whereby the action of norepinephrine is to potentiate CRF release, initiating an anxiety/stress response (Koob 2000).

It would appear that the role of CRF, is central to this mechanism in its ability to cause the human state to resort to basic emotional instinct and physiological responses in states of prolonged stress and anxiety (Pert1997).

Assuming the basic human condition has no inherent dysfunctional mechanisms in its ability to adapt to external stimuli, then the causative factor/s relating PNE responses to CV system pathology must relate to the limitations of the adaptive physiological processes. This suggests that the context of function is a major factor in CV illness.

Behavioural and physiological responses to emotional stimuli are known to be learned processes, and it has been proposed that the emotional climate experienced during childhood is a major factor in conditioning these responses (Goleman 1995). New emotional experiences are matched with those of previous memories and the physiological responses corresponding to those of the memory dictate the response to the *new* experience (Watkins 1997). This comparative activity occurs in the AN, which in the light of the previously presented mechanisms, suggests that the predisposition for CRF disturbances in prolonged stress and anxiety states could be established during childhood.

The picture that develops from these considerations relates personality, as a function of emotional development during childhood, with adaptive ability. This explains how the context, within which the *adaptive ability* is exposed to stressors, dictates whether or not the CRF system integrity can be maintained.

4.1.1.4. ***Interaction of the autonomic nervous system and Corticotropin Releasing Factor***

The mechanisms presented here support an understanding of the interaction of the HPA, the ANS and the higher cognitive processes in a complex regulatory pathway (see appendix VI: fig. 4.), which is primarily mediated by the activities of CRF. As can be seen from the previous sections, the influence of CRF on all levels is to move the psychological and the somatic physiological condition towards an aroused state.

The activating/inhibiting processes of the LC and the AN are complimentary, as there is relative diametric interaction with CRF activity, which can be summarised as follows:

- In the LC, increased CRF levels potentiate norepinephrine activity exciting the LC, which results in the activation of the somatic CV stress response activity (presented in section 4.1.1.2.)
- In the AN, increased norepinephrine levels potentiate CRF activity, which induces stress/anxiety behaviour (presented in section 4.1.1.3.)

Koob (2001 p. 245) takes this control process further by proposing that: "norepinephrine-CRF interaction may occur in the terminal projections of the forebrain norepinephrine systems, in the paraventricular nucleus of the hypothalamus, the bed nucleus of the stria terminalis, and the central nucleus of the amygdala, where norepinephrine stimulates CRF release" (see appendix VI: fig. 4.).

The regulatory processes involved in the control of this complex pathway must involve complex feedback mechanisms that allow for a wide degree of system dynamics, as the action of CRF in a closed loop system would ultimately be self-reinforcing. Koob (2001), proposes that that norepinephrine-CRF inter-reactions could constitute a finally tuned 'feed-forward' mechanism, where CRF released by the AN is in some way mediated by norepinephrine release from the LC. However, 'feed-forward' systems are inherently *astable*, tending to oscillatory entropy. Koob (2001, p. 245) writes: " … such a feed-forward mechanism in a fundamental brain-activating system may be particularly vulnerable to dysfunction and thus, may be the key to a variety of pathophysiological conditions involving abnormal responses to stressors…".

This data would suggest that prolonged stressors could, via the influence of CRF have a dysregulatory effect upon both the HPA and the autonomic nervous system, which are implicated in the CV pathological mechanism proposed by; Musselman (1998), Carney *et al*. (1999) and Carney, *et al*. (1988) (see section 4.3.).

4.1.2. ***The Glucocorticoids***

The classical physiological activities of the glucocorticoids upon the CV system are associated with sustaining CV integrity in states of emotional arousal/stress. The catabolic Glucocorticoids, particularly cortisol, produced by the adrenal cortex are known to sustain myocardial performance, facilitate the vasoconstrictive activities of the catecholamines and angiotensin II, decrease production of the intrinsic vasodilator prostaglandins, and reduce vascular endothelium permeability (Berne & Levy. 1998) (see appendix V: table 3. & fig. 3.).

In addition to these classical activities of the glucocorticoids, various pathways have implicated cortisol in the regulation of CV system dynamics mediated by the cardio-renal axis (CRA). De Matteo and May (1997, p. 1972) have concluded: "… that cortisol acts directly on the kidney to cause renal vasodilatation and to increase RBF [(renal blood flow)]". This influence is mediated by local endothelial production of the intrinsic vasorelaxing factor, nitric oxide. Increase in renal blood flow results in inhibition of the rennin/angiotensin system, causing a reduction of angiotensin

vasoconstrictor activity and ultimately a decrease in the production of the mineralocorticoid aldosterone.

Cortisol also facilitates the vasoconstrictive activity of circulatory angiotensin II (see appendix V: table 3), and as shown above, causes a reduction in angiotensin production. It could be hypothesised that cortisol mediates the regulation of angiotensin responsive activity in relation to circulatory angiotensin levels, where reduced circulatory levels correspond to a cortisol induced increase in angiotensin vasoconstricive response.

These mechanisms relate ultimately to CRF activity, as part of the HPA axis, and as a mediator of ANS activity. The drop in rennin production resulting from cortisol induced renal vasodilatation, could be compensated by the action of the sympathetic nervous system, which induces rennin activity (Berne & Levy 1998) (see appendix VII: fig. 5.).

The glucocorticoid action on the CRA regulatory mechanisms, mediated by CRF, are part of a complex control mechanism involving the ANS. The counteraction of glucocorticoid induced inhibition of the rennin/angiotensin system by both sympathetic ANS activity and the angiotensin agonist activity of the glucocorticoids, could constitute a homeostatic control mechanism that governs CV system dynamics. Disturbances in the HPA/ANS equilibrium, possibly mediated by the LC and the AN, could compromise the regulatory activity of these CRA mechanisms.

4.1.2.1. ***Glucocorticoids and the Autonomic Nervous System ~ Effects of Stressors***

Regulation of the glucocorticoids by CRF activity via the HPA, is associated with emotional responses, suggesting that glucocorticoid related CV activity must also be associated with emotional and cognitive behaviour. Yehuda, Teicher, Trestman, Levengood & Siever (1996) have recognised two patterns of cortisol response that deviate from the normal circadian variation:

- Sensitisation: hyper-responsive to stressors – adaptive, found in post-traumatic subjects.
- Dysregulation: hypo-responsive to stressors – insensitive, found in clinically depressed subjects.

The effects of these responses, seen in the light of the CRA regulatory mechanisms, could be expressed as destabilisation of the regulatory HPA/ANS equilibrium. Both HPA and ANS influence rennin/angiotensin activity, and disturbances in these hormones has been implicated in the development of CV illness (Volpe *et al.* 2002); (Purcell & Mulcahy. 1994).

In addition, disturbances in the *normal* CV catabolic activity of the glucocorticoids have been implicated by; Musselman *et al.* (1998) and Carney *et al.* (1998) in the pathological degenerative processes, which could predispose to CV illness.

These findings strongly suggest that the influence of the glucocorticoids on CV activity is intricately mediated by a multitude of endocrine and neurological regulatory feedback mechanisms. (see appendix VII: fig. 5.). Dysregulation of the intricate nature of these mechanisms, which would appear to be *tuned* by emotional and cognitive behaviour, can ultimately be implicated in CV illness aetiology.

4.2. The Autonomic Nervous System

The ANS is considered as being the swift short-term regulator of CV dynamics, and is according to Nielsen (1989) responsible for the *active stress response.* The classical physiological ANS regulatory control mechanisms are described in appendix I (table 1), and appendix II (fig. 1.). However, as discussed previously, the LC and the TS, under the influence of CRF, have a regulatory effect upon sympathetic and parasympathetic CV system regulation, intimately linking the ANS and CRF activity (see appendix VI: fig. 4.).

The activity of norepinephrine in the LC is principally related to ANS activity, as plasma norepinephrine concentrations primarily reflect its production by the sympathetic nerve terminals and not by the adrenal medulla (Musselman *et al.*1998). In addition, *in vivo* research has shown elevated sympathetic activity in clinically depressed subjects (Veith *et al.* 1994). This corresponds to the hypo-responsive cortisol regulatory patterns also found in clinically depressed subjects by; Yehuda *et al.* (1996), suggesting a correlation between HPA and ANS disturbances in depression.

These findings support the previously presented processes that link the HPA, mediated by CRF, and the sympathetic branch of the ANS, in response to emotional disturbance. The work of Dampney *et al.* (2002) has categorised the sympathetic CV control processes as being primarily activated by homeostatic feedback mechanisms. However, in addition to this they suggest that it is secondary 'feed forward' mechanisms that initiate changes in the CV *status quo*, and that these mechanisms are part of complex behavioural responses. This hypothesis could be related to the *astable* nature of the LC/AN interaction mediated by CRF activity, presented previously in section 4.1.1.4.

4.3. Cardiovascular Pathogenesis ~ a psychoneuroendocrinological understanding

Research into CV pathogenesis in PNE, has concluded that CV illness is intimately associated with psychological disturbances, especially depression, anxiety and psychosocial pressures. (Purcell & Mulcahy 1994); (Hemingway and Marmot 1999); (Kiecolt-Glaser *et al.* 2002). The passive stress response, which is characteristic of depression, (Nielsen 1989), is characterised by high HPA, and subsequently high CRF activity. Previously, in section 4.1.1.2., it was discussed how CRF influenced the activity of the LC by reducing sympathetic vasomotor activity, reducing parasympathetic vagal stimulation of the SA and AV nodes of the heart, and via the TS, inhibiting parasympathetic feedback from the circulatory baro- and chemoreceptors (see appendix VI: fig. 4.). In addition, there is reason to suppose that there is an *astable* reinforcing 'feed-forward' mechanism between the LC and the AN in response to stressors, which could be a potential source of HPA/ANS dysregulation. The CV pathological consequences of these activities are multi-factorial (see appendicies; VI: fig. 4. & VIII: fig. 6.), but there is a commonality in disease aetiology, characterised by disturbances/dysregulation of the mechanisms that mediate CV regulatory activity.

The implicated pathological processes have been identified by; Musselman *et al.* (1996); Musselman *et al.* (1998); Carney *et al.* (1995); Carney *et al.* (1988); Fuster *et al.* (1992) and Sloan *et al.* (1999). These authors discuss the following aspects in CV pathological mechanisms:

- Blood pressure & Heart rate -variability
- Ventricular instability
- Platelet reactivity
- Glucocorticoid induced pathology:
  - Increased circulatory cholesterol
  - Increased circulatory triglycerides

The data suggests that these factors can result in degenerative processes, which can ultimately cause CV illness, and that the mediating factors in the development of these degenerative processes are intimately related to disturbances in the HPA and ANS activity.

Heart rate variability (HRV) is a normal physiological compensatory process that regulates changes in CV hydrostatic dynamics (see appendix IX: table 4.). Reduced HRV is one of the mechanisms by which disturbances of ANS activity can contribute to a CV pathological scenario. The implication of decreased HRV in CV illness has been confirmed by; Krittayaphong *et al.* (1997) and Thornton & Hallas (1999). Clinical studies have showed that decreased HRV is an indicator of mortality in post MI patients (Krittayaphong *et al.* 1997). Furthermore, depressed patients with CV disease have

shown a reduction in HRV, which related to an increased risk of cardiac morbidity and mortality (Carney *et al.* 1988); (Carney *et al.* 1999); (Thornton *et al.* 1999.).

It has been previously suggested that the stress response (Nielsen 1989) could implicate the HPA and the ANS in CV disease pathogenesis. This hypothesis is supported by the findings of Sloan *et al.* (2001), who confirmed a reduction in HRV in subjects demonstrating hostility. The question then arises as to the nature of the pathological mechanisms by which ANS mediated reduction of HRV can result in CV illness.

Reduction of compensatory HRV activity reflects disturbances of autonomic regulation of the heart (Musselman *et al.* 1998) (see appendix IX: table 4.), which as presented, could be a result of LC activity upon cardiac vagal innervation. Reduced HRV causes an increase in blood pressure variability (BPV), as given by the formula in appendix IX: table 4. Changes in BPV could be further accentuated by LC inhibition of sympathetic vasomotor activity effecting arterial outflow (Q_r in the formula appendix IX: table 4), and arterial compliance (C_a in the formula appendix IX: table 4).

Sloan *et al.* (1999) describes how increased in BPV predisposes to damage the cardiac arterial endothelium, which is the first stage of plaque formation. If these processes occur as a result of HPA/ANS dysregulation, then under the influence of the subsequent elevated glucocorticoid activity, the blood chemical profile, with increased triglycerides and cholesterol would be a promoting factor in atheromatous plaque formation (see appendix X: fig. 7.).

A sequel to this scenario explaining acute ischaemic heart disease has been described by both Sloan *et al.* (1999) and Musselman *et al.* (1998). Sloan *et al.* (1999, p. 58) states that: “Damage to the fibrous cap [that covers the atherosclerotic plaque] exposes underlying plaque material to the lumen of the coronary artery, stimulating platelet aggregation and thrombus formation”. Increased platelet activity occurs under the influence of increased circulatory catecholamines (Musselman *et al.* 1996); (Musselman *et al.* 1998) (see appendix III: table 2), which is also characteristic of stress induced HPA/ANS dysregulation. Thrombus formation is one of the major factors in the development of ischaemic heart disease.

Yet another pathological mechanism related to the processes already mentioned, has been suggested by Lown *et al.* (1980). They propose that instability of the cardiac ventricular conduction system can occur due to disturbances in autonomic cardiac regulation. Ventricular fibrillation has been implicated as the mechanism, underlying sudden cardiac death, and is the most common cause of

fatality in patients with coronary artery disease Musselman *et al.* (1988). It is known that parasympathetic vagal activity imparts an anti-arrhythmic influence on the myocardium, and it has been shown that parasympathetic activity stabilises myocardial conduction, which is destabilised by increased adrenergic tone (Lown & Verrier 1976). Musselman *et al.* (1998, p. 584) also states that: "Psychological stress predisposes to abnormal ventricular activity by lowering the ventricular vulnerable period threshold even to the point of fibrillation". This activity can be explained by LC inhibition of parasympathetic cardiac vagal innervation seen in emotional disturbance, as discussed in section 4.1.1.2.

The present state of research into the relationships between psychological disturbance and CV disease has firmly established that disturbances correlating with the *passive stress response* described by; Nielsen (1989) are linked to CV disease morbidity. Much research has been carried out to examine the various mechanisms that could be responsible for these phenomena, and there appears to be substantiating evidence that implicate HPA and ANS activity. Mediated by negative emotional and cognitive responses, such as prolonged depression and anxiety, the finely tuned control mechanisms, which influence HPA/ANS interaction become dysregulated, resulting in disturbance of the CV system dynamics.

The physiological processes defined by a PNE understanding of CV illness are not new phenomena, it is the description of the mechanisms of interaction that propose a new understanding (see appendix VIII, fig. 6.). It would appear that the role of CRF, is central to this mechanism in its ability to cause the human state to resort to basic emotional instinct and basic physiological response in states of prolonged stress and anxiety (Pert 1997). It is the mechanisms that are implied in these responses that ultimately engender dysregulation of CV system activity, and result in pathological CV system changes (see appendix VIII, fig. 6.).

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5. *The Cardiovascular System ~ the western herbal medicine context*

The following text examines the *vitalistic* therapeutic understanding of CV illness evident in traditional WHM by examining the humoral and Physiomedicalist based approaches and the WHM *materia medica*.

5.1. Humoral Medicine

Within Humoral Medicine, the nature of man was described as being an expression of the four elements of ancient Greek philosophy. These elements were understood as qualities of nature and were described as being an expression of the *vital energy* (Fortune 2000). The temperament of an individual, related to the balance of the qualities of the elements, which dictated the humoral constitution. (Tobyn 1997). Disease, which was considered a natural phenomenon, was said to be the result of humoral imbalances, and treatment was aimed at addressing the expressions of the *vital energy* by correcting imbalances at the physical, constitutional and subsequently the temperamental levels (Chishti 1988).

Galen described the heart as bein gone of the principle organs, along with the liver and the brain (Gotfredsen 1973). Each of these organs related to a specific *faculty*, which is described by Chishti (1988) as being a power or a potentiality, and the origin of function. *The animal faculty* related to physical activity, and governed; mental, motor and sensory responses and was related to the brain and mental activity. *The Natural faculty* related to physical existence, governing nutrition and material composition and resided in the liver. *The vital faculty*, which can be understood as being the quality, which imparts life, was said to reside in the heart, the *sol corporis* (Culpeper 1995); (Tobyn 1997)

The concept of the life giving principle, the *spiritus vitalis,* or *principal pneuma* that related to the *vital faculty,* was fundamental to the teachings of humoral medicine. *Pneuma* was described as being disseminated throughout the body by the heart, and was to be felt in the pulse (Chishti 1988). According to Aristotle, the quality of *pneuma* was hot, and its physical manifestation was the *innate heat* of the body (Tobyn 1997). It was the expression of the heart, the *sol corporis,* mediated by the *spiritus vitalis* or *principal pneuma,* which generated the bodies *innate heat* and was the source of life. Culpeper writes: "… for as the Sun gives life, light and motion to the Creation, so doth the heart the body" (Culpeper 1995, p. 300).

The heart, as the source of the bodies *innate heat*, was also considered as being principally *hot* in nature. It was thought that the *innate heat* was tempered by a quality referred to as the bodies *radical moisture*, which was associated with the feminine principle and was imparted at conception (Tobyn 1997). The relationship between the *innate heat* and the *radical moisture* can be understood in terms of the heat being the animator and the moisture the animated. The balance of these two principles was seen as being fundamental in the preservation of health. Culpeper writes: "As the water moistens the Earth, that so it might not be burnt up by the scorching heat of the *Celestial Sun*, so the *Microcosmical Moon* adds moisture to the conception from the very beginning of the embrion, even to the utmost term of life. And this is what they call *radical moisture*…" (Culpeper cited by; Tobyn 1997, p. 79).

Maintaining a balance between the *innate heat* and the *radical moisture* was the dictate of health, and the measures employed in maintaining this state were prescribed within an holistic framework. (Chishti 1988). Chishti writes: "…the emotional/psychological aspects of health and disease are considered holistically, as part of the entire person. For example, severe anger is believed to be the result of an excess of moisture in the heart humour…" (Chishti 1988, p. 30).

The ancient physicians also described the heart as being the seat of the emotions, Tobyn (1997, p. 84) writes: "Fear and terror… were said to confine the spirit [(*spiritus vitalis*)] inwards, as do other feelings of discontent, such as sorrow, grief and care… Gloom or mental depression was reckoned to maintain a prolonged and gradual contraction of the heart". Complimentary to this,: "an active *vital force* would be one that causes the heart and the arteries to dilate" (Chishti 1988, p. 30).

Hildegard of Bingen poetically summarised the ancient understanding of the role of the heart, when she wrote: "If the reason within a mans soul never senses grief, obstinance or malice, will his heart turn towards joy, like a flower that turns towards the rays of the sun… By being joyous, over what is a mans delight, will the feeling of joy radiate from his spine reach his loins and fill his spleen breathing into its vessels. Later, the heart and the liver will recieve the joy"[18] (Ladefoged. 1997 p. 167).

The central tenet of Humoral Medicine was the theory of the four *humours* or 'fluids', described in the *Corpus Hippocraticum*[19], a collection of works attributed to Hippocrates. Based upon the four elements (see appendix XI: table 5.), the humours; *yellow bile (cholos), phlegm (phlegma), blood*

[18] The citation is this authors translation.

(sanguis) and *black bile (melas cholos)*, are described as being the primary constituents of the body (Tobyn 1997). Galen, later related the humours to the doctrine of the four temperaments*: Choleric, Phlegmatic, sanguine and Melancholic* (Jung 1971) (see appendix XI: table 5.). This doctrine is based upon how the humoral balance expresses itself within the individual, both physically and emotionally. Tobyn (1997, p. 46) writes. "The determination of the complexion or temperament of a human being meant a comprehension of the basic nature of that person, their physique, character, personality and their physiological make-up".

The descriptions of pathological states in Humoral Medicine, are explanations of how intrinsic and extrinsic factors can cause disturbance (*dyscrasia*) of the normal temperament (*eucrasia*) of a specific organ, or the entire organism. According to humoral principles, conditions effecting one of the principle organs, of which the heart is one, would always result in the expression of the disturbance throughout the entire organism (Tobyn 1997).

Afflictions of the heart were especially associated with the cold and dry quality of the *Melancholic* temperament, which is characterised by negative emotion such as anxiety and pessimism, (see appendix XI: table 5). The *Melancholic dyscrasia* effected the balance of the *innate heat* and the *radical moisture* by effecting a cooling and drying influence. The effect of prolonged negative states caused contraction of the heart, which concentrated the innate heat, drying up the radical moisture. As the *radical moisture* was considered necessary for the perpetuation of the *innate heat*, the net result would be a gradual cooling and drying, reducing the expression of the *spiritus vitalis* (Tobyn 1997); (Chishti 1988). Tobyn (1997) writes: "…a heart so compressed by heaviness is a heart whose vital force is contracted and whose faculty is depressed".

5.1.1. ***Modern interpretation of the humoral principles***

Interest in humoral constitutional understanding has continued in some aspects of sociology and psychology up until the present day. It is principally in the work of Jung[20], Eysenck[21], Stiener[22] and Kant[23] that we see direct references to the humoral understanding of temperament.

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[19] It is generally thought that the *Corpus Hippocraticum* contains contributions from students and scholars from both Kos and Cnidus.

[20] Carl Gustav Jung, Student of Sigmund Freud. Established the practice of Analytical Psychology (1875-1961 C. E.)

[21] Hans Jürgen Eysenck, Professor of Psychology at London University (born 1916 C.E)

[22] Rudolf Steiner, Austrian philosopher, Established the Anthroposophic movement (1861-1925)

[23] Immanuel Kant, German Philosopher, Professor of Philosophy at Königsberg University (1724-1804)

Eysenck described the characteristic psychological aspects, which are associated with the humoral teachings of the four temperaments. In describing the *Melancholic* temperament, Eysenck states: "They discover everywhere cause for anxiety and notice first of all the difficulties in a situation… Interaction with others makes… [them] worried, suspicious, and thoughtful. It is for this reason that happiness escapes… [them]" (Eysenck1980, p. 56).

Similarly, Stiener (1984) interpreting the *vitalistic* aspects of the humoral system, described how the *Melancholic* temperament was characterised by disharmony between the physical body and the universal energy (or *vital principle*) which animated it. Stiener also described how this would result in a tendency to dwell in negative emotion, and how the physical expression of this disharmony would presented itself as disturbances in the nervous and endocrine systems (Stiener 1984).

5.2. ***Physiomedicalism and Contemporary Western Herbal Medicine Practice***

The basic underlying doctrines of the Physiomedicalist, or the *Thomsonian* approach, also included the concepts of *vital energy* and heat. Expressing his ideology, Thomson wrote: "I found that animal bodies were formed of four elements. The Earth and Water constitute the solid; and the Air and Fire (or heat) are the cause of life and motion; that the cold or the lessening of the heat, is the cause of all disease; that to restore heat to its natural state was the only way health could be produced…" (Thomson cited by; Mills 1991, p. 155). This basic therapeutic strategy formed the focus of early Physiomedicalist therapeutics, and its correspondence with Humoral Medicine is clearly apparent in the understanding of heat being a mediator of health. This idea is concisely summarised in another of Thomsons statements regards therapeutic intervention: "Feed the fuel that continues the fire or life of man, maintain the internal heat…" (Thomson cited by; Lloyd & Lloyd 1907, p. 18) a statement which could easily have been written by Hippocrates in the 4th Century B.C.E.

Explicating the Physiomedicalist therapeutic philosophy, Priest & Priest (1983), say that it: "…is a product of the vitalistic philosophy which regards the 'vital force' as controlling the organism…[and that] health and disease are… the aggregate expression of this vital force…" (Priest & Priest 1983, p. 1). The philosophical tenet of *vitalism* necessitates an acceptance of the concept of a *Soul*, or *animating principle*, the German vitalist Georg Stahl[24] described the *vital force* as being the vehicle through which the soul expressed itself in the body. (Køppe 1990). Watkins and Lewith

(1997, p. 29) write: "The vitalists believed in a *vital energy*, and asserted that illness was the result of a disruption in the *vital* or *spiritual force*". The following is a quotation from the Physiomedicalist inspired herbal text written by Priest & Priest (1983, p. 1).

> "*The manifestation of health and disease are considered as the aggregate expression of this vital force as it endeavours to maintain the functional integrity of the organism.*
> *It is implicit in the modern concept of 'vital force' that the term implies (a) a directive intelligence, and (b) a principle of energy, governing and activating the living organism. It is also implicit that all functional operations are the result of the vital force acting through cellular functions, and that imperfect response at the cell level is the result of internal or external obstructions or restrictions".*

Implicit in the *vitalistic* understanding of disease processes within Physiomedicalis, is the influence of the personality. The degree in which the psychosomatic influence acts to obstruct or restrict the expression of the *vital force* determines the outcome of the treatment. Priest & Priest (1983, p. 3) write: "The limit of treatment is restoration to a state of relative functional equilibrium and optimum trophic state, subject to the tendencies and predisposition of the physiological and temperamental typology".

A development of Physiomedicalist principles also included the concept of polarity, which was expressed as *contraction* and *relaxation*. This concept was applied to the physiological state of the organs, as well as to the activities of herbal remedies (Mills 1991). The vital expression within an organ, or physiological system, was seen as alternating between these two states, and disease was understood as being an imbalance in the normal alternating rhythm, which acted to restricted the vital expression (Colby 1846). Treatment therefore, was aimed at identifying the nature of the imbalance and applying remedies, which corrected it (Priest & Priest 1983).

The basic tenet of Physiomedicalist practice has maintained its integrity within Herbal Medicine, although in the spirit of eclecticism, the practice has been constantly developed by supplementing the basic approach with the new findings from biomedicine (Mills 1991). By applying these findings to the established *vitalistic* understanding, Physiomedicalist influenced Herbal Medicine has developed a unique way of understanding health and disease processes. The result is a heterogeneous system of medicine that approaches the treatment of illness from a *semi-rational mind-body* perspective.

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[24] Georg Ernst Stahl, German Chemist, Doctor and Philosopher (1660-1734)

5.2.1. ***Influential Development in Physiomedicalist Understanding of the Cardiovascular System***

Two herbalists who had a large influence on the practice of WHM, were Dr. Wooster Beach[25] and William Cook. Dr. Beach developed the therapeutic strategy of 'equalising the circulation'" (Holmes 1997). This approach to the treatment of CV illness describes the circulatory system as being comprised of the four compartments; Cardiac, Arterial, Capillary and Venous (see appendix XII: fig. 8.). The disturbance of CV activity was understood as being related to an *imbalance* in the system activity relating to one of the four compartments. Therapeutic measures were aimed at restoring the *trophic* state of the system after identifying the origin of the disturbance and the local state of *contraction* or *relaxation* (Priest & Priest 1983).

Of particular interest to the theme of this dissertation, is the work of William Cook and Joseph Thursten. In the 1870's C.E. Cook developed further the Physiomedicalist theories of polarity and circulatory balance, and correlated them with the activity of the nervous system (Holmes 1997). Joseph Thursten extended this theory in the 1890's C.E., associating the influence of the ANS upon the circulatory system balance (Holmes 1997).

5.2.1.1. ***Nervous System equilibrium***

Organ and physiological system activity was assessed in terms of the state of *contraction* and/or *relaxation*. Cook related this state to nervous system activity. *Contraction* was understood as being associated to hyperfunction and *relaxation* to hypofunction. "… it follows that symptoms of over-sensitivity, excitement, irritability etc., represent the state of nerve 'contraction', while those of an opposite state of function represent nerve 'relaxation" (Priest & Priest 1983, p. 28). Within this context, nervous system *hyperfunction* related to states of excitement, whilst nervous system *hypofunction* related to the moribund condition.

The developments of Thursten, related the concept of *contraction* and *relaxation* to the balance of sympathetic/parasympathetic innervation. ANS activity was described as dictating the *trophic* state of an organ and/or physiological system activity. This was understood as being a function of autonomic innervation of the organ or system, and the autonomic control of blood supply to the organ or system. Within this context, the application of therapeutic measures was aimed at effecting the ANS innervation in order to correct the balance of *contraction* and *relaxation.* The aetiological consequence of this approach is expressed by Priest & Priest (1983, p. 30): "… in long term

[25] Wooster Beach, Herbalist, Homoeopath and qualified Medical Doctor (1794-1868)

sympatheticotonia (e.g. anxiety states) the trophic condition of the vegative organs suffers from chronic vaso-constriction".

The effect of cognitive behaviour and emotional states was also placed within this same context. Psychosomatic conditions were seen as being related to organ and physiological system disturbances, and were understood as being mediated by ANS imbalance. The practical therapeutic implications of this understanding are clearly demonstrated in the writings of (Priest & Priest 1983, p. 34-35): "Sympatheticotonia mainly arises on a background of chronic fear and anxiety, but also from prolonged anger…Typical symptoms are…Cardiac: functional tachycardia and increased blood pressure".

The therapeutic aspects of this understanding, relating to cardiac illness and emotional states can also be seen in the writings of the Herbalist Thomas Rolla[26]. Writing in 1907, Rolla ascribed a whole chapter of his book: 'The Eclectic Practice of Medicine', to conditions which he termed neuroses of the heart (Rolla 1907). Here, Rolla describes the cardiac symptoms; tachycardia, bradycardia, arrhythmia and palpitations, and explains possible CV conditions, which could present with these specific symptoms. However, in each case Rolla prescribes emotional support or rest as the major strategy in treatment. Similarly, Ellingwood writing in 1911 states: "In the treatment of Angina Pectoris the patient should be kept in bed… and mental rest should be considered… [along with] freedom from anxiety and worry…" (Ellingwood 1911, p. 182). Although these examples of Physiomedicalist practice can be rationalised in the therapeutic terms of ANS imbalance, at the time of writing, the biomedical concept of the ANS was in its infancy[27], suggesting an after-rationalisation of empirical therapeutic understanding.

5.3. ***Cardiovascular system Herbal remedies***

The following text is a discussion of the functional application of some of the most often used remedies that are, and have been, used in contemporary and traditional WHM in the treatment of CV illness. The discussion is based upon the citations presented in appendix XIII: tables; 6a, 6b & 6c, which are taken from standard reference texts on herbal *materia medica* representing the traditions of Humoral Medicine and Physiomedicalist influenced contemporary WHM. The

[26] Thomas L. Rolla. American Eclectic Physician. Professor of the Eclectic Medical Institute 1887 – *s.t.*

[27] The first publication describing fully the autonomic nervous system was written by John Newport Langley and published in 1921.

citations give examples of how CV system herbal remedies are, and have been understood in the context of emotional behaviour and nervous system activity.

***Anemone pulsatilla* L.**

The herb is described by Priest & Priest as been indicated in functional neuroses associated with heart conditions (Priest & Priest 1983). This relates the application of the herb to conditions of the nervous system. Felter, writing in 1922 C.E., ascribes the activities of the remedy to its strengthening action upon the sympathetic and cerebral functions. In Physiomedicalist terminology the remedy exerts a *contracting* influence upon the nervous system (*ibid.*) and is therefore applied in states of *over-relaxation*, which relate to *stressed* parasympathetic function (Priest & Priest 1983). Imbalances in ANS function due to *stressed* function are representative of psychosomatic syndromes (Priest & Priest 1983).

***Avena sativa* L.**

The position of this herb in Physiomedicalist therapeutics is as a stimulating relaxant and it can therefore be understood as having an application in states of *over-contraction*, which relate to sympatheticotonia associated with chronic fear and anxiety (*ibid.*). Moore (*s.t.*) describes the activity of the remedy in *adrenergic burnout* and its indication as a *cardiac tonic*, relating compromised adrenal activity with heightened sympathetic activity and cardiac function.

***Borago officinalis* L.**

According to Culpeper (*s.t.*), the temperament of *Borago officinalis* is hot and moist and it is considered as being a remedy that can *comfort the heart.* The Humoral Medical understanding of this application can be understood in terms of the remedies allopathic position in relation to the cold and dry *Melancholic* temperament. In therapeutic applications the remedy counteracts the *Melancholic* predilection to anxiety and worry and its association with conditions effecting the heart (*ibid.*)

***Convallaria majalis* L.**

Felter's description of this remedy's application in conditions disturbing the myocardial capillary resistance (Felter 1922) is associated with the theory of *circulatory equilibrium* developed by Dr Beach (*ibid.*). Increased capillary resistance constitutes an *over-contracted* state (Priest & Priest 1983) which occurs as a result of sympatheticotonia and is associated with anxiety (*ibid.*). Ellingwood (1919) describes the activity of *Convallaria majalis* in terms of exhaustion of the parasympathetic *pnuemogastric* nerves. Combining these two explanations suggests an activity of

the remedy in conditions relating to *over-contraction* due to sympatheticotonia resulting from an imbalance in the ANS that shifts CV system activity towards a sympathetic innervated state.

***Crataegus oxyacanthoides* Thuill.**

Despite the current popularity of *Crataegus oxyacanthoides*, the remedy was not widely used in WHM before the end of the 19th century C.E. (Hedley 2000). Physiomedicalist tradition describes the remedy as being indicated in conditions of cardiac depression associated with nervous conditions and depression (Felter 1922). Moore describes the specific application of the herb in conditions of hypertension, which are 'sympathetic-related' (Moore *s.t.*). These descriptions correspond with *over-contracted* states of sympatheticotonia, which relate to fear and anxiety (*ibid.*).

***Leonurus cardiaca* L.**

According to humoral principles, the remedial action of *Leonurus cardiaca* is effective in *Melancholic* conditions (Culpeper 1995). The *Melancholic* temperament is characterised by negative emotion and is described as having a cold and dry nature, which is associated with conditions effecting the heart (*ibid.*). *Leonurus cardiaca* is described as being hot and moist in nature (Tobyn, 1997) and therefore has an allopathic position in relation to the *Melancholic* temperament.

The Physiomedicalist tradition describes the remedy as being: "Indicated for reflex conditions effecting cardiac function [and] cardiac and vegetative neuroses" (Priest & Priest 1983, p. 90-91). The term 'Reflex conditions' describes states in which there is activation of sympathetic innervation in response to *protective* conditioning and adaptation (Priest & Priest 1983). The indication for *Leonurus cardiaca* is therefore; application in conditions of heightened sympathetic arousal effecting cardiac activity, due to nervous emotional responses.

***Melissa officinalis* L.**

Humoral Medicine describes *Melissa officinalis* as having a hot and dry quality, which would suggest its supportive action upon the heart, which is also considered as having a hot and dry temperament (Tobyn 2001). The remedy is described as being effective against melancholy. However, Culpeper states that the remedy: "expels those melancholy vapours from the spirits and blood which are in the heart and arteries, although it cannot do so in other parts of the body" (Culpeper 1995, p. 22). This specific CV system activity can be understood as relating to the unique effect of the hot and dry quality of the remedy, which is supportive to the temperamental constitution of the heart.

***Selenicerus grandiflorus* (L.) Britt. & Rose**

This remedy is specific to the Physiomedicalist tradition and is regarded as being a cardiac tonic (Priest & Priest 1983). It is described as having an effect upon the sympathetic nervous system, where it said to *impresses*, or stimulate sympathetic activity (Felter 1922). Ellingwood (1919), describes this activity as being due to stimulation of the vaso- and spinal motor centres, which relates to sympathetic nervous system activity (see appendix II, fig. 1.). Similar to *Anemone pulsatilla* mentioned previously, the remedy exerts a *contracting* influence, corresponding to sympathetic autonomic activity, and can be applied in states of *over-relaxation* (*ibid.*), relating to *stressed* parasympathetic function which is representative of psychosomatic syndromes (Priest & Priest 1983).

Tilia spp.

References to this herb in older traditional herbal texts could be described as being extremely lean. However, Culpeper (*s.t.*) describes the herb as being a nervine having an indication in palpitations of the heart. Contemporary texts describe the remedy as being indicated in conditions of nervous tension, arteriosclerosis and heart conditions (BHMA 1983); (McIntyre 1994); (Brooke1992).

***Veratrum viride* Aiton**

This is another remedy particular to the Physiomedicalist tradition. It is described as being a powerful circulatory depressant (Felter 1922), and is discussed in the treatment of cerebral hyperaemia and an *irritable heart* (Leyel 1994); (Moore *s.t.*). The descriptions of the application of this remedy suggest states of sympatheticotonia. This is supported by the *graphic* description of the remedies therapeutic indications by Moore (*s.t.*) who writes: “bounding pulse, sufficient to cause the person discomfort lying on stomach, and sufficient to interfere with sleep; ‘brain fever’ as might be described in an Edgar Allen Poe diatribe…”

In Physiomedicalist terminology, the application of this remedy is indicated in conditions of over contraction, relating to sympatheticotonia and anxiety states (*ibid.*).

***Viscum album* L.**

According to Culpeper, the temperament of *Viscum album* is hot and dry (Culpeper 1995) and he describes the herb as being a cephalic nervine (Culpeper *s.t.*). The hot and dry temperament of the remedy places it in the same category as *Melissa officinalis*, as being a supportive heart remedy.

In more recent texts written in the 20th century C.E., the herb is most often described as a nervous system remedy, being indicated in conditions relating to nervous debility and weakened nervous activity (BHMA 1983); (Leyel 1994).

5.4. The Western Herbal Medicine Context ~ a commentary

Humoral Medicine presents a clearly defined system where aetiological understanding is directly related to the application of herbal remedies. The concept of temperament, which is used to describe health, illness, the activity of herbal remedies and subsequently treatment, was central in defining the humoral basis of the therapeutic strategy. The application of remedies was aimed at restoring the normal temperament (*eucrasia*) to the effected organ, and subsequently to the entire organism. To effect a cure, remedies were applied which had an allopathic relationship towards the nature of the temperamental disturbance (*dyscrasia*) (Tobyn 1997). The heart was understood as being particularly susceptible to affliction by negative emotion, due to the antithesis of the temperament of negative emotion in relation to the *eucrasia* of the heart. This aspect intimately related conditions effecting the heart to emotional states (*ibid.*).

Within the Humoral Medicine *materia medica*, the description of the temperament of herbal remedies was also supplemented by detailed descriptions expounding the specific nature of the remedies. These descriptions were adjuncts to the temperamental alignment of the remedy, and were written in a poetic descriptive language that conveys the particular character of the remedy (see appendix XIII: tables; 6a, 6b & 6c). Seen in a modern context, these descriptions could be considered as being abstractions. However, the context in which they were written does not aim at abstraction, these descriptions should be understood as epitomes of the nature of the remedy seen in the contextual understanding that characterises Humoral Medicine.

Physiomedicalist understanding presents a *semi-rational* framework in which to describe the illness and the activities of herbal remedies. Examination of the descriptions of herbal remedies within Physiomedicalism facilitates a clear definition of the understanding that is implicit within the principles defining practice. Incorporating descriptions of physiological states in terms of *contraction* and *relaxation*, and relating this to the activity of the ANS within a *vitalistic* context, the influence of emotional activity upon CV system activity is implied. This influence is elucidated within the description of the activities of the herbal remedies, which when placed in the context of Physiomedicalist understanding, reveal the intricacy of the aetiological concepts that are inherent in the Physiomedicalist approach to CV illness.

Within the models of the human condition proposed by both Humoral Medicine and Physiomedicalist inspired WHM there can be found concepts, which associate emotional conditions with CV system activity. This relationship is *explicit* within traditional Humoral Medicine, where

there are clearly defined aspects relating the heart to cognitive and emotional behaviour. However, within Physiomedicalism, the CV system/emotion relationship is *implicit* in the functional explanations of this system. Characteristic to both approaches is an inherent *vitalistic* understanding, which facilitates an *holistic* aetiological understanding, implicating many aspects of the human condition in a therapeutic approach (*ibid.*).

Assuming contemporary WHM practice rests upon the understanding established within Humoral Medicine and Physiomedicalism (*ibid.*), Then the principle foundation of the contemporary WHM understanding of CV system treatment, should be seen to relate to Humoral Medicine and Physiomedicalist understanding.

The principles underlying the therapeutic *rationale* in contemporary WHM have been described as: "…[The] application of the therapeutic effects of plant materials within an holistic context" (Eldin & Dunford 1999). The concept of *holism* infers an *anti-reductionist* position (Lübcke 1995) which is characteristic of a *vitalistic* understanding (Køppe 1993). The origin of the v*italistic* influence within contemporary WHM has previously been described as having its origin within Humoral Medicine and Physiomedicalism (*ibid.*). And, as explained in section 3. The *holistic* approach is paramount to understanding to CV illness in a multi-aetiological context.

The empirical basis of CV system treatment within WHM is clearly apparent within the descriptions of the herbal *materia medica*. Developing principally out of Physiomedicalist practice the contemporary WHM *materia medica* has also been influenced by some of the later Humoral Medicine based herbals (Holmes 1997); (Mills 1991). The British Herbal Pharmacopoeia (BHP) published by the British Herbal Medicines Association in 1983, is considered to be representative of the contemporary WHM understanding of the herbal *materia medica*. The Pharmacopoeia is a reference work based upon empirical use and specialist research (Griggs 1997). A comparison between the descriptions presented in the BHP and traditional herbal texts shows a high degree of similarity in the application of herbal remedies (see appendix XIII: tables; 6a, 6b, 6c), defining a parallel between traditional and contemporary practice.

The conceptual understanding evident in the therapeutic philosophy of WHM can be seen to relate CV system function with emotional states and behaviour. Within the empirical basis of contemporary practice, defined by Humoral Medicine and Physiomedicalism, there is a functional understanding that clearly defines this relationship in terms of a *holistic* and *vitalistic* therapeutic approach. The application of herbal remedies is placed within a framework that prescribes an assessment of the constitutional basis of disease aetiology and an understanding of the subtle

characteristics of the remedies used in treatment. The result is an ideology that presents an elegant framework in which CV system illness can be related to *multi-system* functional imbalances (*ibid*.).

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6. Assessing the Conceptual Commonality of the Biomedical and Western Herbal Medicine ~ a discussion

The following text presents an assessment and comparison of the concepts presented within WHM defined by Humoral Medicine and Physiomedicalism, and the biomedical approach of PNE. By defining the basis of the principles used in the exposition, the framework within which the comparison is made is clearly outlined. The presented concepts are then discussed in a comparative narrative, which highlights those aspects common to both approaches.

6.1. Defining the basis of the discussion

A comparative description of the biomedical models of CV illness and the understanding within empirically based WHM can be approached at many levels. The terminology utilised in some of the descriptions can facilitate a direct comparison of physiological understanding, whilst in other areas the diversity of the context allows for only an ideological comparison.

The language of Humoral Medicine and Biomedicine are in many ways incomparable, regards the descriptive understanding employed, although the general observation that the CV system is intimately related to the emotional state is common to both approaches.

Contemporary WHM uses a terminology, which can relate to both Humoral Medicine and the biomedical understanding. Having a fundamental philosophy not far removed from Humoral Medicine (*ibid.*), developments in Physiomedicalist understanding have incorporated some aspects of the biomedical approach facilitating a more descriptive comparison.

It is important to stress that the aim of this dissertation is to investigate *common elements of understanding* that are revealed by *facts of observation* defined within the contexts that are specific to biomedicine and contemporary WHM. This does not necessarily imply finding direct correspondences in understanding, but highlighting common themes and ideas in the systems examined. The objectivity of such a comparative analysis should therefore strive to transcend the context in which the related themes and ideas are anchored. It is therefore necessary to have a clear and unbiased understanding of the context in which any terminology is applied. The following discussion approaches this problem by a comparison of the concepts presented in relation to their level of abstraction. Examination of the more abstract concepts of understanding are presented prior to those constituting a broader and more intricate basis for a comparative discussion.

6.2. Aspects of conceptual commonality

Examining the descriptions of the CV herbal *materia medica* in both Physiomedicalism and Humoral Medicine, many of the remedies discussed are described in terms relating them to CV and nervous system activity. The actions of these remedies upon the nervous system is generally expressed as being indicated in conditions relating to; nervousness, exhaustion, depression & gloom (see appendix XIII: tables; 6a, 6b & 6c). These conditions correspond with the states that are implied in the development of CV illness proposed within the context of PNE. The empirical basis of application of herbal remedies displays an understanding that relates CV illness to negative emotional states.

Humoral Medicine describes how gloom and mental depression, characterised by the *Melancholic* temperament, could influence CV activity due to its temperamental antithesis to the constitution of the heart (*ibid.*). This conceptual approach reveals an understanding of how disturbances of the heart can be mediated by emotional states and ultimately effect the fundamental aspect of the human condition.

Within PNE, there is also the conceptual understanding that emotional states are mediators of CV activity and can be implicated in CV pathology. The neuroendocrinological pathways that constitute this understanding are described as having an *adaptive ability,* which is established during childhood and defines the threshold beyond which normal mediation cannot be maintained and pathological responses occur (see section 4.1.1.3.).

Implicit in the Humoral Medicine explanation of disease, is the concept that the temperamental constitution of the individual is a pre-disposing factor to the development of specific maladies (*ibid.*). The *Melancholic* temperament, described as tending to anxiety, worry and suspicion (Eysenck 1980), is associated with conditions of the heart (*ibid.*). Modern PNE research suggests that the neuroendocrinological pathways that define the level of *adaptive ability*, which could be seen to correspond with temperament, are conditioned by negative emotional states experienced during childhood (Goleman 1995). Furthermore, the characteristic nature of individuals who are exposed to negative emotional states during childhood is characterised by depression, anxiety and worry (Pert 1997).

This comparison shows a common fundamental understanding of how the inherent temperament or psychological state of the individual can be a pre-disposing factor in the development of diseases of the heart. In both PNE and Humoral Medicine, there is a recognition that the principle temperament

or psychological state that is related to CV disturbance is that of the depressive, anxious and worrying *Melancholic*.

Within the more recent interpretations of the humoral principles (see section 5.1.1.) Steiner, writing in 1909, makes a striking observation, in which he relates the *Melancholic* temperament to disturbances in the nervous and endocrine systems (Steiner 1984). Seen in the light of the biomedical understanding of the nervous and endocrine systems during this time it is difficult to comprehend the level of insight that is inherent in this proposal. However, as is shown previously, the observation is an accurate description of the areas of physiological disturbances that are related to negative expression within PNE.

Physiomedicalist understanding associates the concepts of *contraction* and *relaxation* with the activity of the ANS. A summary of these principles, interpolated from descriptions of herbal remedy activity (see section 5.3.), is summarised in appendix XIV: fig. 9. This *semi-rational* ideology was initially developed towards the end of the 19th and beginning of the 20th century C.E. (see sections 5.2.1. & 5.4.), and as such should be considered as being a revolutionary concept when placed in its conceptual timeframe.

In relation to an understanding of the *circulatory equilibrium*, the concept of *contraction* and *relaxation* explains how CV system disturbances, expressed at the level of the vascular system, can by implicated in the development of conditions effecting the heart (see appendix XII: fig. 8.). Contraction at the vascular level is considered to stress cardiac function (Priest & Priest 1983), and is associated with sympathetic activity. Within the concepts proposed by PNE, stress is described as influencing sympathetic vasomotor activity and is one of the mechanisms implicated in CV illness aetiology (see appendix VI: fig. 4. & VII: fig. 5.). The description of the herbal remedy *Convallaria majalis* within Physiomedicalism, explains the activity of the remedy in states of vascular *over-contraction*, where its action is to correct sympathetic ANS imbalance (see section 5.3.). There is a clear common understanding of how ANS imbalance can effect vascular activity, and how this can be related to CV illness.

The Physiomedicalist concept of *contraction* and *relaxation* can also be related to the PNE understanding of the *active* and *passive stress responses* proposed by Nielsen (1989) (see section 4.1.). The *active stress response* is characterised by enhanced sympathetic activity which, with prolonged exposure to stressors, resolves to the state of the *passive stress response* (*ibid.*). Within Physiomedicalist understanding, it is proposed that states of prolonged *over-contraction*, corresponding to sympathetic activity (see appendix XIV: fig. 9.), eventually result in exhaustion of

the physiological mechanisms and a *hypofunctional* state corresponding to *over-relaxation* (Priest & Priest 1983). Parallels in these two approaches can be drawn in terms of the polarity of adaptive responses, involvement of sympathetic activity and the concept that relates protracted activity to a shift in response.

The passive stress response described in PNE is characterised by high activity of the HPA system and enhanced CRF activity (see section 4.1.). CRF has been described as a regulator of ANS activity and via its interaction with the LC and AN, effects a reduction in sympathetic innervation. This can be seen as corresponding with the physiological exhaustion relating to *over-relaxation* described in the Physiomedicalist approach (appendix XIV: fig. 9.), in which system activity resorts to passive vegetative state (Priest & Priest 1983).

This conceptual comparison can also be moved into the descriptive understanding of CV activity presented in the context of Physiomedicalist and PNE understanding. In terms of the application of the Physiomedicalist *materia medica*, the concept elucidates an understanding of the effects of the ANS upon CV system function, and its relation to emotional conditions.

States of *over-contraction* relate to sympathetic activity and correspond with the active stress response described in PNE. Physiomedicalist understanding associates the state of *over-contraction* with *Reflex conditions* of protective adaptation and conditioning (Priest & Priest 1983). The CV system herbal remedies indicated under these conditions are *tonic* remedies that support cardiac activity, reduce vascular sympathetic innervation and *depress* the state of an *irritable heart* (see section 5.3: *A. sativa, C. majalis, V. viride*). The PNE concept of the *active stress response* is also considered as being a normal adaptive response. However, protraction of exposure to the factors that initiate this response ultimately causes the system to revert to the *passive stress response*, which is implicated in HPA/ANS dysregulation and subsequently CV illness (*ibid.*). In view of the PNE understanding, the Physiomedicalist therapeutic strategy dictated in states of *over-contraction* can be seen to be an appropriate measure in supporting the physiological system and subduing the nature of the response.

Psychosomatic syndromes are related to *over-relaxation* and are described as being caused by *stressed parasympathetic function,* which infers a lack of sufficient sympathetic balance (Priest & Priest 1983). Within Physiomedicalism, the state of *over-relaxation* relates to the *hypofunction* of a physiological system or organ (*ibid.*). Within the PNE understanding of the CV system, negative psychological influences are described as primarily inhibiting sympathetic innervation (see section 4.1.1.2.), which could be understood as relating to the *stressed parasympathetic function* described

in the Physiomedicalist ideology. PNE understanding also describes how disturbances in ANS innervation reduces cardiac dynamics, and due to a reduction in responsive HRV is related to CV illness (see section 4.3, appendix VII: fig. 6. & appendix IX table 4.). It could be further considered that reduced HRV could be seen to correspond with the description of system *hypofunction* within Physiomedicalist understanding.

The herbal remedies, which are applied in conditions of *stressed parasympathetic function*, are described as regulating the action of the heart, giving a better character to the pulse rate and being indicated in conditions of bradycardia (see appendix XIII: tables; 6a & 6c: *A. pulsatilla* & *S. grandiflorus*,). The observations presented here can be understood in the context of decreased HRV, and describe the effect of enhancing sympathetic activity.

6.3. Aspects of conceptual commonality ~ a Commentary

The modern biomedical understanding within PNE has arrived at a position where a *vitalist* framework is beginning to dictate a new evaluation of physiological and psychological understanding (Watkins 1997). This constitutes a return by biomedicine, to the contextual position that forms the basis of understanding within the empirical concepts of WHM. It could be assumed therefore, that the *vitalistic* context in which aetiological understanding is placed, constitute the major factor in dictating the recognition of a *mind-body* multi-sytem therapeutic approach.

The context within which the relative concepts are expounded is in some ways a limiting factor in identifying those aspects, which could constitute a direct parallel in the approaches discussed. The developments within biomedicine during the last 150 years have established a new language, which has its basis within the *reductionist* epistemology. Despite the *vitalistic* context in which modern PNE research is placed, the language used is still ultimately that of *reductionist* based science. The descriptive concepts that form the basis of the empirical understanding within WHM, have not been imposed the limitation of having to refer conceptual understanding to a *reductionist* basis. This has permitted the use of abstraction in conveying ideologies relating to the human condition.

In assessing the information presented, it becomes apparent that contemporary WHM (as defined in section 2.3.2.), reveals a conceptual understanding which in many aspects can be seen to correspond with modern PNE descriptions of CV system mediation and the aetiology of CV illness. The level of the conceptual commonality ranges from observational facts, to correlations in the understanding of system dynamics and aetiological mechanisms.

It is necessary to be aware of the timeframe that divides the developments of the concepts presented, in order to appreciate the relevance of a convergence of understanding.

The commonality in the concepts presented represents the *facts of observation* of the human condition that have been recognised throughout history. These concepts have been incorporated into medical understanding since the time of the ancient Greek culture, the epoch that marks the beginning of written western medical understanding (Gotfredsen 1973).

◆

7. Conclusion

The traditions within WHM represent a *vitalistic* therapeutic approach, which has its basis in empirical therapeutic understanding. The information presented illustrates that historically, the fundamental concepts that underpin contemporary WHM are embodied in the descriptions of Humoral Medicine and Physiomedicalist inspired practice.

Analysing these two therapeutic approaches, in the context of a comparison with biomedical understanding reveals the intricacy in which the relatively abstract descriptions found within these approaches demonstrate a consummate understanding of health, disease and therapeutic practice. The ideological frameworks, that are inherent within Humoral Medicine and Physiomedicalism prescribe an understanding of the relationship between CV illness and the emotional state, which can be seen to correspond with the theoretical concepts proposed by a PNE understanding.

The descriptions and application of the herbal *materia medica* within the fundamental concepts of contemporary WHM, also reflects this understanding. The empirically based descriptions of the application of herbal remedies elucidate the intimacy between CV activity and the emotional condition, which is implicit in the ideological framework of WHM.

The fundamental tenets of biomedical science have been cultivated within the *reductionist* paradigm. This contextual development of biomedicine necessitated its dissociation from *vitalistic* understanding, which occurred towards the end of the 19th century C.E. The post-modern developments within biomedical understanding have however, instituted a reversal of this dissociation, and an acknowledgement that *vitalistic* principles could accommodate an enhanced understanding of the *mind-body* relationship.

It could be considered that the ideological concepts; embodied within the practice of contemporary WHM and in the principles of Humoral Medicine and Physiomedicalism, could contain aspects of *mind-body* understanding, which have not yet been defined by PNE research. An explication of the fundamental concepts within contemporary WHM could facilitate a more comprehensive understanding of the nature of disease aetiology.

Since the emergence of Physiomedicalism, WHM has adapted biomedical concepts to extend the framework within which therapeutic understanding is applied. This eclectic context of contemporary WHM has maintained a *non-reductionist* epistemological position, which advocates a *vitalistic* therapeutic approach. The incorporation of *vitalistic* principles within post-modern biomedical understanding could constitute a conjunction, at which the historically defined

incompatible ideologies of biomedicine and empiricism could inaugurate a constructive dialog. The eclectic conceptual developments that have occurred within contemporary WHM since the middle of 18th century C.E., have established an inherent methodology with which to bridge the contextual void between *reductionist* and *vitalistic* understanding. This ability could place WHM in the position of *prime facilitator* in developing the future understanding of the human condition.

To initiate this process, WHM needs to fully explore the aetiological understanding and therapeutic principles that are embodied within the concepts that constitute contemporary WHM practice. An effective exploration would necessitate a high degree of objectivity in order to transcend the implicit exclusive character of conceptual understanding. This approach would ensure an *unveiling* of the concepts that are inherent in the *facts of observation* that constitute contemporary WHM understanding.

Exploring the fundamental principles of contemporary WHM and placing them in a dialectic discourse with *vitalistic* biomedicine would result in the re-establishment of the philosophical framework within which WHM is practised. By effectively moving WHM into the forum, which is dictating the future understanding of health and disease, those concepts that are inherent in contemporary WHM can become aspects that validate empirically based practice.

The present academic climate within biomedicine guarantees the development and subsequent implication of the *vitalistic* concepts that constitute PNE. The approaches that are dictated by these developments are transcending the exclusive character of the paradigms that have existed in the historical cultural understanding of medicine. The role for WHM in facilitating a broader understanding of the integral nature of the human condition and disease processes is there for the taking.

◆

Appendix I

Extrinsic Autonomic Control Pathways of the Cardiovascular System

The cardiovascular autonomic control mechanisms are mediated by the hydrodynamic and chemical state of the blood, in response to chemo- and baroreceptor afferent signals. These signals regulate vagal activity via the medullary vagal center and vasomotor activity via the vasomotor region of the medulla.

Parasympathetic Influence

Parasympathetic autonomic innervation of the heart arises in the medulla oblongata (dorsal motor nucleus of the vagus, or in the nucleus ambiguus).

The right vagus nerve has an inhibitory effect on the sinoatrial (SA) node, which slows SA nodal firing and consequently the heart rate. The left vagus nerve impedes atrioventricular (AV) conduction, delaying the spreading of the action potential, produced at the SA node, from the cardiac atria to the ventricles. However, the distribution of left and right vagal fibres has a degree of crossover, which also imparts a degree of shared functional activity.

Due to the high concentration of the enzyme cholinesterase at the SA and AV nodes, breakdown of the acetylcholine neurotransmitter results in a rapid decay of vagal parasympathetic stimulation.

Sympathetic Influence

Afferent signals from baroreceptors in the cardiovascular system regulate sympathetic activity.

The preganglionic cardiac sympathetic fibres have their origin in the intermediolateral columns of lower cervical and upper thoracic segments of the medulla spinalis. They synapse with the post-ganglionic fibres in the stellate or middle cervical sympathetic ganglia. The heart receives post-ganglionic fibres at its apex, which form an extensive epicardial plexus prior to entering the myocardium.

Sympathetic activity, unlike parasympathetic innervation, has a slow decay, most of the norepinephrine neurotransmitter being taken up by the nerve terminals. Because of this, the heart responds slower to initiatory sympathetic stimulation than it does to initiatory parasympathetic stimulation.

The right and left sympathetic fibres are distributed to different areas of the heart. It is thought that the left fibres have a more pronounced influence upon myocardial contractility, whilst the right fibres have more influence on the heart rate.

Table 1: Extrinsic CV Regulatory Pathways the Autonomic Nervous System

References: Guyton (1986), Berne *et al.* (1998) & Paulson *et al.* (1996)

Appendix II

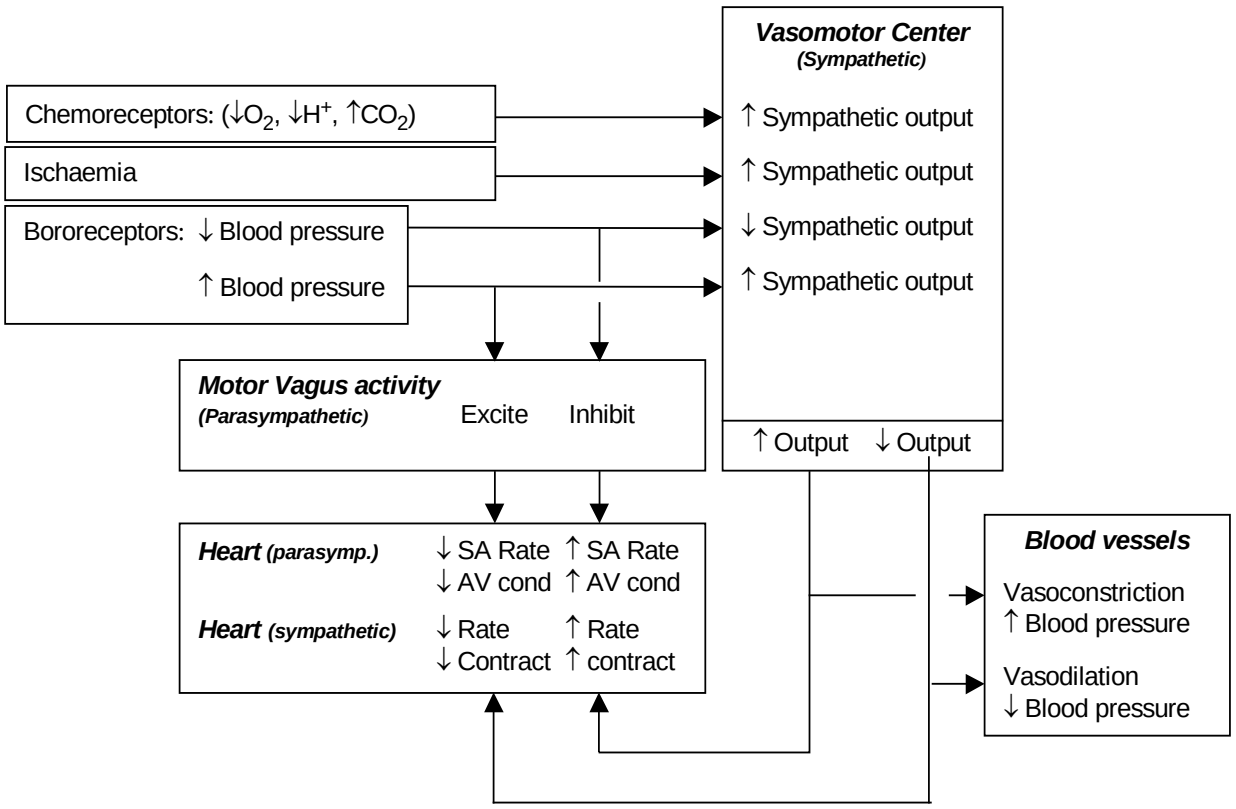


Fig. 1: Extrinsic CV Regulatory Pathways the Autonomic Nervous System

References: Guyton (1986), Berne *et al.* (1998) & Paulson *et al.* (1996)

Appendix III

Cardiovascular Control Mechanisms Mediated by Autonomic Activity

Catecholamine Influence Upon Cardiovascular Activity

Epinephrine and norepinephrine exert their action upon four types of membrane receptors that are found within the cardiovascular system, which are designated α_1, α_2, β_1 and β_2.

Receptors of the type α_1 are more responsive to norepinephrine stimulation and are found in the heart and the arterioles of the renal, splachnic and cutaneous beds.

Receptors of the type α_2 are to be found on the blood platelet membranes.

Receptors of the type β_1 are more responsive to epinephrine stimulation and are found in the heart.

Receptors of the type β_2 receptors are more responsive to epinephrine and are found in the skeletal muscles.

Norepinephrine (primarily α_1 & α_2 activity): Norepinephrine primarily causes an increase in the hearts contractile force, and due to epinephrine action on the α_1 receptors, arteriolar vasoconstriction occurs in the renal, splachnic and cutaneous beds.

Norepinephrine stimulation of the α_2 receptors on the blood platelet membranes causes activation of platelet activity.

Epinephrine (primarily β_1 & β_2 activity): Epinephrine primarily initiates the cardiovascular systems metabolic activity, increasing contractile force and conduction velocity as a result of β_1 Stimulation. Arteriolar vasodilatation occurs in the skeletal muscles due to epinephrine action on the β_2 receptors.

The Overall Cardiac Effect

The action of epinephrine and norepinephrine reinforce cardiovascular system metabolism, increasing the heart rate, contractile force and cardiac output. The effect of the catecholamines upon the arterial system results in an increase in the systolic blood pressure, whilst the diastolic pressure remains either unchanged or slightly decreased.

Table 2: Cardiovascular Control Mechanisms Mediated by Autonomic Activity

References: Guyton (1986), Berne *et al.* (1998) & Paulson *et al.* (1996)

Appendix IV

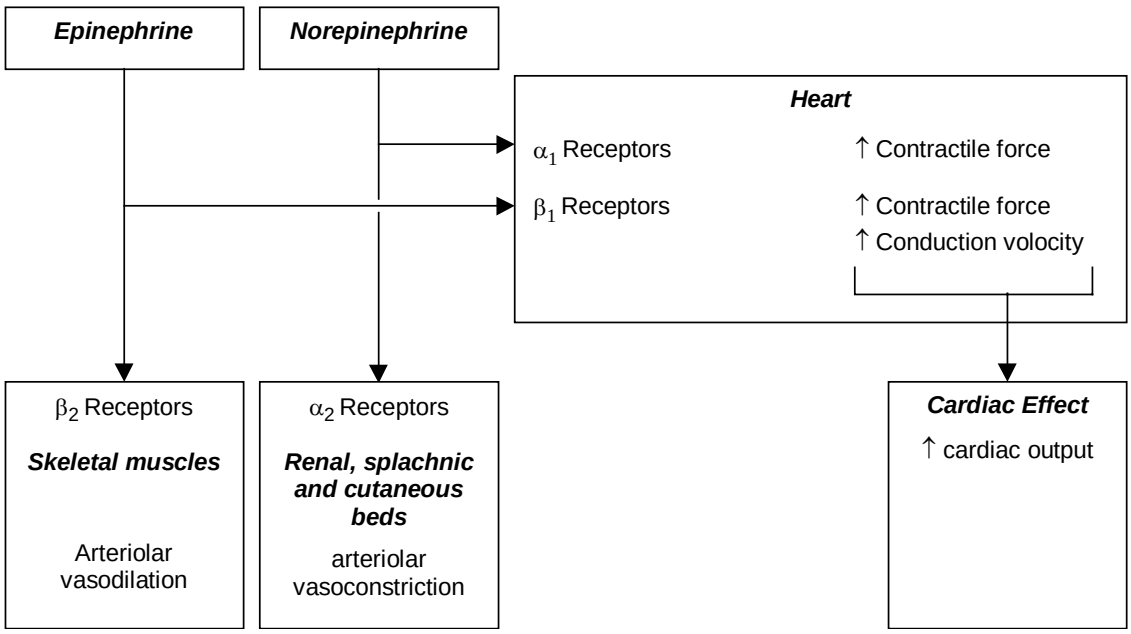


Fig. 2: Cardiovascular Control Mechanisms Mediated by Autonomic Activity

References: Guyton (1986), Berne *et al.* (1998) & Paulson *et al.* (1996)

Appendix V

Cardiovascular Activity of the Glucocorticoids

The catabolic Glucocorticoids are produced by the adrenal cortex in response to adreno-corticotropic hormone (ACTH) release from the anterior pituitary gland. Release of ACTH is mediated by corticotropin releasing factor (CRF), which is released from the hypothalamus.

Glucocorticoid (particularly cortisol) activity upon the Cardiovascular system:

- Sustains myocardial performance
- Facilitates the vasoconstrictive activities of the catecholamines and angiotensin II
- Decreases the production of the vasodilator prostaglandins and reduces vascular endothelium permeability.
- Increases circulatory cholesterol
- Increases circulatory triglyceride

Production of glucocorticoids occurs in response to stress and it has been recognised for nearly a century that this is a two-way process, as increased glucocorticoid levels can cause mood disturbances.

Table 3: Cardiovascular Activity of the Glucocorticoids

References: Guyton 1986, Berne *et al.*1998 & Paulson *et al.* 1996, Thase & Howland 1995, Musselmann *et al*. 1998

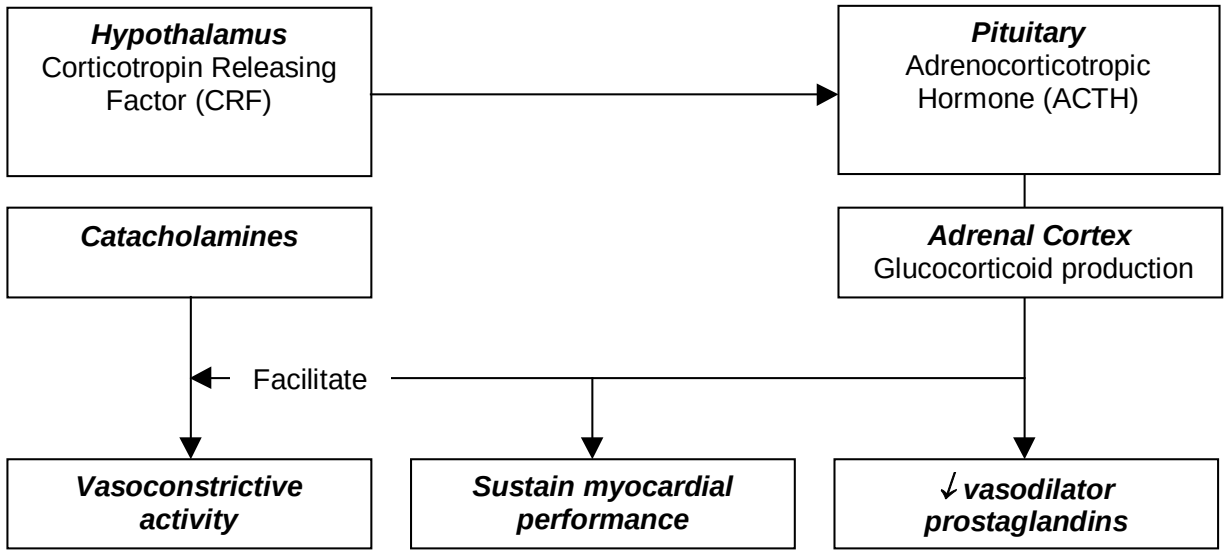


Fig. 3: Cardiovascular activity of the glucocorticoids

References: Guyton (1986), Berne *et al.* (1998) & Paulson *et al.* (1996), Thase & Howland (1995)

Appendix VI

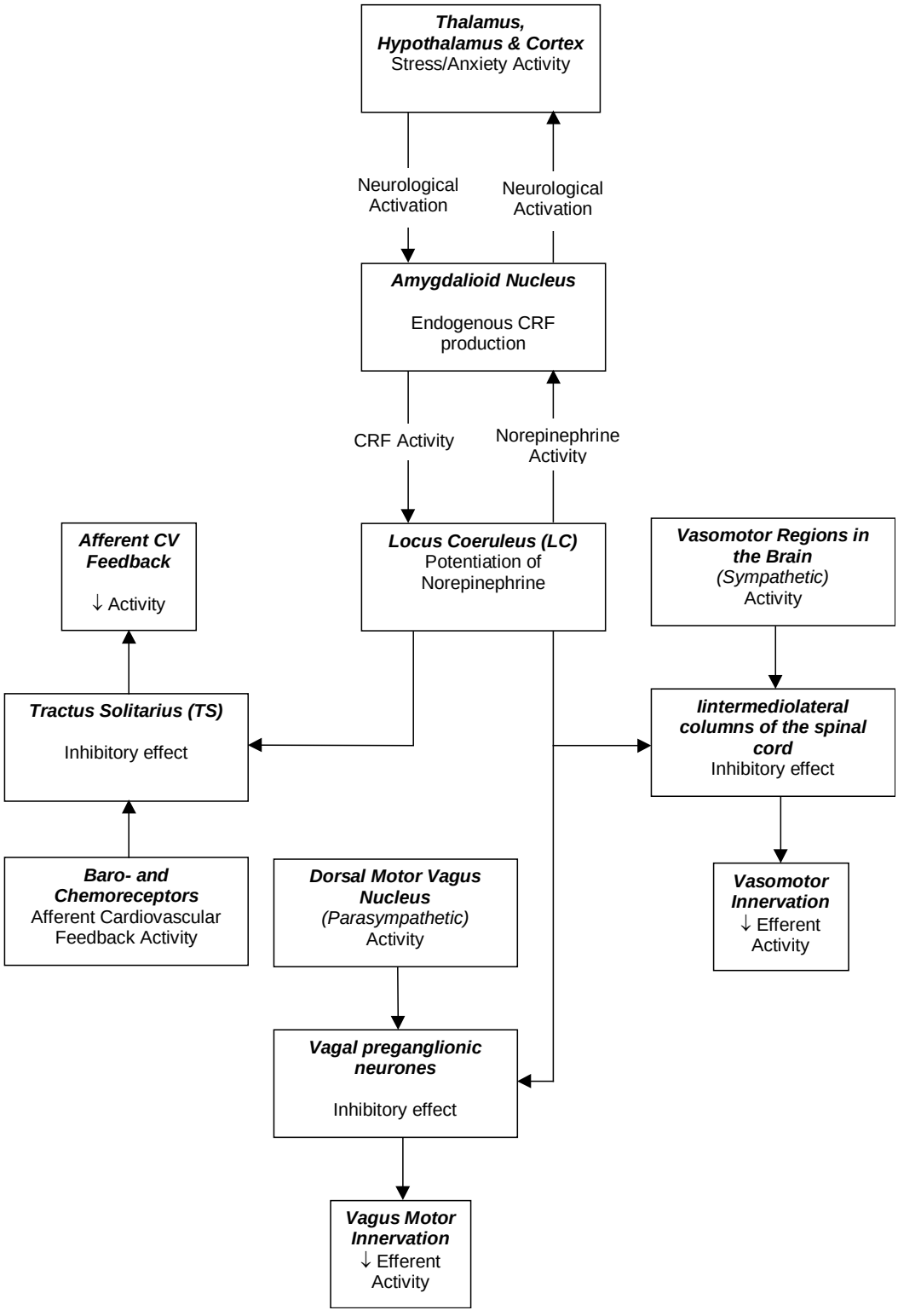


Fig. 4: Corticotropin Releasing Factor Interactions

References: Guyton (1986), Berne *et al.* (1998) & Paulson *et al.* (1996), Thase & Howland (1995), Musselmann *et al.* (1998)

Appendix VII

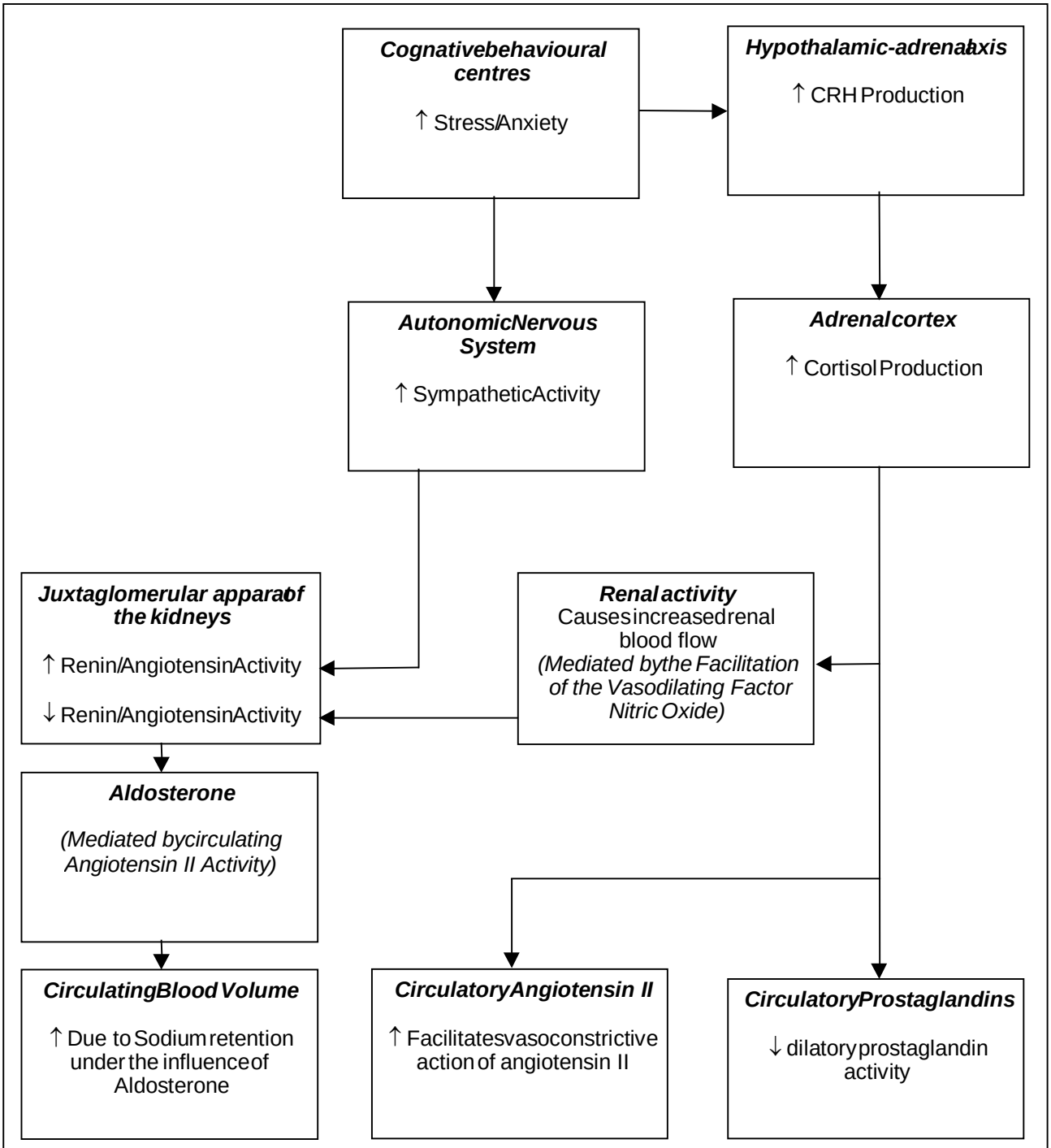


Fig. 5: Glucocorticoid Activity Upon the Cardiovascular System

References: Guyton (1986), Berne *et al.* (1998) & Paulson *et al.* (1996), Thase & Howland (1995), Musselmann *et al.* (1998)

Appendix VIII

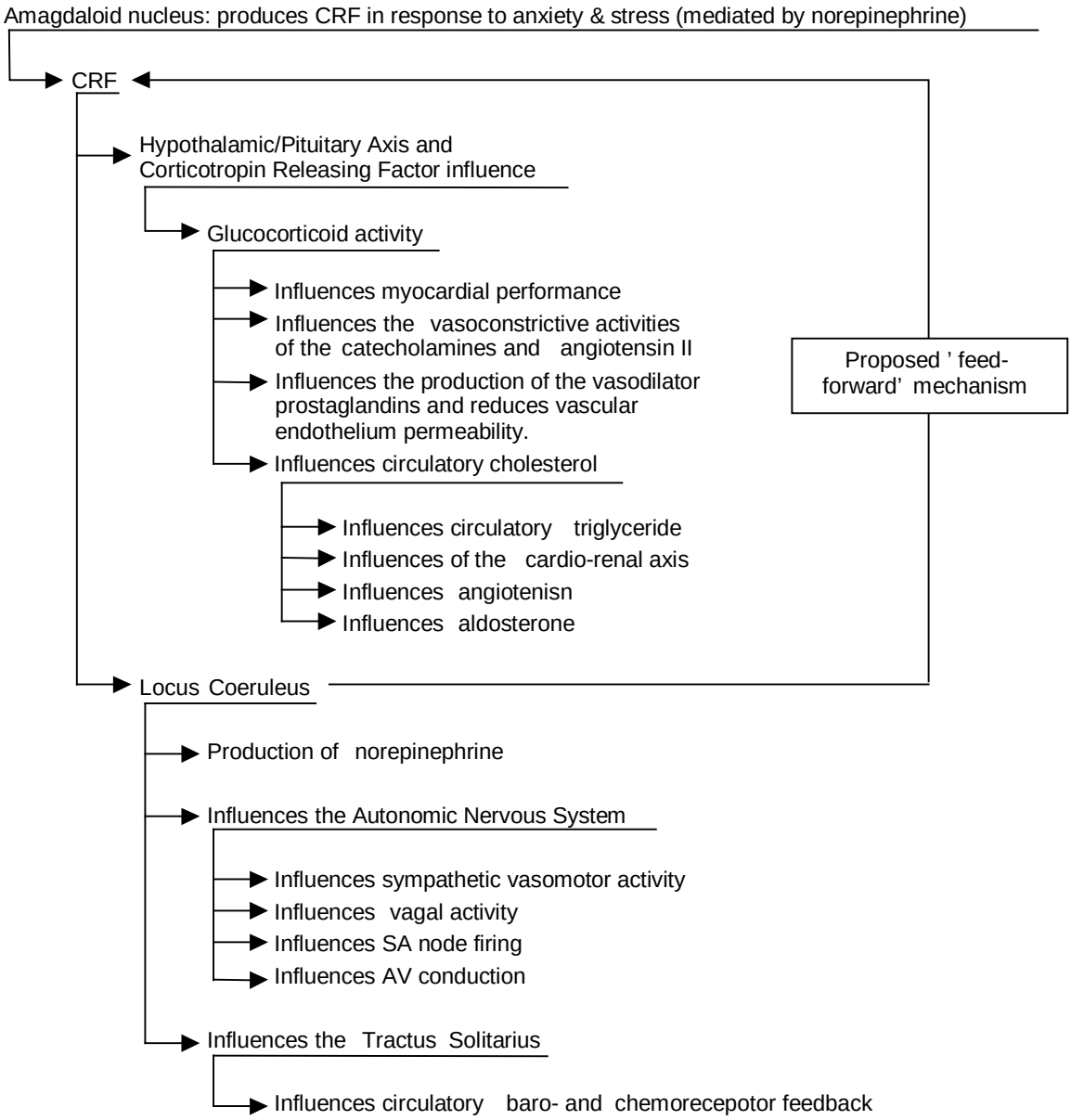


Fig. 6: Neuroendocrine Influences upon the Cardiovascular System

Appendix IX

Heart Rate Variability & Blood Pressure Variability

Heart rate variability

Heart rate variability describes low frequency modulation of the heart rate. These modulatory changes reflect the dynamic response of the cardiovascular system to accommodate for situations that *challenge* the cardiovascular physiology. For example:

- Sinus arrhythmia in response to thoracic hydrostatic pressure changes.
- Changes in heart rate in response to the dynamic changes in circulatory physiology resulting from changes in body position etc.

The heart rate variability spectrum is measured by the standard deviation of successive R-R interval, R being the first positive deflection in the QRS complex. Variability is measured using Fourier or autoregressive analysis, which divides the variability spectrum into high and low frequency components.

Analysis of the spectrum reveals a high frequency (>0,20 Hz) and a low frequency (<0,10) Hz components. The high frequency component is a reliable indicator of parasympathetic efferent activity. The low frequency component, or the ratio of low to high frequency, is thought to be a reflection of sympathetic activity.

Blood pressure variability

Blood pressure variability (BPV) defines changes in the mean arterial pressure per unit time. The main factors influencing BPV are autonomic innervation of the vascular system and heart rate variability.

The mean arterial blood pressure is proportional to heart rate (measured as heart output) and total peripheral resistance (measured as arterial outflow), which is a reflection of autonomic activity. The relationship is given by the following formula:

$$d\bar{P}_a/dt = (Q_h - Q_r)/C_a$$

$d\bar{P}_a/dt$	Mean arterial pressure per unit time
Q_h	Heart output (arterial input)
Q_r	Arterial outflow (a function of total peripheral resistance)
C_a	Arterial compliance

Another important factor in the mean arterial pressure is arterial compliance, which can fall because of chronic degenerative changes of the endothelium.

The vascular system is intolerant to swings in the mean arterial pressure, which can be a cause of progressive endothelial damage. Therefore, decreased HRV is related to degenerative vascular pathology.

Table 4: Heart Rate Variability & Blood Pressure Variability

References: Berne *et al.* (1998), Julien *et al.* (1993), Musselmann *et al.* (1998)

Appendix X

Fig. 7: The Coronary Arteries and Atherosclerosis

References: Anatomical Chart Co. (1993)

Appendix XI

Attributes and Correspondences of the Four Temperaments

	Choleric	Phlegmatic	Sanguine	Melancholic
Primary Quality	hot & dry	cold & moist	hot & moist	cold & dry
Elemental correspondence	Fire	Water	Air	Earth
Associated humor	Yellow bile (cholos)	Phlegm (phlegma)	Blood (sanguis)	Black bile (melas cholos)
Stature	short	short	middle	middle
Build	lean	fat	fleshy	slender
Skin quality	rough	smooth	smooth & soft	rough & hard
Pulse	swift and strong	little and low	great and full	slow
Appetite and digestion	strong	weak	good qnd quick	good appetite weaker digestion
Characteristics	emotional restless aggressive impulsive optimistic	controlled calm peaceful even tempered careful	lively easygoing sociable superficial carefree	moody anxious reserved sober pessimistic
Predilection	Subject to billious and inflammatory affections	Subject to phlegmatic and 'cold' affections	Subject to over-indulgence	Subject to chronic and 'dry' affections
Corresponding age	youth	old age	childhood	middle age

Table 5: Attributes and Correspondences of the Four Temperaments

References: Ebertin (1989), Chishti (1998), Tobyn (1997)

Appendix XII

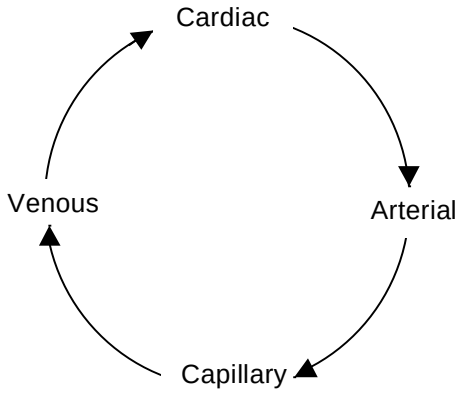
Physiomedicalist Circulatory System Balance

Cardiac: Myocardial tonicity, trophic state and vasomotor function

Arterial: The state of vasocontraction or vasorelaxation existing generally or locally

Capillary: The contractility of the capillaries and terminal arterioles and venules

Venous: General tonicity and influence of the portal circulation



Therapeutic measures addressing the cardiovascular system must consider the influence of the four circulatory compartments. Influence or disturbance in one area will have repercussions throughout the entire system.

Fig. 8: Physiomedicalist Circulatory System Balance

Adapted from Priest and Priest (1983, p. 18)

Appendix XIII

Traditional and Empirical Therapeutic Commentaries on Selected Cardiovascular Remedies

***Anemone pulsatilla* L.**

"Functional neuroses associated with heart conditions" (Priest & Priest 1983).

"Nervousness with despondency, sadness and disposition to weep, without being able to tell why, or to weep while asleep; unnatural fear; fear of impending danger or death; morbid mental excitation associated with physical debility; marked depression of spirits… In medicinal doses, *pulsatilla* increases the power and regulates the action of the heart, and gives a better character to the pulse rate, particularly slowing the irritable, rapid and feeble pulse due to nervous depression. It improves the sympathetic system and cerebral functions, and especially strengthens sympathetic innervation" (Felter 1922, p. 367-368).

"Sedative… Indications: …hyperactive states…" (BHMA 1983, p. 174).

Avena sativa L.

"Stimulating and relaxing nervine. [indicated in] Nervous exhaustion" (Priest & Priest 1983, p. 78-79).
"Nervous exhaustion in normally strong people, from sympathetic adrenergic burnout… Angina pectoris, as an adjunct for fear of death" (Moore *s.t.*).

"Cardiac tonic… Indications: depression… general debility… Specific indication: Depressive states" (BHMA 1983, p. 37).

Borago officinalis L.

"The leaves and roots are good… to defend the heart… Used as a Cordial to … comfort the heart" (Culpeper *s.t.*, p. 57).

Wren, citing the ancient herbalist John Parkinson, writes of *B. officinalis* that it can be used in: "often swounings and passions of the heart" (Parkinson cited by; Wren 1985, p. 46).

"It is also said that Borage can be used to good ends in nervous heart conditions" (The citation is this authors translation) (Lindt *s.t.*).

***Convallaria majalis* L.**

"…comforts the heart and vital spirit" (Culpeper 1995).

"Cardiac tonic and ganglionic trophorestorative" (Priest & Priest 1983, p. 90).

"Convallaria appears to act best in those cases of circulatory failure in which there is imperfect circulation within the heart itself and probably due to capillary resistance or peripheral circulatory enfeeblement" (Felter 1922, p. 123).

"In palpitation resulting from a state of exhaustion of the pneumogastric nerves - *cardiac paresis*, the most frequent source of palpitations" (Ellingwood 1919).

Table 6a: Traditional and Empirical Therapeutic Commentaries on

Selected Cardiovascular Remedies

Cont'd

Appendix XIII cont'd

Traditional and Empirical Therapeutic Commentaries on Selected Cardiovascular Remedies (Cont'd)

***Crataegus oxyacanthoides* Thuill.**

"Specific indications: Hypertension with myocardial weakness…" (BHMA 1983, p. 75).

Writing about the use of the herbal remedy Hawthorn in 1907, Jernigan, stated that the herb acted upon the heart via the central nervous system, where its activity in the patient resulted in a condition where: "All his gloomy forebodings are gone, and he feels that he has a new lease of life" (Jernigan 1907, p. 4).

"Cardiac weakness, with valvular murmurs… especially when associated with nerve depression or neurasthenia" (Felter 1922, p. 130).

"Cardiac tonic trophorestorative" (Priest & Priest 1983, p. 90).

"Indicated in "Hypertension… [which is] sympathetic-related" (Moore *s.t.*).

"Crataegus lowers the blood pressure and is appropriate in nervous heart conditions" (The citation is this authors translation) (Lindt *s.t.*).

***Leonurus cardiaca* L.**

"Specific indications: Cardiac symptoms associated with neurosis" (BHMA 1983, p. 130).

"A simple emmenagogue and antispasmodic, evidently having considerable control over the nervous system. It has been advised in nervous debility with irritation and unrest" (Felter 1922, p. 251).

"No better herb for better herb for strengthening the heart, and that it is good against hysterical complaints, and especially for palpitations of the heart when they arise from hysteric causes…" (Leyel 1994, p. 555).

"There is no better herb to take melancholy vapours from the heart" (Culpepper 1995, p. 171).

"Stimulating and relaxing antispasmodic nervine. Indicated for reflex conditions effecting cardiac function [and] cardiac and vegetative neuroses" (Priest & Priest 1983, p. 90-91).

***Melissa officinalis* L.**

"Indications: "…Neurasthenia and depressive illness" (BHMA 1983).

"Causes the mind and heart to become merry, and revives the heart" (Culpeper 1995, p. 22).

"Balm is sovereign for the brain … comforts and driveth away melancholy" (John Evelyn cited by; Leyel 1994, p. 76).

Table 6b: Traditional and Empirical Therapeutic Commentaries on

Selected Cardiovascular Remedies

Cont'd

Appendix XIII cont'd

Traditional and Empirical Therapeutic Commentaries on Selected Cardiovascular Remedies (Cont'd)

***Selenicereus grandiflorus* (L.) Britt. & Rose (*Cereus grandiflorus* Miller & DeCandolle)**

"Stimulating cardiac tonic and trophorestorative. Elevates arterial tension and accelerates the pulse. Stimulating to the spinal nerves and motor centres. Cardiac weakness. Bradycardia and cardiac neurosis" (Priest & Priest 1983, p. 90-91).

Felter writes that the remedy is indicated in conditions of: "Impaired heart action, whether feeble, irregular, or tumultuous; cardiac disorders with mental depression, praecordial oppression, and apprehension of danger and death; nervous disorders with feeble heart action; …hysteria with enfeebled circulation … Cactus impresses the sympathetic nervous system, and is especially active in its power over the cardiac plexus. (Felter 1922, p. 67-68).

"This remedy increases the musculo-motor energy of the heart… This is accomplished by increased heart action, stimulation of the vasomotor center, and stimulation of the spinal-motor centers, increasing their activity and improving the general nerve tone" (Ellingwood 1919).

Tilia spp.

"Specific indications: Raised arterial pressure associated with arteriosclerosis and nervous tension" (BHMA 1983, p. 214).

"A good cephalic and nervine… excellent for palpitations of the heart" (Culpeper *s.t.*, p. 216)

***Veratrum viride* Aiton**

Discussing the therapeutic application in a case of cardiac weakness, Niederkorn (1911, p. 170) writes: "*Veratrum* was selected because a long experience with its action has given me confidence in its use for just such conditions of vascular and nervous disturbances as were manifested in this case".

***Viscum album* L.**

"Action: Hypotensive, cardiac depressant. Sedative… Indications: …Arteriosclerosis. Nervous tachycardia (BHMA 1983, p. 236).

Leyel describes the traditional applications of the remedy in the treatment of: "…nervous debility… heart disease and many other complaints arising from a weakened and disordered state of the nervous system" (Leyel 1994, p. 548).

"weak, irregular heart-action…Its action would suggest its possible value in nervous disorders" (Felter 1922, p. 456).

Table 6c: Traditional and Empirical Therapeutic Commentaries on

Selected Cardiovascular Remedies

References (for tables: 6a, 6b & 6c): BHMA (1983), Culpeper (1995), Ellingwood (1919), Felter (1922), Felter (1922), Leyel (1994), Lindt (*s.t.*), Niederkorn (1911), Priest & Priest (1983), Wren (1971)

Appendix XIV

Relationships within the Physiomedicalist Concepts of Contraction/Relaxation and Nervous System Equilibrium.

State	***Autonomic Nervous System Activity***
Over relaxation	Stressed parasympathetic function relating to psychosomatic syndromes
Over contraction	Sympatheticotonia related to chronic fear and anxiety
	Exhausted parasympathetic function resulting in sympathetic imbalance
	Reflex protective conditioning mediated by sympathetic activity due to emotional arousal

Fig. 9: Relationships within the Physiomedicalist Concepts of Contraction/Relaxation and Nervous System Equilibrium.

References

ADER. R., FELTON. D., COHEN. N., 1991. *Psychoneuroimmunology. 2nd ed*. San Diego: Academic press

ANATOMICAL CHART CO. (1993) *The Anatomical Chart Series. Classic Library Edition*. Skokie: Illinois.

APPELS, A., 1997 Depression and Coronary Heart Disease: Observations and Questions. *Journal of Psychosomatic Research*, 43 (5), 443-452.

BARKER, J., 1991. A Therapeutic Model of Phytotherapy. *The British Journal of Phytotherapy*. 2 (1), 38-45

BERNE, R. M., LEVY, M. N (Eds.)., 1998. *Physiology*. London. Mosby

BRITISH HERBAL MEDICINES ASSOCIATION (Scientific Committee) 1983. *British Herbal Pharmacopoeia 1983.* Keighley: The British Herbal Medicines Association.

BROOKE, E., *A Womans Book of Herbs*. London: The Womans Press Ltd.

BROWN, P. S., 1991. The Vicissitudes of Herbalism in Late Nineteenth- and Early Twentieth-Century Britain: Part 1. *The British Journal of Phytotherapy*. 2 (1), 31-37

CALDOCK, K., 1990. Researching Herbal Medicine; The Need for Innovation. *The British Journal of Phytotherapy*. 1 (2), 32-35

CAPRA, F., 1988. *Uncommon wisdom*. GB: Century Hutchinson Ltd.

CAPRA, F., 1989 *The Turning Point. Science, society, and the rising culture*. USA: Simon & Schuster.

CARNEY, R. M., RICH, M. R., TE VELDE, A., SANI, J., CLARK. K., FREEDLAND, K. E., 1988. The Relationship between Heart Rate, Heart Rate Variability and Depression in Patients with Coronary Artery Disease. *Journal of Psychosomatic Research*; 32, 159-164

CARNEY, R. M., SAUNDERS, R. D., FREEDLAND, K. E., STEIN, P., RICH, M. W., JAFFE, A. S. 1995. Association of Depression With Reduced Heart Rate Variability in Coronary Artery Disease. *American Journal of Cardiology*. 76, 562-564

CARNEY, R. M., FREEDLAND, K. E., VEITH, R. C., CRYER, P. E., SKALA, J. A., LYNCH, T., JAFFE, A. S., 1999. Major Depression, Heart Rate, and Plasma Norepinephrine in Patients with Coronary Heart Disease. *Biological Psychiatry*. 45 (4), 458-463.

CHENERY, P., 2001. Plant Medicine and Chemical Science; Collusion or Collision course. *The European Journal of Herbal Medicine*. 2 (1), 36-40

CHEN, Y. Y., HUANG, Z.S., 1997. Activation of Locus Coeruleus Inhibits Vagal Imputs in Nucleus Tractus Solitarius. *Sheng Li Xue Bao*. 49 (1), 39-44 [English summary]

CHISHTI, H. G. M., 1988. *The Traditional Healers Handbook, A Classic Guide to the Medicine of Avicenna.* Rochester, Vermont: Healing Arts Press

COLBY, B., 1846. *A Guide to Health Being an Exposition of the Principles of the Thomsonian System of Practice and Their Mode of Application in the Cure of Every form of Disease: Embracing a Concise View of the Various Theories of Ancient and Modern Practice*. *s.l.*: Milford & Burns

CONSTANTAINE, A., STRATAKIS, C. A., CHROUSOS, G. P. 1995. Neuroendocrinology and Pathophysiology of the Stress System. *Annals New York Academy of Sciences*. Dec 29 (771), 1- 18

CULPEPER, N., 1995. *Culpeper's Complete Herbal*. Hertfordshire: Wordsworth Editions

CULPEPPER. N., (s.t). *Culpeper's Complete Herbal* (Facsimile edition). London: Foulsham

DAMPNEY, R.A., COLEMAN, M.J., FONTES, M.A., HIROOKA, Y., HORIUCHI, J., LI, Y.W., POLSON, J.W., POTTS, P.D., TAGAWA, T., 2002. Central Mechanisms Underlying Short- and Long-term Regulation of the Cardiovascular System. *Clin Exp Pharmacol Physiol.* 29 (4), 261-8

DE MATTEO, R., MAY, C. N. 1997. Glucocorticoid-induced renal vasodilation is mediated by direct renal action involving nitric oxide. *The Americal Physiological Society*. 1972-1979

DETHLEFSEN, T., 1990. *The Healing Power of Illness*. Dorset: Element Books Ltd.

EBERTIN, R., 1989. *Astrological Healing, The History and Practice of Astromedicine*. York Beach, Maine: Samuel Weiser

ED. BJHM, 1991. What is Herbal Medicine. *The British Journal of Phytotherapy.* 1 (1), 6-9

ELDIN, S., DUNFORD, A., 1999. *Herbal Medicne in Primary Care.* Oxford: Butterworth-Heinemann

ELLINGWOOD, F. (Ed.), 1911. Therapeutic Facts. *Ellingwoods Therapeutist*. 5 (5).

ELLINGWOOD, F., 1919. *American Materia medica, Therapeutics and Pharmacognosy*. Chicago: Ellingwood

FELTER, H. W., 1922. *Eclectic Materia Medica, Pharmacology and Therapeutic*. Cincinnati Ohio: John K. Skudder

EYSENCK,H. J., 1980. *Fact and Fiction in Psychology*. Penguin Books

FORTUNE, D., 2000. *Principles of Esoteric Healing*. Oceanside CA: Sun Chalice Books

FUSTER, V., BADIMON, L., BADIMON, J. J., CHESEBRO, J. H., 1992. The Pathogenesis of Coronary Artery Disease and the Acute Coronary Syndromes. New England Journal of Medicine. 326 (5), 310-318

GOLEMAN, D., 1995. *Emotional intelligence*. New York: Bantam Books

GOTFREDSEN, E., 1973. *Medicinens historie*. 3. Ed.: Copenhagen: Nyt Nordisk Forlag.

GRIGGS, B., 1997. *The New Green Pharmacy*. London: Vermilion

GUYTON, A. C. 1986. *Textbook of Medical Physiology*. Seventh Edition. London: W. B. Saunders Company

HANSEN, M., THOMSON. P., VARMING. O., 1993. *Psykologisk-Pædagogisk Ordbog.* Copenhagen: Gyldendal

HEDLEY, C., Humours, Hearts and Hawthorn. *European Journal of Herbal Medicine*. 5 (2), 27-32

HEMINGWAY, H., MARMOT, M., 1999. Psychosocial Factors in the Aetiology and Prognosis of Coronary Heart Disease: Systematic Review of Prospective Cohort Studies. *British Medical Journal.* 318, 1460-1467

HILLMAN, J., 1979. The Thought of the Heart. In. *Eranos Acta Philologica Suecana*. Upsala University

HOLMES, P., 1997. Vitalism in Western and Chinese Medicine. *The Britsh Journal of Herbal Medicine*. 3 (2), 37-40

JERNIGAN, M. D., 1909. Tachycardia. *Ellingwoods therapeutist*. 3 (3), 3-8

JULIEN, C., ZHANG, Z-Q., BARRÈS, C., 1993. The Role of Vasoconstrictior one on arterial pressure lability after chronic sympathectomy and sinoaortic denervation in Rats. *J. of the Autonomic. Nervous System* 42, 1-10

JUNG, C. G., 1971. *Psychological Types.* London: Routledge & Keegen Paul Ltd.

KIECOLT-GLASER, J.K, MCGUIRE, L., ROBLES, T. F., GLASER, R., 2002 Emotions, Morbidity and Mortality: New Perspectives from Psychoneuroimmunology. Annual Review of Psychology. 53, 83-107

KRITTAYAPHONG, R., CASCIO, W. E., LIGHT, K. C., SHEFIELD, D. GOLDEN, R. N., FINKEL, J. B., GLEKAS, G., KOCH, G. G., SHEPS, D. S., 1997. Heart Rate Variability in Patients With Coronary Artery Disease: Differences in Patients With Higher and Lower Depression Scores. *Psychosomatic Medicine.* 59, 231-235

KRYSIAK R., OBUCHOWICZ, E., HERMAN, Z.S. 2000. Role of corticotropin-releasing factor (CRF) in anxiety. *Pol J. Pharmacol*. 52 (1), 15-25

KOOB, G. F., 2001. Corticotropin-Releasing Factor, Norepinephrine, and Stress. Encephale. 27 (3), 245-259

KUHN, T. S., 1996. *The structure of scientific revolution*. 3rd Edition. Chicago: The University of Chigago Press

KØPPE, S., 1993. *Virkelighedens Niveauer*. Copenhagen: Gyldendal

LADEFOGED, J., 1997. *Hildergards Lægebog, Hildegardis Causae et Curae*. Copenhagen: Rhodos

LEHNERT, H., SCHULZ, C., DIETERICH, K., 1998. Physiological and Neurochemical Aspects of Corticotropin-Releasing Factor actions in the Brain: the Role of the Locus Coeruleus. Neurochem Res. 1998 Aug (8), 1039-52

LEYEL. C. F. (Ed.), 1994. *Mrs Grieve a Modern Herbal*. London: Tiger Books International.

LINDT, I., *s.t. Lægeplanter i Folkemedicin*. Holbæk: Forlaget Hamlet

LLOYD, J. U., LLOYD, C. G., 1907. Life and Medical Discoveries of Samuel Thomson, and a History of the Thomsonian *Materia medica*. *Bulletin of the Lloyd Library of Botany, Pharmacy and Materia medica.* 11 (7)

LOWN, B., DESILVA, R. A., REICH, P., MUROWSKI, B.J., 1980. Psychological Factors in Sudden Cardiac Death. *American Journal of Psychiatry*. 137, 1325-1335

LOWN, B., VERRIER, R. L., 1976. Neural Activity and Ventricular Fibrillation. *New England Journal of Medicine.* 294, 1165-1170

LUCIER, G. E., SESSLE, B. J., Presynaptic Excitability Changes Induced in the Solitary Tract Endings of Laryngeal Primary Afferents by Stimulation of Nucleus Raphe Magnus and Locus Coeruleus. *Neuroscience Letters*. 36 (3), 221-226

LÜBCKE, P. (ed.) 1995. *Politikens filosofi leksikon*. Copenhagen: Politikens Forlag

MAIER, S. F., WATKINS, L. R., FLESHNER, M., 1994. Psychoneuroimmunology: The Interface Between Behaviour, Brain and Immunity. *American Psychologist*. 49 (12), 1004-1017

MCFADDON, R., 1994. The Herbals of Gerard and Culpeper; a Scientific Appraisal. *The European Journal of Herbal Medicine*. 1 (2), 28-34

MCINTYRE, A., 1994. *The Complete Womans Herbal*. London: Gaia Books Ltd.

MILLER, E. P. S., 1910. Therapeutic Freedom. *Ellingwoods Therapeutist*. 4 (1), 13. Chicago: Ellingwood

MILLS, S. Y., 1991. *Out of The Earth: The Essential Book of Herbal Medicine*. London: Viking Arkana

MIRDAL, G. M., 1995. *Psykosomatik, Sårbarhed, Stress og Sygdom*. Copenhagen: Munksgaard

MITCHEL, A. J., 1998. The Role of Corticotropin Releasing Factor in Depressive Illness: a Critical Review. *Neuroscience and Biobehavioral Reviews*. 2 (5), 635-651

MOORE, M., *s.t*. *Herbal Resource Guide* [database]. New Mexico: Evergreen Herbal Market

MOOS, T., MØLLER, M. 2000. *Basal Neroanatomi: Centralnervesystemets Anatomi*. Copenhagen: FADL's Forlag Aktieselskab.

MUSSELMAN, D. L., TOMER, A., MANATUNGA, A, K., KNIGHT, B. T., PORTER, M. R., KASEY, S., MARZEC, U., HARKER, L. A., NEMEROFF, C. B., 1996. Exaggerated Platelet Reactivity in Major Depression. *American Journal of Psychiatry*. 153 (19) 1313-1317

MUSSELMAN, D. L., DWIGHT, L. E., NEMEROFF, C. B., 1998. The Relationship of Depression to Cardiovascular Disease. Epidemiology, Biology and Treatment. *Archives of General Psychiatry*; 55, 580-592

MONCKTON, J., BELICZA, B., BETZ, W., ENGELBART. H., VAN WASSENHOVEN, M., 1998. Unconventional Medicine in Modern Society: the Historical Context. *COST action B4, Final Report of the Management Comittee 1993-98.* European Commission, Directorate-General Research

NIEDERKORN, J. S., 1911. Tachycardia. *Ellingwoods Therapeutist*. 5 (5), 170-171

NIELSEN. T. 1989. Passiv Stress: Depression og sygdom. *Psyke og Logos* 1989 (10), 349-368

NEMEROFF, C. B. 1992. New vistas in neuropeptide research in neuropsychiatry, Focus on Corticotropin Releasing Hormone. *Neuropsychopharmacology*. 6, 69-75

NIXON, P., KING, J., 1997. Ischemic Heart Disease; Homeostasis and the Heart. *In:* WATKINS, A. (Ed.) *Mind-body Medicine: A Clinicians Guide to Psychoneuroimmunology*. London: Churchill Livingstone

PAULSON, O. B., GJERRIS, F., SØRENSEN, P. S., JUHLER, M. 1996. *Klinisk Neurologi og Neurokirurgi*, 3. ed. Århus: Forenningen af Dansk Lægestuderendes Forlag

PERT, C. B., 1997. *Molecules of Emotion; Why You Feel The Way You Feel.* London: Pocket Books

PERT, C. B., RUFF, M. R., WEBER, R. J., HERKENHAM, M. 1985 Neuropeptides and their Receptors: a Psychosomatic Network. *The Journal of Immunology*. 135 (2), 820-826

PLOTSKY, P. M., OWENS, M. J., NEMEROFF, C. B. 1998. Psychoneuroendocrinology of Depression. *Psychiatric Clinics of North America.* 21 (2), 293-307

PRIEST, A. W., PRIEST, L. R. 1983. *Herbal Medication, A Clinical and Dispensary Handbook*. Essex: C. W. Daniel Co. Ltd.

PURCELL, H., MULCAHY, D., 1994. Emotional Eclipse of the Heart. *BJCP*. 48 (5), 228-229.

ROLLA, T. L., 1907. *The Eclectic Practice of Medicine*. Cincinnati: The Scudder Brothers Company

SCHEIER, M. F., BRIDGES, M. W., 1995. Person Variables and Health: Personality Predispositions and Acute Psychological States as Shared Determinants of disease. *Psychosomatic Medicine*. 57, 255-268

SEYLE, H. 1978. *The Stress of Life*. New York: McGraw-Hill

SLOAN, R. P., SHAPIRO, P. A., BAGIELLA E., MYERS. M. M. GORMAN, J. M., 1999. Cardiac Autonomic Challange: a Psychophysiologic Model of Coronary Artery Disease. Psychosomatic Medicine. 61, 58-68

SLOAN, R. P., BAGIELLA, E., SHAPIRO, P. A., KUHL, J. P., CHENIKHOVA, D., BERG, J., MYERS, M. M., 2001. Hostility, Gender and Cardiac Autonomic Control. *Psychosomatic Medicine.* 63, 434-440

SMITH, W. D., 1994. *Hippocrates Volume VII.* Massachusetts: Harvard University Press.

STEINER, R., 1984. *Hemmeligheden om Menneskets Temperament*. Copenhagen: Antroposofisk Forlag

STERLING, P., EYER, J. 1981. Biological Basis of Stress-Related Mortality. *Sociology, Science & Medicne*.15e, 3-42

ST GEORGE, D., Research & Development in Herbal Medicine; Biomedical Research or New Paradigm. *The European Journal of Herbal Medicine*. 1 (1), 38-40

TER HORST, G. J., TOES, G. J., VAN WILLIGEN, J. D. 1991. Locus Coeruleus Projections to the Dorsal Motor Vagus Nucleus in the Rat. *Neuroscience*. 45 (1), 153-160

THASE, M. E., HOWLAND, R. H. 1995 Biological Processes in Depression: An updated Review and Integration. In: Beckham. E. E., Leber. W. R. (Eds.). *Handbook of Depression* (2.ed.). Guildford Press, New York.

THORNTON, E. W., HALLAS, C. N., 1999. Affective Status Following Myocardial Infarction Can Predict Long-term Heart Rate Variability and Blood Pressure Reactivity. *British Journal of Health Psychology*; 4, 231-245

TOBYN, G., 1997. *Culpepers's Medicine: a Practice of Western Holistic Medicine*. Dorset: Element Books Ltd.

TOBYN, G., 2001. Seminar Material on Humoral Medicine. *Scottish School of Herbal Medicine Winter School*, Majorca 17th & 18th February 2001.

VALUSSI, M., 2001. Biomedical Research Methods and Herbalism. *The European Journal of Herbal Medicine*. Special issue Dec 2001, 25-32

VEITH, R. C., LEWIS, N., LINARES, O. A., BARNES, R. F., RASKIND, M. A., VILLACRES, E. C., MURBURG, M. M., ASHLEIGH, E. A., CASTILLO, S., PESKIND, E. R., PASCUALY, M., HALTER, J. B., 1994. Sympathetic Nervous System Activity in Major Depression. Basal and Desipramine-Induced Alterations in Plasma Norepinephrine Kinetics. *Archives of General Psychiatry*. 51, 411-422

VOLPE, M., SAVOIA, C., DE PAOLIS, P., OSTROWSKA, B., TARASI, D., RUBATTU, S. 2002. The Renin-Angiotensin System as a Risk Factor and Therapeutic Target for Cardiovascular and Renal Disease. J. Am. Soc. Nephrol. Nov (3), 173-178

WATKINS, A., (ed.) 1997. *Mind-body Medicine: A Clinicians Guide to Psychoneuroimmunology*. London: Churchill Livingstone

WATKINS, A., LEWITH, G., 1997. *Mind-body* Medicine: Its Popularity and Perception. In: Watkins, A., (ed.) *Mind-body Medicine, A Clinicians Guide to Psychoneuroimmunology*. London: Churchill Livingstone

WEISS, J. M., STOUT, J. C., AARON, M. F., QUAN, N., OWENS, M. J., BUTLER, P. J., NEMEROFF, C. B., 1994. Depression and Anxiety: Role of the Locus Coeruleus and Corticotropin-Releasing Factor. *Brain Research Bulletin.* 35 (5/6), 561-572

WHITELEGG, M., 1994. Patient Steps to Greener Medicine. *The European Journal of Herbal Medicine*. 1 (2), 21-22

WHITELEGG, M., 1995. An Alternative Science for Herbal Medicine. *The European Journal of Herbal Medicine*. 2 (1), 36-40

WILKINSON, J. L. 1988. *Neuroanatomy for Medical Students*. London: Wright.

WREN, R. C., 1985. Potters New Cyclopedia of Botanical Drugs and Preparations. England: C.W. Daniel Company Ltd.

YEHUDA, M. H., TEICHER, M. H., TRESTMAN, R. L., LEVENGOOD, R. A., SIEVER, L. J. 1996. Cortisol Regulation in Post-traumatic Stress Disorder and Major Depression: A Chronobiological Analysis. *Biol Psychiatry*. 40: 79-88

ZACHARIAE, B., 1991. Psyke og Immunitet; Perspectiver for Sjæl-Legeme Problematikken. *Nordisk Psykologi.* 1 (2), 17-36

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